MIDWEST-NORTHLANDS JOINT CHAPTER MEETING
AMERICAN COLLEGE OF SPORTS MEDICINE

ANNUAL WINTER MEETING

JANUARY 21-23, 1981
THE TELEMARK LODGE
CABLE, WI

In a break from tradition and for the first time, the annual winter meeting of the ACSM will be a joint meeting of the Northlands Chapter and the Midwest Chapter. The meeting will be held at The Telemark Lodge, the Midwest's finest and arguably the Nations best cross country skiing area served by a most luxurious lodge.

PROGRAM

There will be two sessions of free communications selected by the program committee from submitted abstracts. In addition, invited presentations on the topic "The Superior Athlete" will highlight the two evening sessions.

REGISTRATION

Conference registration will take place in the main lobby of the lodge beginning at noon, Wednesday, January 21, and Thursday morning. Chapter dues and conference registration fees total $20; $15 for students.

ROOM RESERVATIONS

Reservations ($50 deposit per room) should be made at least 30 days in advance. Reservations after this time will be made on a space available basis. The fees quoted on the form are per person for both, not each night. Those of you familiar with the Lodge will note these prices are less than one-half the regular daily rate for a double. Four per room is an unbelievable bargain. When you consider all the rooms have kitchenettes (bring your own food if you like), this trip to Telemark is at a price "regulars" can't believe! Telemark is an incredibly popular resort, so get your reservations in soon. Storage for early Wednesday arrivals and late Friday departures is available.

SKIING AND EXTRAS

Telemark is one of the, if not the, most popular cross country ski areas in North America. Over 100 km of daily double tracked trails are right out the door of the lodge. Downhill skiing is Northern Wisconsin's best, served by five chairlifts and will challenge any skier. Don't be surprised though, if you leave as more of a nordic skier than you were before. Nordic and Alpine rentals are available on site; Alpine lift tickets - $7/day (normally $13) and cross country, $3. Swimming, Jacuzzi, skating, and tennis are all available and don't forget the lodges indoor shopping mall.

PROGRAM

WEDNESDAY, JANUARY 21

Noon - 7:00 P.M.	Registration, skiing
4:00 P.M.	Check-in
6:00 P.M.- 7:00 P.M.	Chapter Board Meetings
7:00 P.M.- 9:00 P.M.	"The Superior Athlete", Part I
	"Physiological Profiling of Elite Athletes" Jack Wilmore - University of Arizona
	"Temperature Regulation in Athletes" Carl Gisolfi - University of Iowa
	"Physiological and Psychological Responses to Training in Competitive Speed Skaters" Carl Foster - University of Wisconsin Medical School, Mt. Sinai Medical Center
	"Physiological Responses to Treadmill Exercise, Body Composition and Blood Lipid Profiles of Competitive Speed Skaters" Peter Farrell - University of Wisconsin-Milwaukee
9:00 P.M.	Social Hour, Lobby Bar or Night Club

THURSDAY, JANUARY 22

7:00 A.M.	Breakfast, Registration
8:00 A.M.-10:00 A.M.	First Free Communication Sessions
10:00 A.M.- 4:30 P.M.	Recreation, outdoor - Alpine and Cross Country Skiing
4:30 P.M.- 7:00 P.M.	Recreation, indoor - Swim, Jacuzzi, Tennis, Dinner
7:00 P.M.- 9:00 P.M.	"The Superior Athlete", Part II
	"Monitoring of Stress During Intense Training" William P. Morgan, University of Wisconsin
	"Physiological Investigations Applied to Competitive Cycling" Edmund R. Burke - University of Iowa
	"Physiological Responses of Elite Rowers to Maximal Exercise and Their Application to Training" Fritz C. Hagerman - Ohio University
	"Kinesiologic and Physiologic Characteristics of Collegiate Soccer Players" James C. Agre - Augsberg College
9:00 P.M.	Social Hour

FRIDAY, JANUARY 23

7:00 A.M.	Breakfast
8:00 A.M.-10:00 A.M.	Second Free Communications Session
10:00 A.M.- 4:30 P.M.	Recreation, Outdoor and Indoor
1:00 P.M.	Check Out

Midwest - Northlands Chapter
of the
American College of Sports Medicine
Annual Winter Meeting
January 21 - 23, 1981
The Telemark Lodge
Cable, Wisconsin 54821

Hosted by: Workshop Unit, La Crosse Exercise Program University of Wisconsin-La Crosse

Wednesday, January 21

Ski during lift hours
Post-lift hours: Check-in (4 p.m.)
After Supper: Registration
7:00-8:00 p.m.: Chapter Board Meetings
8:00-9:00 p.m.: "Thermoregulation in Athletes," C. Gisolfi, University of Iowa
9:00 p.m.: Social, Cash Bar

•10 Alpine ski runs • Double chairlifts • 370 foot vertical drop

•Home of the American Birkebeiner ski marathon — the only race in America in the prestigious World Loppet ski marathon league.

Thursday, January 22

Registration; Free Communications; Ski; Swimming; Tennis; Jacuzzi; Skating
7:00-9:30 p.m.: "The Superior Athlete," Jack Wilmore, University of Arizona; Wm. P. Morgan, University of Wisconsin; Fritz Hagerman, Ohio University; Ed Burke, University of Iowa; Pete Farrell, University of Wisconsin-Milwaukee

Friday, January 23

Free Communications; Ski; Check out, 11 a.m.

Costs: (Room-Per person for both nights - all rooms have kitchen, no utensils, children under 10 free)
(90 days notice required for quoted rates to apply over the weekend)

Room: Single $68.64 Double $40.56 Triple $31.20 Quad $29.64

Skiing: Alpine - $7.00 per day Cross Country - $3.00 per day

Conference: Students $15.00 Non students $20.00

Mail to: Telemark Lodge, Cable, Wisconsin 54821

Request for Room Reservation - Midwest - Northlands ACSM - January 21-23, 1981

Occupancy Single ☐ Double ☐ Triple ☐ Quad ☐ # of Children _____ Ages _____

I will share a room with _____

Name _____

Address _____

City _____ State _____ Zip _____

$50 deposit per room required 30 days in advance. Requests less than 30 days previous will be honored subject to availability.

1981 WORKSHOP SCHEDULE
La Crosse Exercise Program

	OFFERING	LOCATION	DATES
1.	Host, ACSM Midwest and Northland Chapter, Midwinter Joint Meeting	Telemark Lodge Cable, WI	January 21-23
2.	Comprehensive Cardiac Rehabilitation Workshop, #1	University of WI-La Crosse Lutheran Hospital La Crosse, WI	February 9-13
3.	Comprehensive Cardiac Rehabilitation Workshop, #2	University of WI-La Crosse Lutheran Hospital La Crosse, WI	April 13-17
4.	Comprehensive Cardiac Rehabilitation Workshop, #3	University of WI-La Crosse Lutheran Hospital La Crosse, WI	June 8-12
5.	Comprehensive Cardiac Rehabilitation Workshop, #4	University of WI-La Crosse Lutheran Hospital La Crosse, WI	June 15-19
6.	ACSM Exercise Specialist	University of WI-La Crosse La Crosse, WI	June 15-19
7.	Comprehensive Cardiac Rehabilitation Workshop, #5	University of WI-La Crosse Lutheran Hospital La Crosse, WI	July 13-17
8.	YMCA Physical Fitness Specialist and Specialist-Advanced	University of WI-La Crosse La Crosse, WI	July 20-24
9.	Comprehensive Cardiac Rehabilitation Workshop, #6	University of WI-La Crosse La Crosse, WI	October 12-16

FOR FURTHER INFORMATION CONTACT:

La Crosse Exercise Program - Workshop Unit
Mitchell Hall
University of WI-La Crosse
La Crosse, WI 54601
Telephone (608) 785-8686

La Crosse Exercise Program
WORKSHOP UNIT
Mitchell Hall
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601

Program for Fall 1981 Meeting American College of Sports Medicine

Friday, November 6, 1981

5:30-7:00 P.M.	Registration Room 177 Enderis Hall University of Wisconsin-Milwaukee
7:00-7:10 P.M.	Opening Comments - Room 177 Enderis Hall
7:10-8:00 P.M.	"A Historical Perspective on Women in Sport and Exercise" Gail P. Dalsky, Ph.D. Brigham Young University
8:00-9:00 P.M.	"Sociological Aspects of Women in Sport and Exercise" Carole A. Oglesby, Ph.D. Temple University
9:30-11:00 P.M.	Social Reception, Music Lounge in UWM-Union Cash Bar

Saturday, November 7, 1981

8:00-8:10 A.M.	Opening Comments
8:10-9:00 A.M.	"Biomechanical Aspects of Women in Exercise and Sport" Barbara A. Hart, Ph.D. University of Wisconsin-Milwaukee
9:00-9:50 A.M.	"Exercise, Menstrual Cycle and Performance" Jackie Puhl, Ph.D. Iowa State University
9:50-10:10 A.M.	Coffee Break, Optional visit to Department of Human Kinetics Laboratories 4th Floor Enderis Hall, UW-Milwaukee

10:15-11:00 A.M.	"Psychological Aspects of Women in Sport and Exercise"
	Carole A. Oglesby, Ph.D.
	Temple University
11:00-12:30 P.M.	Lunch Break, Recreation time in the Klotsche Center
	Board of Directors - MACSM Meeting
	E-307 UWM-Union
12:30-1:00 P.M.	Poster Presentation Outside Room 177 Enderis Hall
1:00-2:00 P.M.	Presenters Present at Posters
2:00-3:00 P.M.	"Physiological Aspects of Women in Exercise and Sport"
	Christine L. Wells, Ph.D.
	Arizona State University

Registration Form

Please Print

Name _____
Last **First**

Address _____
Number **Street**

_____
City **State** **Zip**

Registration Fees:

Regular $5.00
Student $3.00
For Physician CME Credit $20.00

_____
Social Security # (For CME records)

_____
Practice Type

We appreciate pre-registration; however, registration will be available at the door.

Mail registration form and fee to:

Dr. R. A. Boileau
Physical Fitness Research Lab
125 Freer Gym
906 S. Goodwin Ave.
Urbana, IL 61801

Please make checks payable to:

Department of Physical Education

For information, contact:

Dr. R. A. Boileau
(217) 333-1103

Sponsors:

Division of Nutritional Sciences
College of Applied Life Studies
Department of Physical Education
American College of Sports Medicine
Carle Foundation Hospital
University of Illinois College of Medicine,
Urbana-Champaign

Due to many conventions, hotel space is limited. Please make your reservation early. Some nearby inns include:

Jumer's Castle Lodge	(217) 384-8800
LaQuinta	(217) 356-4000
Lincoln Lodge	(217) 367-1111
Paradise Inn Motel	(217) 356-1824
Regal 8	(217) 359-8888

Carle Foundation Hospital
611 W. Park Street
Urbana, IL 61801

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A Symposium on Nutrition, Exercise and Athletic Performance

November 12-13, 1982

Annual Meeting
Midwest Regional
American College of
Sports Medicine

AMERICAN COLLEGE OF SPORTS MEDICINE
INCORPORATED 1955

Nutrition, Exercise and Athletic Performance

Program Chairman

Richard A. Boileau, PhD

Purpose

This program is designed to deal with issues concerning the interrelationship of nutrition to exercise and athletic performance. Scientific presentations and discussions will focus on the status of knowledge in nutrition and exercise, with a focus on the implications for health, fitness and physical performance.

Date: November 12-13, 1982
Location: Medical Sciences Building
Auditorium
506 S. Mathews
University of Illinois
Urbana, Illinois

Continuing Medical Education (CME Credits)

As an organization accredited for continuing medical education, Carle Foundation Hospital designates this continuing medical education activity as meeting the criteria for six (6) credit hours in Category I of the Physician's Recognition Award of the American Medical Association. The program also is acceptable for six (6) elective hours by the American Academy of Family Physicians.

Program

Friday, November 12, 1982

6:00 p.m. **Registration**

Session I - Chairperson, Ralph Nelson, MD, PhD

7:00 p.m. **Introduction**
Ralph Nelson, MD, PhD

7:15 p.m. **Nutritional Knowledges and Practices of Coaches, Trainers and Athletes: Results of a Survey**
Richard Parr, PhD

7:45 p.m. **Exercise and Energy Substrate Utilization**
Elsworth Buskirk, PhD

8:30 p.m. **Nutrition and Exercise in the Maintenance of Body Composition**
Donald Layman, PhD

9:30 p.m. **Social/Mixer**
Levis Faculty Center
919 W. Illinois
Urbana, Ill.

Saturday, November 13, 1982

Session II - Chairperson, Benjamin Massey, PhD

8:15 a.m. **Techniques for Assessment of Dietary Intake and Nutritional Status**
Melanie Shuran, MS

8:45 a.m. **Evaluation of Fitness Status by Body Composition Assessment**
Timothy Lohman, PhD

9:15 a.m. **Coffee Break**

9:45 a.m. **Nutrition and Exercise Programs as Treatment for Obesity**
Merle Foss, PhD

10:15 a.m. **Implications of Nutrition and Exercise in Coronary Heart Disease**
David Quig, MS

11:00 a.m.-noon **Annual MACSM Business Meeting**

Noon **Lunch (on your own)**

Session III - Chairperson, Louis Lussier, MD, PhD

1:30 p.m. **Mineral, Electrolyte and Water Requirements in Exercise and Human Performance**
Elsworth Buskirk, PhD

2:00 p.m. **Vitamin and Trace Metal Requirements in Exercise**
Ralph Nelson, MD, PhD

2:30 p.m. **Iron Status, Exercise and Sports Anemia**
Adria Sherman, PhD

Program Participants

Elsworth R. Buskirk, PhD
Professor of Applied Physiology and Director, Laboratory for Human Performance Research
The Pennsylvania State University

Merle Foss, PhD
Professor of Physical Education
University of Michigan

Donald K. Layman, PhD
Assistant Professor of Foods and Nutrition and Division of Nutritional Sciences
University of Illinois, U-C

Timothy G. Lohman, PhD
Associate Professor of Physical Education
University of Illinois, U-C

Ralph A. Nelson, MD, PhD
Professor of Nutrition
University of Illinois College of Medicine
Director of Research
Carle Foundation Hospital

Richard Parr, PhD
Professor of Physical Education
Central Michigan University

David W. Quig, MS
Graduate Student
Department of Foods and Nutrition
University of Illinois, U-C

Melanie Shuran, RD, MS
Clinical Dietitian
Nutritional Support Team
Carle Foundation Hospital

Adria R. Sherman, PhD
Assistant Professor of Foods and Nutrition and Division of Nutritional Sciences
University of Illinois, U-C

ANNOUNCEMENT

Midwest Regional Chapter
American College of Sports Medicine

Fall Meeting

Topic: Nutrtion, Exercise and Athletic Performance

Place: Medical Sciences Auditorium, University of Illinois at Urbana-Champaign

Date and Time: Friday, November, 12, 1982 (7:00-9:30 p.m.)
Saturday, November 13, 1982 (8:00-12:00 noon; 1:30-3:30 p.m.)

Tentative Topics: Nutrition Trends in the Population and Implications for Health; Exercise and Energy Substrate Utilization; Nutrition and Exercise in the Maintenance of Body Composition; Rapid Techniques for Dietary Assessment; Evaluation of Fitness by Body Composition Assessment; Nutrition and Exercise Programs for Treating Obesity; Mineral and Water Requirements in Exercise and Human Performance; Vitamin Requirements in Exercise; Implications of Nutrition and Exercise in Coronary Heart Disease; Nutritional Knowledge and Attitudes of Coaches, Trainers and Athletes.

Registration:

There will be a nominal registration fee:

Regular registration	$5.00
Student registration	$3.00

Onsight registration will begin at 6:00 p.m. on Friday, November 12th. Advanced registration may be completed by mail - forms will be sent at a later date.

Midwest Chapter
"The First Regional Chapter"

AMERICAN COLLEGE OF SPORTS MEDICINE

WINTER MEETING

BOYNE MOUNTAIN, MICHIGAN

FEBRUARY 2-4, 1983

Host

BOWLING GREEN STATE UNIVERSITY

SCHOOL
OF
HEALTH, PHYSICAL EDUCATION AND RECREATION

FIRST SCIENTIFIC SESSION - Alpine Room
Presiding: Bill Huesner

8:05-8:20 White Blood Cell and Cortisol Changes in Exercised Women - D. J. Cavanaugh, E. L. Fox, W. B. Malarky and M. G. MacVicar; Ohio State University

8:20-8:35 Hormonal Responses of Women to Physical Activity - Joy C. Bunt and S. A. Plowman; Northern Illinois University

8:35-8:50 The Effects of Age on the AAHPERD Health Related Physical Fitness Test in Catholic Sisters - Nora Y. Liu; Bowling Green State University

8:50-9:05 Impaired Plasma Epinephrine Response to Submaximal Treadmill Exercise in Obese Women - Peter A. Farrell, A. B. Gustafson and R. K. Kalkhoff; Medical College of Wisconsin and University of Wisconsin-Milwaukee

9:05-9:20 Residual Effects of Exercise on High Density Lipoprotein-Cholesterol and Total Cholesterol - Thomas J. Birk; Center for Health Promotion, Riverside Hospital, Toledo

9:20-9:35 Frequency Spectra of Physiological Control Signals: Computer Applications to Applied Physiology - John C. Hoag, P. J. Gingo and R. Gandee; University of Akron

9:35-9:50 Electrocardiographic Waveform Response During Maximal Exertion Among Elite A.A.U. Karate Athletes - B. Girten, R. Gandee, R. Schick and J. T. Adolph; University of Akron

9:50-10:05 Alcohol Intake and Liver Enzyme Levels in Marathon Runners During a 20-Day Road Race - Janet Rimer and R. Dressendorfer; William Beaumont Hospital, Royal Oak, MI

10:05-10:20 Chronically Elevated Serum Creatine Kinase Activity in Marathon Runners in a 20-Day Road Race - Rudolph Dressendorfer and C. Wade

RECREATION

10:30- 4:00 Downhill skiing, cross country skiing and skating

12:00- 2:30 Lunch - Main Dining Room

4:00-5:00 Outdoor Swimming

5:00-6:00 Social Hour (Cash Bar) - Snowflake Lounge (back)

SECOND SCIENTIFIC SESSION - GUEST SPEAKER
Presiding: Richard W. Bowers

8:00-9:00 "The United States Olympic Training Center: It's Development and Activities"

Peter Van Handel, Ph.D.
Sports Physiologist, U.S.O.T.C.
Colorado Springs, Colorado

FRIDAY, FEBRUARY 4, 1982

7:15-8:00 Breakfast - Main Dining Room

7:45-8:00 Registration - Alpine Room

THIRD SCIENTIFIC SESSION

8:00-8:05 Announcements and Stories of Heroism

Presiding: Peter A. Farrell, President, MACSM

8:05-8:20 Effects of the Pritikin Diet on Healthy, Exercising Men - Mairanne Bushman, M. Firlit, N. Sol; George Williams College

8:20-8:35 Energetics of Ultraendurance Cycling - Mark E. Lengenfeld; Miami University

8:35-8:50 A Controlled Study of Aerobic Exercise Training Effects in Patients Treated with Intracoronary Streptokinase During Acute M.I. - Christopher DeWitt, R. Dressendorfer, V. Hollingsworth, G. Timmis; William Beaumont Hospital

8:50-9:05 Efficacy of Arm-and-Leg vs. Leg-Only Aerobic Training on Raising the Exercise Threshold for Myocardial Ischemia in Patients with Coronary Insufficiency - James Cameron, R. Dressendorfer, J. Smith, V. Hollingsworth, and G. Timmis; William Beaumont Hospital

9:50-9:20 Hemodynamic and Electrocardiographic Responses During Sustained Isometric Handgrip and Low-Level Treadmill Testing at Hospital Discharge After Myocardial Infarction - Victoria Hollingsworth, R. Dressendorfer, C. DeWitt, S. Gordon; William Beaumont Hospital, Royal Oak, MI.

9:20-9:35 V_{O_2} Steady-Rate at Two Rates of Submaximum Exercise: A Pilot Study of Reproducibility - Robert Dyer, C. Marks, K. Moorehead-Steffins and V. Katch; University of Michigan.

9:35-9:50 Energy Cost of Walking at Different Speeds of Obese Adolescents - Wendy Allen, D. Bacque, A. Rocchini and V. Katch; University of Michigan.

9:50-10:05 Physiological Comparisons of Male and Female Obese Children During Rest and Maximal Exercise - Charles R. Marks, V. Katch, C. Moorhead and A. Rocchini; University of Michigan.

10:05-10:10 Closing Remarks: Peter A. Farrell

RECREATION

10:00-4:30 Downhill skiing, cross-country skiing and skating

12:00-2:30 Lunch - Main Dining Room

CHECKOUT IS 3:00 p.m.

THANK YOU FOR ATTENDING AND HAVE A SAFE DRIVE HOME!

WEDNESDAY, FEBRUARY 2, 1983

1:00-4:30 Skiing (½ day ticket)
4:00-5:00 Outdoor Swimming (heated pool)
6:00-8:00 Dinner - Main Dining Room
8:00-8:30 Registration - Alpine Room
8:30-9:15 Board Meeting - Alpine Room
9:15-10:15 Pre-Conference Clinical Symposium - Alpine Room
Presiding: Earl S. Perrigo, M.D.

Left Ventricular Performance in Patients with C.A.D.: A Comparison of Physiologic Conditions and Pharmacologic Intervention by Cross-sectional Echocardiography - Michael L. Kuehne, E. S. Perrigo, and C. A. Umphrey - Toledo Heart Institute

The Physiologic Advantages of Dual Chamber Pacing: One Year Follow-up of 8 Patients with Biotronik Diplos Programmable Universal (DDD) Pacemakers - Earl S. Perrigo, M. L. Kuehne, and F. Michienzi - Toledo Heart Institute

Post-occlusive Pulse Reappearance Time by Photoelectric Plethysmorgraphy in Assessment of Peripheral Arterial Circulation - James C. Christopher, M. L. Kuehne, and E. S. Perrigo - Toledo Heart Institute

Delta Ao (Δ Ao) - A New Echocardiographic Index of Left Ventricular Function - Carolyn A. Umphrey, E. S. Perrigo, M. L. Kuehne - Toledo Heart Institute

THURSDAY, FEBRUARY 3, 1983

7:15-8:00 Breakfast - Main Dining Room
7:30-8:00 Registration - Alpine Room
8:00-8:05 Welcome and Announcements

1983 Winter Meeting

TENTATIVE

PROGRAM SCHEDULE

WEDNESDAY, FEBRUARY 2nd

1:00 pm-4:30 pm	Half day skiing
6:00 pm-8:00 pm	Dinner in the Main Dining Room
8:00 pm-9:00 pm	Registration in the main lobby
9:00 pm-10:00 pm	MACSM Board meeting in the Alpine Room

THURSDAY, FEBRUARY 3rd

7:15-8:00 am	Breakfast in the Main Dining Room
7:50-8:15 am	Registration in the Alpine Room
8:15-10:00 am	First Scientific Session in the Alpine Room
10:00-4:30 pm	Recreation
4:00-5:00 pm	Group swim in outdoor heated pool
5:00-6:00 pm	Social hour in Snowflake Lounge
6:00-7:30 pm	Dinner in the Main Dining Room
8:00 pm	Guest speaker in Alpine Room - Dr. Peter Vanhandel

FRIDAY, FEBRUARY 4th

7:15-8:00 am	Breakfast in the Main Dining Room
8:15-10:00 am	Second Scientific Session in the Alpine Room
10:00-4:30 pm	Recreation
12:00-2:30 pm	Lunch in the Main Dining Room
1:00 pm	Check out of rooms

WESTERN ILLINOIS UNIVERSITY
Dept. of P.E.W. - 144
Western Illinois University
Macomb, IL 61455

AMERICAN COLLEGE OF SPORTS MEDICINE
INCORPORATED 1955

Children and Exercise

October 21 - 22, 1983

Annual Meeting, Midwest Chapter,
American College of Sports Medicine
at Western Illinois University
Macomb, Illinois

Program Participants . . .

Richard A. Boileau, Ph.D., FACSM
Associate Professor of Physical Education and
Director: Physical Fitness Research Laboratory
University of Illinois at Urbana-Champaign

David H. Clarke, Ph.D., FACSM
Professor of Physical Education
Indiana University

Patty S. Freedson, Ph.D., FACSM
Assistant Professor, Department of Exercise Science
University of Massachusetts

Larry J. Leverenz, M.S., A.T.C.
Assistant Professor of Physical Education and
Director: Athletic Training Curriculum
Western Illinois University

Valerie J. Lindbloom, M.S., A.T.C.
Assistant Professor of Physical Education
Western Illinois University

Vern Seefeldt, Ph.D.
Professor and Director: Youth Sports Institute
Michigan State University

Robert Shapiro, Ph.D., FACSM
Assistant Professor of Physical Education and
Director: Biomechanics Laboratory
Northern Illinois University

Jack H. Wilmore, Ph.D., FACSM
Professor of Physical Education and
Coordinator: Exercise and Sport Sciences Laboratory
University of Arizona

Accommodations . . .

Hotel space is very limited in Macomb. Please make your reservations as soon as possible. A block of rooms has been reserved for persons attending the conference at:

Holiday Inn
1400 North Lafayette
Macomb, Illinois 61455
(309) 833-5511

Please indicate that you will be attending the Midwest Sports Medicine meeting when you make your reservations.

Students may reserve a room (single or double occupancy) in Olson Hall on the WIU campus by calling: (309) 298-2461. Please ask for Glenda Bliss and indicate that you will be attending the Midwest Sports Medicine Conference. Make reservations at least 5 days in advance. Payment required when you check in.

How to reach Macomb . . .

Macomb is at the hub of highways 67 (north-south) and 136 (east-west). It is just forty miles east of the Mississippi River.

From Chicago, travel west on either the East-West Tollway 5 or I-80. Just east of the Quad Cities take I-74 (the Peoria exit) to Galesburg. Turn to Route 34 exit to Monmouth and Highway 67. Proceed 30 miles south to Macomb on 67.

From St. Louis and other points south, take Route 67 north.

From the eastern side of the state, find the most convenient route to Highway 136 and travel west.

For additional information, contact:
Dr. C.J. Cohen
(309) 298-1058

Registration Form . . . (Please type or print)

Name _____
(Last) (First) (Middle Initial)

Address _____
(Apt./House No.) (Street)

City _____ State _____ Zip _____

Registration Fees:
Regular $5.00
Student $3.00

Please make checks payable to:
Midwest Sports Medicine

We appreciate pre-registration;
however, registration will be available at the door

Mail To:
Dr. Cheryl J. Cohen
Human Performance Lab
Brophy Hall
Western Illinois University
Macomb, IL 61455

Children and Exercise . . .

Program Chairperson: Cheryl J. Cohen, Ph.D., FACSM

Purpose

This program is designed to focus on various aspects of exercise science and sports medicine as they relate to a specific population: children. A distinguished group of speakers will present a varied and interesting program dealing with the multidimensional aspects of children and exercise, with implications for health, fitness and sports performance.

Date: October 21 - 22, 1983
Location: Stipes Hall - Room 121
Western Illinois University
Macomb, Illinois 61455

Sponsored By:

American College of Sports Medicine

WIU College of Health, Physical Education & Recreation
(Dean: William L. Lakie, Ed.D.)

Department of Health Sciences
(Chair: Robert J. Synovitz, H.S.D.)

Department of Physical Education for Men
(Chair: George W. Hermann, Ph.D.)

Department of Physical Education for Women
(Chair: Rosemary Aten, Ph.D.)

School of Graduate Studies
(Dean: Suzanne E. Reid, Ph.D.)

Program . . .

Friday, October 21, 1983

6:00 p.m. Registration
7:00 p.m. Welcome and Introduction
Cheryl J. Cohen, Ph.D., FACSM

Session I - Chairperson: Jo Ann Robertson, Ph.D.

7:15 p.m. Energy expenditure patterns during submaximal exercise in children.
Patty S. Freedson, Ph.D., FACSM

7:45 p.m. The physiological capacity of child aerobic and anaerobic performers in sport.
David H. Clarke, Ph.D., FACSM

8:15 p.m. Obesity in children.
Jack H. Wilmore, Ph.D., FACSM

9:00 p.m. CASH BAR SOCIAL
Holiday Inn
1400 N. Lafayette
Macomb, IL

Saturday, October 22, 1983

Session II - Chairperson: Donald F. Mapes, Ph.D.

8:30 a.m. A look at the mental and emotional side of children's sports.
Valerie J. Lindbloom, M.S., A.T.C.

9:00 a.m. Biomechanical implications for sport and exercise.
Robert Shapiro, Ph.D., FACSM

9:30 a.m. Coffee Break

10:00 a.m. Body composition in children and youth.
Richard A. Boileau, Ph.D., FACSM

10:30 a.m. Growth and maturational characteristics. of elite childhood athletes.
Vern Seefeldt, Ph.D.

11:00 a.m. Annual MACSM Business meeting

Noon Lunch and/or exercise (on your o[illegible])

Session III - Chairperson: James J. Neutens, Ph.D.

1:15 p.m. Orthopedic concerns for the young athlete.
Larry J. Leverenz, M.S., A.T.C.

1:45 p.m. CHD risk factors in children.
Jack H. Wilmore, Ph.D., FACSM

2:30 p.m. An analysis of blood lipids, lipoproteins, physical work capacity, and daily activity patterns in 6 and 7-year old children.
Patty S. Freedson, Ph.D., FACSM

3:00 p.m. Adjourn.

9 83-2m-12270

1983 FALL CONFERENCE - MIDWEST CHAPTER: AMERICAN COLLEGE OF SPORTS MEDICINE

October 21-22, 1983

Western Illinois University
Macomb, Illinois

Program Chairperson: Cheryl J. Cohen, Ph.D.

THEME: CHILDREN AND EXERCISE

CONFIRMED SPEAKERS & TOPICS

Richard A. Boileau, Ph.D. University of Illinois	Body composition in children & youth.
David H. Clarke, Ph.D. Indiana University	The physiological capacity of child aerobic & anaerobic performers in sport.
Patty S. Freedson, Ph.D. University of Massachusetts	Energy expenditure patterns during sub-maximal exercise in children.
	An analysis of blood lipids, lipo-proteins, physical work capacity & daily activity patterns in 6 & 7 year old children.
Larry Leverenz, A.T.C. Western Illinois University	Orthopedic concerns for the young athlete.
Valerie J. Lindbloom, A.T.C. Western Illinois University	A physical, mental & emotional look at children's sports.
Robert Shapiro, Ph.D. Northern Illinois University	Biomechanical implications for sport and exercise.
Jack H. Wilmore, Ph.D. University of Arizona	Obesity in children.
	CHD risk factors in children.

Winter Meeting

Midwest Chapter

American College of Sports Medicine

ABSTRACTS OF PAPERS PRESENTED

Boyne Mountain, Michigan

February 1, 2, 3, 1984

Guest Speaker

Thursday, February 2, 1984

8:00 p.m.

PETER A. FARRELL, Ph.D.

School of Allied Health Professions
Human Kinetics Department
The University of Wisconsin-Milwaukee
Milwaukee, Wisconsin

Winter Meeting
Midwest Chapter
American College of Sports Medicine
PROGRAM SCHEDULE

WEDNESDAY, FEBRUARY 1, 1984

1:00- 4:30 p.m.	Half Day Skiing
6:00- 8:00 p.m.	Dinner in the Main Dining Room
8:00- 9:00 p.m.	Registration in the Main Lobby
8:30- 9:30 p.m.	First Scientific Session in the Alpine Room
9:00-10:00 p.m.	MACSM Board Meeting in the Alpine Room

THURSDAY, FEBRUARY 2, 1984

7:15- 8:00 a.m.	Breakfast in the Main Dining Room
7:50- 8:15 a.m.	Registration in the Alpine Room
8:15-10:00 a.m.	Second Scientific Session in the Alpine Room
10:00- 4:30 p.m.	Recreation
4:00- 5:00 p.m.	Swim in Outdoor Heated Pool
5:00- 6:00 p.m.	Social Hour in Snowflake Lounge
6:00- 7:45 p.m.	Dinner in the Main Dining Room
8:00 p.m.	Guest Speaker in the Alpine Room - Dr. Peter A. Farrell

FRIDAY, FEBRUARY 3, 1984

7:15- 8:00 a.m.	Breakfast in the Main Dining Room
8:15-10:00 a.m.	Third Scientific Session in the Alpine Room
10:00- 4:30 p.m.	Recreation
12:00- 2:30 p.m.	Lunch in the Main Dining Room
1:00 p.m.	Check Out of Rooms

WEDNESDAY, FEBRUARY 1, 1984
FIRST SCIENTIFIC SESSION IN THE ALPINE ROOM

8:30 p.m.
The Effect of Aerobic Training on R-Wave Amplitude Among Cardiac Patients.

B. Girten, T. Kirby, B. Garvy, and K. Greaves. Laboratory of Work Physiology, The Ohio State University, Columbus, Ohio 43210

8:45 p.m.
Differences in Exercise Left Ventricular Function Between Normal and Post-Myocardial Infarction Patients: A Two-Dimensional Echocardiographic Study.

W.R. Thompson. Cardiac Rehabilitation and Health Enhancement Center, Swedish Covenant Hospital, 5145 North California Avenue, Chicago, Illinois 60625

9:00 p.m.
Influence of the Start Upon Performance in the Two-Man and Four-Man Bobsled Competition at the 1980 Winter Olympics.

F.F. Andres and C.W. Armstrong. The University of Toledo, Toledo, Ohio 43606, and C.R. Rees, Adelphi University, Garden City, New York 11530

9:15 p.m.
Electrocardiographic Changes Following Chronic Aerobic Training and/or Adriamycin Administration in the Mouse.

M.M. Kanter, R.L. Hamlin, R.M. Montalto, and A.J. Merola. The Ohio State University Department of Exercise Physiology, Veterinary Physiology and Physiological Chemistry, The Ohio State University, Columbus, Ohio 43210

9:30 p.m.
Torque Production and Body Composition Relationship in an Untrained Population.

E.M. Filusch, R.P. DiFabio. University of Wisconsin-Madison, Madison, Wisconsin 53706

THURSDAY, FEBRUARY 2, 1984
SECOND SCIENTIFIC SESSION IN THE ALPINE ROOM
Bev Girten, Ohio State University, Moderator

8:15 a.m.
Practicality of a Three Day Meat Free Diet (3-MFD) for Determination of Urinary Creatinine (UC) in Males.

M.M. Chaney and A.C. Hackney. Applied Physiology Research Laboratory, Kent State University, Kent, Ohio 44242

8:30 a.m.
Conservative Management of an Intramural Hematoma of the Ascending Colon Following Blunt Abdominal Trauma.

P. Reilly and R.E. Welling. University of Cincinnati, Ohio, Cranley, Krause, Strasser, Hafner, Meese and Associates, Inc., Cincinnati, Ohio 45220

8:45 a.m.
A Rehabilitation Program Following Fasciotomy for Chronic Compartment Syndrome.

M.C. Detmer, B.J. Sherman, D.E. Detmer, K.R. Sharpe and W.G. Clancy. Department of Surgery, Sections of Vascular Surgery and Sports Medicine, University of Wisconsin, Madison, Wisconsin 53792

9:00 a.m.
Compensatory Hypertrophy of Dystrophic Muscle: Adaptations of the Fiber Nuclei.

J.J. Uhl, A.C. Snyder and J.L. Fair. Human Performance Laboratory, Ball State University, Muncie, Indiana 47306

9:15 a.m.
Reliability of Body Density Measures By Hydrostatic Weighing in Children.

E.V. Dover, A. Berzins, D.S. Ward, and L. Rocchio. Human Performance Laboratory, University of South Carolina, Columbia, South Carolina 29208

9:30 a.m.
Accuracy of Coaches' Estimates in the Determination of Percent Body Fat and Minimum Safe Wrestling Weight.

D.K. Shaw, J.S. Engmark and R. Shubert. Cardiac Rehabilitation Department, Aultman Hospital, Canton, Ohio 44710

9:45 a.m.
Exercise Efficiency of Women With Breast Cancer.

T.E. Kirby, R.L. Bartels, M. MacVicar and M. Winningham. Exercise Physiology Laboratory, The Ohio State University, Columbus, Ohio 43210

FRIDAY, FEBRUARY 3, 1984
THIRD SCIENTIFIC SESSION IN THE ALPINE ROOM
Anthony Hackney, Kent State University, Moderator

8:15 a.m.
Right Heart Englargement in Competitive, Endurance-Trained Male Athletes.

R.H. Dressendorfer, A.M. Hauser, M. Vos, P. Dudlets, T. Hashimoto, S. Gordon and G.C. Timmis. Division of Cardiovascular Diseases, William Beaumont Hospital, Royal Oak, Michigan 48072

8:30 a.m.
Relationships Between Selected Psychological Variables and Aerobic Capacity in Elite Young Runners.

R.A. Albrecht, D.L. Feltz and W.D. Van Huss. Department of Health and Physical Education, Michigan State University, East Lansing, Michigan 48824

8:45 a.m.
Anaerobic Threshold in Arm, Leg, and Combined Arm Plus Leg Cycling.

K.E. Ang, B. Gutin, G. Lesmes, K. Torrey and J. Saeger. Applied Physiology Laboratory, Teachers College, Columbia University, New York, New York 10027

9:00 a.m.
The Effects of An Aerobic Conditioning Program on Reaction Times of Older Sedentary Adults.

E.M. Russell. Chrousar Fitness Center, Wheaton College, Wheaton, Illinois 60187

9:15 a.m.
The Relationship Between Selected Segmental Kinetic Energy Measures and Skill Level in Female Softball Throwers.

S.A. Evans. Human Energy Research Laboratory, Department of Health and Physical Education, Michigan State University, East Lansing, Michigan 48824

9:30 a.m.
Bone Mineral Content of Amenorrheic/Oligomenorrheic Elite Lightweight Oarswomen.

A.C. Snyder, M.P. Wenderoth, R.S. Baker, and C.C. Johnston. Ball State University, Muncie, Indiana 47306, and Indiana University School of Medicine, Indianapolis, Indiana 46202

9:45 a.m.
Muscular Strength and Power of the Knee and Shoulder of Elite Lightweight Oarswomen.

M.P. Wenderoth, A.C. Snyder, and L.K. Steinrauf. Indiana University School of Medicine, Indianapolis, Indiana 46202, and Ball State University, Muncie, Indiana 47306

THE EFFECT OF AEROBIC TRAINING ON R-WAVE AMPLITUDE AMONG CARDIAC PATIENTS

B. Girten, T. Kirby, B. Garvy, and K. Greaves

The Ohio State University
Laboratory of Work Physiology

The effect of a three month aerobic training program on the amplitude of exercise electrocardiogram R-waves (R) was examined in 33 cardiac patients. This group included 19 patients who had experienced a myocardial infarction (MI), 6 patients who had undergone coronary by-pass surgery (CBS) and 8 who had experienced both an infarction and by-pass surgery (IS). The R amplitudes were obtained with the Marquette Computer Assisted System for Exercise using the standard ECG 12-lead system. The R's of lead V_5 were selected to examine the electromotive forces of the left ventricular function of the heart at various phases of maximal exertion tests on a treadmill. The times during which R-values were obtained included a pre-exercise rest (REST), one minute before maximal exertion (PRE), maximal exertion (MAX), and one minute following maximal exertion (POST). Prior to the training program the changes in R amplitude of the cardiacs were compared to the changes in R amplitude of 12 healthy, but untrained subjects. Paired t-tests indicate a significant decrease ($p < .01$) in all comparisons when examing the change in R from REST to PRE, from REST to MAX, and from REST to POST for the healthy subjects. Prior to training, the t values for the cardiacs show a significant increase ($p < .01$) in change from REST to POST in the MI's, but show no significant difference in change at any other point for the MI's, the CBS's, or the IS's. After training, the only significant change between the pretraining and post-training values for the cardiacs was an increase when comparing the REST amplitudes with POST amplitudes ($p < .01$).

DIFFERENCES IN EXERCISE LEFT VENTRICULAR FUNCTION BETWEEN NORMAL AND POST-MYOCARDIAL INFARCTION PATIENTS: A TWO-DIMENSIONAL ECHOCARDIOGRAPHIC STUDY

Walter R. Thompson, Ph.D.
Program Director
Cardiac Rehabilitation and Health Enhancement Center
Swedish Covenant Hospital
5145 North California Avenue
Chicago, Illinois 60625

In an effort to compare exercise left ventricular function in normals and post-myocardial infarction subjects, we studied 15 patients with diagnosed transmural myocardial infarctions (Group A) and 13 apparently normal age-matched volunteers (Group B) using two-dimensional echocardiography. Upright two-dimensional echocardiographic recordings were performed by the same technician using the apical four-chamber view at rest and immediately post-exercise after the subject reached 85% of maximal heart rate. The exercise test was performed on a specially built, electronically braked bicycle ergometer. Heart rate was recorded simultaneously using a defibrillator-monitor. Single-plane planimetry of cross-sectional area was used for determining end-diastolic (EDD) and end-systolic (ESD) dimensions. The ratio between the difference of EDD and ESD to EDD was calculated to be left ventricular fractional area change. Two subjects in each group failed to demonstrate adequate (i.e., measurable) echocardiograms and were excluded from the statistical analyses. Two-way analysis of variance for repeated measures was used followed by the the Newman-Kuels multiple comparison procedure to determine statistically

significant differences between means ($p < .05$). The results indicated no differences in any of the measured parameters at rest between groups. Exercise values indicated a significant increase in left ventricular fractional area change from rest to exercise only in Group B by virtue of an increase in the EDD. End-systolic dimension did not change in either group. Cardiac output was calculated to be increased in both groups. These data indicate that in the upright position, cardiac output increases in normals due to an increase in stroke volume (increases in EDD with no change in ESD) and heart rate and by an increase in heart rate alone in the post-myocardial infarcion group.

INFLUENCE OF THE START UPON PERFORMANCE IN THE TWO-MAN AND FOUR-MAN BOBSLED COMPETITION AT THE 1980 WINTER OLYMPICS

Fredrick F. Andres & Charles W. Armstrong
The University of Toledo (Toledo, OH)

C. Roger Rees
Adelphi University (Garden City, NY)

Few team sports in the 1980 Winter Olympics, with the exception of ice hockey, engendered spectator excitement as did bobsledding. In addition, the newly allowed corporate sponsorship of the U.S. Olympic Teams in exchange for promotional considerations, stimulated even greater interest in bobsledding equipment and technique. Historically, members of the U.S. Bobsled Teams have been chosen in part for their ability to push a bobsled in a timed, simulated start. The use of push trials results as a selection criterion underscores the importance that has been attributed to the start in bobsled performance. To date, little empirical data have been available to support this assertion. The purpose of the present investigation was to determine the influence of the start upon performance in two- and four-man bobsled competition. The data for this study were drawn from the official computer-generated times obtained on all competitors during the 1980 Winter Olympics (Lake Placid, NY). To determine if a statistically significant correlation existed between start, intermediate and final times, Pearson product moment correlation coefficients were calculated. Results indicated that no statistically significant relationship existed between the variables. Subsequent analysis demonstrated no statistically significant differences in start times between competitors. Supplemental analysis using multiple correlational and other techniques are presently being performed and will be available for presentation. At present, the results of the study question the <u>a priori</u> belief that start performance is one of the principle determinates of success in bobsledding.

ELECTROCARDIOGRAPHIC CHANGES FOLLOWING CHRONIC AEROBIC TRAINING AND/OR ADRIAMYCIN ADMINISTRATION IN THE MOUSE

Kanter, M.M., Hamlin, R.L., Montalto, R.M. and Merola, A.J. The Ohio State University Department of Exercise Physiology, Veterinary Physiology and Physiological Chemistry

This study was designed to investigate the electrocardiographic changes produced by conditioning and/or Adriamycin (Adr) administration in mice. Eighty mice were separated into 4 groups: sedentary, swimming, sedentary plus Adr and swimming plus Adr. After 21 weeks of training and/or a total dose of 40 mg. Adr/kg., mice were anesthetized with pentobarbitol and leads I, aV_F and V_{10} were obtained on a photographic oscillograph. Training increased amplitudes in P and R waves in lead I. Adr produced decreased amplitudes in P wave of lead I and Q wave in V_{10}, and decreased the ratio of S to R waves in leads I and aV_F. Both drug and exercise decreased heart rate significantly. Exercise did not appear to reduce the electrocardiographic alterations produced by Adr. This study shows a variety of measurements which, in mice, indicate an affect of Adr (e.g. decreased voltages) or swim training (e.g. increased voltages). Others using less comprehensive lead systems in various species identified decreases in EKG voltages due to Adr; however, we are aware of no previous work describing the effects of Adr and/or training in mice. In prior studies Adr produced a decreased voltage of QRS; in our study, voltages of QRS in aV_F were unchanged. These discrepancies may have resulted from our more sophisticated and systematic lead system, or because we recorded the EKG's with a photographic oscillograph at twice normal sensitivity.

Torque Production and Body Composition Relationship in an Untrained Population

E. M. Filusch, & R. P. DiFabio
University of Wisconsin - Madison

Investigators have shown that recordings of torque produced during isokinetic exercise are objective measurements of muscle strength. Further evidence suggests that total body weight correlates to peak torque production. It was the purpose of this study to investigate the relationships between total body weight (TBW), lean body weight (LBW), and mean torque production (T) in an untrained population. Seventeen female subjects ($\bar{X}$ age = 23) who were not performing regular exercise were selected to participate in this study. Measurements of TBW ($\bar{X}$ = 57.8 kg.), LBW ($\bar{X}$ = 46.0 kg.) as measured by skinfold technique, and T (ft-lbs.) produced in shoulder flexion (SFLEX), shoulder extension (SEXT), knee flexion (KFLEX), and knee extension (KEXT) as measured on a Cybex II isokinetic dynamometer were recorded. Skinfold measurements were taken at thigh, suprailiac and triceps sites. Torque measurements were recorded at angular speeds of 60, 90, 120, 180 and 240°/sec. for SFLEX and SEXT with the subject lying supine on the UBXT (Cybex-Lumex Corp.), and at 60, 90, 120, 180 and 240°/sec. for KFLEX and KEXT with the subject sitting. Damping setting on the Cybex II dual channel recorder was set at 2. Subjects were given a warm-up of 3 sub-maximal trials at each speed prior to the 5 test trials at each given speed. Correlation coefficients for T/TBW were determined at each speed for SFLEX ($\bar{X}$ = .50), SEXT ($\bar{X}$ = .68), KFLEX ($\bar{X}$ = .64) and KEXT ($\bar{X}$ = .66), as were the correlation coefficients for T/LBW for SFLEX ($\bar{X}$ = .76), SEXT ($\bar{X}$ = .88), KFLEX ($\bar{X}$ = .75) and KEXT ($\bar{X}$ = .86). T tests indicated that the correlation coefficients for T/LBW were significantly greater than the correlation coefficients for T/TBW in SFLEX ($p = .0027$), SEXT ($p = .0002$), KFLEX ($p = .0015$) and KEXT ($p = .0002$). Data suggests that a high correlation exists between T production and LBW. Measurements of LBW may be more valuable than TBW calculation when predicting torque production in the normal untrained female population.

PRACTICALITY OF A THREE DAY MEAT FREE DIET (3-MFD) FOR DETERMINATION OF URINARY CREATININE (UC) IN MALES.

M.M. Chaney and A.C. Hackney. Applied Physiology Research Laboratory, Kent State University, Kent, Ohio 44242

UC excretion (gram/day) is commonly used in body composition evaluation as an index of muscle mass in humans. Existing protocols for UC measurement suggest subjects follow a MFD during urine collection as exogenous creatine/creatinine, primarily within dietary meat, contaminates sampling. Recommended periods for abstinence from meat may vary, ranging from one day to several weeks. The purpose of the present study was to determine the practicality of a 3-MFD for the determination of UC levels in males. Physical characteristics ($\bar{X}$±SD) of subjects (n=4) were: age, 25.3±1.5 yr; height, 181.5 ±3.8 cm; weight, 70.0±5.1 kg. Urine volumes (UV; ℓ/24 hr) were collected for 6 days. The first 3 days subjects ate normal diets containing meat (NMD), followed by 3 days of MFD. UV were analyzed for creatinine concentration (CC; mg/100 mℓ) colorimetrically (Jaffe reaction), and converted to UC. Results ($\bar{X}$±SE) for NMD and MFD were: UV, 1.16±0.10, 1.03±0.10; CC, 178.1±13.0, 182.3±11.8; UC, 1.94±0.08, 1.79±0.13 respectively. No significant differences ($p>0.05$) were observed due to diet for UV, CC or UC. Results suggest that short-term diet modifications may have no significant effect on UC in males. However, existing research has shown UC levels to decrease significantly during extended MFD. Therefore, it was concluded: 1) that a 3-MFD may not be ample time for UC to reach the significantly decreased levels reported with extended MFD, and 2) UC values based upon UV collected from 3-MFD may not represent accurate meat free creatinine levels and should be regarded with caution.

Conservative Management of an Intramural Hematoma of the Ascending Colon Following Blunt Abdominal Trauma

Hematomas of the ascending colon rarely result from blunt abdominal trauma. Only 3 to 5% of all injuries due to blunt abdominal trauma involve either the colon or rectum. When colon injury does occur, it is usually located near the junction of the mobile and fixed portions of the bowel. However, we recently treated a 17-year-old male who sustained an injury to the ascending colon following a helmet spear in the abdomen during football practice.

Although customary techniques combined to help make a diagnosis of colon injury consist of a routine physical, peritoneal lavage and x-ray studies including barium enema, laparotomy has been the final diagnostic tool used to define the specific injury. In our case, we used CT scans and lower GI series to diagnose an intramural hematoma of the ascending colon. The patient's stable condition and negative symptomtology did not warrant surgical intervention. A repeat barium enema study taken a month after the injury showed complete resolution of the hematoma without evidence of stenosis.

Similar intramural hematomas of the duodenum have been treated conservatively with success. Duodenal hematomas may resolve without perforation or prolonged obstruction. Intramural hematomas of the colon should be observed in a similar

in anticipation of spontaneous resolution.

A Rehabilitation Program Following Fasciotomy for Chronic Compartment Syndrome. M.C. Detmer, B.J. Sherman, D.E. Detmer, K.R. Sharpe, and W.G. Clancy. Department of Surgery, Sections of Vascular Surgery and Sports Medicine, University of Wisconsin, Madison.

A rehabiliation program following fasciotomy for chronic compartment syndrome was evaluated after 17 months. Thirty-four patients with 70 symptomatic and functionally disabling compartments were treated during this period. The protocol involved passive stretching, whirlpool, and heat/cold concepts to maintain flexibility, reduce pain and prevent scarring. Mean preoperative resting compartment pressures were 27.3 mm. hg. (53 compartments). Postoperative results were gratifying with 28 patients (82%) reporting total cure. Followup averaged nearly 5 months and was complete. Thirty-three patients experienced relief of tightness in the involved compartment(s). Adverse outcomes included 1 compartment recurrence, 3 muscle injury with delayed recovery, 1 mild neuropraxia, and 1 painful scar. Return to walking averaged 5 days and return to running averaged 23 days. Twenty-six patients followed the protocol. The initial protocol was seen as too aggressive for many. A revised protocol has been developed which will help clinicians assist these patients to return to full activity.

COMPENSATORY HYPERTROPHY OF DYSTROPHIC MUSCLE: ADAPTATIONS OF THE FIBER NUCLEI. J. J. Uhl, A. C. Snyder and J. L. Fair. Human Performance Laboratory, Ball State University, Muncie, IN 47306.

Stretch overloaded normal muscle has been shown to adapt to this regimen by increasing in weight and cross-sectional area, as well as to increase the number of peripherally located nuclei per muscle fiber. Dystrophic muscle fibers, on the other hand, have a greater number of nuclei, particularly central nuclei, than do normal muscle fibers. The purpose of this study, therefore, was to determine if stretch-overloaded dystrophic muscle would adapt to this regimen by decreasing the number of centrally and increasing the number of peripherally located nuclei. METHODS: Seven week old male normal and myopathic (strain 14.6) hamsters were obtained from Bio-Research Inc., Bar Harbor, ME, and housed in individual cages. The animals were divided into four groups depending on animal type and exercise group (i.e., normal-control, NC; normal-overloaded, NO; dystrophic-control, DC; dystrophic-overloaded, DO). Muscle overload of the soleus and plantaris muscles was induced by surgical ablation of the gastrocnemius muscle. After eight weeks of the stretch-overload treatment the soleus (SOL) and plantaris (PL) muscles were removed. The location and number of the muscle nuclei were analyzed using histological techniques. RESULTS: Muscle fiber weights and nuclei/fiber data are presented in tables I and II:

TABLE I - SOLEUS MUSCLE

	NC	NO	DC	DO
Muscle Wt (mg)	16.8 ± 1.00	25.2 ± 2.12	20.0 ± 1.24	22.2 ± 1.88
Peripheral Nuclei	1.64 ± 0.14	1.18 ± 0.14	1.05 ± 0.19	1.09 ± 0.12
Internal Nuclei	0.15 ± 0.09	0.12 ± 0.10	1.17 ± 0.23	0.55 ± 0.19
Total Nuclei	1.81 ± 0.22	1.31 ± 0.09	2.21 ± 0.22	1.63 ± 0.22
Periph/Total	0.93 ± 0.04	0.90 ± 0.06	0.47 ± 0.08	0.68 ± 0.08

TABLE II - PLANTARIS MUSCLE

	NC	NO	DC	DO
Muscle Wt (mg)	33.2 ± 4.20	77.4 ± 6.37	34.8 ± 1.94	75.0 ± 5.64
Peripheral Nuclei	1.28 ± 0.01	1.44 ± 0.29	1.20 ± 0.14	1.32 ± 0.14
Internal Nuclei	0.01 ± 0.01	0.01 ± 0.01	0.92 ± 0.11	0.67 ± 0.13
Total Nuclei	1.29 ± 0.01	1.44 ± 0.29	2.12 ± 0.16	1.99 ± 0.17
Periph/total	0.99 ± 0.01	0.99 ± 0.01	0.56 ± 0.04	0.67 ± 0.05

DISCUSSION: These results indicate that both normal and dystrophic plantaris muscles hypertrophied following a stretch-overload regimen of 8 weeks. The DO muscles (both SOL and PL) showed a significant reduction in the number of internal nuclei along with a nonsignificant increase in the number of peripheral nuclei. The ratio of peripheral/total nuclei showed an increasing trend in both muscles of the DO animals. This morphological evidence suggests that dystrophic muscle when subjected to a stretch-overload treatment has the ability to adapt to a more normal muscle composition.

RELIABILITY OF BODY DENSITY MEASURES BY HYDROSTATIC WEIGHING IN CHILDREN

E. V. Dover, A. Berzins, D. S. Ward, L. Rocchio
Human Performance Lab, University of South Carolina
Columbia, S.C. 29208

Measurement error and intra-subject variability may occur during the determination of body density using hydrostatic weight and lung volumes. It was the aim of this study to examine the test-retest reliability of body density measurement in children. Eight prepubescent children underwent hydrostatic weighing at maximal expiration and maximal inspiration on 3 occasions, and in the fed and fasted state. Residual lung volume was measured using helium dilution (HRV) and oxygen dilution (ORV) techniques. Total lung capacity was also determined. Three measurement periods were compared: fasting, day one (FAST1), fed,day one (FED1) and fasting, day two (FAST2). ANOVA results indicate that HRV levels were significantly higher than ORV values ($p < .0001$) for all testing periods. Test-retest reliability was higher for ORV values between FAST1 and FED1 ($R=.85$) and FAST1 and FAST2 ($R = .79$) than in the helium dilution technique ($R = .59$ and .67, respectively). Total lung capacity was significantly correlated for all testing periods. There was a significant correlation for underwater weight during maximal expiration, however, at maximal inspiration , underwater weight values were not highly correlated . Body density values calculated using either breathing technique for all testing periods, were not significantly different. Results of this study indicate that, in children, at maximal expiration, underwater weight is a reproducible measure. Furthermore, while there were no significant variations in body density due to measurement error or intra-subject variability, body density measured in the fasted state on consecutive days was more reproducible in children than that measured in the fed and fasted state on the same day.

ACCURACY OF COACHES' ESTIMATES IN THE DETERMINATION OF PERCENT BODY FAT AND MINIMUM SAFE WRESTLING WEIGHT

D.K. Shaw, J.S. Engmark and R. Shubert*. Cardiac Rehabilitation Department, Aultman Hospital, Canton, Ohio 44710

The purpose of this study was to compare coaches' estimates to actual determinations of percent body fat (% BF) and minimum safe wrestling weight (MSWW). Fifty high school wrestlers and three coaches participated in the study. Mean age, height and weight for the wrestlers was 15.9±1.6 yrs, 169±1.1 cm and 66.6±2.2 kg, respectively. Coaches were asked to estimate their wrestler's % BF and MSWW prior to actual densitometric determination. Body density, % BF and LBW was then calculated for each wrestler following underwater weighing. Residual lung volumes were computed using .24 x vital capacity. Vital capacity measurements were obtained via a Bourns LS-75 electronic spirometer. Estimated % BF for all wrestlers was $\bar{x}$=15.4±.78 percent while actual % BF was $\bar{x}$=13.5±.72 percent. Estimated MSWW was $\bar{x}$=62±1.9 kg and actual MSWW (based on 5% BF) was $\bar{x}$=59.7±3.4 kg. Coaches over-predicted the MSWW 56 percent of the time with the estimated/actual MSWW matching in only one subject. A significant difference ($p<.05$) was noted between estimated ($\bar{x}$=14+.59) and actual ($\bar{x}$=11.1±.65) % BF in the middle weight classes (57-66 kg). The difference between estimated ($\bar{x}$=77.6±2.9 kg) and actual ($\bar{x}$=72.3±1.9 kg) MSWW also proved significant ($p<.05$) in the heavier weight classes (70 kg - unlimited). The MSWW was over-predicted for 94% of this group. These data suggest that coaches tend to overestimate both the % BF and MSWW of their wrestlers. It is concluded that coaches' estimates lack the accuracy required to properly determine % BF and MSWW in high school wrestlers.

EXERCISE EFFICIENCY OF WOMEN WITH BREAST CANCER

Kirby, T. E., R. L. Bartels, M. MacVicar and M. Winningham. Exercise Physiology Laboratory, The Ohio State University, Columbus, OH 43210.

Since many involved in the treatment of cancer patients have the opinion that a regular exercise program may be of significant benefit to individuals being treated for the disease, this project was undertaken to determine if the efficiency with which women with breast cancer perform bicycle ergometry is the same as a normal (no diagnosed disease) matched population.

Subjects were volunteers and were allowed to participate in the testing based on the referral of their physician. This project identified two groups.

Group 1: Normal subjects who had volunteered to enter a regular exercise program (N = 11, $\bar{X}$ age = 42 years).

Group 2: Cancer patients who had agreed to be tested, had Stage II breast cancer and were receiving adjuvant chemotherapy (N = 11, $\bar{X}$ age = 39 years).

A symptom-limited graded exercise test was given each subject using an electrically braked bicycle ergometer. The work began with Ø load and increased 25 watts every two minutes. Measurement of oxygen uptake, respiratory quotient and associated parameters was made during the final 30 seconds of the 50, and 75 watt workload, which all subjects could attain.

Net efficiency, or the efficiency of the exercise alone, was respectively for Group 1 and 2, 27.6% ($\pm$5.9) and 24.8% ($\pm$4.8) for 50 watts, 28.0% ($\pm$2.7) and 29.3% ($\pm$4.0) for 75 watts. Independent T test for both workloads indicated no significant difference ($P > .05$) between the groups.

These results indicate that no significant difference exists in the exercise efficiency or oxygen requirement for a given work task between women with breast cancer, undergoing treatment, and a normal control group.

RIGHT HEART ENLARGEMENT IN COMPETITIVE, ENDURANCE-TRAINED MALE ATHLETES

Rudolph H. Dressendorfer, Ph.D., Andrew M. Hauser, M.D., Marc Vos, M.S., Patricia Dudlets, Tetsuo Hashimoto, M.D., Seymour Gordon, M.D. and Gerald C. Timmis, M.D.

Division of Cardiovascular Diseases, William Beaumont Hospital, Royal Oak, Michigan 48072

Two-dimensional cardiac ultrasound produces a tomographic view of the heart that can be recorded on videotape for future analysis. Previous echocardiographic studies of endurance-trained athletes have mostly used M-mode ultrasonography, which provides only an "ice-pick" cardiac image rather than a 2-dimensional sector scan. Left-ventricular dimensions of endurance-trained men have been characterized with both M-mode and 2-dimensional echocardiography. However, descriptive data are not available on right heart sizes in highly-trained endurance athletes. We measured right ventricular (RV) and right atrial (RA) chamber sizes and RV free wall thickness using 2-dimensional and M-mode echocardiography in 12 male competitive athletes (8 triathletes and 4 marathon runners), ages 23 to 49, who trained an average of 16.5 hours/week. Twelve healthy sedentary men paired with the athletes for age, height, weight, and calculated body surface area (BSA) served as controls. All subjects were screened by history, physical exam, ECG, and maximal treadmill testing that included measurement of VO_2max. RV and RA areas were planimetered in the apical 4-chamber view. Group means $\pm$SD:

Group	VO_2max (ml/kg/min)	RV Area (cm^2/BSA)	RV Wall Thickness(mm)	RA Area (cm^2/BSA)
Athletes	67.4+5.6	16.5+2.5	3.8+0.9	13.3+3.2
Controls	43.6+5.1	11.5+2.5	3.1+0.5	9.6+1.4
p-value	<.0001	<.0001	<.04	<.001

Calculated stroke volumes at rest and during isometric handgrip exercise were both 20% greater ($p<.02$) in the athletes. The ratio of right atrial to left atrial area for individual subjects also was about 20% higher ($p<.02$) in the athletes. However, the ratios of RV area to left ventricular (LV) area and of RV free wall thickness to LV free wall thickness were not significantly different between groups. CONCLUSIONS: 1) These highly-trained endurance athletes had marked increases in RV and RA chamber sizes and RV wall thickness compared with closely-matched controls. 2) The observed RV concentric hypertrophy was proportionate to the athletes' LV enlargement. 3) Right heart volume overloading from increased venous return during endurance training is the presumed mechanism of RA and RV dilatation and compensatory RV wall thickening.

RELATIONSHIPS BETWEEN SELECTED PSYCHOLOGICAL VARIABLES AND AEROBIC CAPACITY IN ELITE YOUNG RUNNERS, Richard R. Albrecht, Deborah L. Feltz, and Wayne D. Van Huss, Dept. of Health and Physical Education, Michigan State University.

Relationships between measures of selected psychological variables and aerobic capacity during a progressive treadmill test protocol were examined in a group of elite young long distance runners (n=28), nine to 15 years of age. Psychological measures obtained individually in a structured interview setting included the Commitment to Running scale, Sport Competition Anxiety Test, 28 sources of stress typically experienced prior to and during competition, and mental strategies employed while running. The intermittent treadmill protocol consisted of progressively more intense three-minute work intervals with three-minute rest intervals until the subject reached exhaustion. $\dot{V}O_2$ was measured each minute during work and rest intervals using the Douglas bag technique. Descriptive statistics revealed that young runners worried about their races approximately 41% of the time. Their major sources of stress concerned performing up to their ability level, improving upon their last performance, participating in championship races, not performing well, and being able to get mentally ready to run. In terms of the mental strategies that runners used in races, 75% employed associative-type strategies. Correlations were obtained between maximum $\dot{V}O_2$ and the runners' commitment to run, competitive anxiety, percent of worry, and the five major sources of worry. Significant correlations were found at the .10 level between $\dot{V}O_2$ max and worry about being mentally prepared to run (r=.26, p <.09) and percent of worry (r=.31, p <.06). A discriminant function analysis was performed using two groups of runners divided on the basis of their associative/disassociative running strategy. The discriminating variables included $\dot{V}O_2$ max, commitment to run, competitive anxiety, mental preparation, and percent of worry. None of the variables measured satisfactorily discriminated among the two groups.

ANAEROBIC THRESHOLD IN ARM, LEG, AND COMBINED ARM PLUS LEG CYCLING.

K.E. ANG*, B. GUTIN, G. LESMES*, K. TORREY, AND J. SAEGER*. Applied Physiology Lab., Teachers College, Columbia University, New York, NY 10027

Ten untrained males participated in a study to identify the anaerobic threshold (AT) under 4 seperate conditions: 1) arm (A), 2) leg (L), 3) combined A+L with 10% of the work apportioned to the A and 90% to the L (A+L10/90), and 4) combined A+L with 25% of the work apportioned to the A and 75% to the L (A+L25/75). The AT was determined by 1) the highest PO before an abrupt increase in ventilatory equivalent for oxygen (VE/VO_2) without an associated systematic increase in the ventilatory equivalent for carbon dioxide (VE/VCO_2) and 2) a systematic decrease in the fractions of mixed expired carbon dioxide to oxygen ratio ($FECO_2/FEO_2$). The AT was expressed as oxygen consumption (VO_2) ml/kg min (ATrel), absolute VO_2 l/min (ATABL), VO_2 as a percentage of maximal oxygen uptake (VO_2max) at that mode (AT%), and absolute power output (PO) in Kpm/min (ATPO). The AT expressed as ATrel, ATABL, and ATPO was significantly lower during arm work as compared to all other exercise modes. No significant differences between arm and leg were observed when the AT was expressed as AT%. No significant differences were observed when comparing L with A+L25/75. With A+L10/90, the AT was significantly higher than that of leg cycling. These data suggest that when 10% of the total PO is apportioned to the arms, the onset of AT is delayed, suggesting a higher level of work rate can be tolerated at a given physiological strain.

* Present address: Human Performance Lab., Northeastern Illinois University, Chicago, IL 60625

RUSSELL, E. M. The Effects of an Aerobic Conditioning Program on Reaction Times of Older Sedentary Adults. Ph.D. in Physical Education, 1982, 135 p. (R. O. Ruhling)

The effects of an aerobic conditioning program on RT's of older sedentary adults were studied. No previous studies have directly measured $\dot{V}O_2$ max in conjunction with a RT task. 45 sedentary males and females between the ages of 55 and 70 yr's served as S's. 30 S's were randomly placed into one of 2 groups (aerobic exercise [AE], n=15; exercise control [EC], n=15) while a (nonexercise control [NEC], n=15) was selected independently. 2 S's in the AE group dropped out prior to completion of the study. The S's in the exercise groups participated in a 4-mo exercise program that consisted of 60-min sessions, 3 days/wk. The AE group walked/jogged at HR's that corresponded to 60-70% of their maximal HR reserves, while the EC group performed strength/flexibility exercises. Prior to the 4-mo exercise program, and at its conclusion, both exercise groups were given a $\dot{V}O_2$ max test and a RT test. The NEC group S's were only tested on RT. Analysis of the pretraining data indicated that the 3 groups were similar to each other on measures of IQ, education, and RT ($p > 0.05$); however, the NEC group was slightly, but significantly, younger than the EC group ($p < .05$). Posttraining results showed that the exercise groups experienced increases in $\dot{V}O_2$ max ($p < 0.05$). The AE group improved by 25.1% while the EC group improved 8.6%. With this increase in $\dot{V}O_2$ max was an improvement in simple RT across all groups (B-Main Effect) ($p < .05$). The pre-posttraining results showed that RT's of the AE group were significantly faster after training, whereas the RT's for the other 2 groups did not significantly improve. Thus, a 4-mo aerobic conditioning program can not only increase $\dot{V}O_2$ max in older sedentary adults, but shorten simple RT as well.

THE RELATIONSHIP BETWEEN SELECTED SEGMENTAL KINETIC ENERGY MEASURES AND SKILL LEVEL IN FEMALE SOFTBALL THROWERS.

S. A. Evans, Human Energy Research Laboratory, Department of Health and Physical Education, Michigan State University, East Lansing, Michigan 48824.

The purpose of this study was to investigate the relationship between selected kinetic energy measures from the upper arm, forearm, and hand segments and skill level in an analysis of the overarm throw. Two groups, of five subjects each served as the sample for this investigation. Group assignment was based on the score in a pretest measure of initial ball velocity. Those subjects having an initial ball velocity ranging between 70-85 feet per second were assigned to the skilled group, while those subjects with initial ball velocities ranging between 40-50 feet per second were assigned to the unskilled group. High speed cinematography was utilized for data collection with camera placement being perpendicular to the plane of motion. Seventeen data points from selected body landmarks were digitized for every frame, from the point where the upper arm initiated its forward movement to three frames after release of the ball. Kinetic energy measures of body segments were obtained through computer analysis of the raw data. Three kinetic energy measures were selected for statistical analyses. These were: 1) the kinetic energy of the upper arm at the point where this segment initiated its forward movement, 2) the kinetic energy of the forearm at the point where this segment was perpendicular to the ground, and 3) the kinetic energy of the hand at the point of ball release. A step-wise multiple regression analysis was performed using the kinetic energy measures of the upper arm, forearm, and hand segments as the predictor variables, and skill level as the criterion variable. Results indicated that the kinetic energy of the forearm was a good predictor of skill level. This measure was significantly different ($p<.01$) between the two groups and accounted for 93 percent of the variance in the criterion variable. A high correlation ($r=.89$) was observed between the kinetic energy measures of the forearm and the hand. This indicated a direct relationship between the amount of kinetic energy generated by the hand segment at release and that of the forearm segment. Examination of composite curves of the upper arm, forearm, and hand segments for both the skilled and the unskilled throwers indicated a more sequential pattern of segmental energy expenditure in the skilled group. This would seem to indicate a more effective summation of forces by the skilled throwers.

BONE MINERAL CONTENT OF AMENORRHEIC/OLIGOMENORRHEIC ELITE LIGHTWEIGHT OARSWOMEN.

A.C. Snyder*, M.P.Wenderoth, R.S. Baker, C.C. Johnston. *Ball State University, Muncie, IN. Indiana University School of Medicine, Indianapolis, IN.

A previous investigation has indicated that 6 hypothalamic amenorrheic runners had a mean of 28% less bone mass than age-matched controls (Cann et al., 1982). This finding implies that amenorrheic athletes may be at greater risk for developing premature osteoporosis. This finding is also in conflict with previous work which has shown that exercise increases bone density. Therefore, the purpose of this study was to determine if amenorrheic athletes involved in another type of sport, rowing (a power sport), have a decreased bone mass. METHODS: Sixteen elite lightweight (body weight < 59.0 kg.) oarswomen who had been rowing at the collegiate or national level for 2-5 years (X = 3.4) were the subjects for this study. The menstrual status of each athlete was determined according to the following criteria: N - normal menstrual cycles occurring every 23- 33 days, O-oligomenorrheic, cycles greater than 33 or less than 23 days in length, S.A. - Sport amenorrheic, less than two cycles per year. A group of non-athletic women with normal menstrual cycles and matched for age, height, weight, and race were used as controls. In vivo bone mineral content (BMC) was determined at the mid-shaft region of the radius and in the lumbar vertebrae by photon absorptiometry. We did not assess the endocrine status of the subjects but did assess the percent body fat of the athletes using the hydrostatic weighing technique. (Previous research has indicated that a low (< 18%) percent body fat may cause amenorrhea.) RESULTS: The results of this study are presented in the following table (MEAN ± S.E.):

	CONTROLS	OARSWOMEN		
		--N--	--O--	--SA--
NUMBER	9	7	5	4
AGE	22.7 ±0.8	24.1 ±1.3	21.4 ±0.5	22.3 ±0.9
HEIGHT (m)	1.65 ±1.70	1.55 ±0.15	1.69 ±0.01	1.69 ±0.01
WEIGHT (kg)	55.3 ±1.2	57.5 ±1.3	57.0 ±1.1	55.9 ±1.1
BMC				
RADIAL (gm/cm)	0.94 ±0.13	0.98 ±0.05	0.89 ±0.04	1.09 ±0.16
VERTEBRAL (gm/cm3)	1.44 ±0.09	1.67 ±0.13	1.63 ±0.17	1.53 ±0.18
PERCENT BODY FAT		12.5 ±1.50	12.8 ±1.02	11.6 ±1.40
YEARS ROWING		3.9 ±1.1	2.6 ±0.8	3.5 ±0.6

DISCUSSION: The results of this study indicate that the amenorrheic oarswoman has a greater (nonsignificant) bone mass than age matched sedentary controls. Similarly, the mean bone mass of the O and SA oarswoman is not significantly different from the mean bone mass of age matched athletic controls (the N oarswomen). The percent body fat of the O and SA oarwomen is not different from that of the N oarwomen, and all athletes were less than 18% body fat. We conclude that the elite SA and O oarswoman does not have a decreased bone mass, nor is her menstrual status associated with her percent body fat . The findings of Cann et al.(1982) imply that running is a causative factor in premature osteoporosis. Yet these rowers use long distance running as an integral part of their training program and show a normal BMC.

MUSCULAR STRENGTH AND POWER OF THE KNEE AND SHOULDER OF ELITE LIGHTWEIGHT OARSWOMEN.

M.P. Wenderoth*, A.C. Snyder^, and L.K. Steinrauf*. *Indiana University School of Medicine, Indianapolis, IN, ^Ball State University, Muncie, IN.

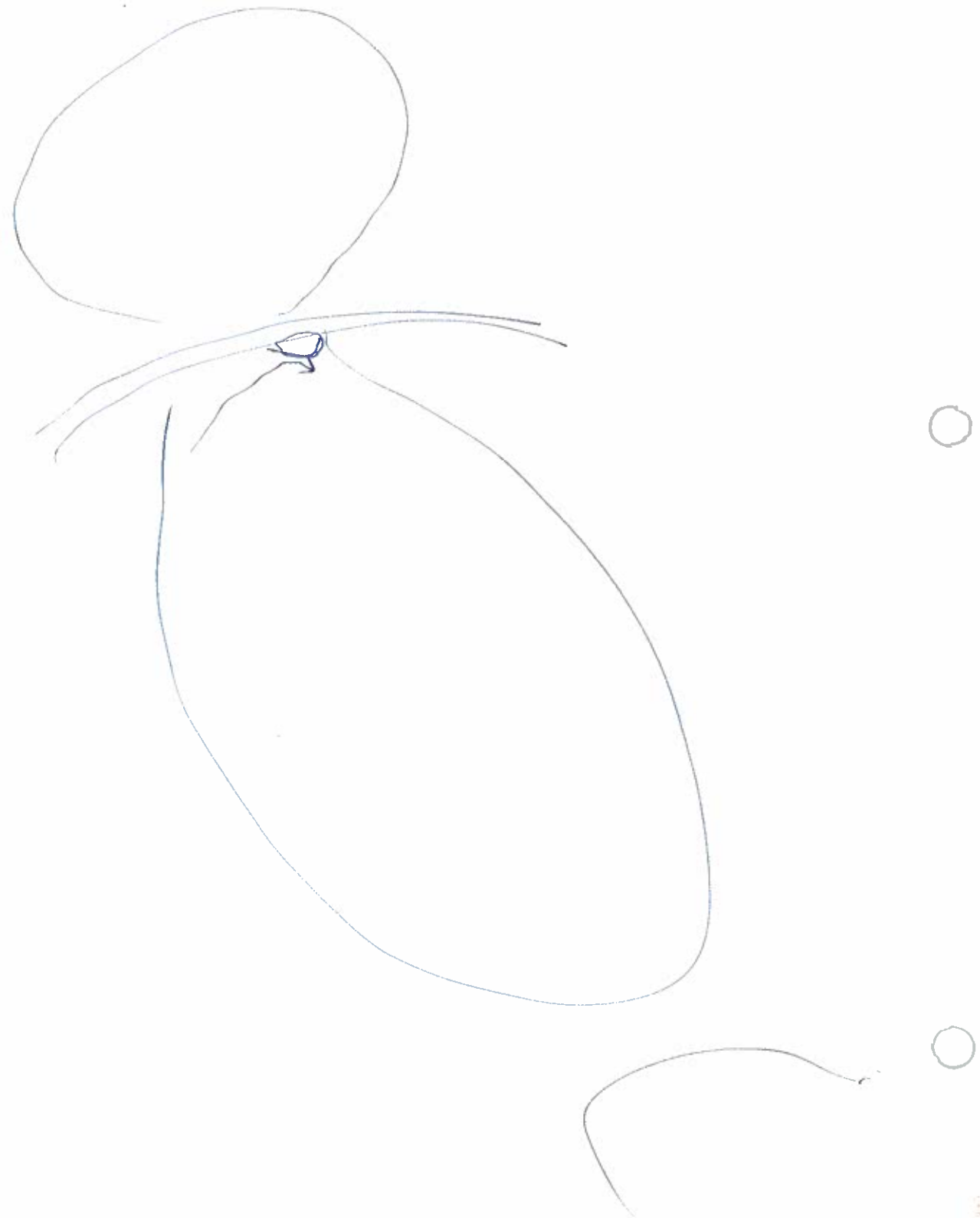
It has been implied that muscular strength and power are essential attributes of the athlete intertested in the sport of Rowing. To acertain if these physiological variables are important to successful rowing we determined the muscular strength and power of the 17 elite lightweight oarswomen of the Lightweight Development Camp. One month after the testing eight of these women were chosen by the coaches to be on the U.S.A team (USA) while the other 9 comprised the 2nd team (LDC). At the time of team selection, the coaches had no knowledge of the test results. METHODS: The muscle testing was done on a CYBEX dynamometer which was interfaceo with an AppleII+ computer for data storage and processing. Each athlete was tested for peak torque and power during extension and flexion of right and left knee and shoulder. The testing was conducted at three speeds: 180, 240, 300 degrees/sec (knee testing also included 15 d/s) RESULTS (P<.05): KNEE - The USA team had greater absolute strength and absolute power of left knee extension at every speed. There was no difference between teams in strength or power of knee flexion. There were no differences between right and left knees for any variable for either team. Both teams had a high positive correlation (r= 0.87 - 0.97) between peak torque and power at every speed for knee extension. SHOULDER - The USA team had greater absolute strength and absolute power of left shoulder extension at every speed. The USA team also had great absolute power of left shoulder flexion at the faster speeds (240,300). There was no difference between right and left shoulder parameters for the USA team but the LDC team showed a right shoulder dominance for power. Only the right shoulder of the USA team showed a high positive correlation (r=.91) between peak torque and power. DISCUSSION: These results indicate 1) the left side of the USA team was stronger and more powerful than the left side of the LDC team, 2) The USA team had greater muscular symmetry at every speed of movement , 3) Cybex test results can differentiate the members of the USA crew from the LDC crew. Given that the USA team had a faster time for a 1,000 m. race, these results also indicate that muscular strength and power are related to a successful rowing performance.

Midwest Chapter of the American College of Sports Medicine, Winter Meeting
Boyne Mountain, Michigan, February 3, 1984

ACUPUNCTURE AS AN ADJUNCT TO COMPREHENSIVE PROGRAMS FOR SMOKING ABSTINENCE AND WEIGHT REDUCTION

Perrigo, E.S., Olms, J.S., Birch, D.B., Kuehne, M.L., Umphrey, C.A., Christopher, J.C., Blackshear, B.L., and Boucher, C.J., Heart CARE Foundation, Toledo, Ohio

Since the 1973 report by Wen and Cheung of Hong Kong on their success with auricular acupuncture in treating drug addiction, the use of similar techniques for the control of smoking has become increasingly popular in the United States. Acupuncture programs have a reported success rate of between 18-84% abstinence after six months, but most of these studies are not controlled and multiple experimental variables are present. Auricular acupuncture has also been used as an anorexiant with variable success in weight reduction programs, but with little or no side effects. Evelyn Lee Sun, M.D., reported in 1979 very favorable results in 155 subjects using a molded plastic Acu-Ring, a non-invasive acupressure device which the subject can wear on the external ear and squeeze gently to suppress eating impulses. In October, 1983, a pilot study of a comprehensive program for smoking abstinence and weight reduction for patients in our Cardiology Practice was initiated. The program includes a ninety minute session of nutritional and smoking health counselling, behavior modification counselling, encouragement in aerobic exercise, fifteen minutes of oriental steel needle acupuncture after obtaining written informed consent, and instruction in the use of the plastic molded Acu-Ring for the patient's self application of non-invasive acupressure to suppress at will impulses for eating or smoking. We placed steel acupuncture needles in the external ear at the oriental hand and mouth points, and placed silver needles in the oriental self-aggression point of all weight control and smoking control patients. In our smokers, two steel needles are also placed in the auricular lung point and a silver needle is placed in each wrist at the Tim Mee ("sweet taste") point described by Dr. James Olms in 1971. In our weight reduction patients, two steel needles are also placed in the auricular stomach points. Additionally, we offer two-hour medically supervised aerobic exercise sessions at a local health club twice weekly for our subjects and encourage also a one-hour follow-up visit each month with our nurse. We now have one-month follow-up data on thirty of our patients - 17 in our smoking abstinence program and 13 in our weight reduction program. Four patients are participating in both programs simultaneously. In our smoking group, there has been an average reduction of 22.9 cigarettes (1.1 pack) per day with 45% of the subjects abstaining completely and 76% of the subjects abstaining or reducing their number of cigarettes by more than one-half pack per day. 24% of the subjects have either not changed their smoking habit or reduced their smoking by less than one-half pack per day. For the 13 subjects in the smoking program alone, there has been an average weight gain of 2.4 pounds over the first month. For the 4 individuals participating in both smoking and weight programs, there has been an average weight loss of 1.3 pounds during the first month. In our weight reduction program, there has been an average weight loss of 0.48 pounds per week with 75% of the subjects losing more than one-half pound per week and 38% of the subjects losing more than one pound per week with only 25% of the subjects either not changing their weight or actually increasing their weight during the first month of the study. These preliminary results from our one month pilot study suggest that our comprehensive programs for smoking abstinence and weight reduction have been effective.



The Ohio State University
School of Health, Physical Education and Recreation
337 W. 17th Ave.
Columbus, Ohio 43210

Extending Athletic Performance: The Role of "Ergogenic Aids"

Annual Meeting, Midwest Chapter, American College of Sports Medicine

October 26-27, 1984

The Ohio State University
Columbus, Ohio

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PROGRAM

Friday, October 26, 1984

3:00-5:00 Tour Laboratory Facilities
Larkins Hall

5:00-7:00 Registration
University Hilton

7:00 Welcome and Introduction

7:15-8:00 Carbohydrate Loading & Carbohydrate Feedings Before and During Athletic Performance
David Lamb, Ph.D., FACSM
The Ohio State University
Columbus, Ohio

8:00-8:45 Dietary Protein and Athletic Performance
Peter Lemon, Ph.D., FACSM
Kent State University
Kent, Ohio

8:45-9:00 Break

9:00-9:45 Vitamins, Minerals and Athletic Performance
Arthur Hecker, Ph.D., FACSM
Ross Laboratories
Columbus, Ohio

9:45-10:30 Blood Doping and Endurance Performance
Melvin Williams, Ph.D., FACSM
Old Dominion University
Norfolk, Virginia

10:30-10:45 Break

10:45-11:30 Amphetamines and Athletic Performance
John Lombardo, M.D.
Cleveland Clinic
Cleveland, Ohio

11:30- 1:00 Luncheon on own

1:00- 1:30 Anabolic Steroids and Growth Hormone: Effects on Athletic Performance
John Lombardo, M.D.

1:30- 2:00 Anabolic Steroids and Growth Hormone: Harmful Side Effects/Drug Testing Methods
Richard Strauss, M.D., FACSM
The Ohio State University
Columbus, Ohio

2:00- 2:15 Anabolic Steroids and Growth Hormone Discussion
(Dr. Lamb, Dr. Lombardo, Dr. Strauss)

2:15- 2:30 Break

2:30- 3:15 Caffeine and Athletic Performance
William Fink, Ph.D., FACSM
Ball State University
Muncie, Indiana

3:15- 4:00 Warmup and Performance
Robert Bartels, Ph.D., FACSM
The Ohio State University
Columbus, Ohio

4:00 Closing

Saturday, October 27, 1984

7:30- 9:00 Registration

7:45- 8:45 Breakfast
Business Meeting

9:00- 9:45 Dehydration — Rehydration and High Power Athletic Performance
Donald Corrigan, Ph.D.
Purdue University
West Lafayette, Indiana

Location

On site registration and all meetings will be held at the University Hilton, 3110 Olentangy River Road, Columbus, Ohio, close to the University campus (see map on reverse). Rooms have been reserved for those attending the conference, at a special rate. Please detach and return the enclosed room reservation request as soon as possible to the University Hilton.

Midwest Chapter of American College of Sports Medicine No. 41032
October 26-28, 1984

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Midwest Chapter
A.C.S.M.
Winter Meeting

February 6-8, 1985
Boyne Mountain, Michigan

Hosted by: Ball State University

Call For Abstracts

The Midwest Chapter of the American College of Sports Medicine is seeking research papers to be presented at its' Winter Meeting. All interested persons, especially students and new investigators, who desire to present a paper should submit an abstract (250 words) in a format suitable for reproduction by January 15, 1985.

SEND ABSTRACTS TO:

Ann C. Snyder, Ph.D.
Human Performance Laboratory
Ball State University
Muncie, IN 47306

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Russell R. Pate, FACSM
Department of Physical Education
University of South Carolina

Topic: Sports Anemia and Iron Metabolism in Exercise

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FOURTH SCIENTIFIC SESSION - Alpine Room

8:15-8:30	Electromyogram (EMG) Analysis of Selected Parallel Squat Stances - Jeff Lucas; Ball State University
8:30-8:45	Central and Peripheral Responses to Varied Arm Speed at Constant Work Loads - R. C. Keyser; The University of Toledo
8:45-9:00	Comparison of Maximal Oxygen Uptake During Exercise on a Versaclimber, Bicycle Ergometer and Treadmill - D. L. Ballor; The University of Michigan
9:00-9:15	Within-Subject Variability of Steady-Rate Heart - Rate and Blood Pressure During Cycling at 50 and 124 Watts - M. D. Becque; The University of Michigan
9:15-9:30	Lactate Production among College Males During Rowing Exercise - K. Greaves; The Ohio State University
9:30-9:45	Optimal Course Size and Shape for Walk Stress Test - Carol Vredevoogd; The University of Michigan
9:45-10:00	Whole Body Electrical Resistance as a Predictor of Body Fat: A Validity and Reliability Study - C. Marks; The University of Michigan

RECREATION

10:00-4:30	Skiing
12:00-2:30	Lunch - Main Dining Room
1:00	Check out of Room

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Midwest Chapter

American College

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Sports Medicine

Winter Meeting

Boyne Mountain, Michigan

February 6-8, 1985

Host

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ABSTRACTS OF PAPERS PRESENTED

Boyne Mountain, Michigan

February 6,7,8, 1985

EFFECTS OF EXERCISE UPON CHANGES IN BLOOD GLUCOSE

Fredrick F. Andres
Exercise Physiology Laboratories
The University of Toledo

Numerous studies have demonstrated that the magnitude of physiological response to acute muscular exercise depends upon the relative intensity of the workload. The present investigation examined the effects of bicycling at 40, 50, 60, 70, 80 and 90 percent of maximum physical work capacity upon changes in blood glucose. Twenty-eight undergraduate and graduate students (M = 14, F = 14) volunteered for this investigation. Prior to participation all subjects were informed of the inherent risks and benefits. Subjects performed a maximal graded exercise test on a bicycle ergometer and were then randomly assigned to Group I (40, 50 and 60%) or Group II (70, 80 and 90%) for subsequent testing. Following a ten hour fast and two hours before each test, subjects ingested a standardized meal consisting of a commercially prepared powdered breakfast drink mixed with 8 oz. of milk. Arterialized capillary blood was drawn pre- and post-exercise for subsequent determination of whole blood glucose. Analysis of the data (Table 1) reveals a 4.8, 3.8 and 9.3% rise in mean blood glucose for exercise at 40, 50, and 60% maximum work capacity respectively. Subjects exercising at 70, 80 and 90% respectively, showed a 16.2, 20.5 and 15.6% rise in mean blood glucose.

The results of the present study suggest that the magnitude of blood glucose change produced during exercise may be related to the exercise intensity.

Table 1

Mean Pre- and Post-Exercise Blood Glucose Values

Workload (% PWC)	Blood Glucose (Mg %) Pre Ex	Post Ex	Δ
40	88.5 ± 8.67	93.0 ± 12.9	4.5
50	91.4 ± 8.44	95.0 ± 13.5	3.6
60	94.1 ± 11.2	103.8 ± 14.1	9.7
70	88.8 ± 9.9	106.1 ± 20.4	17.2
80	92.2 ± 11.3	116.0 ± 16.9	23.8
90	91.8 ± 10.8	108.8 ± 19.2	17.0

AN EDUCATIONAL APPROACH FOR YOUTH SPORT PSYCHOLOGY

T. A. Crawford and R. Ware. Youth Sports Aptitude Clinic, Indiana University School of Medicine, Indianapolis, IN. 46223

This paper outlines a procedure for educating junior athletes, their parents and coaches regarding the role and practice of Sport Psychology. Exposure to this component of sports medicine should occur early in the child-athlete's development within a comprehensive, non-threatening sports medicine testing program. Subjects were fifty-eight (58) accomplished athletes ages 8 to 18, their parents (N=51), and coaches (N=6). Sports chosen were gymnastics, cross country track, figure skating, swimming, and tennis. The following psychological assessments were administered to each of these groups in a classroom setting with parents, peers and coaches present: the Myers-Briggs Type Indicator, the Cosiol-Jones Children's Personality Scale, the Coopersmith Self-Esteem Scale, and motivation scales taken from the Personality Research Form. Information was also collected on history of sport involvement, competitive attitude, outside interests, and activity level as compared with peers and other family members. Data collected thus far indicate specific psychological profiles may differ for selected sports. For instance, differences in self-esteem between athletes and between their parents were statistically different [$F(1,80) = 9.78$, $P < .05$]. Preference for schedules and order also seem to be higher among specific sports -- tennis and cross-country runners ($\chi^2 = 10.5$, $P < .05$). The paper also discusses rationale for choice of assessments, future integration with physiological testing, and feedback of information to athletes, coaches and parents. The importance of a positive introduction to Sport Psychology for this population is discussed with implications for longitudinal research design.

Supported by the International Institute of Sports Science and Medicine of the Indiana University School of Medicine.

THE EFFECTS OF MUSIC ON PERCEIVED EXERTION AND VARIOUS PHYSIOLOGICAL PARAMETERS

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Ten female college athletes participated in two graded submaximal bicycle tests on separate days one week apart. Testing consisted of three minute work stages at a starting intensity of 300 KPM/min (50 W), and progressive increments of 150 KPM/min. During one test, subjects listened to the music of their choice through headphones (HP) connected to a stereo system. The second test was administered without headphones (WHP). Test order was reversed in half of the subjects to avoid learning bias. All tests were terminated when subjects completed a work stage at a heart rate corresponding to 90% of heart rate max. At workloads corresponding to approximately 60% of max VO_2, heart rates during both trials were identical (X = 179 bpm). In addition, no significant differences existed in mean arterial blood pressure (HP = 106.7 mm/Hg, WHP = 103.9 mm/Hg), respiratory rate (HP = 36 b/min, WHP = 35 b/min) or RQ (HP = .89, WHP = .87) between tests. Perceived exertion ratings were not significantly different (HP = 18, WHP = 17.5). Similar findings existed at termination of the workbout (90% of max heart rate). Although not statistically significant, total exercise time was greater when subjects listened to music (18.3 min vs. 16.8 min). It was subjectively observed that subjects who chose to listen to music which might be classified as "loud" or "fast tempo" fared worse on the test when they listened to music. It was concluded that stereo headphones provided no physiological benefits when performing a graded submaximal bicycle test, nor were perceptions of exertion lessened by listening to music during exercise.

EFFECTS OF ACUTE INGESTION OF SMALL DOSES OF ALCOHOL ON 5-MILE TREADMILL RUN TIMES

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Previous investigations concerning acute alcohol ingestion have generally not examined the effects of dosages of alcohol producing blood alcohol levels (BAL) below .05 percent. Indeed, no studies have been found which examined such low BAL in the context of endurance running. The aim of this study was to determine how dosages of 0, .1, and .2 ml of alcohol per pound of body weight would affect well-trained runners during a simulated 5-mile race on a treadmill. All 18 male subjects were avid runners and had previous racing experiences. Physical characteristics (mean±SD) included ages of 23.3 ± 3.5 years and $\dot{V}O_2$ max values of 61.8 ± 6.8 ml/kg-min. A one week interval separated each of the five running sessions. The first session was introductory and included a $\dot{V}O_2$ max test; the next three were the experimental time trials with one at each alcohol level; the final session was a $\dot{V}O_2$ max test. The subjects were instructed not to drink milk nor eat within four hours prior to each time trial. Procedures insured that the subjects could neither smell, taste, nor see the placebo or ethanol-grape drink mixture. Administration was double-blind and counter-balanced in order. Following ingestion of the drink mixture, each subject had a half-hour absorption period, a blood sampling, and a five-minute warm-up on the treadmill. Subjects then started the time trial and judged their pace by time splits given at .25 mile, .5 mile, and every half-mile thereafter. Subjects could alter their running speed at any time. Heart rate and ratings of perceived exertion were also taken at every mile. Despite an apparent trend for deterioration of performance with increased alcohol intake, analysis of variance indicated no significant difference ($p > .05$) for any of the parameters measured. These data indicate that there is no performance-enhancing "removal of inhibition" at these very low BAL as has been speculated by some investigators. Analysis with order as a covariant revealed a significant order effect despite familiarization sessions prior to the experimental time trials. This latter finding has important implications for future studies which simulate real race conditions in the laboratory.

Midwest Chapter of the American College of Sports Medicine, Winter Meeting
Boyne Mountain, Michigan, February 6, 1985

EFFECTIVENESS OF ACUPUNCTURE AS AN ADJUNCT TO A SMOKING ABSTINENCE PROGRAM

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Smoking continues to be the largest preventable cause of death in America. About 350,000 Americans die prematurely each year from pulmonary and cardiovascular diseases related to smoking. It is report that 75% of smokers want to abstain, but only 3 - 15% are successful on their own without a formal abstinence program. We therefore want to offer an effective smoking abstinence program to our patients. In January 1981 the American Cancer Society (ACS) reported a prospective study of 1213 participants in their group interaction and behavior modification smoking abstinence clinics (four to sixteen hours with a trained lay facilitator). On six month followup the ACS programs reported 23% smoking abstinence. From December through May 1984 our office practice provided a 90 minute smoking abstinence program to 195 clients with 45 minutes of group interaction and behavior modification lead by our nurses followed by 20 minute Acupuncture at Lung Points on the ears (Nogier) and wrists (Olms Lung 7). Each client was contacted in followup by a nurse interviewer six months after his participation. We had a 82% (159/195) response rate with a 36% (57/159) abstinence rate (effectiveness = 3X no program, 1.6X ACS programs), 16% (25/159) reduction rate (one-third less) and an overall success rate (abstinence or smoking one-third less) of 52% (82/159). Our favorable results suggest that Acupuncture has been an effective adjunct to our smoking abstinence program. Acupuncture seems to reduce the compulsive urge to smoke and to minimize the smoking withdrawal symptoms, possibly through autonomic reflex release of endorphins and enkephalins from the pituitary.

RELATIONSHIP OF LOCUS OF CONTROL TO RATINGS OF PERCEIVED EXERTION DURING CARDIOVASCULAR EXERCISE TRAINING IN CARDIAC PATIENTS

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Purpose of this study was to investigate the relationship between heart rate (HR) and ratings of perceived exertion (RPE) in internally vs. externally motivated cardiac rehabilitation patients. Twenty-two patients; 12 men and 7 women were categorized as internally or externally motivated based on Rotter's locus of control scale. Mean age and weight for the men were 59.5 yr. and 77kg.,respectively. Mean age and weight for the women were 60.6 yr. and 60.3 kg., respectively. HR and RPE were recorded retrospectively for exercise sessions involving step bench (S), rowing machine (R), bicycle ergometer (B), arm crank (A), air dyne (D), and treadmill (T). Mean exercise HR's for the internals were consistently lower than for the externals, while mean RPE's were consistently higher for the internals. Correlations of HR and RPE for the internals were: r=.278 (D); r=.267 (A); r=.302 (B); r=.020 (R); r=.270 (S); r=.020 (T). Correlations for the externals were: r=.516 (D); r=.477 (A); r=.626 (B); r=.911 (R); r=.515 (S); r=.402 (T). Z_r-transformation showed a significant difference ($P<.05$) between correlations for the internals and externals for the bicycle ergometer, rowing machine, and treadmill. It was concluded that the source of motivation may have an important role in determination of RPE.

EVALUATION OF LOGISTIC REGRESSION TO PREDICT RISK FOR PHASE II TRAINING IN CARDIAC PATIENTS.

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Logistic regression equations were previously reported as useful in predicting the risk for Phase II training among myocardial infarction (MI) and coronary artery bypass graft (CABG) patients (pts). However, since these equations were originally presented, no follow-up data has been published demonstrating their usefulness in similar out-patient programs. Purpose of the present study was to assess the predictive value of these equations when applied to another Phase II group. Regression scores were calculated on 16 MI and 19 CABG pts entering our Phase II program May through September 1984. Both groups were analyzed separately. The logistic equations used were:

$$\text{MI pts}\quad Z = 1.94 - 1.13_{x1} - 1.8_{x2} - 1.35_{x3} + 1.69_{x4}$$

$$\text{CABG pts}\quad Z = 18.25 - .1_{x1} - 11.72_{x2} - 11.27_{x3}$$

For MI pts, 4 yes/no variables were utilized: x1 = GXT ST depression, x2 = GXT dysrhythmias, x3 = GXT angina and x4 = use of propranolol. For CABG pts, 3 yes/no variables were utilized: x1 = age, x2 = use of anti-dysrhythmia medication and x3 = GXT dysrhythmias. During the 12 week period of exercise training, 2 MI and 2 CABG pts suffered clinical events. A clinical event was defined as: 1) unstable angina, 2) complicated ventricular dysrhythmia, 3) heart failure, 4) MI or 5) sudden death. Predictive accuracy was 100% for CABG pts but neither MI patient event was predicted. Results of this study suggest that the existing equation for CABG pts is adequate while further consideration should be given to the equation for MI pts.

EVALUATION OF INTERVAL TRAINING IN A PHASE III CARDIAC REHABILITATION PROGRAM

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The purpose of this study was to determine if HR's elicited from a walk/jog exercise routine were of sufficient intensity (60% HR max) and duration (15 min) to meet minimum ACSM conditioning criteria. One female and 12 male Phase III participants ($\bar{x}$ age 56.2 ± 2.1 yrs, $\bar{x}$ height 177 ± 2.0 cm, $\bar{x}$ weight 79.2 ± 2.4 kg) with an average of 12.6 months class experience volunteered for the study. Nine subjects were post CABG surgery patients and 4 subjects were post-MI patients. Subjects performed their prescribed walk/jog routines while being monitored via radio telemetry. Target HR's were calculated from GXT data using the heart rate reserve method. ECG strips were obtained after each alternate walk/jog cycle. Mean walking HR (101 ± 13 beats/min) was below the 60% lower HR limit mean of 111 ± 14 beats/min. Mean jogging HR (124 ± 18 beats/min) was above 60% but below the 85% upper HR limit mean of 130 ± 18 beats/min. Walking and jogging mean times were 21 ± 7 min and 10 ± 5 min respectively. Results of this study indicate the mean jogging intensity was sufficient to elicit a training HR; however, mean jogging duration was too short. Mean walking intensity was of insufficent demand to produce a training HR although mean walking duration was adequate. It is recommended that participants' walking paces be regularly monitored to assure that training HR's are achieved. Further, the present walk/jog ratio should be modified to maintain HR's in the prescribed 60-85% training zone.

DEVELOPMENT AND REGRESSION OF CARDIAC HYPERTROPHY IN FEMALE WISTAR RATS

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The effects of an 8-week swim training program and a 3-week detraining period on the size and protein composition of the heart of female Wistar rats were examined. The animals were separated into three groups: trained, detrained, and sedentary control. The training program of 6 hours/day, 5 days/week, resulted in significantly ($P < 0.05$) larger (33%) dry heart weight (HW), and greater (40%) collagen content (HYPRO), as compared with control animals at 8 weeks. The mean values were HW = 0.204 and 0.153g, and HYPRO = 3.90 and 3.72 mg/heart, for trained and control animals, respectively. The greatest changes among trained rats occurred between 4 and 6 weeks of training, with HW increasing 29%, total protein content increasing 20% and HYPRO increasing 15%. Only HYPRO and dry HW were significantly elevated at 6 and 8 weeks as compared with 2 and 4 weeks of training ($P < 0.05$). Heart mass, total protein content and collagen concentration returned to normal by the end of the detraining period. The regression of dry HW, however, was interrupted by a lack of change during the second week of detraining. These data demonstrate the dynamic growth response of the heart to changes in functional demand, i.e., exercise and its cessation.

TISSUE OXYGEN CONSUMPTION VALUES IN RABBIT SKELETAL MUSCLE AFTER NINE MONTHS OF TREADMILL EXERCISE

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Succinic oxidase activity (SOA) levels of fast, slow, and intermediate hindlimb skeletal muscle were determined in eight male New Zealand White Rabbits. Approximate age and weight at the time of sacrifice was 12 months and 3.8 kg. Rabbits were age-matched and randomly assigned to either an exercise group (EXER) or a sedentary control group (SED). EXER animals underwent a nine month training program that involved exercising on a Quinton treadmill twice a day for five days a week. The exercise program started with 7.5 minute sessions and progressed to 20 minutes, while the speed of the treadmill increased from 16 m/min to 32 m/min over the nine months. A constant grade of 8% was used throughout the program. The muscles examined were the soleus (SOL), the tibialis anterior (TA), and the extensor digitorum longus (EDL). SOA levels were determined by measuring the rate of oxygen consumption of the muscle homogenate with a recording oxygen polarograph. Mean and standard deviations for SOA levels of the EXER rabbits in the SOL, TA, and EDL were 4.3 ± 0.6, 2.5 ± 0.5, and 2.3 ± 0.4 μmol/min/gWW, respectively. Values for the SED group in the respective muscles were 2.2 ± 0.4, 1.6 ± 0.3, and 1.5 ± 0.3. Students' t-tests indicate a significant difference ($p < 0.05$) between the EXER and SED animals in each of the three muscles. These data document the training effect that occurs in three types of rabbit skeletal muscle with chronic endurance exercise and tend to concur with SOA levels reported in other animal models. These findings, along with observed changes in heart rates and muscle weights, demonstrate the feasibility of utilizing rabbits in endurance exercise training studies involving both in vivo and in vitro measurements.

Muscle Glucose 6-Phosphate Activity with Varying Durations of Eccentric Exercise

Susanne B.Kaiserauer, Ann C. Snyder, Willis Morse, and P. Darrell Neufer

Exercise induced muscle degeneration has been shown to be related to the eccentric component of muscle contraction. The purpose of this study was to determine if the inflammatory response following eccntric exercise was dependant on exercise duration and to compare this response in different muscles. Methods: untrained male rats ($\bar{X}$ ± SE, body weight = 554.3 ± 7.70) were run on a treadmill for a total effective running time of one hour. The animals were run 0,25,50,75 or 100 percent of that time down a decline of 16 degrees,with the remainder of the run being level. The effects of the varying durations of eccentric exercise on the inflammmatory response were determined by analysis of Glucose-6-phosphate dehydrogenase (G6PDH) activity in the soleus, plantaris, long head of the tricep and vastus intermedius muscles 60 hour post-exercise. Results: plantaris G6PDH activity in all groups that performed some eccentric exercise was significantly higher than that of the level runners or controls ($p=.001$). There was no effect of increasing the duration of the eccentric exercise. Vastus intermedius G6PDH activity was higher ($p=.01$) following the longer bouts of eccentric work than in the control and level runners. The rats running 100% level also had significantly higher vastus intemedius G6PDH activity than did the controls. The soleus and tricep muscle G6PDH activity was not significantly elevated above control values in any exercising group. The muscles as a whole revealed that level running did not produce the significant rise in G6PDH activity that all other exercise groups did; as the level running values were comparable to those of the controls. Conclusions: our results suggest that inflammation occurs with any exercise that has an eccentric phase, as varying the amount of time spent performing eccentric exercise only caused a significantly greater response at near 100 percent eccentric work. As the responses were varied in different muscles, the regenerative/degenerative time course following such exercise may differ with fiber type and locomotion.

ELECTROMYOGRAM (EMG) ANALYSIS OF SELECTED PARALLEL SQUAT STANCES

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The purpose of this study was to investigate muscular involvement and technique during the performance of various stances of the parallel squat. Six variations of the parallel squat were analyzed. There were three variations in the placement of the feet (narrow, medium, wide) and two variations in placement of the barbell (high on trapezius muscle and lower on mid-scapula area of the back). Each of the three variations of feet placement were combined with the two variations of barbell placement. The subjects performed three repetitions of each stance. Eleven trained and experienced male weightlifters were used. Ages ranged from 18 to 41 years with a mean of 24.5 years. Subjects' body weights ranged from 157 to 248 pounds with a mean of 195.3 pounds. Electromyography and cinematography were used to determine muscular activity and observe technique, respectively. The four muscle groups analyzed for muscular activity were the adductors, gluteus, hamstrings, and quadriceps. Changes in myoelectrical activity (muscular action potentials) in the muscles were found to be nonsignificant, as determined by ANOVA for repeated measures, in the six variations of the squat that were performed. When the two variables (stance and bar height) were analyzed for interrelationships between stances, as determined by MANOVA, there was one combination found to have significantly ($p < .05$) less muscular activity than the others. The wide stance with the bar carried high (WBH) did show significantly less myoelectrical summation in the quadriceps group. Although there were no significant differences between the stances for the subjects as a group, there were some obvious differences between stances for some of the subjects when looked at individually. Technique differences could be the cause of some of the differences seen in the individual performances of the subjects.

CENTRAL AND PERIPHERAL RESPONSES TO VARIED ARM SPEEDS AT CONSTANT WORK LOADS

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At present, considerable uncertainty exists regarding the relative contributions of speed and resistance to total oxygen consumption (VO_2) and myocardial oxygen consumption (MVO_2). The product of heart rate and systolic blood pressure (RPP) is a well accepted index of MVO_2 and has been used to quantify the level of central stress during exercise. The purpose of the present study was to determine the effects of arm cranking rate upon VO_2 and RPP. The subjects were 10 college students (6 male, 4 female). Peak work load was determined by a maximal arm crank GXT using a modification of the method of Franklin et al. Subsequent maximal GXTs required the subjects to exercise at 60, 80 and 100% of measured peak work capacity at speeds of 30 and 70 rpms. The GXTs were given 7 days apart in random order, at 70 and 30 rpms. A main effect, of cranking rate, was observed for both VO_2 and RPP. Interaction of work load and cranking rate also had a significant effect on RPP ($p \leq .05$).

	VO_2		RPP		HR		BPS	
	F	P	F	P	F	P	F	P
Workload	.44	.6533	1.25	.3097	3.24	.0630	1.24	.3141
RPM	16.47*	.0001	27.55*	.000	64.97*	.0000	12.96*	.0003
Interaction	.61	.6575	6.25*	.0006	.62	.6526	.67	.6174

*$p \leq .05$

These findings indicate that VO_2 and MVO_2 are influenced by arm cranking rate and that MVO_2 is determined by the combined effects of workload and rate of cranking.

COMPARISON OF MAXIMAL OXYGEN UPTAKE DURING EXERCISE ON A VERSACLIMBER, BICYCLE ERGOMETER AND TREADMILL.

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Eleven subjects underwent a maximal graded exercise stress test on a treadmill, bicycle ergometer and Versaclimber (VC) (a device that simulates a climbing motion using the arms and legs) to compare the maximal oxygen uptake exercise requirements. The order of testing was rotated. For each test, the workload was increased after every three minutes until the subject could no longer continue to exercise. Subjects (age, 27.7 yrs +/- 5.8 yrs; weight, 75.2 kg +/- 11.6 kg; %fat, 10.8% +/- 6.0%) were monitored for RER, HR, and VO_2 (mls/kg) at all stages.

	RESULTS +/- S. D.		
	TREADMILL	**VERSACLIMBER**	**BICYCLE**
MAX VO_2	65.5 +/- 9.4	61.0 +/- 8.7	61.4 +/- 8.6
HR	188.6 +/- 13.7	186.0 +/- 10.7	187.5 +/- 13.5
RER	1.11 +/- 0.08	1.08 +/- 0.08	1.12 +/- 0.07

For RER and HR there were no significant differences across exercises. Maximal oxygen uptake scores for the treadmill were significantly different from the bicycle ($p < 0.05$) and VC ($p < 0.01$). Bicycle scores and VC scores were not significantly different ($p > 0.05$). Oxygen consumption (mls/kg) for the VC can be predicted ($r = .954$, $SE = 4.11$) as follows:

$$\textbf{mls/kg} = 0.2947 * \textbf{ft/min} + 6.644$$

The VC is a weight dependent type of exercise that has an energy cost in mls/kg of O_2 that is comparable for all persons at the same climbing speed. The correlations between the treadmill, bicycle and VC for max VO_2 were: treadmill vs bicycle, $r = 0.87$; treadmill vs VC, $r = 0.87$; bicycle vs VC, $r = 0.84$. Therefore, maximum oxygen uptake elicited on the VC is lower than the treadmill and yet comparable to the bicycle. Furthermore, the high correlations between the tests demonstrates within subject consistency between tests.

WITHIN-SUBJECT VARIABILITY OF STEADY-RATE HEART-RATE AND BLOOD PRESSURE DURING CYCLING AT 50 and 125 Watts.

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The within-subject variability of steady-rate heart-rate and blood pressure responses to exercise at 50 and 125 watts (W) was studied in four male subjects ($\bar{X} \pm$ SEM for age, weight, fat% and VO2 max is: 30.3±5.5 yrs; 67.84±3.68 kg; 11.4±4.4%; 58.13±8.96 ml/kg/min). An average of 17 and 10 repeat tests were done at 50 and 125 W, respectively. Twice per week testing was done on a rotated design basis. Each test was 10 min duration. The pedal rate was 65 rpms for all tests. Heart-rate was measured with a bipolar ECG. Systolic and diastolic blood pressures were measured with a Critikon Exercise Monitor. Within-subject variability of heart-rate and blood pressure was calculated as the standard deviation of steady-rate heart-rate and blood pressure for the repeat tests at each work-rate. Steady-rate was defined as the average of min 3 to min 10 for each of the dependent measures. The mean values of the 4 subjects for heart-rate and blood pressure for the 2 work-rates are presented in the table.

	HR		Systolic BP		Diastolic BP	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
50W	99.8	8.59	140.5	10.56	71.7	7.30
125W	126.5	8.67	168.7	9.75	73.1	7.81

The average relative within-subject variability ($SD/\bar{X}$) for heart rate is 8.49% and 6.67% for 50 and 125 W, respectively. The average relative within-subject variability ($SD/\bar{X}$) for systolic blood pressure is 7.09% and 5.70% and for diastolic blood pressure 10.16% and 10.58% for 50 and 125 W, respectively. It can be concluded that while the absolute within-subject variability remains unchanged with increasing work-rate, relative variability decreases with increasing work-rate (except for diastolic blood pressure). This decrease in within-subject variability suggests that steady-rate heart-rates and systolic blood pressures are achieved with less biological variability at higher work-rates.

LACTATE PRODUCTION AMONG COLLEGE MALES DURING ROWING EXERCISE

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The lactate production resulting from a 20 minute bout of exercise on a rowing machine was measured in ten healthy college males. The mean age of the subjects was 23.4 ± 0.9 yrs. and the mean height was 69.7 ± 2.4 inches. Blood lactate concentrations were measured before (PRE) and 1 min. 30 secs. following (POST) 20 minutes of rowing. Prior to the rowing test each subject completed a graded exercise test on a treadmill (TDM) to determine maximal oxygen consumption (MAX VO2). Subjects also completed 5 minute bouts of rowing exercise at varying speeds and intensities to determine the levels required to elicit an appropriate training range of exercise. The mean maximal values for heart rate (HR) and MAX VO2 during the treadmill test were 196.1 ± 6.6 bpm and 61.0 ± 7.8 ml/kg/min, respectively. All subjects, with the exception of one, were able to complete the 20 minute rowing bout. The mean maximal value for HR during the rowing test was 174.3 + 9.8 bpm (88.9% of MAX HR on TDM) while the mean MAX VO2 was 39.9 ± 2.1 ml/kg/min (65.4% of VO2 MAX on TDM). PRE lactate values ($\bar{X}$ = 2.2 ± 0.7 mM) concur with previously reported information concerning lactate levels among college males. The POST lactate levels ($\bar{X}$ = 8.0 ± 3.0 mM) were significantly greater ($p < 0.05$) than the PRE values and tended to be higher than concentrations reported for treadmill exercise at approximately the same percent of MAX VO2. These data document lactate production among healthy college males during steady state rowing exercise and the results have implications concerning the appropriate use of rowing machines in various training programs.

MACSM ABSTRACT

OPTIMAL COURSE SIZE AND SHAPE FOR WALK STRESS TEST

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Traditional graded exercise stress tests with ECG, O2 uptake, treadmills, bicycle ergometers, and technical assistants provide much useful information in both diagnostic and functional performance evaluations. At the same time they might be viewed as an entry level bottleneck to many who simply desire to safely begin an exercise program but are reluctant because they haven't had a stress test. Seventy-two volunteers (18-35 yrs., equal subgroups, N=18 of non-active and active males and females) were tested in the first of a study series to determine whether a valid alternative "stress test" procedure using level walking can be devised.

Three basic geometric shapes which suggested their potential use in gyms, small rooms and hallways, etc. were chosen: a large oval track (49.1 m), a smaller circle (30.7 m) and a still smaller rounded rectangle (24.8 m). The associated internal lengths and widths, avoiding duplication, provided 3 additional shuttle courses (37.9 m, 19.0 m, and 9.8 m) which could be tested. Subjects walked for 3 min at a standardized and monitored fixed pace (3 mph = 4.8 km/h) over these 6 randomly assigned courses marked off on a gym floor followed by 3 min rest intervals. Criteria for optimal course selection were smallest increases over resting levels and lowest response variability ($P < .05$, ANOVA) for selected measures such as exercise heart rates, blood pressures, breathing rates, and combined observations plus subject perceptions of pacing difficulty.

Results indicated similar responses to 4 courses which could be used (oval, circle, rectangle, and long shuttle) but not for short or intermediate shuttles which yielded high and variable responses likely due to unsteady pacing. These same 4 courses were optimal in terms of discriminating between previously active vs. non-active subjects using heart rates, whereas, all courses showed such differences based on breathing rates. The only differences observed in blood pressure responses were gender specific. Greater difficulty in steady pacing and enhanced subject perceptions of rigor are other negative factors against the use of the short and intermediate shuttle courses in future studies of optimal test speeds.

WHOLE BODY ELECTRICAL RESISTANCE AS A PREDICTOR OF BODY FAT: A VALIDITY AND RELIABILITY STUDY.

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Twenty-seven females (F) and 28 males (M) were studied to test the validity and reliability of whole body resistance (WBR) as a predictor of body fat. Selected characteristics (mean ± sd) of the subjects are given below.

	AGE (YRS)	WEIGHT (KG)	HEIGHT (CM)
F	24 ± 5	57.00 ± 7.00	165.0 ± 6.4
M	24 ± 5	74.59 ± 9.87	178.4 ± 6.6

	FAT % (U.W.W.)	FAT % (WBR)	VALIDITY (r, ± se)
F	20.1 ± 4.7	22.2 ± 4.0	0.382, ± 4.5%
M	12.1 ± 5.3	12.2 ± 4.1	0.538, ± 4.5%

Body composition was measured using the hydrostatic weighing technique (U.W.W.), with residual lung volume determined by the oxygen dilution method. Percent body fat was computed from body density using the Siri equation. Percent body fat analysis by WBR was determined employing the RJL bio-electrical system.

Test-retest reliability for WBR (5 min between tests) is r=0.999. Reliability across a 5 day period is r=0.984 in 13 subjects. The correlation between fat percent by hydrostatic weighing and WBR is r=0.382 (F) and r=0.538 (M). There were no significant mean percent fat differences between the two methods. The standard error for predicting an individuals percent fat is ± 4.5 percentage points for both male and females.

It is concluded that WBR is reliable method and can predict group mean scores, but at present, is not a good predictor of individual percent fat scores. To improve validity, new equations for specific populations are required.

ACCOMMODATIONS:

The conference hotel is:
Howard Johnson's Motor Lodge
501 W. Washington
(317) 635-4443

Other hotels include:
Atkinson Hotel
(317) 639-5611
Hilton on the Circle
(317) 635-2000
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The Female Sport and Fitness Participant

November 8-9, 1985

Annual Meeting
Midwest Chapter
American College of Sports Medicine
Indianapolis, Indiana

The Female Sport and Fitness Participant Conference

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-THE INDIANAPOLIS STAR-

SUNDAY, NOVEMBER 10, 1985

Dietitian warns against losing races in kitchen

RUNNING

By PATRICIA HAGEN

SOME female athletes sabotoge their training in the kitchen. If their low-calorie diets are low in nutrients, their health and performance may suffer.

A balanced diet will go a long way toward beating nutritional deficiencies, contend Nancy Clark, a registered dietitian and nutrition writer from the Boston area, and Richard Parr, director of the human performance lab at Central Michigan University. They discussed nutritional concerns in telephone interviews before arriving in Indianapolis Friday for *The Female Sport and Fitness Participant* conference sponsored by the Midwest chapter of the American College of Sports Medicine.

Women are more likely than men to be deficient in iron, which is crucial to the formation of red blood cells, Parr said. Many women don't consume enough iron, and the problem may be more common among athletic women who restrict their calorie intake.

Women lose iron each month during their menstrual period, in addition to the amount lost in perspiration. They need almost twice as much iron as men do, but, typically, consume only about half as much in their diets.

Women need about 18 mg of iron a day, but consume only 9 mg in a typical 1,500 calorie diet. Men only need 10 mg, but usually consume about 18 mg in 3,000 calories.

IRON-DEFICIENCY anemia is a commonly heard term, but not a common condition, Parr said. Few people have deficiencies severe enough to be classed as anemia.

Scientists aren't sure yet how iron levels affect performance, said Parr, a professor of health education and health science. An iron deficiency may not be noticed by a weekend sports enthusiast, but it may mean the difference between a win and a loss for an elite athlete. Tiredness is a common symptom of iron deficiency, which can be detected by a blood test.

A balanced diet, high in iron-rich foods, may prevent a problem, Parr said. Meat and green leafy vegetables are good sources of iron, while dairy products are not. Vitamin C enhances absorption of iron, but fats and tea may inhibit it.

Some women also choose to take an iron supplement or a multi-vitamin with added iron, Parr said.

Three other nutritional deficiencies are common among women, said Nancy Clark, the author of *The Athlete's Kitchen* and a columnist for sports magazines.

- Calcium deficiency can lead to osteoporosis, bone loss. "Most women don't recognize that their bones are alive and need to be fed," she said.

Some weight-watchers figure that milk and cheese have too many calories, so they skip the necessary two to three servings a day of dairy products, a good source of the calcium needed to build bones.

- Carbohydrate deficiency is another common problem. Some women mistakenly think high-carbohydrate foods make them gain weight. High-fat foods are a more likely culprit, she said, adding that carbohydrates are the best source of energy for muscles.

A shortage of carbohydrates means that "your muscles just get real tired," a problem for active woman, Clark said.

Most people should eat a diet comprised of 60 percent carbohydrates, Clark advised. Eat more potatoes, bread and noodles, rather than a big serving of meat or poultry. Women who exercise a lot may consume more calories than sedentary women, but need about the same share of carbohydrates.

- "Deficiency of breakfast" is another common problem.

Dieters who skip breakfast and eat a few lettuce leaves for lunch typically pig out in the evening on "grease, goo and sweets." The next day, they wake up full and repeat the unhealthy pattern the next day, Clark said.

It's better to eat substantial meals and burn the calories during the day, than to consume a lot of calories in the evening before bed, when the calories are more likely to be stored as fat.

Clark recommended breakfast cereal to people looking for high-energy foods that won't sabatoge their nutrition or their weight. Bran flakes, for example are high in fiber and enriched with B vitamins and iron. Top the cereal with banana for a good dose of potassium and low-fat milk for calcium. A glass of orange juice provides vitamin C which enhances iron absorption.

FOURTH SCIENTIFIC SESSION - ALPINE ROOM

8:15-8:30 The incidence of Cardiovascular complications identified by continuous monitoring in a phase II cardic rehabilitation program, M.A. Kelsey, Ohio State University.

8:30-8:45 The appropriateness of a fixed blood lactate concentration for determining training intensities, J.S. Simonsen , Texas Tech.

8:45-9:00 Cardiovascular effects of endurance training during submax exercise in elders, N.I. Williams, The Ohio State University.

9:00-9:15 Interactions among aerobic exercise, anxiety, and myocardial damage in the rat. G. DeJong, Michigan State University.

9:15-9:30 Postnatal Fiber composition in the rat soleus muscle following endurance training - a pilot study, M. Haven, Michigan State University.

RECREATION

10:00-4:30 Skiing
12:00-2:30 Lunch - Main Dining Room
1:00 Check out of Room

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Winter Meeting

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American College of Sports Medicine

ABSTRACTS OF PAPERS PRESENTED

Boyne Mountain, Michigan

February 5,6,7, 1986

Athletics and Self-Actualization

Toni M. Schindler, M.A., Dayton, Ohio

ABSTRACT

Self-actualization differences, as measured by the Shostrom Personality Orientation Inventory (POI), between sexes and different degrees of athletic involvement were measured for college students. Differences were found on all six scales used, Time Ratio (T_I/T_C), Support Ratio (O/I), Self-Actualizing Value (SAV), Existentiality (Ex), Self-Acceptance (Sa), and Self-Regard (Sr).

In general, women were more self-actualizing than men. Male athletes were significantly more self-actualizing than non-athletic males while athletics did not, significantly, affect females' self-actualization. Male and female athletes had similar scores on most scales, yet for non-athletes sex differences were substantial. Practical implications for use in counseling, coaching, as well as for the athlete himself are discussed.

BODY COMPOSITION ANALYSIS: COMPARISON OF HYDROSTATIC WEIGHING AND SKINFOLD DETERMINATIONS WITH BIOELECTRICAL IMPEDANCE MEASUREMENTS FOR ESTIMATING BODY COMPOSITION IN MALE AND FEMALE SUBJECTS

C. M. Renk, L. V. Breitlow, and E. Sander. Department of Associated Health Professions, Eastern Michigan University, Ypsilanti, MI 48197 and Department of Human Kinetics, University of Wisconsin, Milwaukee, WI 53201.

This study was undertaken to compare the usefulness of bioelectrical impedance (BI) measurements with skinfold (SF) determinations and hydrostatic weighing (HW) for estimating body composition (BC). Reliable rapid screening methods are useful when determining BC in large numbers of subjects. HW and whole body potassium counting are reliable methods for determining body density but are cumbersome for screening large numbers of subjects. SF measurements are useful for screening large populations but may be subjective in their estimation of BC. BI offers the advantage of rapid analysis with reliable non-subjective determination of body density. In order to determine the usefulness of BI with more standard methods, 63 female (F) and 36 male (M) subjects (ages 18-67) were screened by BI and SF and 28 F and 28 M subjects (ages 19-53) were screened by BI and HW and BC estimated. Mean percentage fat determinations (%F) were not significantly different between BI and SF and BI and HW. Correlation coefficients comparing %F by BI with SF were statistically significant for F & M ($r = .872$, $p = .0011$) and F alone ($r = .889$, $p = .0003$). No statistical correlation was found in male subjects ($r = .572$, $p = .22$). Correlations of %F between BI and HW were statistically significant in all groups ($p < .0001$), (F & M, $r = .938$), (F, $r = .934$) and (M, $r = .897$). The results from this study suggest that BI is a reliable predictor of BC when compared to HW in female and male subjects and BI is a reliable predictor of BC when compared to SF in female subjects. BI may prove to be a useful tool for assessment of BC when evaluating the nutritional status of large groups and in patients where standard methods cannot be adequately applied.

IMPROVING VERTICAL JUMPING ABILITY IN COLLEGE-AGE FEMALE VOLLEBALL PLAYERS

L. B. Stewart, M. Lingenfelter, J. McManama, Human Performance Laboratory, Ball State University, Muncie, IN. 47306

Eight college-age female volleyball players participated in a 15-week program of depth jumping and leg strength training (TR) during their fall volleyball season in order to improve their vertical jumping ability. The previous year's volleyball season which did not include these training programs (NoTr) acted as a control. Isokinetic leg contractile strength (extension and flexion peak torque measured at three speeds) and isotonic leg strength (leg press, extension, and flexion) were measured pre-season (Pre) and post-season (Pos). Significant improvement in vertical jump (cm) ($p < 0.007$) was found Pos-TR compared to the other periods. (Pre-NoTR = 44.60 ± 3.43, Pos-NoTR = 46.84 ± 3.73, Pre-TR = 47.32 ± 3.63, Pos-TR = 51.28 ± 3.38) (Mean ± SD). Isokinetic extension mean peak torque (ft.lbs) significantly improved when measured at 180 deg/sec ($p < 0.02$) and 300 deg/sec ($p < 0.004$) Pos-TR compared to Pre-TR (99.13 ± 9.83 vs 91.88 ± 11.63, 66.75 ± 8.58 vs 60.63 ± 8.25, respectively). Similarly, isotonic strength (lbs.) significantly improved Post-TR for leg press strength ($p < 0.001$) and leg extension strength ($p < 0.03$) compared to Pre-TR (561.25 ± 22.48 vs 428.13 ± 58.73, 260.63 ± 28.84 vs 230.00 ± 22.52, respectively). Pos-TR vertical jump correlated with Pos-TR isotonic leg flexion strength ($r = 0.82$, $p < 0.001$). Surprisingly, no other correlations of individual Pos-TR vertical jumping ability were found with 12 measures of isokinetic strength, 2 measures of isotonic strength, or 4 measures of body composition ("r" ranged from -0.38 to 0.34). This indicates the techniques used to measure improvements in vertical jumping ability may not be specific for the performance activity. Depth jump and leg strength training will improve vertical jumping ability as well as isokinetic and isotonic leg strength. The mechanisms for these improvements are likely to be found in neuro-muscular proprioceptive and contractile adaptations.

A PROFILE OF CORPORATE FITNESS PROGRAM DIRECTORS AND STAFF

J. Douglas Seelbach and Geraldina Mattia. Exercise and Health Science Department, Alma College, Alma, MI 48801

A survey of corporate fitness program directors and staff was made to gain information concerning the experience, certification, and educational backgrounds of corporate fitness personnel employed in "on site" programs. 250 questionnaires were distributed; 170 (68%) were returned but only 97 (39%) satisfied the "on site" criterion. The average time of existence for the programs surveyed was 3.3 yr (range 1 mon to 19 yr) and the average length of employment of current program directors was 2.0 yr (range 1 mon to 10 yr). 56% of the respondents had no previous experience as program directors while those with experience averaged 1.7 yr. 9% of the respondents were Ph.D's, 67% held masters degrees and the remaining 18% held a bachelors as their highest academic degree. Approximately 1/3 of the program directors were ACSM certified with the breakdown as follows: Program Director, 3%; Exercise Specialist, 5%; Exercise Technologist, 18%; Fitness Instructor, 7%. 12% were YMCA certified Fitness Specialist, while 8% were YMCA certified Fitness Instructors. 77% were CPR certified, 42% were certified CPR Instructors, 9% were certified Athletic Trainers and 10% were Emergency Medical Technicians. 9% of the program directors possessed no professional certifications. 40% of the corporate fitness programs had no full or part-time staff other than the program director. Those programs with additional staff averaged 1.5 full-time and 1.9 part-time personnel. 41% of the full-time and 23% of the part-time staff held graduate degrees. 22% of the full-time staff held at least one ACSM certification compared to only 4% for the part-time staff. These data reflect the fact that many fitness programs in business and industry are in their infancy and that few guidelines have been established concerning the educational and competancy standards of corporate fitness personnel. The modest number of ACSM certified program directors is a concern that must be addressed as the fitness movement continues to expand into the corporate sector.

ABSTRACT

CHANGES IN AEROBIC AND ANAEROBIC POWER DURING A CROSS COUNTRY SEASON. J.E. Davis, J.D. Seelbach, K. Ball, and M. Duff. Dept. of Exercise and Health Science, Alma College, Alma, MI 48801

This study was conducted to follow changes in aerobic and anaerobic power during a distance training program (mean running distance = 12 km per day). Five male and 5 female competitive cross-country runners were tested early season (EAR), mid-season- (MID), and the end of their competitive season (POST). Maximum oxygen consumption ($\dot{V}O_2$max) was determined using a standard progressive protocol. Peak anaerobic power (AP) and anaerobic capacity (AC) - mean 30 sec anaerobic power output were measured using the Wingate Anaerobic Power Test. The results were as follows:

		Men			Women		
		EAR	MID	POST	EAR	MID	POST
$\dot{V}O_2$max	(ml/kg/min)	76.6	76.9	75.0	64.7	65.8	67.3
AP	(watts)	513.0	538.1*	584.0*#	402.4	430.8*	432.5*
AC	(watts)	323.3	357.2*	361.9*	225.6	277.5*	275.7*

* POST, MID > EAR ($P < .05$) # POST > MID ($P < .05$)

There were no significant differences in $\dot{V}O_2$max between EAR, MID, and POST testing sessions for either men or women. However, for both the men and women, AP increased from EAR to MID and in the men there was a further increase from MID to POST. Anaerobic capacity also increased from EAR to MID but not from MID to POST. These data probably reflect two factors. First, cross country runners at the start of a season are more aerobically than anaerobically trained and second, mid and late season training emphasizes more speedwork resulting in improvements in anaerobic performance. It is interesting to note that the most significant performance improvements also occurred at the end of the competitive season. These data indicate that even though there was no change in $\dot{V}O_2$max during the course of their training program, these runners were able to run at a higher percentage of their $\dot{V}O_2$max during the latter stages of the season.

COMPUTERIZED METABOLIC ASSESSMENT OF ELITE CYCLISTS USING A VO2 WITH A.T. PROTOCOL.

Douglas Briggs, Ph..D., Eastern Michigan University; Lawrence Rink, M.D., Bloomington Hospital, Indiana

Fifteen elite cyclists including two National champions, cycled to exhaustion on a modified Monark 868 friction braked ergometer. The protocol was designed to exhaust subjects in 6 mins. following a 5 min. steady state warm up, at leg speeds between 90 and 120 RPM.
Blood gases were sampled every 15 seconds using a Sensormedics Horizon Metabolic Cart. A 12-lead EKG, manual blood pressures, and S-T changes were routinely recorded during rest, work to exhaustion, and recovery.
Within the limitations of the study, the magnitude of maximum power outputs (watts) and duration of ride(s) to exhaustion (min/secs), exceeded those earlier reported by U.S.O.C. when testing top male and female individual pursuit riders to exhaustion (315-480 W at preferred pedal frequencies of 92-126 RPM, compared with 540-600W at pedal rates of 110-120 for the T4C** in this study).
VO2 max values for the T4C ($\geq$80 mls./kg-min), were some of the highest reported for racing cyclists.
T4C ventilation frequency (f) (X=67.6) at critical power outputs of 385-540W was THE determining factor in high VEmax. values of 203-240L/min.
At power outputs of 315-460W, T4C obtained consistently higher PERCENTAGE INCREMENTS in VE and H.R., which were matched by similar increments in VO2(mls./kg-min).
T4C values for non-invasive A.T. criteria used in this study were consistently high, occurring at 460W. Less consistency was observed for gas exchange estimates of VO2 max.
The greatest number of significantly high positive zero-order correlations >.94 occurred at 460W, with the greatest number of significantly high positive correlations for T4C occurring at power outputs of 315-460W.
At 460W the relationships between VE(L/min); f(breaths/min): O2VE(L/L);CO2VE(L/L);VO2(mls./kg-min);Relative Efficiency (R.E.); and H.R. (bpm), appeared optimal for T4C.
A linear relationship existed between VO2 (L/min) and power output(w) between 90 and 315W.
MAXIMUM VALUE differences that existed between the T4C and total group (N=15) zero-order correlations occurred between: Max,power(w) and:1. VEmax. (.90/.38 grp.); 2. O2VE (.80/.04 grp.); 3. CO2VE 9-.93/-.30 grp.); 4. VO2(mls/kg-min) (.70/.43 grp);
VO2 max. (L/min) and 5. Weight (kgs) (.972/.66 grp);
6. Max H.R.(bpm)(.99/.56grp)
VO2max(l/min) and : 7. Weight(kgs.)(.82/.64 grp.).
It is concluded that the protocol used in this study is a valid measure of oxygen consumption capability for elite racing cyclists.

**T4C denotes the four highest recorded VO2 max values.

PREDICTING GLYCOSYLATED HEMOGLOBIN FROM MEAN PRE-EXERCISE BLOOD GLUCOSE IN AN EXERCISING DIABETIC POPULATION

D. M. Wojta, F. F. Andres, and R. Keyser. Department of Health Promotion and Human Performance, University of Toledo, Toledo, Ohio 43606

In recent years glycosylated hemoglobin (GHB) has been used as an indicator of long term control of blood glucose (BG) in a diabetic population. This pilot study examined mean pre-exercise BG from a home monitoring device, and GHB to determine if any correlation existed between the two. Such a finding would possibly allow clinicians, practitioners and patients to use the simple method of fingerstick capillary collection of blood to determine long term control of BG, thereby reducing the need for expensive and time-consuming laboratory measurements of GHB. A secondary purpose of the study was to determine the degree of compliance of the population with diabetic lifestyle modifications learned from the study the days BG was not recorded.

Six diabetics, all female, (63.0±10.2 yrs.), three insulin dependent and three noninsulin dependent, participated in a program consisting of diabetes education, exercise and nutritional counseling. Formal class met twice a week with subjects urged to practice class procedures throughout the duration of the week. BG was obtained by fingerstick collection of capillary blood and measured colormetrically. Samples were obtained pre each formal exercise session. Individual means were determined for the 14 weeks, summed and averaged. Meal time and content pre-exercise was controlled. Values of GHB were determined with venipuncture blood samples collected 14 weeks into the program and assayed by column chromotography. The Pearson product-moment correlation coefficient between GHB and BG = .9210, ($p < .0091$). A regression equation to predict GHB from BG was also calculated, Y(GHB)= .0565X(BG) + .6389.

These data indicate a significant correlation between GHB and pre-exercise BG in a diabetic population participating in a lifestyle modification program. Further studies need to be done in order to develop an accurate equation to predict longterm pre-exercise BG control from simple fingerstick collection. The high correlation between the two variables also indicates that lifestyle modification procedures were carried out <u>in abstentia</u> of formal class.

THE EFFECTS OF BODY POSTURE ON MAXIMUM VOLUNTARY VENTILATION

T.J. Michaud, J.A. Rodriguez-Zayas and F.F. Andres. Exercise Physiology Laboratories, The University of Toledo, Toledo, OH 43606

A recent investigation by Gergley et al., revealed significant differences in VO_2 peak with swim bench ergometry when compared to values obtained from treadmill and tethered swimming. It was hypothesized that differences in VO_2 peak may be attributed to impaired respiratory function due to torso position on the swim bench. Maximum voluntary ventilation (MVV) is the maximal volume of air that can be breathed in 15 sec, extrapolated to one minute. To determine the effect of body position on respiratory function, maximum voluntary ventilation values for 7 male and 2 female (age 21.6 $\pm$ 4.99 yr, ht 70.4 $\pm$ 3.15 in, wt 73.19 $\pm$ 13.55 kg) college students were determined in three positions. Subjects were tested for MVV values in the standing upright position (163.0 $\pm$ 29.38 l/min), prone on a swim bench (152.6 $\pm$ 31.99 l/min) and prone in the water (152.1 $\pm$ 34.83 l/min). Maximum voluntary ventilation was measured with an Ohio 827 Airco Spirometer interfaced with an Apple II plus computer using a Universal Computer Interface. The software package utilized was the Apple II plus, V1.0B, UCI/Imagewriter. One-way ANOVA was performed using the mean of two MVV values in each position. There was no significant difference between MVV values for the three positions. This suggests that posture particularly when lying prone on the swim bench does not appear to compromise MVV. These findings are in agreement with the observations of Gergley et al. Gergley found that the ventilatory equivalent value of swim bench ergometry was higher than for ventilatory equivalent values for treadmill and tethered swimming. This also suggests that posture had no adverse effect upon respiratory function.

EFFECTS OF SELECTED EXERCISE MODALITIES ON RESPIRATORY ECONOMY

A.E. Sawicki, R.E. Keyser, D. Mor, F.F. Andres, and L.O. Greninger. Exercise Physiology Laboratories, The University of Toledo, Toledo, OH 43606

The purpose of this investigation was to assess the effects of treadmill (TM), bicycle ergometer (BE) and arm-crank (AC) exercise on ventilatory equivalent (V_{eq}), an indicator of respiratory economy. Subjects were eight apparently healthy college students (5 male and 3 female). Discontinuous graded exercise tests were performed in random order by each subject on the TM, AC and BE. Steady state Minute volumes (V_E), breathing frequencies (f_b) and oxygen consumption (VO_2) values were obtained. Mean Tidal volumes (V_T) and V_{eq}'s were computed from the collected data. One-way ANOVA indicated that peak V_{eq} for AC (40.74 $\pm$ 15.64) was significantly higher than for BE (30.49 $\pm$ 3.97) or TM (29.90 $\pm$ 3.90) ($p<.05$). Mean V_{eq}'s were 10% higher for AC than for TM and 14% higher than for BE at comparable levels of VO_2. A two-way ANOVA indicated that these differences were statistically significant ($p<.05$). Furthermore, V_E was 14% lower for BE than for AC at equivalent levels of VO_2 ($p<.05$). Significant interactions of V_T, V_E and exercise modality were observed. Minute volume rose more rapidly with increases in V_E for AC than for TM or BC ($p<.05$). The results of the present study suggest that AC was less economical in terms of respiratory function than BE or TM as a result of an elevated V_T. The implications of these findings to exercise programs for healthy clients or patients with Chronic Obstructive Pulmonary Disease (COPD) remain undetermined and will serve as the basis for future studies.

OXYGEN UPTAKE AT 10-MILE INTERVALS DURING A SIMULATED 80-MILE BICYCLE TIME TRIAL

Langenfeld ME and Seifert JG. Human Performance Laboratory, Miami University, Oxford OH 45056.

Oxygen uptake data were collected from fourteen subjects who participated in a laboratory study which was designed to closely simulate an 80-mile bicycle time trial race. During the rides subjects ingested either a glucose polymer (GP) solution (5% GP + 2% fructose) or non-caloric placebo (PL). On three occasions, subjects rode their own bicycles mounted on windload simulators. The first trial was a familiarization ride. The second and third rides were conducted in double blind fashion using a counterbalanced design. Riders were instructed to cover the 80 mile distance as fast as possible at self-selected pace. Diet control was imposed during the 48 h preceding each trial. RESULTS. The mean VO2max based on preliminary evaluation was 55.9 ml/kg-min. Time to complete 80 miles was approximately 4 h. Beyond 60 miles there was a significant difference in mean VO2 values comparing the GP trial to the PL trial ($p<.05$). Similarly, beyond 60 miles there was a significant difference in mean %VO2max values comparing the GP trial to the PL trial ($p<.05$). There were no differences in Ratings of Perceived Exertion between the GP and PL rides at any distance. These data indicate that ingestion of GP polymer during ultraendurance exercise allows higher sustained oxygen consumption several hours into exercise without increasing the perception of effort.

THE USE OF BICYCLE WINDLOAD SIMULATORS IN THE LABORATORY

John G. Seifert, Mark E. Langenfeld, and Tim Rickabaugh, Human Performance Laboratory, Miami University, Oxford, OH 45056

Windload simulator devices for indoor bicycling have recently become widely available. With these devices an individual's bicycle is mounted on a stand which has a fan driven by the rear wheel to create a resistance related to wheel speed. The usefulness of such a device for VO2max testing, and the simulation of bicycle riding, was evaluated. Three experienced cyclists were tested for VO2max on a Monark friction-braked ergometer and on a Skid-Lid TurboTrainer windload simulator. When using the simulators, bicycles were fitted with commercially available bicycle computers to monitor speed. VO2max values were similar for the Monark and TurboTrainer (54.3 and 54.4 ml/kg-min, respectively). In order to reach VO2max on the simulators higher than normal gearing had to be fitted in order to create a large enough workload without increasing cadence above comfortable levels. The usefulness of these devices to mimic ultraendurance bicycling has been recently comfirmed in our laboratory during a study in which subjects rode 80 miles. Due to the geometry of the frames, subjects expressed strong preference for riding their own bikes instead of the Monark for the VO2max testing and especially the ultraendurance task. Although various details require close attention, windload simulators deserve further consideration for laboratory testing.

THE INCIDENCE OF CARDIOVASCULAR COMPLICATIONS IDENTIFIED BY CONTINUOUS MONITORING IN A PHASE II CARDIAC REHABILITATION PROGRAM

M.A. Kelsey, T.E. Kirby, and J.E. Homan, Cardiac Rehabilitation Program, Exercise Physiology Laboratory, The Ohio State University, Columbus, Ohio.

To determine the incidence of ECG abnormalities we reviewed the exercise training records of 94 participants (pts) successfully completing a Phase II monitored cardiac rehabilitation program (CRP) over a four year period. Pts were classified as follows:

Group A (n=12) - significant unexpected ECG changes with exercise who received subsequent medical intervention (MEDI).

Group B (n=9) - significant unexpected ECG changes with no MEDI and those with no unexpected ECG changes but MEDI due to other cardiac symptoms.

Group C (n=73) - no significant ECG changes during exercise and no MEDI during the course of the program.

Pts in group A were further classified as having other symptoms (As, n=4) or not having other symptoms (An, n=8). Seven of eight pts in group An had exercise induced ventricular arrhythmias (couplets or bigeminy) during which no symptoms occurred. One pt in group An had episodes of sinus arrest. Of the pts in group As three had chest pain during exercise associated with significant changes in their ECG; one had T wave inversion, and two had ST depression greater than 2mm. The fourth pt in group As showed sinus arrest (6 sec) and dizziness. Pts in group B had complications which included chest pain and complex ventricular arrhythmias. Continuous monitoring (CM) provided information not previously documented resulting in MEDI in 8.5% of the population (group An). This represented one occurrence for 423 hours of monitored exercise training. CM supported symptoms in 4.3% of the population (group As) and increased the efficacy of CM to identify 1 occurrence per 282 hours of exercise training. CM identified three pts from group B with significant ECG changes but no MEDI was instituted. Based on the ability of CM to identify otherwise undetected significant ECG changes with exercise we conclude that CM is of value in approximately 16% of the population evaluated.

THE APPROPRIATENESS OF A FIXED BLOOD LACTATE CONCENTRATION FOR DETERMINING TRAINING INTENSITIES

J.C. Simonsen and J.C. Rupp, Human Performance Lab, Texas Tech, Lubbock, TX 79409

28 subjects (14 trained, 14 untrained) completed a 5K track run and a maximal treadmill exercise test during which $\dot{V}O_2max$, $\dot{V}O_2$ at the Ventilatory Threshold (VT), and $\dot{V}O_2$s where blood lactate equalled 2mM and 4mM were determined. Correlations for trained and, in parenthesis, untrained are given below:

	$\dot{V}O_2max$	$\dot{V}O_2/VT$	$\dot{V}O_2/2mM$
$\dot{V}O_2/VT$	.862*(.769*)		
$\dot{V}O_2/2mM$	.799*(.404)	.714*(.358)	
$\dot{V}O_2/4mM$	.721*(.369)	.681*(.332)	.731*(.667*)

The correlations between performance time and $\dot{V}O_2$ variables are given below:

	$\dot{V}O_2max$	$\dot{V}O_2/VT$	$\dot{V}O_2/2mM$	$\dot{V}O_2/4mM$
r (trained)	-.521*	-.681*	-.191	-.102
r (untrained)	-.738*	-.904*	-.393	-.140

*p<.05

These data indicate that although $\dot{V}O_2$ at the VT is the best predictor of performance for both trained and untrained, fixed blood lactate values are not good performance indicators. Also, as one becomes trained, there is a change in the relationship between blood lactate concentrations and the VT. Using a fixed blood lactate value as a determinant of training intensity may therefore be inappropriate.

CARDIOVASCULAR EFFECTS OF ENDURANCE TRAINING DURING SUBMAXIMAL EXERCISE IN ELDERS

N.I. Williams, K.A. Greaves, G.R. Brodowicz, T.E. Kirby, D.R. Lamb, FACSM. Exercise Physiology Lab., The Ohio State University, Columbus, OH 43210.

The cardiovascular effects of endurance training at low (L) and moderate (M) intensity levels were documented in 10 men and 9 women over 60 years of age (X = 65.7) who attended carefully monitored exercise sessions three times a week for 4 months. Subjects progressed gradually to 30 minutes of cycling per session at average heart rates (HR) = 28%(L) or 53% (M) of (HR_{max}-HR_{rest}) added to HR_{rest}. CO_2 rebreathing was used to obtain measurements of cardiac index ($CI(L \cdot min^{-1} \cdot M^{-2})$), stroke volume index ($SVI(ml \cdot beat^{-1} \cdot M^{-2})$), and arteriovenous O_2 difference ($A\text{-}VO_2(ml \cdot dl^{-1})$) at a submaximal workload of 50 watts on a Monark bicycle ergometer. MEANS:

VARIABLE		0 MONTHS		4 MONTHS	
		L	M	L	M
$\dot{V}O_2$	M	1.08 ± 0.06	1.10 ± 0.15	1.06 ± 0.06	1.03 ± 0.13
	W	0.94 ± 0.06	0.97 ± 0.1	1.00 ± 0.07	1.00 ± 0.10
CI*	M	6.0 ± 1.3	6.8 ± 1.2	5.9 ± 1.3	5.7 ± 0.5
	W	7.1 ± 1.2	5.9 ± 0.6	6.6 ± 0.8	5.6 ± 0.9
HR*+#	M	104 ± 11	102 ± 5	105 ± 7	101 ± 11
	W	129 ± 15	124 ± 8	121 ± 11	115 ± 4
SVI	M	59 ± 16	67 ± 10	57 ± 14	57 ± 9
	W	56 ± 13	48 ± 8	55 ± 8	49 ± 9
$A\text{-}VO_2$*	M	9.0 ± 1.9	8.0 ± 1.0	9.2 ± 2.7	8.9 ± 0.5
	W	8.1 ± 1.4	9.7 ± 1.0	9.3 ± 1.8	10.9 ± 0.7

*Significant main effect of time (0-4 months); ($p<.05$) by ANOVA
+Significant main effect of sex; ($p<.05$) by ANOVA
#Significant interaction of time x sex; ($p<.05$) by ANOVA

CONCLUSIONS: Exercise training for 4 months resulted in an increased arteriovenous O_2 difference. Central changes were a decrease in cardiac index and heart rate. Females exhibited a greater decline in heart rate than males. There were no significant differences associated with training intensities. This may indicate that the threshold for training-induced adaptations for elders is low.

Interactions Among Aerobic Exercise, Anxiety, and Myocardial Damage in the Rat

G. DeJong, L. Correia, R. Wells, K. Ho, W. Van Huss, and W. Heusner

The purpose of this study was to determine the effects of a long-duration, low-speed running program, initiated and maintained at various times, on anxiety-related myocardial damage in the rat. The anxiety treatment consisted of randomly distributed applications of a disturbing but nonpainful electrical shock for a 13-day period. The running program consisted of aerobic exercise: 50 min/day, 5 days/week, at a speed of 36 m/min during an 8-week preconditioning period and/or during the 13-day anxiety treatment period. Three hundred and seventy-five male albino rats were randomly assigned to five comparison groups: EBA--exercise before anxiety, EBD--exercise before and during anxiety, EDA--exercise during anxiety, ANE--anxiety with no exercise, and CON--no exercise or anxiety. Following the entire 10-week experimental treatment, transverse sections of both ventricles were cut, stained, and rated on a well-defined scale of myocardial damage. Chi-square contingency tests were used for statistical analysis of the results. The anxiety treatment produced a marked incidence of nonfatal myocardial damage. The aerobic exercise program altered the response of the myocardium to the anxiety treatment. Animals aerobically preconditioned before the anxiety treatment alone (EBA) showed a cross-resistance effect resulting in a decreased incidence and extent of anxiety-produced myocardial damage. Animals starting aerobic exercise and the anxiety treatment simultaneously (EDA) showed a signficantly greater incidence and extent of myocardial damage than did all preconditioned animals.

Postnatal Fiber Composition in the Rat Soleus Muscle Following Endurance Training - A Pilot Study

M. Haven, G. DeJong, M. Ball, B. Garvey, W. Heusner, K. Ho
Michigan State University, East Lansing, MI 48824

Fifty newborn albino rats (Sprague-Dawley strain), 5 per mother, were assigned randomly as exercise (EXER) or control (CON) animals. These rats were kept with their own mothers until they were 25 days old. Exercise training was initiated using a motor-driven treadmill when the animals were 10 days of age. The speed and the percentage of incline of the treadmill, as well as the daily running time, gradually were increased as the training program progressed. During the last 10 days of training (50-59 days of age) the EXER animals completed a daily workout at a running speed of 26.8 m/min on a 25% incline for 60 min. Randomly selected animals from both EXER and CON were sacrificed at 10, 15, 22, 30, 37, 45, 52, and 59 days of age. Serial transverse sections of the soleus, plantaris, and vastus lateralis muscles were histochemically stained with H & E, NADH-D, and myosin-ATPase with acid or alkali preincubation. All available fibers across each of the muscle sections were classified. All histochemical evaluations were performed blind. At present tissue analysis has been completed for the soleus muscle only. Being a pilot study, the number of EXER and CON animals in each of the age groups was small and data of male and female animals were pooled. Within these limitations, however, the resulting percentages of fiber type indicate a trend toward more SO fibers in exercised soleus muscle. Since the sample size was small ($n = 4$ for EXER; $n = 2$ for CON) in each of the age groups no statistical analysis was made for the data.

Midwest Chapter-American College of Sports Medicine
Kellogg Center for Continuing Education
Michigan State University
East Lansing, MI 48824-1022

Midwest Chapter-American College of Sports Medicine

Health Promotion In Aging Populations: A Tribute to Wayne Van Huss

October 17-18, 1986

Michigan State University
East Lansing, Michigan

Sponsored by:

American College of Sports Medicine
Michigan State University

- College of Education-School of Health Education, Counseling Psychology and Human Performance
- College of Human Medicine
- College of Osteopathic Medicine
- MSU Health Promotion Project
- Lifelong Education Programs

Upjohn Company

Conference Schedule

Friday evening sessions will be held in the Kellogg Center Lincoln Room

Friday, October 17, 1986

7:00 p.m. Registration
Kellogg Center Lobby

7:30 p.m. Opening remarks, Welcome and Introductions
William W. Heusner, Ph.D.

Session I

Richard C. Nelson, Ph.D., Presiding
Pennsylvania State University

7:45 p.m. **Psychological Considerations in Health Promotion**
William P. Morgan, Ed.D.
University of Wisconsin

8:15 p.m. **Performance Enhancement - Physiological Dimensions**
David L. Costill, Ph.D.
Ball State University

8:45 p.m. Refreshment break

Session II

Barry S. Brown, Ph.D., Presiding
University of Arkansas

9:00 p.m. **Prevention of Injuries in the Dancing Athlete**
Marie D. Schafle, M.D.
St. Francis Hospital, San Francisco

9:30 p.m. **Physical Fitness for Everyone - Including the Aged**
Herbert A. DeVries, Ph.D.
University of Southern California

:00 p.m. Cash Bar - Lincoln Room Foyer

Saturday, October 18, 1986

Saturday morning sessions will be held in the Kellogg Center Auditorium
Coffee, tea and juice will be served in the South Lobby

8:00 p.m. MACSM Board Meeting (Midwest Chapter, American College of Sports Medicine)
Kellogg Center Auditorium

Session III

Michael G. Maksud, Ph.D., Presiding
Oregon State University

9:00 a.m. **Health Promotion and Issues of Stress**
William C. Hinds, Ed.D.
Michigan State University

9:30 a.m. **Nutrition and Physical Performance**
Ralph A. Nelson, M.D., Ph.D.
University of Illinois

10:00 a.m. **Strategic Planning for Wellness Within a Corporation**
Dee W. Edington, Ph.D.
University of Michigan

10:30 a.m. Refreshment break

Session IV

Kenneth D. Coutts, Ph.D., Presiding
University of British Columbia

10:45 a.m. **Health Promotion in a University Setting**
Marilyn L. Rothert, Ph.D.
Michigan State University

11:15 a.m. **Costs and Effectiveness of Exercise Programs for Adults**
Roy J. Shephard, M.D., Ph.D.
University of Toronto

Luncheon

Noon **A Tribute to Wayne Van Huss**
Henry J. Montoye, Ph.D., Presiding
University of Wisconsin

Saturday afternoon sessions will be held in the Kellogg Auditorium

Session V

Dale L. Hanson, Ph.D., Presiding
Purdue University

1:45 p.m. **Osteopathic Health Care - The Weekend Warrior**
Allen W. Jacobs, D.O., Ph.D.
Kirksville College of Osteopathic Medicine

2:15 p.m. **Exercise in the Primary and Secondary Prevention of Heart Disease**
Herman K. Hellerstein, M.D.
Case Western Reserve University

2:45 p.m. Refreshment break

Session VI

Robert C. Hickson, Ph.D., Presiding
University of Illinois, Chicago

3:00 p.m. **Effects of Chronic Exercise on Physiological Functions in the Elderly**
David R. Lamb, Ph.D.
Ohio State University

3:30 p.m. **Mechanisms of Adaptation of the Neuromuscular System to Exercise**
V. Reggie Edgerton, Ph.D.
University of California, Los Angeles

4:00 p.m. **Conference Wrap-Up**
William W. Heusner

Program Committee

John Downs, John Haubenstricker, Mary Edna Helfer, William Heusner (Chair), Kwok Ho, Dave Hough, [illegible] Hinds, Sandy Kilbourne, Douglas McKeag, [illegible]m Reuschlein, Vern Seefeldt, and Kenneth Stringer.

Conference Highlights

A cash bar reception will be held at 10:00 p.m. Friday.

A conference luncheon, **A Tribute to Wayne Van Huss**, will be held Saturday, 12:00 noon. Extra tickets for guests may be ordered for $15.00 with the registration form.

Michigan State University guests attending the conference are allowed full use of the recreational facilities including outdoor tennis courts, handball, racketball, swimming, and the use of the jogging track at no charge. Your conference name tag will gain you access to these facilities. The university golf courses are available; green fees are charged. The indoor tennis facility is also available. Fees are charged by the hour.

Wayne D. Van Huss
Scientist, scholar, teacher, counselor
Michigan State University 1953-1986

Wayne D. Van Huss, known as "Van" to his friends, is an internationally recognized expert on the effects of exercise in muscle, nerve and bone. His work on the structure and function of skeletal muscle as a result of various exercise programs and the relationship of exercise to such cardiac risk factors as serum cholesterol and obesity were initiated long before they became popular topics of study in the scientific community.

Although Wayne Van Huss is known as an outstanding scientist and teacher, his students and co-workers will remember him fondly as the friend who was never too busy to lend a hand, provide counsel or offer the encouragement that was needed to overcome a problem. Wayne Van Huss leaves a legacy of devotion to the understanding of exercise in daily living.

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Conference Fee

The fee of $45.00 includes registration, abstracts of all papers, Saturday luncheon, refreshment breaks and Continuing [illegible]ucation credits. Payment of the conference fee should be [illegible]bmitted with your registration form.

Continuing Education Units (CEUs) have been requested for this activity through Lifelong Education Programs of Michigan State University. The Continuing Education Unit is defined as "ten contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction and qualified instruction."

Conference Information

Headquarters for the conference will be The Kellogg Center for Continuing Education on Harrison Road at Michigan Avenue on the campus. It is readily accessible from all expressways via US-127, I-496, or temporary I-69. Travelers should exit on Trowbridge Road and, as it ends, turn left on Harrison Road to the gated parking lot adjacent to the center. The parking fee is payable on leaving; fee for overnight guests is waived. Both East Lansing's bus station and the regional Amtrak station are about a half mile from the center. Airport transportation vans and taxis serve between the center and Republic Express, American Eagle, Piedmont, and United Airlines flights at Lansing's Capital City Airport.

[illegible]ellogg Center Housing

[illegible]alf Twin-bed Room $23.15
Single Room $38.75

Housing at the center may be reserved by completing and returning the attached form as soon as possible. Requests must be received at least two weeks prior to the conference to guarantee housing at the center. A confirmation will be mailed to you, time permitting. If Kellogg Center is filled, a reservation will be made for you at a nearby motel, which will confirm the reservation, time permitting. Kellogg Center reservations will not be held past 6 p.m. unless a guarantee to advance payment is made. To guarantee a guest room reservation, use your VISA, MasterCard or American Express credit card number. **Do not prepay housing costs** unless needed to hold for late arrival.

If you need to be contacted, the Kellogg Center telephone number is 517/332-6571. The conference is under the guidance of Myrtle F. Jones, Conference Coordinator/Consultant, Lifelong Education Programs, Michigan State University. Telephone 517/353-9407.

Registration Form

Name _____

Address _____

City _____ State _____ ZIP _____

Phone ( ) _____

Organization _____

Social Security No. _____
(include if you wish to earn CEUs)

Enclose registration fee, check payable to Michigan State University

Registration Fee

- ☐ Graduate and undergraduate students $15.00
- ☐ All other conferees $45.00
- ☐ Spouses and friends attending the luncheon, only $15.00

(Registration fee includes abstracts of all papers, refreshments, Saturday luncheon, and Continuing Education credits.)

- ☐ Additional luncheon ticket(s). Indicate how many and include payment with this form.
- ☐ Continuing Education credits

Lodging

Please check if you wish Kellogg Center accommodation.

Kellogg Center room
Friday night _____ Saturday night _____
Single ($38.75) _____ or Shared ($23.15) _____

I wish to share a room with _____

- ☐ I will arrange for my own lodging.

Please do not prepay housing unless needed to hold for late arrival. If it is necessary to prepay, please make check payable to Kellogg Center.

CONFERENCE ABSTRACTS

Midwest Chapter - American College of Sports Medicine

Health Promotion in Aging Populations: A Tribute to Wayne Van Huss

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Upjohn Company
Wyeth Pharmaceuticals

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SESSION I

PSYCHOLOGICAL CONSIDERATIONS IN HEALTH PROMOTION

Morgan, W.P.
Sport Psychology Laboratory, University of Wisconsin-Madison
Madison, WI 53706

Health promotion appears to be a movement whose time has come in the exercise and sport sciences, but there is a danger that workers in this field will cultivate what Kaplan has termed "the promotion of promotion." It is now apparent that an evidential imperative must be adopted in health promotion, and the need for this re-direction is based upon ethical, moral, scientific, and legal issues. The most visible illustration of this overall problem is the invalidity of the Type A Behavior Pattern (TABP) construct. The inability of TABP to predict the onset of CHD in a compelling manner has recently been placed in historical perspective by Lenfant and Schweitzer who have described the fading signal in recent TABP studies. This particular issue will be addressed in detail, and implications for various behavior modification techniques will be examined. This portion of my presentation will stress the necessity of having an empirical data base supporting intervention strategies in primary and secondary prevention efforts. The second part of my presentation will emphasize the importance of considering psychological issues in health promotion programs. There has been a tendency for exercise and sport scientists to examine the efficacy of exercise interventions solely from a physiological perspective. These paradigms have generally been inappropriate for a number of reasons. First, physiological alterations have sometimes not been observed, and this has usually been explained within the context of stimulus inadequacy; that is, from the perspective of exercise mode, frequency, intensity, and/or duration. An equally tenable explanation, but one that has seldom been offered, involves the insufficiency of the parameters chosen for investigation. It is possible that changes of physiological significance actually occur in these situations but these changes are not detected because they are not measured (e.g., release and uptake of neurotransmitters in the CNS). Furthermore, fixation on physiological considerations in health promotion is scientifically myopic and philosophically naive, since workers in this field have recognized for many years that positive changes in affect are universally reported following exercise interventions. These observations have been made even when physiologic changes have not been observed. It is commonly reported, for example, that quality of life and self-concept are enhanced, anxiety and depression are reduced, and psychic vigor is increased following initiation of exercise programs. This dilemma is not restricted to exercise research, and a similar example is the report of the NHLBI Consensus Panel on the efficacy of bypass surgery. The panel concluded that quality of life improves in patients who have undergone bypass surgery even though physiological changes do not occur. While there has been speculation for many years concerning the influence of habitual physical activity on quality of life, there is an absence of empirical evidence in support of this view. Preliminary longitudinal research involving athleticism in the early years, and the relationship of exercise and quality of life in the middle years, will be reviewed. This review will include a summary of Flannagan's Model of Quality of Life. My presentation will conclude with a discussion of the NIMH Consensus Panel's recent deliberations on "what we know" and "what we need to know" about the relationship of exercise and mental health.

PERFORMANCE ENHANCEMENT -- PHYSIOLOGICAL DIMENSIONS

Costill, D.L.
Human Performance Laboratory, Ball State University
Muncie, Indiana 47306.

Achieving optimal sport performance depends on a variety of inheritant physiological talents, the athletes status of training, and proper management. This presentation will discuss the physiological changes associated with both endurance and strength training. Special attention will be given to the processes of muscular adaptation that occur during periods of intense and reduced training. Effort to monitor these physiological adjustments to training require the development of sports specific tests. Examples will be provided to show how to design and validate tests that can assist the coach and athlete. Specific information will be provided to answer the following questions: 1. How much training is needed to achieve optimal performance? 2. What is "tapering" and how does it produce improvements in performance? 3. How rapidly are the benefits of training lost when the athlete stops training? 4. How can the coach and athlete identify and prevent overtraining? Answers to these and other questions are intended to provide the coach with information the will help the athletes realize their full potential.

* Presented at the Annual Fall Meeting of the Midwest Chapter of the American Collelge of Sports Medicine, October 17, 1986.

SESSION II

PREVENTION OF INJURIES IN THE DANCING ATHLETE

Schafle, M.D.
St. Francis Hospital
San Francisco, CA 94109

Adults dancers are of two types -- those with many years of dance experience and those who are novices. Their injury patterns differ.

There are four etiologies of dance injuries: technique errors, overuse syndromes, accidents and poor nutrition. Dance injuries, and their relationships to technique errors in particular, are discussed.

The dance instructor is a key element in both diagnosis and rehabilitation of injury. He/she also acts as a source of information and as a translator between dancer and doctor.

Dance was the second "most dangerous sport" in a study done by Dr. James G. Garrick of the Center for Sports Medicine at Saint Francis Memorial Hospital, San Francisco; second only to football. Like other athletes, dancers have a great desire to return to their activities as soon as possible after injury. Our goal should be helping them do just that.

PHYSICAL FITNESS FOR EVERYONE-INCLUDING THE AGED

deVries, H.A., Professor Emeritus, University of Southern California, Los Angeles, California

Only two decades ago the trainability of the elderly was in doubt. In the late sixties Wessel and Van Huss and their colleagues presented data which suggested that differences in physical activity level were more important than chronological age in determining physiological responses to exercise. In the following years several investigators have provided convincing data to support the trainability of the elderly and also to suggest important health benefits to be derived from improvement of aerobic power. $\dot{V}O_2$ max has been improved by 25% , $\dot{V}e$ max by 29-35%, vital capacity by 20%, and gains in muscular strength of up to 50% have been reported. Significant increase in bone density may follow walking type exercise in older females and both males and females appear to lower resting neuromuscular tension as the result of moderate exercise such as walking and cycling ($\sim$40% $\dot{V}O2$ max).

One of the remaining problems is that presently available tests of physical work capacity (PWC) such as VO_2 max may not be appropriate for geriatric populations or unfit subjects whose cardiovascular-respiratory systems cannot be fully loaded because of insufficient muscular power. Therefore we evaluated a discontinuous incremental bicycle ergometer test (PWC_{ft}) with an endpoint (fatigue threshold, FT) determined by recording EMG fatigue curves in the quadriceps muscle.* The FT was defined as the lowest workload to produce a slope of the EMG voltage-time relationship significantly different from zero slope at $P < 0.05$. The test-retest reproducibility of PWC_{ft} (n=17) was found to be r=.95 with no significant difference ($p < 0.05$) between trials. Thirty-two healthy, male subjects aged 18-29 ($\bar{x}$ 23.4 $\pm$ 3.1 years) whose fitness ranged from highly trained to untrained were tested for PWC_{ft}, lactate threshold (OBLA), % heart rate range at PWC_{ft}, (%HRR) and heart rate-workload relationship (HR-WL). Stepwise multiple regression resulted in R=0.833 with %HRR accounting for 40.7%, OBLA for 22.3% and HR-WL for 5.9% of total variance. In addition 12 subjects performed critical power testing. PWC_{ft} and CP were correlated at r=0.67 with no significant difference ($P < 0.05$) between the means for the two methods. The results of this study indicated that the PWC_{ft} test was objective, valid, highly reproducible and should be particularly useful for evaluating the PWC of subjects in geriatric conditioning programs.

* This study by deVries, H.A., Tichy, M.W., Housh, T.J., Smyth, K.D., Tichy, A.M., and Housh, D.J., was funded in part by grants from the American Heart Association, Oregon Affiliate Inc., and the Autzen Foundation

SESSION III

ABSTRACT

HEALTH PROMOTION AND ISSUES OF STRESS

Hinds, W.C.
School of Health Education, Counseling Psychology and Human Performance
Michigan State University

Basic assumptions about the intrinsic (biopsychosocial) values associated with health promotion (wellness) behaviors would seem to run counter to known compliance statistics in health care delivery systems. Present models for health promotion programs need to broaden their conceptual framework before compliance/adherence impact statistics can improve. Intervention models which include the dimensions of stress and loss in their programs are more likely to succeed than health promotions programs that do not. Current theories of wellness and health promotion assume that growth is a continuous and forward moving process (Maslow,1963; Travis, 1981). When the term "wellness" was coined in the 1960's (Dunn, 1961) its meaning connoted an optimum level of functioning. Unfortunately, this meaning relates well to outcome definitions of behaviors, but not process definitions of functioning.

Health behaviors which contribute to one's well being relate to a process of dynamic equilibrium (Timberlake, 1980). Such a process takes into account the balance between adaptive (growth) resources and adaptive (growth) demands. Stress and learning theory models have long used a theoretical framework which takes into account life demands which exceed, deplete or threaten our adaptive resources. The dynamic equilibrium model utilizes both sides of a loss-gain equation which is constantly undergoing change. Health promotion and wellness models have yet to integrate such a process model into their interventions programs.

NUTRITION AND PHYSICAL PERFORMANCE

Nelson, R.A.
Department of Research, Carle Foundation and
College of Medicine, University of Illinois
Urbana, IL 61801

Physical training increases the nutrient requirements for total calories, carbohydrates, thiamine, riboflavin, niacin, pantothenic acid, vitamin C, iron, water, and perhaps chromium. Conscious adjustments must usually be made in the intake of total calories, carbohydrates, water and iron by those people engaged in heavy physical training programs in order to maintain optimal performance levels. But thiamine, riboflavin, niacin, pantothenic acid, vitamin C and chromium requirements should be met by simply eating more of a varied diet. Nutritional practices which adversely affect physical performance are failure to eat sufficient calories, deliberate semi-starvation, and dehydration. Eating to promote the development of lean body mass results in obesity and is counterproductive to physical training. Excess of vitamin supplementation are also counterproductive to physical training. Excess repletion of water can lead to water intoxication. Menstruating women engaging in heavy physical training routines may have to modify them so as to prevent amenorrhea which can lead to osteopenia and stress fractures.

STRATEGIC PLANNING FOR WELLNESS WITHIN A COPORATION

Edington, D. W.
Fitness Research Center, University of Michigan
401 Washtenaw Avenue, Ann Arbor, MI 48109

Most organizations are finding that to capitalize on investments, long term strategic planning is important. Corporate wellness needs to be included in this process. The direction of the wellness program within the organization depends upon the expressed goals of the corporation. Those goals are usually in terms of health care cost containment or human resource development. The relative importance of each of the goals, to a large part, determines the direction of the wellness program. Evaluation of the program is, of course, dependent upon the goal of the program.

Before embarking upon an investment in a wellness program, the corporate leaders must clarify the goal and the purpose of the proposed program. Other questions such as facilities, inclusion of selected employee groups, allocation of work time, use of professional staff, relationship to other programs, and expected budget are all key components to the design of the program. Other considerations include the use of the marketing techniques and the ability of the organization to incorporate the program into the "culture" of the organization. Key demographic variables include the age and sex of the employee population as well as the average income and education levels.

The success of wellness programs can be predicted based upon the amount of pre-planning and marketing success. The cost benefit and cost effectiveness of programs may or may not play an important role in designing the wellness program, according to the philosophy of the organization.

SESSION IV

HEALTH PROMOTION IN A UNIVERSITY SETTING

Rothert, M.L.
College of Nursing, Michigan State University
East Lansing, Michigan 48824

A university has a mission to educate individuals to assume leadership roles within established disciplines and professions. Michigan State University recognizes that greater emphasis needs to be placed on educating individuals to assume leadership roles in the area of health promotion. Successful health promotion programs require leadership from a broad range of disciplines including the health professions, education, business, psychology, and many others. Further, to sustain the individual's decisions regarding health behaviors requires not only a multidisciplinary approach, but an environment which supports and promotes positive behaviors toward health. The university is a worksite similar to a large corporation, with a community component involving people living within the university as well as working and studying within its parameters. The challenge to a university is to develop leaders prepared to address the complex issues of health promotion, and to model a community environment supportive of health promotion for its members.

Michigan State University has long had an interest in health promotion, in both academic and non-academic units throughout the university. For the past two years a major assessment of health promotion activities and planning has occurred across 20 units involving more than 300 faculty and staff, targeting the risk areas of exercise/fitness, nutrition, safety, substance abuse and stress. Interest and commitment have been demonstrated by students, employees, retirees, and families. Academic and non-academic employees have worked with administration in defining feasible programs consistent with the university's mission. Building on programs already in place, and using the existing organizational and administrative framework, the university has proposed a plan to implement activities to enhance the health promotion focus in curricula, provide services to the community members, and develop a supportive environment among the university community.

This project was funded in part by the W.K. Kellogg Foundation.

COSTS AND EFFECTIVENESS OF EXERCISE PROGRAMS FOR ADULTS

Shephard, R.J.
School of Physical and Health Education and
Dept. Of Preventive Medicine & Biostatistics,
Faculty of Medicine, University of Toronto,
Toronto, Ont. M5S, 1A1.

The basic principles of cost/benefit and cost/effectiveness analysis will be discussed in the specific context of exercise and fitness programming for the adult. Because of difficulties in valuing all aspects of fitness and health - particularly the quality of life and the value of survival into the retirement years, cost/effectiveness analysis is generally preferable to a rigid cost/benefit analysis. Which ever type of calculation is choose, due allowance must be made for the effects of inflation, the discount rate (except in the "steady-state" evaluation of programmes), anticipated program participation rates, the marginal costs of program expansion, the opportunity costs incurred by participants as they invest time in exercise, and the economic multiplication of investment in fitness programming in relation to societal trends such as urbanisation and aging of the population. The benefits of exercise may be observed by the individual (improved personal health and a better quality of life), by major corporations (reduced turnover and absenteeism, increased productivity and fewer industrial injuries) and by the state (reduced direct and indirect costs of illness, lesser incidence of lifestyle diseases, reduced demand for geriatric services). On the expense side of the ledger, costs of programs vary widely from one activity to another; however, even something as simple as walking involves the participant in charges of several hundred dollars per year. Employee fitness programs often cost $500 to $750 per participant year, depending on the completeness of accounting by the sponsoring corporation. Depending on the type of sport and the extent of speculation by local land "developers", community programs may cost $175 to $1000 per participant year. In many situations, cost/benefit and cost/effectiveness ratios seem favourable. Moreover, such analyses allow governments and corporations to make informed decisions on investment in exercise programs. However, fiscal analyses cannot always answer the associated ethical problems, such as the value to be placed upon human health and happiness, and the importance of individual rights relative to those of society.

Reference: Shephard, R.J. The Economic Benefits of Fitness. Champaign, Ill.: Human Kinetics Publishing, 1986.

SESSION V

OSTEOPATHIC HEALTH CARE - THE WEEKEND WARRIOR

Allen W. Jacobs, DO, PhD
Kirksville College of Osteopathic Medicine
Kirksville, MO, 63501.

Traditionally osteopathic medicine has embraced the philosophy of preventive health care and wholistic medicine. The emphasis of osteopathic practice has been directed toward health and wellness rather than a disease orientation. The osteopathic physician utilizes all contemporary medical diagnostic and treatment modalities plus osteopathic diagnosis and treatment (manual medicine, osteopathic manipulative medicine, manipulative treatment). Osteopathic philosophy and practice have been applied to the management of a new patient population - the weekend warrior.

The "Weekend Warrior" is generally defined as anyone, regardless of age, who primarily participates in physical activity/exercise on non-working days (usually Saturday and Sunday). These participants frequently come to the primary care or sports medicine clinic on Monday with a variety of musculoskeletal complaints and conditions. Most of the injuries are the result of repeated microtrauma (overuse syndromes) or rapid changes in speed/position (deceleration injuries).

The Kirksville College of Osteopathic Medicine has implemented an Employee Fitness Program to change the behavior of the weekend warrior to include exercise on a regular (at least every other day) schedule. Prior to participating in this program each employee is required to participate in a Health Screening Program, complete osteopathic (biomechanical) evaluation, medical risk assessment and functional/physical capacity assessment. Each potential participant who is older than 35 years of age or classified as "high risk" is required to have a complete cardiovascular evaluation.

Following completion of the required pre-screening program, each employee may select an exercise activity which is organized and conducted by members of the college physical fitness program. The College releases the employee from 30 minutes of work to participate in one hour of exercise, three times each week. Programs are conducted in the morning prior to work, during the lunch hour, or in the afternoon.

Injuries associated with this program are monitored and acute or preventive osteopathic health care is provided. Program evaluation includes a follow-up study at three, six, nine and 12 months. The data from each assessment is analyzed and discussed individually with each participant. In addition, the affective (sense of well-being) changes and absence for illness of participants is monitored.

SESSION VI

CHRONIC EXERCISE EFFECTS ON PHYSIOLOGICAL FUNCTIONS OF THE ELDERLY

Lamb, D.R., S.F. Schaal, P.F. Binkley, E. Copelan, J.M. Falko, J.S. Stevenson, N.I. Williams, G.R. Brodowicz, B. Topp, and D. Shook
School of HPER, College of Medicine, and School of Nursing, The Ohio State University, Columbus, Ohio 43210

We compared the effects of 8 months of training at low (L) and moderate (M) exercise intensities on the physiological status of 56 healthy men and women, mean age = 64 years. Three times weekly, subjects performed calisthenics and stretching activities for 15 min, cycled for 30 min at mean heart rates (HR) - 28% (L) or (53%) (M) of heart rate range added to resting heart rate, and walked for 5 min. Subjects were tested for most variables at baseline and after 4 and 8 months of training at rest, during 50 W cycling, and during maximal cycling. MEANS:

Variable	Intensity	0 Months	4 Months	8 Months
*VO_{2max} (mL x kg^{-1} x min^{-1})	L	21.8	21.7	22.7
	M	20.5	22.0	22.6
*$Power_{max}$ (W)	L	111.6	127.7	125.9
	M	107.1	125.0	126.8
HR_{rest} (beats/min)	L	78.9	76.9	79.7
	M	81.2	77.5	80.2
*Systolic BP_{rest} (torr)	L	127.7	121.1	123.4
	M	122.9	117.6	122.4
*$HR_{50\ W}$ (beats/min)	L	111.0	101.6	103.3
	M	115.5	106.4	106.1
*V_E;50 W (L/min)	L	29.1	25.6	27.1
	M	31.0	27.1	27.5
*VO_2;50 W (mL x kg^{-1} x min^{-1})	L	12.7	11.8	12.4
	M	13.5	12.8	13.0
*Peak Ejection Fraction (%)	L	70.3	72.5	71.5
	M	69.0	74.7	75.1
Plasma Somatomedin C (U/mL)	L	0.6	----	0.8
	M	0.3	----	0.4
Total Cholesterol (mg/dL)	L	210.2	----	208.9
	M	208.6	----	206.0
*HDL Cholesterol (mg/dL)	L	57.1	----	52.4
	M	49.7	----	49.3
Triglycerides (mg/dL)	L	108.0	----	110.0
	M	121.0	----	143.5

*Significant main effect of time (0-8 months), no intensity effect; ($P < .02$) by ANOVA

Effects of low and moderate intensity training regimens were similar for variables tested at rest, 50 W, and maximal exercise. This study extends previous work that showed significant effects of low-intensity exercise training in older subjects.

Supported by National Institute on Aging Grant AG 02409

students
mid — you are ~ probably [illegible] with
your [illegible] [illegible]

Dallas Police [illegible]

~~[illegible]~~ 1986 –

Moby

has group data for Hospital Insurance Plan
of NBSW

More
1/2 employer program

3.1 billion – cost of program [illegible] } Direct cost
3.5 billion – [illegible] of savings
C-V Increase 3.1 [illegible] –

MECHANISMS OF ADAPTATION OF THE NEUROMUSCULAR SYSTEM TO EXERCISE

Edgerton, V.R. and R.R. Roy
Department of Kinesiology, UCLA,
Los Angeles, CA 90024

It is apparent that some activity-related events can influence the regulation of proteins in skeletal muscle and in motoneurons. However it is not clear what these events are because most experiments that have characterized adaptations to exercise have not distinguished the multitude of events associated with a particular movement. For example, both electrical and complex mechanical events during a movement could affect muscle proteins. Evidence will be presented which suggest that the electrical excitation in itself or even the muscle contraction is not an essential element in the maintenance of normal muscle mass. A series of experiments using compensatory hypertrophy, hindlimb suspension and space flight as models of adaptation suggest that the force produced by a muscle has a major influence on muscle proteins.

These studies were funded in part by NIH NS-16333 as NASA NCA2-1R390-502.

Costill
overtraining
- late 1800s - 4:12 mile
49:00 10 mile } 10 mi/wk

- Costill study - 50 mi/wk in 2 cases resulted in
no performance ↑ (+ trained runner limit)

- swim 5-6,000 yd/day

various levels of detraining - see costill & others data
0
1 day/wk
2 " "
3 " "
- distance Δ
} changes in Q
Σ a-v O2

MSU

Health Prom. - 2 yr. Kellog grant to start
Stress
Nutrition
Safety
Ex. Fit
Subs. abuse
for stud., employees
families / retirees

upper div. & grad. - personal health too
in a position to influence health & lifestyle activities
└ 5 targeted courses

objectives
1) enhance curricula (health promo.) - pre prof - gen ed. stud
2) experiential education activities - opportunity to apply concepts - interns in Health & fitness delivery activity for grad stud
3) outreach support activities
- communication
newsletter - printed 3 color
"Healthy U"
- newspaper supplement

- programs for all employees
a) occupational health & safety

- family
motor skills develop.
etc.

- Survey covering many aspects.

Endurance Performance State of the Art 1987
Registration Form

Please Print

Name _____
Last **First**

Address _____
Number **Street**

_____
City **State** **Zip**

Registration Fees:*

Non Member $30.00
ACSM Member $20.00
ACSM Student Member $15.00
ACSM CME/CEC Credit Fee $5.00

_____
Social Security #(For CME records)

Pre-registration recommended. Enrollment limited.

Mail registration form and fee to:

Northeastern Illinois University
c/o George R. Lesmes, Ph.D.
Human Performance Laboratory
5500 N. St. Louis Avenue
Chicago, IL 60625

For Additional information contact:
Human Performance Laboratory
(312) 583-4050 ext. 4775 or 4776

Sponsors:

American College of Sports Medicine
Northeastern Illinois University
The Quaker Oats Company
Performance Potential Group
Swedish Covenant Hospital

Due to many conventions, hotel space is limited. Please make your reservation early. Some nearby inns include:
Howard Johnson–Skokie Illinois
Lincolnwood Hyatt–Lincolnwood, Illinois

*Participants of the ACSM Fitness I..ructor Workshop Oct 19 - 22 will receive a 50% discount o.. registration

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Endurance Performance
State of the Art 1987
CYCLING RUNNING SWIMMING

MIDWEST CHAPTER
OCTOBER 23–24, 1987
Northeastern Illinois University

Sponsored by:
American College of Sports Medicine
Northeastern Illinois University
The Quaker Oats Company
Performance Potential Group
Swedish Covenant Hospital

Annual Meeting
Midwest Regional
American College of Sports Medicine

Endurance Performance
State of the Art 1987

Purpose

This program is designed to focus on the current state-of-the-art information on performance as it relates to the endurance athlete, with a special emphasis on cycling, running and swimming.

Date: October 23–24, 1987
Location: Northeastern Illinois University (Auditorium)
5500 N. St. Louis Ave.
Chicago, Illinois

Program Committee: George R. Lesmes Ph.D.
Leonard A. Kaminsky Ph.D.
Janet LaHam Saeger M.S.
Robert Murray Ph.D.
Noel D. Nequin M.D.

Accreditation

Endorsed by ACSM
6 hours ACSM CEC Credits
6 hours AMA Category 1 CME Credits

Who should attend

Fitness and Sport Participants, Coaches, Educators, Athletic Trainers, Athletic Directors and Physicians, Health Club Participants, and Health Club Managers /Owners.

QUAKER

POTENTIAL PERFORMANCE GROUP

PROGRAM

Friday, October 23,1987

5-5:45 p.m. **Registration**

Session 1

5:45 p.m. **Introduction**
George R. Lesmes, Ph.D.

6:00 p.m. **Swimming Performance**
David L. Costill Ph.D.

7:00 p.m. **Running Performance**
Russell R. Pate Ph.D.

8:00 p.m. **Cycling Performance**
Edmund R. Burke Ph.D.

9:00 p.m. **Greetings and Reception**
Gordon H. Lamb. President,
Northeastern Illinois University

Saturday, October 24,1987

Session II

7:00 a.m. **MACSM Business Meeting**

8:00 a.m. **Coffee Break & Registration**

8:15 a.m. **Fluid Replacement for the Endurance Athlete**
J. Mark Davis, Ph.D.

9:15 a.m. **Performance Assessment for the Endurance Athlete**
Peter J. VanHandel, Ph.D.

10:15 a.m. **Strength Training for the Endurance Athlete**
Steve J. Fleck, Ph.D.

11:15 a.m. **Panel Discussion/Question Answer**

12:15 p.m. **Closing**

Program Participants

Edmund R. Burke, Ph.D.
Advisor, U.S.Cycling Team
Director, Product Development
Spenco Medical Corporation

David L. Costill, Ph.D.
Director, Human Performance Laboratory
Ball State University

J. Mark Davis, Ph.D.
Director, Exercise Biochemistry Laboratory
University of South Carolina

Steven J. Fleck, Ph.D.
Sports Physiologist
Sports Science Program
U.S. Olympic Committee

Peter J. Van Handel Ph. D.
Senior Physiologist
Sports Science Program
U.S. Olympic Committee
Colorado

Russell R. Pate, Ph.D.
Director, Human Performance Laborato
University of South Carolina

Northeastern Illinois University

LifeCenter ON THE GREEN
SWEDISH COVENANT HOSPITAL

PLEASE COMPLETE AND RETURN THE REGISTRATION FORM ON THE REVERSE SIDE OF THIS PANEL

THEORY AND PRACTICE OF STRENGTH AND STRENGTH TRAINING

Purpose

The program is designed to review the scientific foundations of muscular strength and their applications to training and performance.

Date

November 4-5, 1988

Location

Kent State University
Student Center - Kiva

Contact for Program Information

Wayne E. Sinning
Applied Physiology Research Laboratory
School of PERD
Kent State University
Kent OH, 44242
(216) 672-2857

Contact for Registration Information

University Conference Bureau
211-A Kent Student Center
Kent State University
Kent OH 44242
(216) 672-3161

Accreditation

Endorsed by ACSM
ACSM CEC Credits and AMA Credits Applied for

Who Should Attend

Educators, Athletic Trainers, Coaches, Researchers, Fitness and Sports Participants, Physicians, Fitness and Health Directors

*88-27756

University Conference Bureau
211-A Kent Student Center
Kent State University
Kent, Ohio 44242

THEORY AND PRACTICE OF STRENGTH AND STRENGTH TRAINING

Annual Meeting of the

Midwest Chapter of the American

College of Sports Medicine

Kent State University

November 4-5, 1988

Sponsored by the

American College of Sports Medicine

and the

Kent State University

Applied Physiology Research Laboratory

School of Physical Education, Recreation and Dance

PROGRAM

Friday, November 4, 1988

6:30 p.m. - 7:30 p.m.

Registration
Kent Student Center - Kiva

SESSION I

7:30 p.m. - 7:45 p.m.

Welcome

7:45 p.m. - 8:00 p.m.

Introduction to The Topic
Wayne E. Sinning

8:00 p.m. - 9:00 p.m.

Historical Perspectives of
Strength Training
Terence Todd

9:00 p.m. - 10:00 p.m.

Social, Cash Bar

Saturday, November 5, 1988

7:45 a.m. - 8:30 a.m.

Registration

SESSION II

8:15 a.m. - 9:00 a.m.

Neuromuscular Basis for
Strength and Strength Training
Walter Kroll

9:00 a.m. - 9:45 a.m.

Effects ofStrength Training
on Skeletal Muscle
J.D .MacDougall

9:45 a.m.- 10:15 a.m.

Break

PROGRAM

SESSION III

10:15 a.m. - 11:00 a.m.

Drug Use and Strength Training
John Lombardo

11:00 a.m. - 11:45 a.m.

Nutrition and Strength Training
Peter W.R. Lemon

11:45 a.m. - 12:15 p.m.

Midwest Chapter
Annual 8usiness Meeting
Barry A. Franklin, Ph.D,
Chapter President

12:15 p.m. - 1:30 p.m.

Lunch

SESSION IV

1:30 p.m. - 2:15 p.m.

Strength Training in Children
Digby Sale

2:15 p.m. - 3:00 p.m.

Strength and Strength Testing
in the Occupational Setting
Tom Gilliam

3:00 p.m. - 3:45 p.m.

Strength Training for Athletes
John Grogan

3:45 p.m.

Adjournment

PROGRAM PARTICIPANTS

Thomas Gilliam, Ph.D.
Gilliam Enterprises, Inc.
Hudson, OH

John Grogan, M.S.
Director of Physiological Testing Center
Section of Sports Medicine
Cleveland Clinic Foundation
Conditioning Coordinator, Cleveland Cavaliers
Cleveland. OH

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University of Massachusetts
Amherst, MA

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Kent, OH

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Digby G. Sale, Ph D.
Departments of Physical Education and Medicine
McMaster University
Hamilton, Ontario, Canada

Terence Todd, Ph.D.
Department of Kinesiology and Department of
American Studies
The University of Texas
Austin, TX

REGISTRATION FORM

Please Print

NAME _____

ADDRESS _____

CITY _____ **STATE** _____

ZIP _____ **PHONE** _____

Information on hotels and restaurants will be forwarded upon receipt of advanced registration

Registration Fees:

	Prior to Oct. 28	*After Oct 28 (and on site)*
Students	**$10.00**	**$15.00**
Member, Midwest Chapter, ACSM	**$15.00**	**$20.00**
Non-Members of Midwest Chapter, ACSM	**$20.00**	**$25.00**

TOTAL AMOUNT ENCLOSED $_____

Please Make Checks Payable to:
Kent State University

Mail Registration Form and Check to:

University Conference Bureau
211-A Kent Student Center
Kent State University
Kent, 0H 44242

MidWest Chapter Officers

PRESIDENT	Barry A. Franklin William Beaumont Hospital
PRESIDENT ELECT	Richard Bowers Bowling Green State Univesity
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PROGRAM COMMITTEE - KENT STATE UNIVERSITY

Linda Bultman	Jay W.Cranston, M.D.*
David T. Deutsch	Peter W.R. Lemon
Timothy J. Quinn	Wayne E. Sining

**Medical Representative*

PROGRAM SPEAKERS

Thomas Gilliam, Ph. D.
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Hudson, Ohio

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Director of the Physiological Testing Center
Cleveland Clinic Foundation
Conditioning Coordinator,
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Hamilton, Ontario, Canada

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Department of Kinesiology and Program of American Studies
The University of Texas
Austin , Texas

MIDWEST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE

Annual Fall Meeting
November 4 & 5, 1988

Kent Student Center /Kiva
Kent State University

Theory & Practice of Strength and Strength Training

SPONSORS
The Applied Physiology Research Laboratory
Kent State University

The American College of Sports Medicine

Approved for ACSM CME credit and Category 1 CME credit of AMA

Endorsed By
The American College of Sports Medicine

Theory & Practice of Strength and Strength Training

Friday, November 4, 1988

6:30 p.m. - 7:30 p.m. Registration
Kiva Lobby/Kent Student Center

Session I

7:30 p.m. - 7:45 p.m. Welcome
Dr. Geoffrey D. Broadhead, Dean
School of PERD
Kent State University

7:45 p.m. - 8:00 p.m. Introduction to the Topic
Wayne E. Sinning

8:00 p.m. - 9:00 p.m. Historical Perspectives of Strength Training
Terry Todd

Presiding: Joyce Strand, School of PERD
Representative to the Graduate Student Senate

*This lecture is co-sponsored with the Graduate Student Senate of Kent State University

9:00 p.m. - 10:00 p.m. Social, Cash Bar
Kent Student Center Ballroom

Saturday, November 5, 1988

7:45 a.m.- 8:30 a.m. Registration
Kiva Lobby/Kent Student Center

Session II

Presiding: Tim Kirby, The Ohio State University

8:15 a.m. - 9:00 a.m. Neuromuscular Basis for Strength
Walter Kroll

9:00 a.m. - 9:45 a.m. Effects of Strength Training on Skeletal Muscle
J. D. MacDougal

9:45 a.m. - 10:15 a.m. Break
Kiva Lobby/Kent Student Center

Session III

Presiding: Richard Bowers, Bowling Green State Univeristy

10:15 a.m. - 11:00 a.m. Drug Use and Strength Training
John Lombardo

11:00 a.m. - 11:45 a.m. Nutrition and Strength Training
Peter W.R. Lemon

11:45 a.m. - 12:15 p.m. Midwest Chapter
Annual Business Meeting

Presiding: Barry P. Franklin, President

12:15 p.m. 1:30 p.m. Lunch Break

The Applied Physiology Research Laboratory will be open from 12:00-1:00 for those interested in touring the facility. It is located in the Memorial Gym Annex, Room 163

Session IV

Presiding: Robert Gandee, University of Akron

1:30 p.m. - 2:15 p.m. Strength Training in Children
Digby Sale

2:15 p.m. - 3:00 p.m. Strength & Strength Testing in the Occupational Setting
Tom Gilliam

3:00 p.m. - 3:45 p.m. Strength Training for Athletics
John Grogan

3:45 p.m. Adjournment

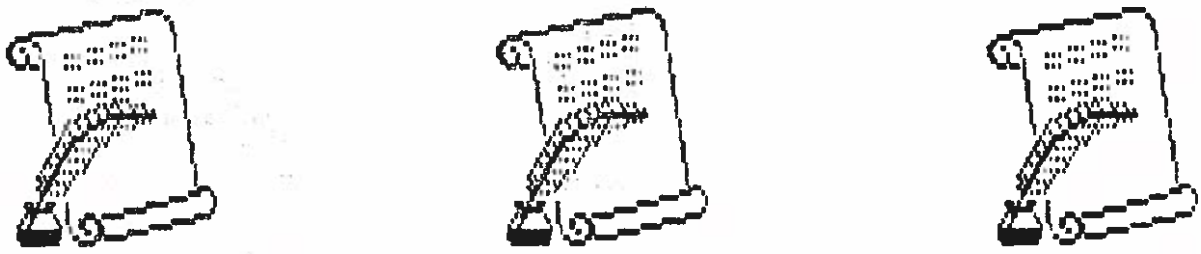
CEC/CME CREDIT

The American College of Sports Medicine's Continuing Education Committee certifies that this Continuing Education offering meets the criteria for 6 hours of ACSM Continuing Education Credit. The American College of Sports Medicine is accredited by the Accreditation Council for .Continuing ...cal Education (ACCME) to sponsor continuing medical education for physicians. ... American College of Sports Medicine designates this continuing medical education offering for 6 credit hours in Category I of the Physicians Recognition Award of the American Medical Association. For those seeking CEC/CME credit: 1. Obtain the appropriate attendance verification form and evaluation forms from the registration area. 2. Complete the forms at the end of the conference and pay the $5.00 fee. You must turn in program evaluation forms. 3. The application must be completed and the fee paid before you leave the conference - You cannot forward it later.

MIDWEST ACSM WINTER 1988 MEETING

HOSTED BY:

OHIO STATE AND BOWLING GREEN UNIVERSITIES



PROGRAM OF THE WINTER MEETING
MIDWEST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE
FEBRUARY 3-5, 1988

WEDNESDAY EVENING, FEBRUARY 3, 1988
OPENING REMARKS

9:00 - 9:15 SEGMENTAL STRUCTURE OF FEMALE FATNESS. C.R.C. Marks, M.D. Becque, V.L. Katch, K. Hattori, The Behnke Laboratory for Body Composition Research, Dept. of Kinesiology, Div. of Physical Education, The University of Michigan, Ann Arbor, MI

9:15 - 9:30 BODY SHAPE CHANGE FOLLOWING TRAINING: THE BEHNKE SOMATOGRAM., W.R. Colchagoff, D.K. Shaw, D.T. Deutsch, J.S. Engmark, Applied Physiology Research Laboratory, Kent State University, Kent, Ohio and Cardiac Rehabilitation Department, Aultman Hospital, Canton, Ohio

BOARD MEETING

THURSDAY MORNING, FEBRUARY 4, 1988
SCIENTIFIC SESSIONS RESUME

8:00 - 8:15 CHANGES IN BODY WEIGHT AND BODY MASS INDEX FOLLOWING A 10 MONTH GASTRIC BUBBLE TREATMENT PROGRAM FOR OBESITY. P. Ewbank, K. McMachen, D. Thorne, Midland Hospital Center Weight Management Center, Midland, Michigan

8:15 - 8:30 SOMATOTYPE OF CARDIAC PROGRAM PARTICIPANTS. C.E. Moore, D.K. Shaw, D.T. Deutsch, Applied Physiology Research Laboratory, Kent State University, Kent, Ohio and Cardiac Rehabilitation Department, Aultman Hospital, Canton, Ohio

8:30 - 8:45 COMPARATIVE BODY COMPOSITION ASSESSMENT USING THREE METHODS WITH PROFESSIONAL FOOTBALL PLAYERS. R.W. Bowers, D.T. Kirkendall, Bowling Green State University, Bowling Green, Ohio and Cleveland Clinic, Cleveland, Ohio

8:45 - 9:00 METABOLIC EFFECTS OF EXERCISE TRAINING IN THE YOUNG, OBESE ZUCKER RAT. J.J. Betts, W.M. Sherman, FACSM, J.M. Lash, School of HPER, The Ohio State University, Columbus, OH

9:15 - 9:30 CONTRACTILE PROPERTIES OF SKELETAL MUSCLE FOLLOWING 28 DAYS OF INACTIVITY. S.C. Kandarian, J.A. Opiteck, T.P. White, FACSM, Dept. of Kinesiology, The Univeristy of Michigan, Ann Arbor, MI

9:30 - 9:45 THE INFLUENCE OF EXERCISE DURATION ON EXCESS POST-EXERCISE OXYGEN CONSUMPTION. L.A. Kaminsky, J. LaHam-Saeger, G.R. Lesmes, S. Padjen, Human Performance Laboratory, Northeastern Illinois University, Chicago, Illinois

9:45 - 10:00 OXYGEN UPTAKE RESPONSE IN CHF PATIENTS PERFORMING A HIGH AND LOW INCREMENTAL TREADMILL PROTOCOL M.A. Kelsey, T.E. Kirby, C.V. Leier, Laboratory of Exercise Physiology, and Division of Cardiology, The Ohio State University, Columbus, Ohio

10:00 - 10:15 CHANGES IN PHYSIOLOGICAL CHARACTERISTICS OF COLLEGIATE CROSS COUNTRY RUNNERS WITH ENDURANCE TRAINING. G.P. Lambert, J.E. Davis, J.D. Seelbach, Dept. of Exercise and Health Science, Alma College, Alma, Michigan

ADJOURN FOR LUNCH

THURSDAY EVENING, FEBRUARY 4, 1988 - GUEST SPEAKER

9:30

8:00 - 9:00 BIOMECHANICS OF THE SKI JUMP

Kevin Campbell, Ph.D.
Cleveland Clinic, Cleveland, Ohio

RECEPTION FOLLOWING THE KEYNOTE ADDRESS

SCIENTIFIC SESSIONS RESUME

FRIDAY MORNING, FEBRUARY 5, 1988

8:00 - 8:15 ✓ Doug
MEASUREMENT OF COMPETITIVE CYCLING PERFORMANCE USING AN ON-BOARD COMPUTER. D.W. Briggs, J. Foulke, C. Woolley F.J. Fedel, Eastern Michigan University, Ypsilanti, Michigan, The University of Michigan, Ann Arbor, Michigan

8:15 - 8:30 ✓ Jolb
PRELIMINARY DETERMINATION OF NORMATIVE CHOLESTEROL LEVELS FOR A SMALL EAST-CENTRAL ILLINOIS COMMUNITY. student
J.J. Zachwieja, B.F. Timson, M.T. Woodall, Department of Physical Education, Eastern Illinois University, Charleston, Illinois

8:30 - 8:45 Norris
THE EFFECT OF ORAL ARGININE-ORNITHINE SUPPLEMENTS ON GROWTH HORMONE AND NITROGEN BALANCE IN WEIGHT LIFTERS. student ?
M.M. Chaney III, Applied Physiology Laboratory, Kent State University, Kent, Ohio

9:00 - 9:15 Kelley
LACK OF AN EFFECT OF AGE ON POST-PRANDIAL RESTING METABOLIC RATE IN FIT SUBJECTS. K.R. Holcomb, J.E. Davis, Student
J.D. Seelbach, Dept. of Exercise and Health Science, Alma College, Alma, Michigan

9:15 - 9:30
EFFECTS OF PURSED LIP BREATHING ON ARTERIALIZED-VENOUS BLOOD GASES AND LACTATE DURING SUBMAXIMAL CYCLING. 9:57
J.R. Kinker, Jr., R.L. Bartels, FACSM, The Ohio State University, Columbus, Ohio

9:30 - 9:45 Crank
CHRONIC BACK RELATED PAIN: PHYSICAL CAPACITY PROFILE. Did not show.
F.M. Ambrosius, F.N. Davis, M.L. Gostine, M.W. Heller, M. Walters, AIM WELL, Grand Rapids, Michigan

9:45 - 10:00
HIGH INTENSITY, AEROBIC CIRCUIT, CARDIAC REHABILITATION CONDITIONING, R.E. Keyser, S.A. Blair, B.C. Leutholz, 10:19
Applied Physiology Research Center, Butterworth Hospital, Grand Rapids, Michigan
— criteria for plateau central comparison

10:00 - 10:15
MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION USING IMMEDIATE PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA) FOR MYOCARDIAL SALVAGE. E. Enrique Leguizamon, E.S. Perrigo, Borgess Medical Center and the Heart Institute of Michigan, Kalamazoo, Michigan

MEETING ADJOURNMENT

Joan | CO = 3:00

Segmental Structure of Female Fatness.

Marks, C.R.C., M.D. Becque, V.L. Katch and K. Hattori.
The Behnke Laboratory for Body Composition Research, Department of Kinesiology, Division of Physical Education,The University of Michigan, Ann Arbor, MI 48109

A segmental approach was used to test the concept that females are fatter than males because they carry the same amount of fat on a smaller body size. Fifty-two male (M) and 47 female (F) subjects participated in this study. Mean ± SD age = M: 23 ±5yr, F: 24 ±5yr; stature = M: 176.8 ±7.0cm, F: 163.6 ±7.6cm; body mass = M:63.15 ±9.17kg, F:60.59 ±13.18kg; and percent fat = M:14.3 ±5.4%, F:25.1 ±8.3%. Segment volumes were used as an index of segment size. Arm, leg and whole body volumes were measured by water displacement. Trunk volume was computed by subtraction. Triceps, subscapular, suprailiac, abdomen, thigh and calf fat-folds (FF) were measured in duplicate and used as an index of segment fatness. Fat-fold distribution was computed as individual FF / Σ FF. Bonferonni multiple comparison method was used for analysis. The confidence interval was set with an $\alpha = 0.05$. Results are given below.

VARIABLE		MALE $\bar{x}$	±SD	FEMALE $\bar{x}$	±SD
Volume (lit)	*arm*	2.63	0.47	1.98 †	0.46
	leg	10.03	1.40	9.52	2.19
	trunk	36.45	6.12	29.51 †	8.37
Fat-folds (mm)	*triceps*	11.3	4.5	19.5 †	8.1
	subscap	12.2	4.4	16.3	9.3
	suprailiac	18.1	9.6	19.0	9.9
	abdomen	18.4	9.7	22.2	11.4
	thigh	14.3	5.5	30.3 †	10.8
	calf	9.0	3.3	17.2 †	7.8
Fat Distribution	*triceps*	13.8	2.7	15.8 †	2.6
(% of sum)	*subscap*	15.1	2.9	12.8 †	2.8
	suprailiac	21.0	4.3	14.8 †	2.8
	abdomen	21.6	4.3	17.3 †	3.7
	thigh	17.5	4.0	25.2 †	4.0
	calf	11.1	2.5	14.0 †	3.4

† significant gender differences, $p < 0.0017$.

The females had significantly larger extremity FFs and smaller trunk FFs when expressed as a percentage of Σ FF. Since the males and females were not significantly different in absolute trunk FFs, the increased female extremity fat distribution must have been due to increased absolute limb fatness. Leg volume was not significantly different between the males and females, but female leg FFs were larger. This implies that females carried more fat on the same size leg. Males had a larger arm volume and smaller arm FFs. This indicates that females carried more fat on a smaller size arm. Females had a smaller trunk volume, but the same size trunk FFs as the males. This suggests that females carried the same amount of fat on a smaller size trunk. In summary, it appears that females had the same amount of fat on a smaller size trunk, and carried more fat on a smaller size arm and same size leg when compared to males. The greater fatness for females, therfore, was regionally more complex than simply having more fat, or the same amount of fat, on a smaller size.

25 people

9:30-

BODY SHAPE CHANGE FOLLOWING TRAINING: THE BEHNKE SOMATOGRAM

W. R. Colchagoff, D. K. Shaw, D. T. Deutsch and J. S. Engmark. Applied Physiology Research Laboratory, Kent State University, Kent, Ohio and Cardiac Rehabilitation Department, Aultman Hospital, Canton, Ohio.

The Behnke Somatogram was used to plot body shape change in adult fitness program participants following three months of supervised exercise. Somatograms were first developed using Behnke's original Navy reference group and then were recalculated based on conversion constant (k values) obtained from the present subjects' initial anthropometric measurements. Twelve circumferences were obtained on thirty-nine male fitness class participants having a mean age of 45.8 ± 7.7 yrs, height of 177.3 ± 6.8 cm, weight of 87.7 ± 15.9 kg, percent fat of 25.1 ± 5.0, and estimated maximum oxygen uptake ($\dot{V}O_2max$) of 37.7 ± 1.7 $ml/kg \cdot min^{-1}$. Figure 1 shows anthropometric deviations based on the Navy reference while Figure 2 shows deviations based on the recalculated k values.

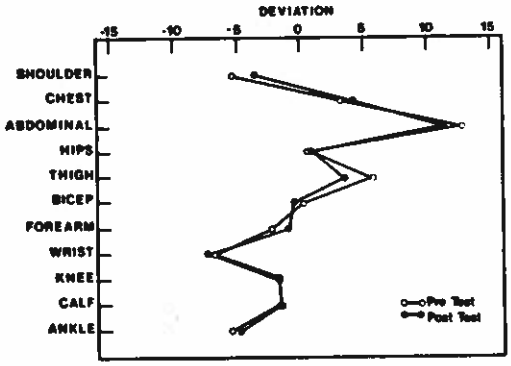


FIG 1

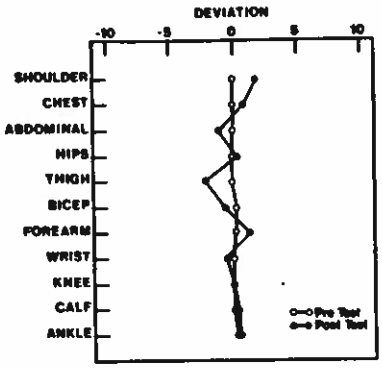


FIG 2

Training consisted of both aerobic and resistive-type exercise. Improvement in VO_2max to 43.8 $ml/kg \cdot min^{-1}$ was evidenced after the training period. The Behnke Somatogram was developed in order to quantify the body in a meaningful manner. Large deviations would be expected and were demonstrated when a 45-year-old untrained male was compared to a group of 25-year-old naval personnel. The largest percentage difference in k values was found in the abdominal measurement (the average of abdominal 1 and 2) at 12.85%. The larger the deviation in an individual's relative proportions from those of the reference group, the more difficult interpretation of pre- and post-training Somatograms becomes since the large deviation masks overall change. The Somatogram can be a valuable instrument in evaluating and educating program participants as to the value of exercise and dietary modification in altering body form.

8:32
1
8:47

CHANGES IN BODY WEIGHT AND BODY MASS INDEX FOLLOWING A 10 MONTH GASTRIC BUBBLE TREATMENT PROGRAM FOR OBESITY. Philip Ewbank, Kay McMachen and Denise Thorne. Midland Hospital Center Weight Management Center, Midland, MI.

To determine the combined effect of gastric bubble therapy and conservative obesity treatment upon body weight and body mass index (BMI) in the obese, 10 obese females ($\bar{x}$ wt=125.06$\pm$20.86 kg) were followed longitudinally as members of a hospital based, outpatient weight management program. Gastric bubble therapy consisted of 2 consecutive bubble insertions and removals, with each gastric insertion lasting about 4½ months. Conservative treatment, provided by the weight management program, consisted of both group and individual psychological treatment sessions, nutritional counseling and exercise counseling. Comparison of the initial insertion values for weight and BMI to the final post-removal values indicated both body weight and BMI decreased. The decreases, however, were not significant ($p>0.05$). Mean body weight declined 13.86 kg, from 125.06$\pm$20.86 kg to 111.20$\pm$26.08 kg during the time of bubble insertion. BMI decreased 5.05 units, from 44.99$\pm$7.25 kg/m^2 to 39.94$\pm$8.99 kg/m^2. The decrease in BMI, while statistically non-significant, did change the initial BMI category designation of morbidly obese (BMI>40) to a final category designation of obese (BMI=30-39). The results of this study suggest gastric bubble therapy, in combination with traditional weight management therapy, produce a minimal decrease in the body weight and BMI of the obese during the time of bubble insertion. Follow-up study needs to examine the maintenance of the changes following terminal bubble removal.

1800 / wk - goal 1K cal expend

8:46

SOMATOTYPE OF CARDIAC PROGRAM PARTICIPANTS.

C. E. Moore, D. K. Shaw, and D. T. Deutsch.
Applied Physiology Research Laboratory, Kent State University, Kent, Ohio and Cardiac Rehabilitation Department, Aultman Hospital, Canton, Ohio.

Male cardiac patients are often described as overweight, medium-framed and rotund. The purpose of this study was to provide a more precise morphologic description of this patient group using the Heath-Carter somatotype. Anthropometric and body composition data were collected on 27 male cardiac patients upon entry to a Phase III cardiovascular rehabilitation program. Mean (SD) age, height and weight were 61.1 (6.5) yrs, 176 (7.2) cm and 80.8 (12.2) kg, respectively. Mean somatotype components were 5.2-5.2-1.7. These data are in contrast to previously-reported somatotype components of asymptomatic exercise program participants (3.9-4.7-3.4). Subjects had higher endo/mesomorphic and lower ectomorphic components than Sheldon's normal male. Sheldon's normal height to weight ratio (13.1) was used to calculate an appropriate weight relative to height. Subjects were judged 12.6 kg overweight by this criterion. Relative body fat predicted from skinfold measurement was 27.5 percent. Predominance of endo/mesomorphic components supports the notion of male cardiacs as overweight, medium-framed and rotund. The significance of excess mesomorphy relates to the predisposition for the development of heart disease.

COMPARATIVE BODY COMPOSITION ASSESSMENTS USING THREE METHODS WITH PROFESSIONAL FOOTBALL PLAYERS

8:58

R. W. Bowers and D.T. Kirkendall

Bowling Green State University and The Cleveland Clinic

Ten weeks prior to the opening of training camp for a professional football team, the team was given an annual physical examination. This occasion provided the opportunity to conduct a comparative study of three accepted methods of assessing body fat levels. Hydrostatic weighing (estimated residual volumes), skinfold analysis (Jackson-Pollack three site procedure), and bioimpedance analysis tests were administered within one hour of one another. Complete data sets were collected on 29 athletes. Statistical treatment includes: discriptive data; ANOVA for method with race and position groupings; and linear regression analysis.

Overall, percentage body fat levels were 15.8 (±5.4), 14.2 (±4.5), and 19.2 (±5.2), respectively, for SF, H_2O, and BIO. Bioimpedance was significantly higher than the other two methods. The highest correlations occured between H_2O and SF methods. Overall, BIA did not correlate well with either SF or H_2O. Within the black athletes results of the regession analysis were poorer than with whites. Differences in bone density may account for some of the descrepancy. The results of this field trial on a unique sample suggests that SF is a better method of estimating percent body fat when hydrostatic weighing equipment is not available and that further work on BIA as a method is warranted before a broad application of that technique can be generally accepted.

9:25
15
9:40

METABOLIC EFFECTS OF EXERCISE TRAINING IN THE YOUNG, OBESE ZUCKER RAT

J.J. Betts, W.M. Sherman, FACSM, and J.M. Lash.
School of HPER, The Ohio State University, Columbus, OH 43210

Can peripheral metabolic and vascular adaptations be induced by training male obese Zucker rats (OZR) for only 1 hour per day, 15 meters per minute (17% grade), 5 days per week for 5 weeks from 6 to 11 weeks of age? After a 12 hour fast and 48 hours after training, a blood sample was obtained and analyzed for glucose (mM) and insulin (uU/mL), and the hindlimb perfused. Glucose uptake (GU) and vascular resistance were measured with 1 mM insulin/mL. Trained animals (T, n=9) were compared to age-matched sedentary lean (L, n=8) and OZR (S, n=7) (ANOVA, $p \leq 0.05$). Body weight was unaffectd by training. Glucose was significantly increased in S (9.00) and T (9.3) versus L (6.9). Insulin was significantly increased in S (51) and T (49) versus L (24). GU (umol/g/h) was significantly decreased in S (12.2) versus L (17.3); T showed significantly higher GU (16.0). Vascular resistance ([mmHg]/[mL/g/min]) was significantly increased in S (148) versus L (106) and significantly decreased in T (93). Training increased citrate synthase activity 1.3-fold. Like training for 2 hours per day (Am. J. Physiol. 251:E299, '86), training for only 1 hour per day induced significant peripheral metabolic and vascular adaptations.

Supported by the Central Ohio Heart Chapter, Inc., American Heart Association, 1986-1987.

mech for ↑ Var. Res
↓ Var Res (of obese)

9:44

CONTRACTILE PROPERTIES OF SKELETAL MUSCLE FOLLOWING 28 DAYS OF INACTIVITY. Susan C. Kandarian, Julie A. Opiteck, and Timothy P. White, FASCM. Department of Kinesiology, The University of Michigan, Ann Arbor, MI 48109-2214.

We tested two hypotheses. Following 28 days of inactivity due to hindlimb suspension: 1) decreases in skeletal muscle size will be of equal magnitude to decreases in maximum isometric force (P_o) and; 2) time to peak tension (TPT) and one-half relaxation time (1/2RT) will be faster compared to control values. The tails of female Wistar rats (200 g) were plaster casted under anesthesia. Rats were hung by tail casts such that the hindlimbs were suspended and the forelimbs remained on the cage floor. Soleus muscles (n=8) were studied 28 days following suspension and compared to those from age-matched unsuspended rats (n=4). Isometric contractile properties were measured *in vitro* at 25°C. Following suspension, body mass was not different between suspended and control groups. Soleus muscle mass of suspended rats was 39% lower ($p<0.0001$) than the control value of 122 ± 2 mg ($X\pm SEM$). No change in muscle architecture was measured. P_o was depressed 56% due to suspension ($p<0.0001$). P_o normalized to muscle cross-sectional area was 25% lower ($p<0.05$) in muscles from suspended rats compared to those from control rats (21.3 ± 0.6 N/cm^2). TPT was 37% faster ($p<0.0001$) and 1/2RT was 28% faster ($p<0.07$) in muscles from suspended rats compared to the control values of 86 ± 2 ms and 99 ± 4 ms, respectively. Decreases in muscle force are not completely explained by decreases in muscle size, thus hypothesis 1 is not supported. Since inactivity resulted in faster contractile properties, hypothesis 2 is supported.

Supported by NIH AG-06130 and AR-34298

Welch - aspen for analysis?

10:00

Abstract for the
Midwest Chapter of American College of Sports Medicine
Annual Winter Meeting 1988

THE INFLUENCE OF EXERCISE DURATION ON EXCESS POST-EXERCISE OXYGEN CONSUMPTION

L. A. Kaminsky, J. LaHam-Saeger, G. R. Lesmes, and S. Padjen
Human Performance Laboratory, Northeastern
Illinois University, Chicago, IL 60625

Excess post-exercise oxygen consumption (EPOC) has been proposed to be an important contributor to the total caloric expenditure associated with an exercise session. Controversy regarding the magnitude of EPOC and the relationship of exercise duration to EPOC prompted this investigation. Six women (mean $\pm$ SD, age and body mass index (kg/m^2) were 29.7 ± 4.2 years and 22.0 ± 2.0 respectively) participated in this study. The EPOC associated with a 50 min treadmill run (70% peak VO_2) was compared against the combined EPOC of two successive 25 min runs at the same intensity. The two exercise trials were conducted on separate days in the morning 3 hours after a standardized 300 kcal meal to control for the influence of diet-induced thermogenesis. Metabolic measurements were obtained prior to exercise after a quiet 30 min rest period in a seated position, during exercise, and at regular intervals following exercise (seated position). The mean exercise energy expenditure was equal in the two exercise trials (500 kcals). Following exercise VO_2 returned to the pre-exercise value within 30 min after all three treadmill runs. There were no significant differences in the magnitude of EPOC following the 50 min vs. the two 25 min runs. The net energy expenditure associated with the EPOC was significantly greater when comparing the two 25 min runs against the one 50 min run (13.88 vs. 6.39 kcals, $p<0.05$). The ratio of the post-exercise to exercise caloric expenditure was 2.8% and 1.3% for the two 25 min and the one 50 min runs respectively. These data suggest that EPOC is not a significant contributor to the total caloric expenditure associated with an exercise session. However, split exercise sessions can produce significantly greater post-exercise caloric expenditure.

EPOC / EOC (exercise ~~expended~~ energy expend)

10:16

OXYGEN UPTAKE RESPONSE IN CHF PATIENTS PERFORMING A HIGH AND LOW INCREMENTAL TREADMILL PROTOCOL

Moira A. Kelsey, Timothy E. Kirby, Carl V. Leier. Laboratory of Exercise Physiology and Division of Cardiology, The Ohio State University, Columbus, Ohio.

To determine if the rate of increase in work on a graded exercise test (GXT) influenced oxygen uptake (VO2) response of congestive heart failure (CHF) patients, VO2 was directly measured during a high (HI) incremental and a low (LI) incremental treadmill protocol. Nine CHF (NYHA class II and III) and 10 normal control (C) subjects performed a HI (1.7 MET/stage increase) and a LI (estimated .85 MET/stage). Venous blood samples were obtained for LAC analysis during the second minute of each stage. ANOVA was done to compare VO2 and LAC obtained during equal levels of work (WL). VO2 and LAC did not differ for CHF nor C at any WL when comparing HI and LI. The mean VO2 responses of the CHF were significantly lower than C at every WL on both HI and LI (3.4 ml/kg/min avg. for LI, 5.7 ml/kg/min avg. for HI). Compared to CHF, peak LAC was significantly higher in the C with the HI (2.5 vs 6 mMoles) and LI (1.6 vs 6.4 mMoles. These results indicate that a larger incremental TM protocol (1.7 METS) does not influence the VO2 response of CHF patients. The LI protocol does not ensure an improved performance in this population. Using estimated values based on a normal population to predict the VO2 response of CHF patients, even on a very slow increasing TM protocol, is likely to over estimate oxygen consumption.

10:39

CHANGES IN PHYSIOLOGICAL CHARACTERISTICS OF COLLEGIATE CROSS COUNTRY RUNNERS WITH ENDURANCE TRAINING. G.P. Lambert, J.E. Davis, and J.D. Seelbach. Dept. of Exercise and Health Science, Alma College, Alma, MI 48801.

This study was conducted to follow changes in aerobic and anaerobic power during a collegiate cross country season and to relate them to blood lactate levels following anaerobic exercise. Eight male competitive cross-country runners were tested before (PRE) and after (POST) their competitive season. Maximum oxygen consumption ($\dot{V}O_2max$) was determined using a standard progressive protocol. Peak anaerobic power (AP) and anaerobic capacity (AC) were measured using the Wingate Anaerobic Power Test. For 4 subjects, venous blood lactate (Bla) was determined following the AP test both PRE and POST competitive season.

There was no significant difference between PRE and POST $\dot{V}O_2max$ (72.1 to 70.6 $\pm$ 4.4 ml/kg/min). However, AP increased from PRE to POST(4290 to 4600 $\pm$ 65 kg·m/min). Anaerobic capacity also increased from PRE to POST (2730 to 2991 $\pm$ 84 kg·m/min). These data are probably a result of two factors. First, cross country runners at the start of the season are more aerobically than anaerobically trained and second, late season training emphasizes more speedwork resulting in improvements in anaerobic performance.

The results were as follows for subjects tested for blood lactate:

SUBJECT #	$\dot{V}O_2max$ ml/kg/min		AP kg·m/min		Bla mmol	
	PRE	POST	PRE	POST	PRE	POST
1	79.3	69.4	4487	4650	8.7	9.8
2	76.8	81.0	3673	4284	8.7	8.2
3	68.4	61.5	4109	4520	7.0	9.5
4	64.8	67.9	4986	5190	11.6	11.7

These data suggest that the changes in Bla are related to both AP and $\dot{V}O_2max$. Increases in AP were accompanied by increased Bla only in subjects (1,3) where $\dot{V}O_2max$ decreased. In those subjects where $\dot{V}O_2max$ increased, Bla either decreased (2) or stayed the same (4) even though AP increased. This is probably reflective of increased clearance of lactate from the blood with increased aerobic power.

VO_2 slight ↓
AnP ↑ sig.

Δ in weight ?
express AnP per wt.

GXT protocol
measure of perf. or Δ in performance test

MEASUREMENT OF COMPETITIVE CYCLING PERFORMANCE USING AN ON-BOARD COMPUTER.

8:37

Douglas W. Briggs, James Foulke, Charles Woolley, Frank J. Fedel.
Eastern, Michigan University, Ypsilanti, Michigan, U.S.A.; The University of Michigan, Ann Arbor, U.S.A.

The purpose of this investigation was to design a portable cycle computer capable of storing crank arm force moment data (Nm) sampled every 22½° of crank rotation, and averaged over sixteen crank revolutions, during outdoor competition. Information obtained was used to analyse individual work patterns, and to provide the cyclist with immediate feedback.

The basic module was a straingauge force measuring system mounted on the sprocket cluster. Pedal forces were transduced by strainguages mounted in pairs on the crank arms. Two instrumentation amplifiers provided volts per N pedal force through a slipring assembly to the computer. Data sampling was synchronised by an index on the slipring. Additional interface modules were used to log distance, heart rate, gear size, and microstrain frame loads. An optical sensor affixed to the front wheel was used to record elapsed distance.

A portable computer was used to initialise, calibrate, programme, perform a diagnostic data dump, and store data. Two elite athletes, subsequently designated PT (professional triathlete) and USC (1986 United States World Cycling Team member), each completed a 17.4 km time trial but at different elevations.

Both men recorded similar total work magnitudes (PT: 30,059 Nm; USC: 30,058 Nm), but total negative work was significantly less for PT (PT: -1562 Nm; USC: -5,212 Nm). Significantly greater negative force magnitudes existed for USC at a higher average leg cadence than for PT (USC: -65 to -85 N at 109 rpm; PT: -20 to -30 N at 88 rpm). Total average net power asymmetry for PT exceeded that for USC by 19% (PT: 117.5%; USC: 98.5%). Although USC's total positive work and net power values were exceeded by PT, USC completed the 17.4 km ride 5 minutes 55 seconds faster than PT (average speed USC: 58.6 km/h; PT: 44 km/h). This indicates that many other factors in addition to mechanical power output need to be considered to further reduce performance times. These data demonstrate distinct yet subtle individual differences in crank work patterns, and that the on-board computer described here is a functional device for recording crank arm force moments during competition.

8:55

ABSTRACT

PRELIMINARY DETERMINATION OF NORMATIVE CHOLESTEROL LEVELS FOR A SMALL EAST-CENTRAL ILLINOIS COMMUNITY: J. J. Zachwieja, B. F. Timson, and M. T. Woodall, Department of Physical Education, Eastern Illinois University, Charleston Illinois.

Evidence from the Framingham study (JAMA 1987:257:2176-2180), indicating that blood cholesterol is associated with coronary heart disease risk, has caused a large number of Americans to become concerned about their individual cholesterol count. The variation in measurement between labs and among methods has caused inconsistency in the production of normative data. Furthermore, established national norms may not be representative of the number of diverse populations throughout this country. It was the purpose of this study to establish norms for the Charleston community at large based on a single measuring device. Fifty-five males and females ranging in age from 26 to 78 had total cholesterol measured in a rested fasting state. A Reflotron Dry Blood Chemistry Analyzer, made by the Boehringer Manheim Company, was the measuring instrument. A range of 129mg/dl to 309mg/dl, with a mean of 208.8 mg/dl was obtained. Mean cholesterol values with respect to age are presented in the following table.

	AGE					
	20-29	30-39	40-49	50-59	60-69	70-79
Mean CHO	183.3	209.7	198.6	226.0	207.6	207.8
SE	9.7	16.3	18.0	13.4	7.7	21.0
Number	3	3	8	11	25	5

Although these data are only preliminary, we hope that further information will establish a basis for the assessment of obtained values upon initiating a community screening service.

THE EFFECT OF ORAL ARGININE-ORNITHINE SUPPLEMENTS ON GROWTH HORMONE AND NITROGEN BALANCE IN WEIGHT LIFTERS

M. M. Chaney III, Applied Physiology Laboratory, Kent State University, Kent, OH, 44242.

Weight training athletes are consuming oral arginine-ornithine supplements with the belief that growth hormone (GH) is elevated and natural "steroid like" anabolism occurs. Evidence for arginine or ornithine stimulation of GH is from clinical intravenous infusion studies with 20 - 30 grams, while distributors recommend oral dosages of 1 - 3 grams. Recent investigations with oral arginine-ornithine supplements show no GH elevation except with hypersensitive populations (i.e. adolescents), nor any anabolic effects. In the present study (5 males, aged 21 - 29), acute resting serum GH responses to 0.04, 0.12 or 0.21 g/kg showed no significant differences across time or between dosages. Following chronic (17 day) ingestion of arginine-ornithine (0.12 g/kg) vs lactose placebo (6 experienced weight trained males, aged 21 - 24), day 15 measures of GH in combination with a weight training session showed no significant differences for treatment. Despite random order of treatments, five of the six subjects showed a greater GH elevation with the first treatment. This was interpreted as a a stress response. Pre- and post-treatment measures of strength, muscle size, body fat, and body weight also showed no significant differences. Dietary protein requirement to weight lifting (also an indicator of anabolism) was measured and its adequacy assessed from nitrogen (N) losses (urine and sweat) on days 15 - 17. No significant differences occurred due to treatment or across days. Nitrogen status was frequently negative and was observed to parallel changes in self selected protein (mean + SE) (1.26 ± 0.12, 0.96 ± 0.18, 1.32 ± 0.18 g/kg) and energy (10797 ± 1417, 9847 ± 1727, 12815 ± 1971 kJ) consumptions, despite sufficient intake as respectively indicated by the recommended dietary allowance (0.8 g/kg) (protein) and calculations of need (energy). The day after weight training showed the most negative N status. Attainment of a positive N status with weight training may necessitate greater energy and/or protein intake than that selected by these subjects.

Supported by a grant to P. W. R. Lemon from Weider Health & Fitness, Inc. in conjunction with the Federal Trade Commission.

9:30

LACK OF AN EFFECT OF AGE ON POST-PRANDIAL RESTING METABOLIC RATE IN FIT SUBJECTS. K.R. Holcomb, J.E. Davis, and J.D. Seelbach. Dept. of Exercise and Health Science, Alma College, Alma, MI 48801.

It is generally accepted that resting metabolic rate(RMR) increases after a meal. This occurs if the meal is large enough to stimulate dietary induced thermogenesis. The purpose of the present investigation was to determine the effects of age on post-prandial RMR as indicated by the resting oxygen consumption ($\dot{V}O2$). We originally hypothesized that the typical increase in RMR observed in young subjects would diminish with age. To test this hypothesis, ten fit(>4 hours of exercise /week) subjects were tested. Subjects ranged from 20 to 74 years of age. Each subject participated in a experimental and a control condition. During the experimental condition, resting $\dot{V}O2$ was measured initially(T0), then subjects consumed a mixed meal consisting of approximately 1500 kcal. Resting $\dot{V}O2$ was measured again 1(T1), 2(T2), and 4(T4) hours after the meal. There was a significant increase in RMR at T1, T2, and T4 after food ingestion in all subjects ($P < 0.05$) as is indicated in the following table:

Resting $\dot{V}O2$ (ml/min)

	PRE	T1	T2	T4
Mean	254	315*	314*	302*
SE	26	22	29	24

To determine if age influenced the post-prandial RMR, a regression analysis was performed to relate age to the change in resting VO2 for T0 to T1, T0 to T2, and T0 to T4. There was no significant relationship between age and the change in resting $\dot{V}O2$ for any of the previously mentioned time periods. These data suggest that age does not play a role in modulating the post-prandial RMR.

EFFECTS OF PURSED LIP BREATHING ON ARTERIALIZED-VENOUS BLOOD GASES AND LACTATE DURING SUBMAXIMAL CYCLING

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The Ohio State University, Columbus, Ohio 43210

Pursed lip breathing (PLB) has been practiced by patients with emphysema for many years. Many apparently healthy endurance athletes and recreational runners have been observed PLB by this writer and others. Also, it has been reported that the University of Oregon's runners are taught to use PLB.

This pilot study was designed to determine if PLB would increase arterialized-venous CO2 (PavCO2) and if PavCO2 is elevated, to test if an elevated PavCO2 effects lactate (La). Previous studies using controlled breathing resulted in elevated blood CO2 showed no change in La, but elevated PavCO2 has been shown to decrease blood La by possible inhibition of phosphofructokinase, decreased transport of La out of the muscle, and/or a greater La oxidation within the muscle cell. Furthermore, it has been shown that when the work of breathing is reduced in conditions requiring a high cardiac output the blood La is also significantly reduced.

Ten subjects pedalled on a cycle ergometer for 30 min at 55% VO2max. The subjects randomly breathed normally or used PLB for the first part of the ride then adapted the other breathing pattern for the last part of the ride. PLB was performed as follows: slightly increased inspiratory level toward inspiratory capacity, momentarily pausing, passively exhaling to FRC then actively expiring to RV and slowing breathing frequency as tolerated. A paired T test was used to determine the differences in La, PavCO2, arterialized-venous PO2 (PavO2) and heart rate (HR), as an indication of workload. Correlations between La and PavCO2, PavO2, pH and HR were tested.

The results demonstrated that PLB significantly ($P < .05$) increased PavCO2 from 37.28 mmHg with normal breathing to 41.96 mmHg with PLB. PLB also significantly reduced La from 1.26 mMol/L with NB to 1.11 mMol/L ($P < .05$). The decrease in La while PLB occurred within five minutes. The mean HR of 129 while PLB was significantly ($P<.05$) higher than the NB HR of 124. PavO2 while PLB was significantly lower ($P<.05$) than NB, which were respectively 69.76 mmHg and 77.74 mmHg. None of the changes in the parameters were significantly ($P<.05$) correlated to the reduced lactate while PLB. The highest correlation coefficient, of 0.33 was between PCO2 and La.

To discuss the results it is suggested from this data that the decreased in La with PLB could have been partly due to changes in PCO2. The lack of significant correlation between La and PavCO2 may be due to the wide variability in the PavCO2, since the subjects had difficulty tolerating the reduced ventilation with PLB. Although, the drop in La occurred within five minutes of initiating PLB and it takes up to fifteen minutes for hypercapnia to reduce blood La. So it is unlikely that the hypercapnia induced with PLB caused the reduction in La. Decreases in the work of breathing (WOB) have reduced blood La levels in conditions such as shock, which requires a substantial percentage of the limited cardiac output for the WOB. In addition, it has been shown that increasing the WOB with all other muscles inactive does not effect blood La until ventilation reaches 100% of maximal exercise ventilation. But this does not lead to competition for blood flow as occurs with shock. Studies of animals in shock have shown a reduced La when the WOB is reduced. Perhaps in this study with PLB a decreased WOB occurred facilitating blood flow to the working muscles contributing to a reduction in blood La.

It was concluded that the reduced La with PLB is unlikely due to a reduced workload, since the HR during PLB was higher than NB. The changes observed in PavO2, pH, or PavCO2 were not related to the La changes. It is therefore concluded that a decrease in La while PLB is primarily due to other causes that may increase La clearance or decrease La production. Further research is needed to support this observed reduction in La with PLB during submaximal exercise and to determine what effects if any would be induced on endurance performance.

ABSTRACT

AMBROSIUS, FRANK M., FRED N. DAVIS, MARK L. GOSTINE, MIKE W. HELLER, and MICHAEL WALTERS. Sixty-four individuals suffering from chronic pain were assessed at a multidisciplinary functional rehabilitation facility to evaluate their functional status. The purpose of this data collection was to determine inherent parameters of a chronic back injured population in an effort to raise awareness levels of the general public. The subjective and objective results indicate a generally reduced level of health as measured by; body fat percentage (32.57%), aerobic capacity (6.64 mets), muscular strength utilizing a leg press (133.58 lbs), and gross flexibility (108.23 deg.). It was concluded from these results that physical activity and increased health awareness play integral roles in the prevention and recurrence of back related injury.

CARETRAC FUNCTIONAL REHABILITATION CENTER, CHRONIC BACK RELATED PAIN, PHYSICAL CAPACITY PROFILE (PCP).

HIGH INTENSITY, AEROBIC CIRCUIT, CARDIAC REHABILITATION CONDITIONING. R.E. Keyser, S.A. Blair, B.C. Leutholz. Applied Physiology Research Center, Butterworth Hospital, Grand Rapids, MI 49503

Cardiac rehabilitation programs of low to moderate intensity and long duration have been shown to result in significant increases in peak O_2 consumption ($\dot{V}O_2$) and work rate (WR) with little central cardiovascular effect. The present study examined the effects of three minute exercise intervals which alternated arms and legs to continuously maintain an exercise intensity of approximately 91% of the peak heart rate (HR), for 30 minutes, in seven patients with coronary artery disease (CAD). Total length of the program was three months (36 sessions). Analysis of variance (ANOVA) indicated a slight increase in peak $\dot{V}O_2$ as a result of the training regimen ($p<.05$). Anaerobic threshold (AT), peak ventilatory equivalent for O_2 (Veq) and respiratory exchange ratio (RER) significantly increased following the exercise program ($p<.01$). Significant increases in peak HR and rate pressure product (RPP) were observed ($p<.01$).

Trial	HR (beats/min)	RPP	$\dot{V}O_2$ (ml/min)	AT (% VO_2 max)	Veq	RER
pre	113 (±9)	212 (±57)	1258 (±357)	66 (±15)	46 (±7.9)	1.09 (±.07)
post	122 (±14)	236 (±28)	1312 (±316)	72 (±12.3)	50 (±14)	1.19 (±.18)

It was concluded that high intensity, aerobic, circuit training enhanced central circulatory capacity and delayed the onset of anaerobiosis in patients with CAD.

Abstract of Special Interest Presentation, Winter Meeting Midwest Chapter American College of Sports Medicine, Boyne Falls, Michigan, Februrary 4, 1988

MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION USING IMMEDIATE PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA) FOR MYOCARDIAL SALVAGE

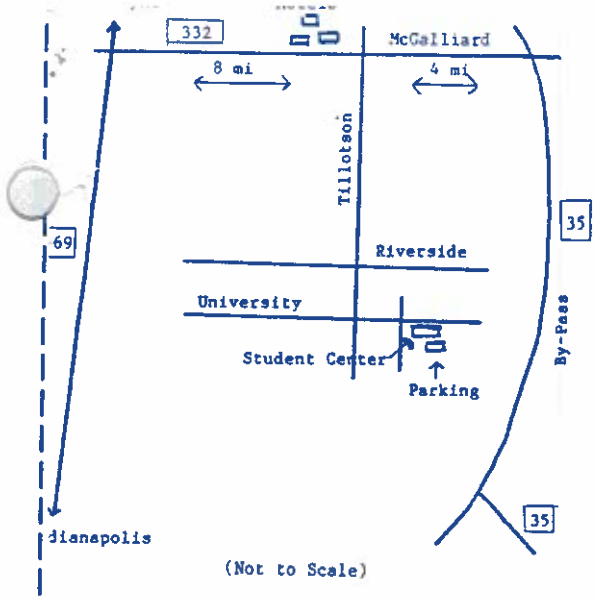
E. Enrique Leguizamon, M.D.,FACC, Medical Director of Cardiology Services and Earl S. Perrigo, M.D.,FACSM, Post-Graduate Fellow in Interventional Cardiology, BORGESS MEDICAL CENTER and THE HEART INSITUTE OF MICHIGAN, Kalamazoo, MI.

One third of the survivors of acute myocardial infarction (AMI) sustain substantial damage to the myocardium resulting in clinical manifestations of congestive heart failure and impaired quality of life. Animal studies have shown that reperfusion of the infarct related artery (IRA) within 3-4 hours of ligation results in significant salvage of myocardium. The Group Italian Study of Streptokinase in Myocardial Infarction (GISSI) demonstrated in patients sustaining an AMI, that coronary reperfusion by intravenous thrombolysis with Streptokinase administered within 3-6 hours of onset of pain resulted in a 17% reduction in net mortality. Thrombolytic interruption of AMI, however, is only "coronary first aid" since 70% of these patients are found to have a residual high grade stenosis in the IRA which may require PTCA or coronary artery bypass grafting (CABG) to prevent recurrent angina (43%) or a recurrent AMI (22%). One option in "high tech " aggressive management of AMI is the performance of emergency or immediate PTCA (I-PTCA) on the IRA to interrupt the progression of infarction and to salvage myocardium. Hartzler has reported a series of 321 AMI patients treated with I-PTCA with a 92% procedural success, 13% improvment in left ventricular function, and an 8% mortality.

From December 1978 through November 1987, 2775 PTCAs were performed at the Borgess Medical Center in Kalamazoo, Mighigan. 412 (15%) of these procedures were performed as the primary therapy in AMI within 0.5-6 hrs (mean 3.4) of onset of pain. The patient population consisted of 109 females and 303 males with age range 26-85 yr. and mean age 40.8 yr.. I-PTCA as emergency treatment for AMI was accomplished with initial success in 381 (93%) patients. Early restenosis (prior to discharge) occured in 50 (13%) of these patients. Of this group 39 (78%) underwent second PTCA which was successful in 34 (87%) patients. One patient required a third PTCA before discharge, and this was successful. At the time of hospital discharge 365 (89%) patients had experienced successful PTCA. Of the 47 (11%) PTCA failures, 30 received medical therapy alone and 17 received CABG prior to discharge. There was only one in-hospital death in this group (0.2% mortality).

Repeat coronary angiography was performed 6-12 months following successful I-PTCA in these 365 patients with the demonstration of 55 (14%) late restenosis. PTCA was attempted on 45 (82%) of these patients with success in 40 (89%). Of the five PTCA failures, three were treated medically and two by CABG. The procedure had an overall late success in 350 (85%) patients.

These observations from 9 years experience at Borgess Medical Center clearly demonstrate that PTCA as the primary treatment in AMI is efficacious and safe for the management of patients who present early with their infarct to a specialized center possessing a high level of expertise in PTCA. This non-randomized study suggests that I-PTCA during AMI results in higher rates of reperfusion, better preservation of left ventricular function, and reduced mortality compared to immediate treatment with a thrombolytic drug alone. Before this approach would become a standard of care, however, we need to know from large randomized trials that I-PTCA alone is as efficacious and safe as PTCA performed as a staged procedure following initial thrombolytic therapy.



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RESPONSES AND ADAPTATIONS TO EXERCISE: TWENTY-FIVE YEARS OF RESEARCH

Annual Meeting of the
Midwest Chapter of the American
College of Sports Medicine
and
25th Anniversary of
The Human Performance Laboratory
Ball State University

October 19 & 20, 1990

Hosted by
The Human Performance Laboratory
Ball State University
Muncie, Indiana
in the
L.A. Pittenger Student Center

PURPOSE

This program is designed to review the metabolic adaptations of muscle to exercise, the response of muscle to altitude training, pathophysiological consequences of exercise induced injury and the effects of exercise on other organ systems.

PROGRAM
FRIDAY, OCTOBER 19, 1990

6:00 p.m. **Registration**
7:00 p.m. **Welcome**
Dr. John Worthen
7:05 p.m. **Adult Fitness/Health Promotion**
Dr. Bud Getchell
7:15 p.m. **Exercise and Protein Metabolism**
Dr. Bill Evans
8:05 p.m. **Effects of Exercise on Lipid Metabolism**
Dr. Paul Thompson
8:55 p.m. **Closing Remarks**
Dr. David Costill
9:15 p.m. **Reception - Kitselman Center**

SATURDAY, OCTOBER 20, 1990

7:00 a.m. **MWACSM Board of Trustees**
Terrace Dining Room
8:00 a.m. **Registration**
8:30 a.m. **Welcome**
Dr. David Costill
8:45 a.m. **Muscle Adaptations and Performance with Altitude Training**
Dr. Bengt Saltin
9:30 a.m. **Exercise Induced Muscle Damage: Etiological Factors and Patho-Physiological Consequences**
Dr. Harm Kuipers
10:15 a.m. **Refreshment Break**
10:45 a.m. **Cycling Technology**
Dr. Ed Burke
Carbohydrate Feeding and Performance
Dr. Ed Coyle
11:15 a.m. **Maximal Exercise Testing in Various Manifestations of Heart Disease**
Dr. Mike Sullivan
Fluid and Mineral Balance during Exercise
Dr. Larry Armstrong
12-1:30 p.m. **Tour of Human Performance Lab.**
12:00 p.m. **Lunch - on your own**
12:00 p.m. **Luncheon for Speakers**
Terrace Dining Room
1:00 p.m. **MWACSM Business Meeting**
Student Center Ballroom
1:45 p.m. **Introduction to Afternoon Session**
Dr. Lenny Kaminsky
2:00 p.m. **Metabolic Responses to Exercise of High Intensity and Brief Duration**
Dr. Clyde Williams
2:45 p.m. **Athlete's Nutrition Knowledge and Practices**
Dr. Susan Barr
Muscle Glycogen Storage after Prolonged Exercise
Dr. John Ivy
3:15 p.m. **Amino Acid Supplementation and Performance during High Intensity Exercise**
Dr. Rick Sharp
Measurements of Muscular Force: Relevance to Musculoskeletal Biomechanics
Dr. Bob Gregor
3:45 p.m. **Refreshment Break**
4:00 p.m. **Measurements of Anaerobic Capacity**
Dr. Carl Foster
Exercise and Bone Mineral Density
Dr. Gail Dalsky
4:30 p.m. **Genetic Potential for Endurance**
Dr. Pete Van Handel
Pre-Exercise Feedings and Exercise Performance
Dr. Mike Sherman
5:00 p.m. **Closing Remarks**
Dr. Duane O. Eddy
President, MWACSM

KEYNOTE SPEAKERS

Harm Kuipers, M.D., Ph.D., FACSM
Department of Physiology
University of Limburg
The Netherlands

Bengt Saltin, M.D., Ph.D., FACSM
Department of Physiology
August Krogh Institute
University of Copenhagen
Copenhagen, Denmark

Clyde Williams, Ph.D.
Department of Physical Education and Sport Science
Loughborough University of Technology
Loughborough, Leicestershire, England

CREDIT

This program has applied for Continuing Education Credit (CEC) by the American College of Sports Medicine.

PROGRAM CHAIRPERSONS

David L. Costill, Ph.D., FACSM
Director, Human Performance Laboratory
Ball State University
Muncie, IN

Duane O. Eddy, Ph.D.
Dean, College of Applied Sciences & Technology
President, Midwest Chapter American College of Sports Medicine
Ball State University
Muncie, IN

Leonard A. Kaminsky, Ph.D.
Assistant Director, Adult Fitness
Ball State University
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1990 Winter Meeting of the Midwest Chapter of the American College of Sports Medicine

Boyne Mountain, Michigan

Sponsored by: Butterworth Hospital

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Dear Participant:

Welcome to the Winter Meeting of the Midwest Chapter of the American College of Sports Medicine. This year's meeting features an exceptional "Keynote" address being presented by Dr. Roger Glaser, FACSM, Professor and Acting Chair of Rehabilitative Medicine and Restorative Care, Wright State University. Dr. Glaser will be explaining a method of aerobically training persons with spinal cord injury paralysis known as Computerized Functional Electrical Stimulation. His research is certainly the "cutting edge" of exercise science and technology.

This year's abstract presentation agenda represents a cross-section of the field with presentations related to a wide variety of topics and presenters from some of the leading institutions in the Midwest. You will note that Wednesday evening and Thursday morning are devoted to applied exercise science studies. Friday morning has been set aside for clinical physiology. The abstracts selected by the expert team of reviewers were selected on the basis of scientific and literary merit. We had many fine abstracts submitted this year and we appreciate the effort of those who willingly submitted their work. Unfortunately, we just could not fit all of the submissions into the schedule. Presenters are asked to leave three to five minutes at the end of their presentation for questions and discussion.

There are also many acknowledgments this year. Special thanks to Dr. Richard Bowers, FACSM for the expert advise and direction necessary to make this meeting successful. Also I am gratified to those who reviewed and graded abstracts this year. Those persons are: Fredrick F. Andres, Ph.D., Barbara Campaigne, Ph.D., John Davis, Ph.D., Mike Flynn, Ph.D., and William Salterelli, Ph.D. Thanks also to Brian Leutholtz, Ph.D. (cand) for his assistance with details and program moderation and Reneé Stamper, my Senior Administrative Secretary, for her attention to details. A very special thank you is also given to Vicky Hollingsworth, M.A., for helping me with our last minute C.E.U. problem.

I hope you find this year's meeting to be enjoyable and profitable. We always have excellent presentations, good communication and great fun at our winter meeting.

100 Michigan Northeast Grand Rapids, Michigan 49503 Tel 616/774-[illegible]

It is a pleasure to see you here and your participation is appreciated.

In best regards,

Randy Keyser

Randall E. Keyser, Ph.D.
Meeting Coordinator

"American College of Sports Medicine endorsement pending approval"

BIOGRAPHICAL SKETCH

Roger M. Glaser, Ph.D., FACSM is Professor and Acting Chair of Rehabilitation Medicine and Restorative Care, Professor of Physiology and Biophysics at Wright State University School of Medicine, and a Senior Research Health Scientist at the Dayton Department of Veterans Affairs Medical Center. Dr. Glaser also serves as the Director of Clinical Studies at the Rehabilitation Institute of Ohio at Miami Valley Hospital. His major areas of teaching and research include medical physiology, exercise/environmental physiology, bioinstrumentation, and rehabilitation engineering. He has published extensively on metabolic and cardiopulmonary stresses for wheelchair locomotion under various architectural conditions, methods of assessing physical fitness and for exercise training of wheelchair dependent individuals, evaluation of various wheelchair designs, as well as the use of functional neuormuscular stimulation for exercise training of paralyzed muscles and for assisting locomotion.

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9/15/89

AGENDA

Wednesday: 8:00-10:00 p.m.

8:00: Opening remarks - Dr. Randall Keyser and Dr. Richard Bowers.

8:15-8:30: Respiratory Muscle Loading During Upper and Lower Extremity Exercise. Michael L. Troxell, MEd, RRT, Fredrick F. Andres, Ph.D., Michael G. Flynn, Ph.D., Department of Respiratory Care MCH and Exercise Physiology Laboratories, The University of Toledo.

8:30-8:45: Prediction of Exercise Adherence in a University Adult Fitness Program. C. Murphy, L. Simmons, D. Brown and R. Claytor. Department of Physical Education and Sport Studies, Miami University.

8:45-9:00: A Comparison of Postexercise Energy Expenditure in Men and Women. Darlene A. Sedlock. Exercise Physiology Laboratory, Purdue University.

9:00-9:15: Heart Rate and Blood Lactate as Predictors for Cross Country Running Performance. G.P. Lambert, D.L. Costill, G.A. Beard, M.A. Benedict, C.P. Lambert, R.R. Robergs and G.K. McConnell. Human Performance Laboratory, Ball State University.

9:15-9:30: Break

9:30-9:45: Plymetric Training in Women Athletes. Todd A. Baden and Fredrick F. Andres, Ph.D. University of Toledo, Exercise Physiology Laboratories.

9:45-10:00: Hyperadrenergic Response to Stress - "Hot Responder" William F. Simpson, Carolyn A. Umphrey and Earl S. Perrigo, FACSM. University of Toledo, Department of Health Education and Human Performance and Toledo Heart Institute.

10:00-10:15: Biomechanical and Physiological Comparison of the Parallel Squat and the "Tru-Squat" Techniques. T.J. Swiergosz, C.W. Armstrong, F.F. Andres and M.G. Flynn. University of Toledo.

Thursday, 8:00-10:30 a.m.

8:00-8:15: Effects of Increased Protein Intake on Muscle Hypertrophy and Strength Following 13 Weeks of Resistance Training. C.A. Weideman, M.G. Flynn, F.X. Pizza, R. Coombs, J.B. Boone, E.R. Kubitz, W.F. Simpson. The University of Toledo.

8:15- 8:30: The Time Course of Cardiovascular Adaptations to Exercise Training. M.J. Turner, T.W. Journell and R.P. Claytor. Department of Physical Education, Health and Sport Studies, Miami University.

8:30- 8:45: Indices of Overtraining Syndrome During a Swim Season. F.X. Pizza, M.G. Flynn, J.B. Boone, J.E. Holden, E.R. Kubitz, J.A. Rodriquez-Zayas, F.F. Andres. Exercise Physiology Laboratories, The University of Toledo.

8:45- 9:00: An Evaluation of the Accuracy of Age Predicted Maximal Heart Rate in Establishing Exercise Intensity. Stephen C. Glass, Leonard A. Kaminsky and Mitchell H. Whaley. Human Performance Laboratory, Ball State University.

9:00- 9:15: Break

9:15- 9:30: Does High Intensity Weight Training Enhance Peak Aerobic Capacity? T. Fitton, D. Torok, T. Journell, D. Wright, R. Claytor and R. Cox. Department of PHS, Miami University.

9:30- 9:45: Cardiovascular Adaptations to Repeated Psychological Challenge in Young Males. D. Cole, M. Turner and R. Claytor. Department of Physical Education, Health and Sport Studies, Miami University.

9:45- 10:00: Fluid and Electrolyte Balance During an International Distance Triathlon. P.G. Brolinson, M.G. Flynn, G.E. Johnson, F.X. Pizza, M.J. Hancock, W.F. Simpson, and E.H. Vogel. Exercise Physiology Laboratories, The University of Toledo, Parkview Hospital, W.W. Knight Family Practice Center, Toledo.

10:00- 10:15: The Metabolic Response to Caffeine in Men with High and Low Aerobic Power. D.B. Davenport, L.A. Kaminsky. Human Performance Laboratory, Ball State University.

10:15- 10:30: Reflotron Cholesterol Measurements: Assessment of Validity and Precision. R.D. Heninger, L.A. Kaminsky and M.H. Whaley. Human Performance Laboratory, Ball State University.

10:30: Adjourn for lunch.

Thursday Evening, Feb. 8, 1990

8:00-9:00 p.m. KEYNOTE

"Functional Electrical Stimulation for Physical Fitness Training of the Spinal Cord Injured"

Roger M. Glaser, Ph.D.
Professor and Acting Chair,
Department of Physical Medicine
and Restorative Care
Professor of Physiology and Biophysics
Wright State University

Friday Morning 8:00-10:30 a.m.

8:00-8:15: Physiological Profile of Ambulatory and Non-Ambulatory Older Adults. K.E. Horwood, J.D. Seelbach, and J.E. Davis. Department of Exercise and Health Science, Alma College.

8:15-8:30: Cardiovascular Responses to Submaximal Work in Normotensive Females with and without Parental History of Hypertension. J. Richards, M. Turner and R. Claytor. Department of Physical Education, Health and Sport Studies, Miami University.

8:30-8:45: The Effects of Exercise on Mild Hypertension. S.A. Blair and R.E. Keyser. Cardiovascular Physiology Section, Division of Cardiovascular Services, Butterworth Hospital and College of Education, Western Michigan University.

8:45-9:00: Continuous Passive Motion After Knee Arthroscopy. Lisa Bauman. Department of Physical Therapy, Butterworth Hospital and Physical Education, Western Michigan University.

9:00-9:15: Break

9:15-9:30: Computational Versus Measured Peak VO2 on the RAMP Protocol. B.C. Leutholtz and R.E. Keyser. Cardiovascular Physiology Section, Division of Cardiovascular Services, Butterworth Hospital and Health Education, Counseling Psychology and Human Performance, Michigan State University.

9:30-9:45: The Cardiovascular Response to Exercise Following Stroke. Connie Schepers and R.E. Keyser. Mary Free Bed Hospital, Butterworth Hospital and Grand Valley State University.

9:45- 10:00: Weight Regain Does Not Increase Relative Abdominal Adiposity in Obese Women. R.L. Hammer and A.G. Fisher, FACSM, Human Performance Laboratory, Central Michigan University and Human Performance Research Center, Brigham Young University.

10:00- 10:15: Rehabilitative Outcomes Following Orthotopic Heart Transplantation. Steven J. Keteyian, Jonathan K. Ehrman, Frank J. Fedel, Pamela Theisen*, Kenneth L. Rhoads, Henry Ford Hospital.

10:15- 10:30: Physiologic Training Effects of Electrical Stimulation Leg Cycle Ergometry in the Spinal Cord Injured. S.P. Hooker, S.F. Figoni, R.M. Glaser, FACSM, M.M. Rodgers, P.D. Faghri, and B.N. Ezenwa. VA Medical Center, Wright State University, School of Medicine and Miami Valley Hospital.

10:30: Presentation of student award.

Meeting adjourned.

RESPIRATORY MUSCLE LOADING DURING UPPER AND LOWER EXTREMITY EXERCISE

Michael L. Troxell MEd RRT
Fredrick F. Andres PhD
Michael G. Flynn PhD

Department of Respiratory Care MCH and
Exercise Physiology Laboratories
The University of Toledo

Several authors have reported that fatigue occurs earlier during arm exercise than leg exercise. The lack of endurance for arm exercise may be in part related to demands placed upon the accessory respiratory muscles for breathing and/or stabilizing the thorax. To assess the effect of respiratory muscle loading on the physiological response to exercise, arm and leg ergometry was performed with the use of an inspiratory muscle trainer (IMT). The IMT was adjusted to 25% of maximum inspiratory pressure. Eight male subjects (31.4± 3.0 yr) completed six cardiopulmonary exercise tests: three each with leg and arm ergometers. A maximal exercise test was performed on each ergometer and data used to determine the 50% submaximal work loads. After obtaining pre-exercise data, subjects performed four submaximal tests on different days. Two submaximal tests were performed on the arm and leg ergometers; one with and without the IMT for each mode. A t-test comparison of resting data showed that VO_2 (267.5 v 346.0 ml/min; $p < 0.05$), heart rate, and minute ventilation increased significantly with the addition of the inspiratory load. A MANOVA was used for the statistical analysis of the data for each mode of exercise. VO_2, heart rate, VE, VCO_2, and the ventilatory equivalent (VE/VO_2) did not change during arm exercise ($p > 0.05$, $F = 0.34$, $df = 5,3$) with the addition of the inspiratory load nor during leg exercise ($p > 0.05$, $F = 2.73$, $df = 5,3$) with the addition of the inspiratory load. In conclusion, the metabolic work of breathing may be increased with 25% of maximum inspiratory pressure during rest; but during exercise this added inspiratory load does not create a significant increase in the measured cardiopulmonary values. In normal subjects, there was no observed difference in loaded breathing during submaximal leg and arm ergometry.

PREDICTION OF EXERCISE ADHERENCE IN A UNIVERSITY ADULT FITNESS PROGRAM. C. Murphy, L. Simmons, D. Brown, and R. Claytor. Department of Physical Education, Health and Sport Studies, Miami University, Oxford, OH 45056.

The purpose of the present research project was to investigate the relationship between exercise adherence in Miami University's Adult Fitness program and select psychological and physiological variables. Specifically, the study was conducted to identify differences between good (n=20) and poor (n=21) program adherers and dropouts (n=16) by analyzing the psychological responses of the exercise participants to their initial test of maximal oxygen uptake administered shortly after their enrollment into the fitness program. The Spielberger State-Trait Anxiety Inventory and Profile of Mood States test were used to assess the psychological responses of the subjects. In addition to the psychological profiles of the subjects, and VO_2 max, gender, time of involvement in exercise and attendance records were evaluated.

Simple one-way ANOVA's were performed on the baseline or initial measures of Time of Exercise Session (i.e., morning, noon or afternoon), VO_2 max, Trait Anxiety, pretest State Anxiety and the pretest POMS measures. The results from these analyses indicate that no significant differences ($p>.05$) were found among the groups on any of these variables. In other words, the Good Adherers, Poor Adherers and Dropouts were similar in regard to their psychological profiles and maximal oxygen uptake values at the start of their involvement in the Miami University Adult Fitness program. There was also no difference between the time of day participants exercised and good and poor adherence and drop-out rates.

A chi-square analysis was also conducted and showed that there was no significant difference between the proportion of men and women who were classified as Good Adherers, Poor Adherers or Drop-outs ($x2=3.987$, $df=2$, $p>.05$). Therefore, there were no gender differences associated with adherence and drop-out rates.

A final series of analyses conducted in this study were a series of multivariate analyses of variance (MANOVA's). These analyses compared the mean pre-post difference for each of the three subject groups on the State Anxiety and POMS measures that were obtained before and after the subjects treadmill stress test. No significant findings resulted from these statistical procedures. Thus, the changes that occurred on psychological mood state due to the treadmill stress test were basically the same for all three groups. The Good Adherers, Poor Adherers and Dropouts were no different in terms of their psychological mood state response to maximal treadmill exercise, at the point of initial enrollment in the Miami University Adult Fitness program.

Abstract Submission:

1990 Annual Winter Meeting
Boyne Mountain, MI
Midwest American College of Sports Medicine

A COMPARISON OF POSTEXERCISE ENERGY EXPENDITURE IN MEN AND WOMEN

Darlene A. Sedlock, Exercise Physiology Laboratory, Purdue University, W. Lafayette, IN 47907

Although the literature concerning excess postexercise oxygen consumption (EPOC) remains controversial, little is known about this phenomenon in women. The purpose of this investigation was to examine the magnitude and duration of EPOC in women and to compare these responses to a group of men. Eighteen subjects volunteered for the study. The 9 women had a $\bar{x}\pm$SD age, height, weight, and $\dot{V}O_2$ max of 25.0±3.6 yr, 162.8±4.3 cm, 60.6±5.5 kg, and 36.1±4.3 ml·kg-1·min-1, respectively. Values for the 9 men were: age=23.2±4.4 yr, ht=178.3±7.6 cm, wt=75.7±10.4 kg, and $\dot{V}O_2$ max=45.1±7.4 ml·kg-1·min-1. Baseline $\dot{V}O_2$ and HR were measured for 15 min following a 45 min seated rest. The exercise was performed for 20-30 min on a cycle ergometer at an intensity equal to 60% $\dot{V}O_2$ max. $\dot{V}O_2$ and HR were measured continuously during the recovery period until baseline $\dot{V}O_2$ was achieved. Baseline $\dot{V}O_2$ was significantly lower ($p<0.001$) in the women (0.22±0.03 L·min-1) than in the men (0.31±0.06 L·min-1). However, when expressed relative to body weight, no significant difference was found (women=3.6±0.5, men=3.9±0.7 ml·kg-1·min-1). Resting HR was similar for the women (68±10 b·min-1) and men (65±7 b·min-1). No significant difference was found for duration of EPOC (women=27.6±15.6, men=28.2±15.9 min). Magnitude of EPOC averaged 9.4±4.7 kcal for the women and 13.0±4.6 kcal for the men ($p>0.10$). HR at the end of the EPOC period was similar for both groups (women=75±11, men=72±9 b·min-1) but was significantly elevated above the baseline value ($p<0.02$). Results indicate that the exercise conditions of this study did not result in a prolonged elevated metabolic rate. However, cardiovascular function was not normalized at the time the metabolic rate returned to baseline. Magnitude of EPOC was found to be relatively small and therefore of little practical significance. Additionally, no gender difference in either magnitude or duration of the EPOC response was found when exercise was performed at a similar relative (to maximum) intensity.

HEART RATE AND BLOOD LACTATE AS PREDICTORS FOR CROSS-COUNTRY RUNNING PERFORMANCE

G.F. Lambert, D.L. Costill, G.A. Beard, M.A. Benedict, C.P. Lambert, R.R. Robergs, and G.K. McConell. Human Performance Laboratory, Ball State University, Muncie, IN 47306

The intent of this investigation was to determine if submaximal heart rate (HR) and blood lactate accumulation (Bla) are valid predictors of distance running performance. Seven highly trained male cross-country runners (VO_2max 68.9 ±4.3 mlO_2/kg/min) ran one mile on an indoor track at submaximal pace (83.14 ±4.44% VO_2max) 1-2 days prior to each scheduled competition. HR was monitored via telemetry throughout the run and arterialized blood was obtained 2-3 min post-exercise for determination of Bla. Individual performance was based on time (sec) from the team's first finisher (range = 10-195 sec). Mean HR did not change significantly between trials for the group. Mean Bla for the group was significantly lower mid-season compared to early and late season (2.24 ±0.17, 2.80 ±0.38, and 2.60 ±0.34 respectively) ($p < 0.05$). Significant relationships between group means for HR and Bla and mean running performance were not observed ($r = .329$, and $r = .255$, respectively). Individual performance could not be explained by individual HR response (range $r = -.629$ to .705), nor was individual Bla significantly related to individual performance (range $r = -.357$ to .847). These data suggest that in highly trained distance runners cross-country performance cannot be predicted from submaximal HR or Bla values.

Plyometric Training in Women Athletes

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The purpose of this study was to determine the effects of Plyometrics and free weight strength training on the athletic performance of college women. The subjects were members of The University of Toledo Women's Volleyball (7) and Field Hockey (9) teams. The mean age for the subjects was 19.5 yrs.(SD± 1.22). The athletes were randomly assigned to control (8) and experimental (8) groups, and pre-evaluated in weight, standing reach, vertical jump standing long jump, and 20 meter sprint test. Following initial assessments the experimental (EXP) group performed 4 plyometric exercises; leap frog, single-leg hops, lateral jumps, and depth jumps 3 times per week. for 6 weeks. The subjects executed 10 repetitions of 1-4 sets. The control (CNT) group performed 3 sets of 10 repetitions of upper body resistance exercises. Following training both groups were re-evaluated and "t" tests performed on the percent difference {((post - pre)/pre) * 100%}. A significant difference ($P<.05$) was found for the mean percent change in the vertical jump of the EXP (10.1 ± 2.98) as compared to CNT (0.19 ± 1.96). Significant differences were found for standing long jump (2.66 ± 1.69 vs. 1.30 ± 0.80), and sprint time (18.1 ± 3.61 vs. 3.21 ± 3.50), and power output for EXP (6.35 ± 2.16 vs. 0.71 ± 0.69). No significant differneces were found for body weight and standing reach ($p>.05$)

The authors concluded that the EXP significantly improved in selected tests of athletic performance following 6 weeks of plyometric training.

Abstract for the 1990 Midwest Chapter of the American College of
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HYPERADRENERGIC RESPONSE TO STRESS- "HOT RESPONDER"

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The purpose of the study was to explore the relationship of stress, the Type A Behavior Pattern (TABP), and the response of Heart Rate (HR) and Blood Pressure (BP) at pre-test, during a Graded Exercise Test (GXT), and during a Life Simulation Stress Test (LSST). The three components of the LSST were Atari Super Breakout, Serial 7s, and Cold Pressor. Twenty subjects (6F, 14M; $\bar{x}$ = 49.8 $\pm$ 12.5 yrs) were selected based upon histories suggesting TABP or excessive stress. Each subject completed 6 written Stress and Tension Inventories which were scored and indexed. Based on this Stress and Tension Index (STI), the subjects were separated into four subsets- 1 "low", 11 "mild", 6 "moderate", 2 "high". Following pre-test vital signs each subject underwent a GXT and the battery of three LSSTs, during which HR and BP were recorded each minute and were indexed. Based on this Life Stress Simulation Index (LSSI), subjects were separated into three subsets- 2 "cool", 13 "warm", and 5 "hot responders". Vital signs at pre-test (r=0.98) and vital signs during GXT (r=0.99), Atari Super Breakout (r=0.997), Serial 7s (r=0.98), and Cold Pressor (r=0.99) each correlated with the LSSI. There was no significant relationship between the STI and the LSSI. Of the 20 subjects, 9 were determined to have the TABP. There was no significant relationship between TABP and LSSI. Therefore, the "hot responder" does not correspond to either the highly stressed individual or to the TABP. This hyperadrenergic response to stress- "hot responder"- may represent an independent risk factor for Hypertension and Ischemic Heart Disease.

BIOMECHANICAL AND PHYSIOLOGICAL COMPARISON OF THE PARALLEL SQUAT AND THE "TRU-SQUAT" TECHNIQUES.

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Selected biomechanical and physiological variable related to the performance of the parallel squat in the conventional manner and using the"Tru-Squat" (Southern Xercise, Cleveland, TN) were investigated. The "Tru-Squat" is a mechanical device designed to restrict undesirable joint movements and reduce lumbar stress during the performance of the parallel squat. Eight males (22 ± 1.32 yr) with experience (5.25 ± 1.3) in performing the squat were used. Each subject completed one repetition maximum (1RM) for both squat modes from which a seventy percent load was calculated for use in testing. Subsequently each subject completed one set of ten repetitions for each of the two muscle groups studied. EMG data were collected for the rectus femoris and the erector spinae muscle groups. Simultaneously, video data were collected and digitized to provide measures of joint range of motion. A significantly lower ($p < .05$) mean peak flexion (52.16°± 17.2 vs. 95.63°± 18.1) and total range of motion (71.58°2.43 vs. 81.43° ±2.85) for the hip and knee were observed for the "Tru-Squat" mode. However, the "Tru-Squat" trials elicited significantly greater mean ($p < .05$) in IEMG values (2.29±0.46 vs 1.71±0.35 mv) for the rectus femoris. No significant difference ($p > .05$) in IEMG activity for the erector spinae was observed. Pre and post exercise blood pressure demonstrated no significant difference ($p > .05$). The "Tru-Squat" restricted range of motion, with no significant change in IEMG activity of the erector spinae muscle group, while increasing electrical activity of the rectus femoris muscle. These results may reflect alterations in the patterns of motion and associated muscle recruitment that have implications for muscle development as well as for safety.

WINNER of Student award.

EFFECTS OF INCREASED PROTEIN INTAKE ON MUSCLE HYPERTROPHY AND STRENGTH FOLLOWING 13 WEEKS OF RESISTANCE TRAINING.

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Athletes involved in resistance training usually maintain a high dietary protein intake and often take protein supplements. The purpose of this study was to compare the effects of a high versus a normal protein intake on leg muscle hypertrophy and strength gains during a 13-week training program. Twenty-one untrained male subjects (18-32 yrs.) were matched for initial total leg strength (TLS = 8AM of leg curl (LC) + leg extension (LE) + squat (S)) and leg volume, calculated via anthropometric measurements. Subjects were placed into a high (Hi-P) or normal (Lo-P) protein intake group. The Hi-P group received a protein supplement (mean protein intake 2.94 g/kg/d) and the Lo-P a carbohydrate placebo (mean protein intake 1.30 g/kg/d). Training consisted of three sets/d (8-12 RM) of LC, LE, and S exercise three days per week. Assessments of body composition and leg volume were performed pre-training (T1) and post-training (T2). Magnetic Resonance Imaging (MRI) was performed at T1 and T2 to determine the cross-sectional area (CSA) of the quadriceps and hamstrings. Lean body mass increased, body fat decreased, and leg volume increased ($p < 0.05$) for both groups. TLS (kg) increased ($p < 0.05$) in the Hi-P (pre, 189.6 ± 9.74; post, 311.2 ± 13.07) and in the Lo-P (pre, 194.2 ± 12.31; post, 305.1 ± 12.47). Total CSA (cm^3) was increased ($p < 0.05$) for Hi-P (pre, 121.68 ± 5.83; post, 129.49 ± 5.66) and Lo-P groups (pre, 122.75 ± 6.09; post, 132.95 ± 5.17). There were no significant differences between groups in TLS, CSA or leg volume during the training. The results of this study indicate that increasing dietary protein intake 3.67 times the RDA does not cause additional gains in muscle hypertrophy or strength when compared to a normal protein intake.

Supported by: deArce Medical Research Grant, The University of Toledo

maybe better but no sig. diff

THE TIME COURSE OF CARDIOVASCULAR ADAPTATIONS TO EXERCISE TRAINING. M.J. Turner, T.W. Journell, and R.P. Claytor. Department of Physical Education, Health and Sport Studies. Miami University, Oxford, Ohio.

Cardiovascular and EMG responses to seven consecutive days of submaximal cycle ergometry training were measured. Seven male subjects (23.1±3.1 yrs.) trained (TR) on a cycle ergometer for 20 mins./day at 85% of peak oxygen uptake (PVO_2). Four male control subjects (23.0±4.7 yrs.) cycled on day 1 and day 7. In addition, one week prior to and one day after training, PVO_2 was assessed. Heart rate (HR), oxygen uptake (VO_2), and EMG were measured on training days 1, 3, 5, and 7 (TR) and on days 1 and 7 for the control group. The data are summarized as follows:

		Pretest	Training Days				Posttest
		Maximal	1	3	5	7	Maximal
TR	HR (b/min)	190±2.8	190±3.6	184±3.5*	179±3.6*	175±3.3*	187±2.5
	VO_2 (l/min)	2.99±0.09	2.60±0.08	2.62±0.06	2.57±0.03	2.56±0.03	3.15±0.10
NTR	HR (b/min)	192±4.7	184±6.2			183±6.2	187±5.2
	VO_2 (l/min)	3.72±0.28	3.04±0.21			3.02±0.19	3.72±0.22

Significant reductions in HR ($p<0.05$) were observed following 3 days of aerobic training. VO_2 did not change across training days. Additionally, PVO_2 did not change as a result of this training stimulus. The pronounced attenuation in HR without a subsequent increase in PVO_2 suggests a dissociation in the cardiovascular response to a relative workrate.

- No way

much worse

Indices of Overtraining Syndrome During a Swim Season.

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The purpose of this study was to examine the sensitivity of previously proposed indices of the overtraining syndrome to changes in training volume. Five male swimmers reported to the laboratory at four different times during their season. Each trial corresponded to a different training volume. Trial 1 (T1), after 8 weeks of training at 6,000 m/d. T2, after 2 weeks of training at 10,060 m/d. T3, after 8 weeks of training at 7,300 m/d and T4, after 3 weeks of training at 4,700 m/d (Post-championship). Venous blood samples, resting heart rate (R-HR) and blood pressure (R-BP) were obtained (0700 h) after 15 mins of supine rest at each trial. A complete blood count was performed and serum was analyzed for cortisol (C), total testosterone (TT), free testosterone (FT), haptoglobin (HAPT) and ferratin (FR). No significant differences were observed among trials in R-HR, R-BP, C, FR, or molar ratios of TT:C and FT:C. Hemoglobin (HG (g/dl)) was significantly ($P < 0.05$) lower at T2 (14.3 ± 0.16), T3 (14.1±0.18) and T4 (14.4 ± 0.20) compared to T1 (14.8 ± 0.15) with no significant alterations in red blood cell number or hematocrit. HB changes coupled with significant alterations in mean cell hemoglobin concentration, mean cell volume, and a tendency for HAPT to be lower ($p = 0.07$ NS) at T2 indicate slight intravascular hemolysis. FT (pmol/l) was significantly reduced at T2 (85.3 ± 8.5) compared to T4 (153.2 ± 15.6) and tended to be reduced at T2 ($p = 0.10$) compared to T1 (130.2 ± 20.9). TT (nmol/l) was significantly lower at T2 (16.6 ± 2.5), T3 (21.2 ± 0.4), and T4 (23.2 ± 1.3) compared to T1 (30.3 ± 2.8). The FT and TT were the most sensitive indicators of training stress.

Supported by USOC Sports Medicine Council

criteria
why did volume constitute overtraining
- volume vs intensity?

as good but only 5

AN EVALUATION OF THE ACCURACY OF THE AGE PREDICTED MAXIMAL HEART RATE IN ESTABLISHING EXERCISE INTENSITY

Stephen C. Glass, Leonard A. Kaminsky and Mitchell H.Whaley
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When prescribing exercise intensity, knowing the true maximal heart rate of an individual allows for accurate and safe exercise prescription. However, in a large majority of cases, exercise testing is not performed and exercise intensity is frequently based upon a percentage of the age predicted maximal heart rate (220-age). The purpose of this study was to determine the accuracy of an age predicted target heart rate (PTHR) versus a target heart rate calculated from the true maximal heart rate (THR). Data from 552 maximal exercise tests conducted in our lab were reviewed. Subjects were between the ages of 21 and 70 years. True maximal heart rates ranged from 120 to 214 bpm. For this evaluation PTHR and THR were defined as 75% of the age predicted maximal heart rate and 75% of the true maximal heart rate respectively. A PTHR was considered accurate if it fell within ± 6 beats of THR. Results showed that the PTHR accuracy was 51% and 50% for the males and the females respectively.

Inaccurate THR estimate (%) and Percentage Overestimated THR

	Males (n=330)		Females (n=222)	
Age in Years	Inaccurate THR	Overestimated THR	Inaccurate THR	Overestimated THR
21-30	39	42	48	73
31-40	44	29	33	44
41-50	57	26	37	30
51-60	44	36	66	27
61-70	60	44	64	67

When the individuals outside of the THR were examined, it was seen that 36% and 41% of the time males and females were above the THR respectively. Those males and females were 7.9 ± 7.2 and 7.5 ± 4.1 beats above THR respectively. The age group with the highest overestimation of THR were the male 51-60 group (9.4 ± 8.9) and the female 61-70 group (10.7 ± 1.2). These results indicate that exercise intensity based upon age predicted maximal heart rates result is inaccurate about half of the time. In addition, the greatest overestimation of THR (in beats per minute) was seen in the older population. These results suggest caution when prescribing exercise based upon age predicted maximal heart rates, with special reference to elderly and at-risk individuals.

DOES HIGH INTENSITY WEIGHT TRAINING ENHANCE PEAK AEROBIC CAPACITY? T. Fitton, D. Torok, T. Journell, D. Wright, R. Claytor and R. Cox. Department of PHS, Miami University, Oxford, OH 45056

To investigate the effect of 8 weeks of intense circuit weight training on peak leg and arm aerobic power and the heart rate (HR) responses to standardized submaximal arm and leg work 5 untrained males performed a Nautilus and free weight circuit routine that consisted of 17 exercises (3 day/week; 30 min/day). Each subject completed peak arm and leg ergometer tests to determine peak aerobic power and submaximal arm and leg ergometer tests at 75% of arm and leg VO_2 peak.

	Pretests				Posttests			
	Maximal		Submaximal		Maximal		Submaximal	
	VO_2 (l/min)	HR (b/min)	VO_2 (l/min)	HR (b/min)	VO_2 (l/min)	HR (b/min)	VO_2 (l/min)	HR (b/min)
Legs	3.4±0.2	191±4	2.8±0.3	177±5	3.5±0.5	187±5	3.0±0.6	177±5
Arms	2.2±0.2	188±4	1.5±0.3	180±10	2.7±0.4*	186±3	1.7±0.2	168±9*

Peak arm aerobic power did increase($p<0.05$)with intense weight training. Also, the HR response to an absolute submaximal workbout was attenuated during arm work ($p<0.05$). Peak aerobic power can be increased with weight training and the adaptations to the HR response to weight training are exhibited during submaximal aerobic exercise.

Nice work

Hemodynamic

CARDIOVASCULAR ADAPTATIONS TO REPEATED PSYCHOLOGICAL CHALLENGE IN YOUNG MALES.

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Eight males (x = 20.1±35 yrs; 87.8±3.3kg; 47.5±1.2 ml(kg•min)$^{-1}$) underwent four exposures (alternate days schedule) to a psychological challenge (PC). Heart rate (HR), systolic (SBP) and diastolic blood pressure (DBP), oxygen uptake (VO_2), Peak acceleration of blood flow (PA) and rate-pressure produce (RPP) were taken each minute during PC. Additionally, time to finish PC (TF) and the number of wrong answers (WA) were recorded for each trial. The data are summarized as follows:

	Trials			
Variables	1	2	3	4
HR (b/min)	84±5	91±6	89±6	91±6
SBP (mmHg)	148±4	152±5	150±3	146±5
RPP (x10^3)	12.4±.7	13.9±1.1	13.3±.9	13.2±1.0
DBP (mmHg)	88±3	85±2	82±2*	80±3*
VO_2 (ml(kg•min)$^{-1}$)	4.0±0.1	4.4±0.1	4.3±0.2	4.2±0.2
PA (m/sec^2)	25.6±2.2	26.6±3.0	27.8±2.3	27.5±2.3
TF (min)	5.8±.2	5.2±.2	4.7±.15*	4.6±.08*
WA (#)	18.8±3.5	13.6±2.2	7.6±1.7*	4.1±.7*

During PC all dependent measures during each trial were significantly increased above rest values ($p < 0.05$). DBP, TF and WA were significantly lower ($p<0.05$) when comparing trials 1 with trials 3 and 4. There were no significant differences for HR, SBP, RPP, VO_2, and PA during any of the trials. These data suggest that the cardiovascular responses to psychological challenge are not attenuated with repeated trials. Cardiovascular reactivity to cognitive stimuli is related to performance and/or one's ability to cope with the stressor.

No letter

BP - 82 * TPP

FLUID AND ELECTROLYTE BALANCE DURING AN INTERNATIONAL DISTANCE TRIATHLON P.G. Brolinson, M.G. Flynn, G.E. Johnson, F.X. Pizza, M.J. Hancock, W.F. Simpson and E.H. Vogel. Exercise Physiology Laboratories, The University of Toledo; Parkview Hospital; W.W. Knight Family Practice Center, Toledo, OH

A recent investigation suggested that the recommendations on fluid intake during competition (0.8-1.6 l/h) by the American College of Sports Medicine may be excessive (Noakes et al. Eur. J. Appl. Physiol. 57: 210-219, 1988). The purpose of this study was to examine the effects of fluid composition and volume ingested on hydration and electrolyte balance during a triathlon (1.5 km swim; 40km bike; 10 km run). Forty-two competitive triathletes (30 male; 12 female) were asked to select a volume group (high ~1.0 l/h or low ~0.5 l/h) and a drink composition (water or glucose polymer/electrolyte; Exceed, Ross Labs) prior to the race. Venous blood samples and body weights were obtained pre- and post-race. All drinks were provided during the race by the investigators. The athletes were given known volumes of fluid during the cycling and run segments. The actual volume ingested was calculated by measuring the volume remaining in the drink bottles after the cycling segment and by subject interviews following the run segment. Following post-race data analysis the athletes were divided into three volume groups: high (>0.7 l/h; N=12), medium (0.4-0.7 l/h; N=16) and low (<0.4 l/h; N=14). These groups were further subdivided based on fluid composition. The percent changes in body weight were significantly different between high (-0.75 ±0.26), medium (-1.60 ±0.21) and low (-2.17 ±0.23) volume groups ($P<0.01$). The percent changes in sodium were not significantly different among volume groups (high, -0.58 ±0.78; medium, +0.80 ±0.65; low, +1.78 ±1.16). In addition, sodium balance was not effected by drink composition. Subjectively, 75% of athletes in the high group reported feeling "bloated" post race while only 37% and 29% of the athletes in the medium and low groups, respectively, reported this feeling. The average fluid intake was 0.53 l/h which is similar to previous studies which allowed <u>ad libitum</u> fluid consumption. Fluid intakes during competition in excess of 0.7 l/h may prevent dehydration but may also result in discomfort. Furthermore, drink volume or composition did not effect sodium balance during an international distance triathlon.

.5 gal/hr recommended

water

THE METABOLIC RESPONSE TO CAFFEINE IN MEN WITH HIGH AND LOW AEROBIC POWER

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Increasing energy expenditure is one established method for treating obesity. Exercise training and caffeine consumption are two methods used to increase metabolic rate, however, their combined influence is not well understood. Poehlman et al. (Med. Sci. Sports Exerc., 17:689-94, 1985) reported a significantly greater increase in resting metabolic rate (RMR) following caffeine ingestion in untrained subjects (13.7%) as compared to their trained counterparts (7.2%). Opposingly, LaBlanc et al. (J. Appl. Physiol., 59:832-7, 1985) reported that trained subjects had a greater RMR increase (18.3%) following caffeine ingestion than did untrained subjects (13.7%). Differences in methodology and lack of some controls may account for the discrepancy in these two reports. The purpose of the present study was to compare the metabolic response to caffeine intake in men with high and low aerobic capacities with controls for caffeine habituation, dose of caffeine, and prior exercise. Sixteen men were classified as either having high (H, $VO_{2max} \geq 55$ ml/kg/min) or low (L, $VO_{2max} \leq 48$ ml/kg/min) aerobic power using a maximal graded exercise test and as caffeine users or nonusers via a questionnaire. On two separate days after an overnight fast (10h) RMR was measured using an indirect calorimetry open circuit system. Subjects orally consumed either a cocktail containing caffeine (6 mg/kg lean body mass) or a placebo after which volume of oxygen consumed (VO_2), respiratory exchange ratio (RER), expired ventilations (V_E), heart rate (HR), and systolic blood pressure (SBP) were monitored for 180 minutes. Data were analysed via a 3-way ANOVA with repeated measures. During the placebo trial no significant differences was observed in VO_2, V_E, HR, or SBP between the H and L groups. Following caffeine consumption no significant interaction between fitness level and caffeine habits were observed for any of the dependent variables. Although VO_2, V_E, HR, and SBP all increased significantly following caffeine consumption, there were no significant main-effect differences between the H and L groups or between caffeine users and nonusers. However, there was a trend that the H group experienced a greater increase in VO_2 than the L group over the 180 minutes (+.039 vs. +.027 L/min, respectively). Also, the RER of the H group (-.03) was significantly lower than the L group (+.03) over the 180 minutes. Although there was some indication that H subjects had a heightened response to caffeine, the sensitivity of our measures could not conclusively demonstrate this. Further investigation of the influence of aerobic power on the metabolic response to caffeine with more sensitive indicators would be warranted.

REFLOTRON CHOLESTEROL MEASUREMENTS: ASSESSMENT OF VALIDITY AND PRECISION. R. D. Heninger, L. A. Kaminsky and M. H. Whaley. Human Performance Laboratory, Ball State University, Muncie, IN

Mass screening of cholesterol measurements has been popularized by the convenience and immediate results of table top analyzers. Although the utility of these rapid measurements is readily apparent, the validity and precision of these tests have not been thoroughly evaluated. Therefore, this study was designed to analyze the validity and precision of cholesterol measurements performed on the Reflotron analyzer. Blood samples were obtained from 40 men and women. Each of their samples were split into 10 separate serum sub-samples. The samples were coded to blind technicians from the identity of duplicate samples. Each subjects' sample was analyzed once on a Hitachi-705, once with a Sigma Chemicals diagnostics kit and 8 times on Reflotron analyzers (manufacturer's calibration and control procedures were utilized). Accuracy of the Reflotron measurements was assessed by comparison to the Hitachi and Sigma reference assays using a one-way ANOVA with repeated measures. The coefficient of variation (CV) was used to assess precision. Comparison of methods revealed that the Reflotron cholesterol measures were significantly lower (186.7 $\pm$ 7.2 mg/dl) compared to the Sigma (191.4 $\pm$ 6.1 mg/dl) and Hitachi (193.8 $\pm$ 6.0 mg/dl) values. However, the Reflotron measures correlated highly with both reference methods (Sigma, r=.99), (Hitachi, r=.99). The CV of the Reflotron measures was 2.5 $\pm$ 1.3% which conforms to the "ideal" goal of <3% established by the Laboratory Standardization Panel of the National Cholesterol Education Program (NCEP). Although, analysis of individual sample runs (8 sub-samples) revealed that 6 out of the 40 samples had a CV of >3% and 3 of these six samples had a CV of >5%. In 4 of these 6 cases there was one value in each sub-sample group that could be termed an "outlier". In conclusion, the Reflotron appears to provide valid serum cholesterol measures as it was highly correlated with the two reference methods. The Reflotron had a negative bias of 2.5% and 3.7% compared to the Sigma and Hitachi methods, respectively. Although, the overall precision of the Reflotron cholesterol measures could be considered "ideal", individual cases of CV >3% suggests that duplicate measurements may be needed to control for "outliers".

National Cholesterol Education Program guidelines
CV should be ↓ 3% (IDEAL)

Physiological Profile of Ambulatory and Non-Ambulatory Older Adults. K.E. Horwood, J.D. Seelbach, and J.E. Davis. Dept. of Exercise and Health Science, Alma College, Alma, MI 48801

The purpose of this study was to establish a physiological profile for older adults in two gerontological settings. Ninety subjects were studied to assess physiological differences between individuals that were still ambulatory, living independently(AMB) and those non-ambulatory and confined to a long term health care center (NAMB). The AMB subjects were younger than the NAMB subjects (68.3 + 9.0 vs. 79.9 + 10.6 years). Systolic pressure (SBP), diastolic blood pressure (DBP), blood glucose (BLG), blood cholesterol (CHOL), blood triglycerides (TRIG) and grip strength (GRIP) were measured. Results were as follows:

		SBP mmHg	DBP mmHg	BLG mg%	CHOL mg%	TRIG mg%	GRIP kg
AMB	Mean	139.9	78.6	94.0	259.9	170.9	48.8
N=54	SD	15.9	8.8	29.3	48.2	112.5	12.5
NAMB	Mean	133.1	69.0	98.3	239.7	156.6	21.5
N=36	SD	15.4	10.6	20.5	49.5	69.9	9.7

Blood pressure and blood chemistry measures were comparable in the two populations. This was unexpected considering the NAMB group was older and less active than the AMB group. Grip strength was greater in the AMB group suggesting that muscle function was compromised in the NAMB group. These data show a strength decline in NAMB individuals which may be targeted as a focus for therapy programs.

Supported by Mich Dept. of Public Health Grant

No table – no sig diff.

CARDIOVASCULAR RESPONSES TO SUBMAXIMAL WORK IN NORMOTENSIVE FEMALES WITH AND WITHOUT A PARENTAL HISTORY OF HYPERTENSION.

J. Richards, M. Turner and R. Claytor. Department of Physical Education, Health and Sport Studies, Miami University, Oxford, OH 45056.

Twenty-five college-age females (14 females with parental history of hypertension (HYP) and 11 females without a family history of hypertension (CON)) underwent a maximal cycle ergometer test and a submaximal cycle ergometer test that included 5 minute workbouts of 20%, 40%, 60% and 80% of VO_2 max. Heart rate (HR), systolic (SBP) and diastolic blood pressure (DBP) and oxygen uptake were measured at minutes 3 and 5 of each workrate. The CON group exhibited a significantly ($p<0.05$) higher VO_2 max (CON; X = 41.7±1.3 vs. HYP; x = 35.3±1.6 ml $(kg \cdot min)^{-1}$). Data from the submaximal exercise bouts are summarized as follows:

		HYP			CON		
		HR	SBP	DBP	HR	SBP	DBP
% VO_2max	20	102±5	125.7±1.3	71.1±2.0	111±3	124±2.9	77.9±2.0*
	40	123±3	139.9±2	71.8±1.4	123±3	138.1±3	78.0±2.3*
	60	154±3	160.5±3	73.3±1.6	152±4	158.8±3	78.5±2.1*
	80	175±4	172.3±4	74.5±1.6	176±4	178.4±3	79.4±2.3*

DBP was significantly greater ($p<0.05$) during each workrate in the HYP group. These results suggest that normotensive young females without a parental history of hypertension may be more fit in this population. Additionally, the HYP group may be more reactive to exercise stress.

THE EFFECTS OF EXERCISE ON MILD ESSENTIAL HYPERTENSION. S.A. Blair and R.E. Keyser. Cardiovascular Physiology Section, Butterworth Hospital, Grand Rapids, MI.

The effects of a twelve week, high intensity exercise training program on diastolic blood pressure was evaluated in six subjects (ages 59.7 ± 7.7) with baseline diastolic blood pressures of 90 to 114 mmHg. Three men (ages 62 ± 5.7) and three women (ages 57.3 ± 8.7) with a history of benign essential hypertension discontinued their hypertension medications and underwent maximum exercise testing on a bicycle ergometer five to seven days later. Subjects then participated in a twelve week (three sessions per week) exercise program at a target heart rate above 90% of the peak measured heart rate after resuming their hypertension medications. Exercise tests were repeated following discontinuation of hypertension medications. The comparative means of diastolic blood pressures at rest, peak exercise, and two minutes post exercise are listed below.

	Resting (mmHg)	Peak (mmHg)	Post (mmHg)
Before training	95.33 ± 14*	107.33 ± 11	90.33 ± 8
After training	84.67 ± 10*	103.00 ± 14	85.00 ± 5

*indicates a significantly lower value ($p<0.1$)

Following the exercise conditioning program, resting diastolic blood pressure was 11.2 percent lower than program entry levels. These results suggest that a high intensity exercise training regimen can result in a decrease in diastolic blood pressure that is independent of medication effects in patients with chronic mild essential hypertension.

CONTINUOUS PASSIVE MOTION AFTER KNEE ARTHROSCOPY.

Lisa Bauman and Mary Dawson, Western Michigan University, Kalamazoo, MI, and Butterworth Hospital, Grand Rapids, MI.

The purpose of the study was to investigate the effect of continuous passive motion (CPM) after arthroscopy. A continuous passive motion machine was used one hour following knee surgery. Statistical analysis was performed to determine differences in knee range of motion (ROM), strength, and circumference, at time intervals preoperatively, one, seven, and twenty-eight days following surgery. The analysis of variance revealed no significant difference between the CPM and control groups for any parameter. A significant interaction effect between treatment and time was demonstrated one day after surgery for extension, joint line circumference, and mid-thigh circumference; and 28 days after surgery for the later. Based on the results of this study, CPM decreased joint line and mid-thigh edema with resultant increased extension one day after knee arthroscopy. CPM had no effect on postoperative days 7 and 28. CPM did not influence strength, but may have prevented decreased mid-thigh girth, 28 days postoperatively.

about five same knee data not in abstract

COMPUTATIONAL VERSUS MEASURED PEAK $\dot{V}O_2$ ON THE RAMP PROTOCOL.

Brian C. Leutholtz and Randall E. Keyser. Cardiovascular Physiology Section, Butterworth Hospital, Grand Rapids, MI 49503

Computational formulae, as developed by the ACSM, are known to overestimate the actual volume of oxygen consumed ($\dot{V}O_2$) at peak exercise. A comparison of computed and measured $\dot{V}O_2$ at peak exercise for continuously incremented, or RAMP, cycle ergometer protocols has not been reported. Eight men recovering from angiographically documented coronary heart disease (CHD) were evaluated at peak exercise before and after an exercise conditioning regimen by an electronically braked cycle ergometer and a 20 watt per minute RAMP protocol. Peak $\dot{V}O_2$ as computed from the ACSM formula and $\dot{V}O_2$ obtained from on-line, breath by breath measurement were compared by two tailed, Student's dependent t-tests. Significant differences in $\dot{V}O_2$ obtained before and after the exercise regimen were not observed irrespective of whether the values were computed or actually measured.

	Calculated	Measured	Difference	P value
Before Exercise Regimen (ml/min)	2303 ± 595	1690 ± 574	613 ± 210	.001
After Exercise Regimen (ml/min)	2379 ± 478	1587 ± 435	729 ± 204	.001

Significant differences in peak $\dot{V}O_2$ were observed for the values obtained from the computational and actual measurement methods ($p<.001$). Moreover, the difference in computed and measured $\dot{V}O_2$ significantly increased as a result of the exercise regimen ($p<.001$). These findings underscore the necessity for measurement of $\dot{V}O_2$ at peak exercise and elucidate the increased importance of these measurements following an exercise conditioning program particularly when using the RAMP protocol in men with CHD.

not as good

THE CARDIOVASCULAR RESPONSE TO EXERCISE FOLLOWING STROKE.

Connie Schepers and Randall E. Keyser. Mary Free Bed Rehabilitation Center, Butterworth Hospital and Grand Valley State University, Grand Rapids, MI.

The cardiovascular response to exercise was studied in individuals diagnosed with stroke immediately following one to two weeks of acute neurological care. Six patients were studied on three consecutive days before and three consecutive days after an exercise rehabilitation program conducted in an inpatient rehabilitation setting. Submaximal evaluations were conducted on an electronic cycle ergometer. Work rate began at 84 watts and was incremented by five watts at the end of each three minutes of exercise. Heart rate (HR) was continuously monitored by electrocardiography (ECG) and blood pressure (BP) was manually ausculated at the brachial artery. Perceived exertion (RPE) was evaluated (6-20 scale) at the end of each work stage. HR and BP were also recorded at the end of each stage. Analysis of variance indicated that there was no significant differences as a result of exercise training or test trial for any of the measured variables. The results suggested that work rate, blood pressure, heart rate and perception of effort were reproducible during bicycle ergometry in these stroke patients.

no sig diff
no data in abstract

purpose: reproducibility of CV response

① reproducibility by ANOVA?
need Intra class corr.

② start at 84 watts.?
(age of pts?)

WEIGHT REGAIN DOES NOT INCREASE RELATIVE ABDOMINAL ADIPOSITY IN OBESE WOMEN

R.L. Hammer, and A.G. Fisher, FACSM, Human Performance Laboratory, Central Michigan University, Mt. Pleasant, MI 48859, and Human Performance Research Center, Brigham Young University, Provo, UT 84602

It is well known that women with male abdominal type of obesity are more susceptible to the adverse effects of excess body fat on lipid and carbohydrate metabolism. Obese women with a high waist/hip circumference ratio (WHR) are at greater risk for cardiovascular disease, stroke and total mortality. Weight loss is particularly important for these individuals. Obesity is a refractory disorder, however, where a majority of those who lose weight regain it. The purpose of this study was to determine if recovery of body weight increased relative abdominal adiposity (WHR) and/or percent body fat above initial levels. Fifteen obese women who regained weight (R) one year after a 16-wk treatment are compared with eight who did not (NR) in the table below:

	Waist/Hip			Body Weight (kg)			Body Fat (%)		
	Pre	Post	1 yr	Pre	Post	1 yr	Pre	Post	1 yr
R	0.83	0.79*	0.80*	90.0	81.4*	90.8	38.9	33.9*	38.0
NR	0.82	0.80*	0.79*	82.9	74.8*	74.5*	35.8	30.3*	30.7*

*Different from Pre ($p<.01$)

Although R regained all lost weight by 1 yr WHR remained the same as Post and percent body fat returned to the same level as Pre but not higher. Blood pressure, glucose, triglycerides and cholesterol were also not increased in R at 1 yr compared to Pre. It is concluded that selected health risks of obese women are not increased after a single episode of weight regain.

Please use as good weight letter

REHABILITATIVE OUTCOMES FOLLOWING ORTHOTOPIC HEART TRANSPLANTATION

Steven J. Keteyian, Jonathan K. Ehrman, Frank J. Fedel, Pamela Theisen*, Kenneth L. Rhoads. Henry Ford Hospital, Detroit, MI 48202

To determine rehabilitation status following orthotopic heart transplantation (OHT), 51 patients (42 males and 9 females) living greater than 6 months after surgery (mean 22.1 months, range 6 to 42 months) were surveyed. Rehabilitation was defined as current involvement in at least one of the following classifications: employment, school, volunteering, aerobic exercise, or recreational activities. A questionnaire was administered by a staff rehabilitation specialist via telephone, with input from a staff social worker and spouse where indicated. Mean patient age at OHT was 48.0 years (range 18 to 61), with 41% currently employed, 6% actively looking for paid-employment, 75% receiving medical retirement and/or social security disability, 8% currently enrolled as students, 18% actively volunteering, 67% regularly participating in aerobic exercise, and 73% involved in recreational activities. Ninety-two percent of the OHT patients achieved at least one of the classifications of rehabilitation. Forty-one patients were married and one patient divorced at the time of OHT. Current marital status is 38 patients married with 4 patients divorced. Results suggest that OHT is a reasonable alternative for improving rehabilitation status in patients with end-stage heart disease.

- questionnaire description

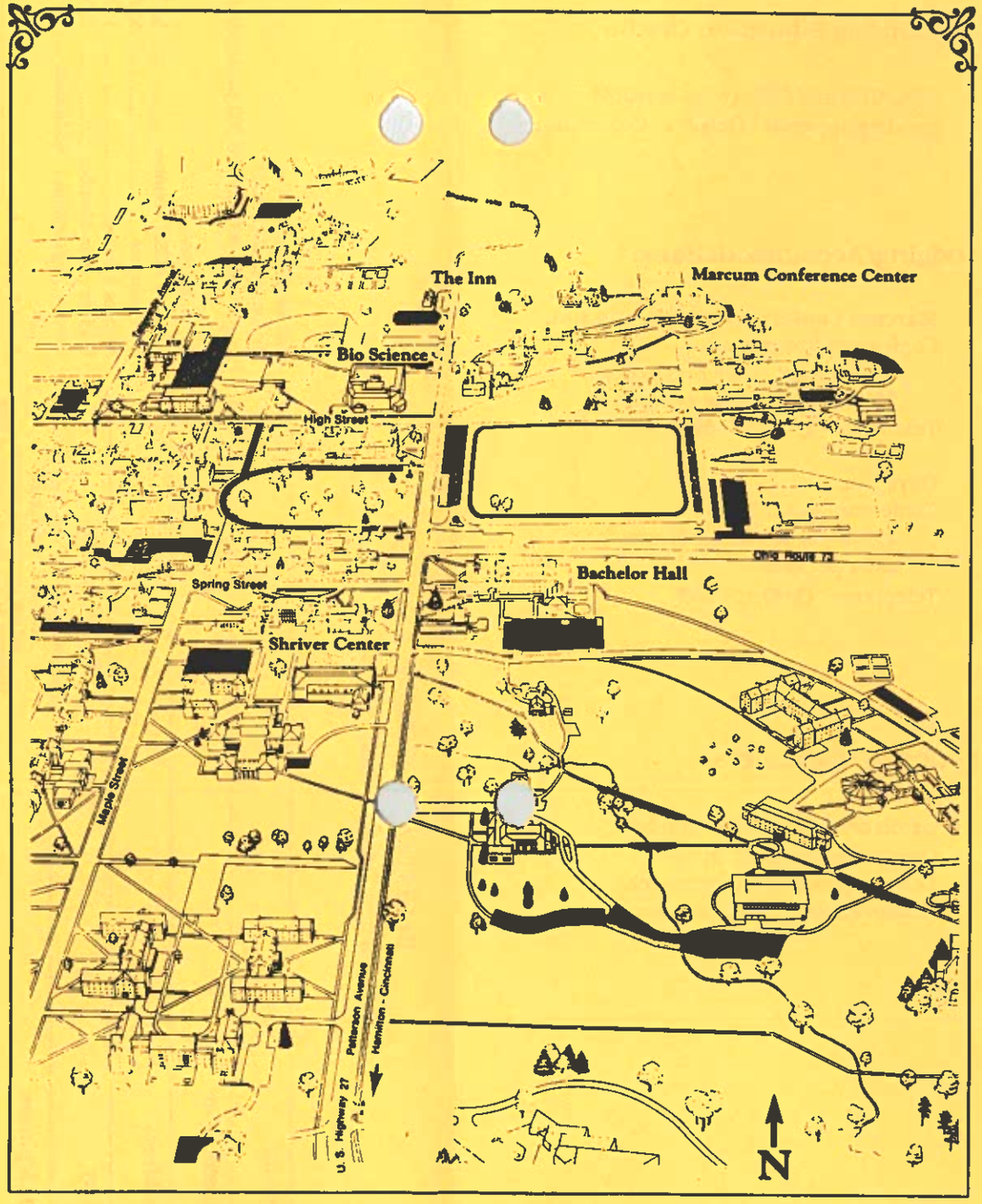
PHYSIOLOGIC TRAINING EFFECTS OF ELECTRICAL STIMULATION LEG CYCLE ERGOMETRY IN THE SPINAL CORD INJURED

S.P. Hooker, S.F. Figoni, R.M. Glaser, FACSM, M.M. Rodgers, P.D. Faghri, and B.N. Ezenwa.
VA Medical Center, Wright St. Univ. School of Medicine, and Miami Valley Hospital, Dayton, OH.

The purpose of this study was to assess the physiologic training effects of electrical stimulation leg cycle ergometer (ES-LCE) exercise in spinal cord injured (SCI) persons. Untrained quadriplegics (C5-C8, n=7) and paraplegics (T4-T11, n=5) completed discontinuous graded ES-LCE (TTI "ERGYS 1" ergometer) to fatigue for pre- and post-training assessments of peak power output (PO), oxygen uptake ($\dot{V}O_2$), pulmonary ventilation ($\dot{V}_E$), heart rate (HR), left ventricular stroke volume (SV), cardiac output ($\dot{Q}$), and arteriovenous oxygen difference (a-$\bar{v}O_2$ diff). Microprocessor-controlled ES of the bilateral quadriceps, hamstring, and gluteal muscles produced a cyclic pattern of leg motion at a target pedal rate of 50 rpm. Metabolic and hemodynamic responses were determined with open-circuit spirometry and impedance cardiography. Data were statistically analyzed with one-way ANOVA and Tukey post-hoc tests (alpha = .05). ES-LCE training was performed 10-30 min, 2-3 times per week for 12-16 weeks (36 total training sessions). The initial training PO was set at 0 watts (unloaded pedalling). Training PO was increased in 6.1-W increments after three successive sessions with 30 min of continuous pedalling at the previous training PO. A significant increase in training PO occurred from week 2 (4.6 W) to the final week of training (17.3 W). This SCI cohort exhibited significantly higher post-training peak PO (+43%), $\dot{V}O_2$ (+18%), and $\dot{V}_E$ (+24%), and a tendency for increases in peak HR (+10%, p=.06) and $\dot{Q}$ (+10%, p=.15). No significant pre- to post-training differences were observed for SV (+0%, p=.95) or a$\bar{v}O_2$ diff (+5%, p=.47). The data indicate that chronic ES-LCE is capable of eliciting significant changes in selected metabolic and cardiopulmonary parameters in SCI persons. However, the post-training increases in peak $\dot{V}O_2$, $\dot{V}_E$, HR, and $\dot{Q}$ appear to be a function of the increase in peak PO rather than improvements in myocardial performance or metabolic capacity of the muscle. This is supported by the lack of change in SV and a-$\bar{v}O_2$ diff observed with ES-LCE training. Although the relative increase in $\dot{V}O_2$ level with ES-LCE training is similar to that reported for able-bodied subjects following voluntary lower-limb exercise training, the absolute levels of metabolic and hemodynamic responses elicited with ES-LCE are far less than those elicited during voluntary dynamic lower-limb exercise. This is due to the extremely low PO achieved by the SCI during ES-LCE. Therefore, ES-LCE may not provide the necessary training intensity to promote significant peripheral metabolic and central hemodynamic effects. It may be necessary to combine ES-LCE with voluntary upper body exercise in the SCI to increase the active muscle mass and training stimulus. Additional studies are clearly needed to determine optimal exercise prescription guidelines utilizing ES-LCE as a training mode.

(Supported by VA Rehabilitation R & D Service, Grant #B433-RA)

Joe
- make up graph of HR Δ (with atropine, & with βb & with both)
- graph of PS influence at rest & ↑ exercise levels
pre train.
post train.



Department of PHS
45 Phillips Hall
Miami University
Oxford, OH 45056

The Influence of Exercise on Cardiovascular Responses to Environmental Stimuli

presented by

The Midwest Regional Chapter
of
The American College
of Sports Medicine

and

Miami University
Department of Physical Education,
Health and Sport Studies

College of Education
and Allied Professions

October 30-31, 1992

at

Miami University
Marcum Conference Center
Oxford, Ohio

PROGRAM

October 30, 1992

5:00-7:00 pm Registration and Exhibits

7:00-7:15 pm Welcome
Dr. Janet S. Kettlewell, Dean
College of Education and Allied Professions
Miami University

7:15-8:15 pm Cardiovascular Adaptations to Prolonged Exercise and Dehydration
Edward Coyle, Ph.D., FACSM
University of Texas
*sponsored by Gatorade Sports Science Institute

8:15-8:30 pm Break

8:30-9:30 pm Blood Pressure Regulation and Endurance Training: Is it a Liability for Space Travel?
Charles M. Tipton, Ph.D., FACSM
University of Arizona
*sponsored by Quinton Instruments, Inc.

9:30-11:00 pm Reception and Exhibits

October 31, 1992

7:30-8:00 am Coffee and Exhibits

8:00-8:15 am ACSM Report: Healthy People 2000 Update
Barbara Campaign, Ph.D., FACSM
Children's Hospital Medical Center
Cincinnati,OH

8:15-9:15 am Exercise as a Modulator of the Physiological Response to Behavioral Stress
Ronald H. Cox, Ph.D.
Miami University

9:15-10:15 am Baroreflex Control of the Circulation during Exercise: Influence of Exercise Training
Steven Di Carlo, Ph.D.
Northeastern Ohio
Associated Universities College of Medicine

10:15-10:30 am Break

10:30-11:30 am Body Fluid Balance and Intolerance Following Weightlessness
John Davis, Ph.D.
Alma College

11:30-12:30 pm Cardiovascular Responses During Exercise in the Heat: Control of Skin Blood Flow
Clark Tankersley, Ph.D.
Johns Hopkins University

12:30-1:45 pm Lunch
Tour of Facilities in Phillips Hall and Biological Sciences Building

1:15-1:45 pm Midwest ACSM Business Meeting

1:45-2:45 pm Exercise and Psychological Stress Reactivity in Humans
Mark Sothmann, Ph.D., FACSM
University of Wisconsin at Milwaukee

2:45-3:45 pm Does Resistance Training Alter Cardiovascular Responses to a Reduction in Circulating Blood Volume?
J. Timothy Lightfoot, Ph.D., FACSM
Florida Atlantic University

Continuing Education Credit:

CEC, CEU and CME credit available pending approval. Details at Conference.

Lodging/Accommodations:

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Sponsors/Exhibitors:

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Midwest ACSM Fall Meeting

Pre-Registration:
By October 23, 1992
Registration is limited to 300 participants

Fee Schedule:
Midwest ACSM Member $30.00
Non-Member $35.00
Student Member $15.00
Student , Non-Member $25.00
On-Site Registration : Additional $5.00

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1993
AMERICAN COLLEGE OF SPORTS MEDICINE MIDWEST WINTER MEETING

BOYNE MOUNTAIN, MICHIGAN

FEBRUARY 3-5

Program Planning Committee
Ball State University Adult Physical Fitness Program

Sponsored by

Midwest Chapter American College of Sports Medicine

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Gatorade Sport Science Institute

This meeting is approved for 10 Continuing Education Credits by ... the American College of Sports Medicine

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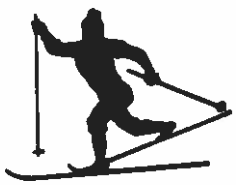

MIDWEST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE

1993 ANNUAL WINTER MEETING

I welcome you to the Annual Meeting of the Midwest Chapter of the American College of Sports Medicine wearing two hats--Chapter President and a member of this year's meeting's Program Planning Committee.

As Chapter President I want to share a little information about the Midwest Chapter. The goal of the Chapter is to fulfill the mission of the American College of Sports Medicine (*to promote and integrate scientific research, education, and practical applications of sports medicine and exercise science to maintain and enhance physical performance, fitness, health, and quality of life)* using the unique resources available on the regional level. The Chapter seeks to fulfill this goal through a variety of approaches. Some specific activities are as follows: two scientific meetings each year, lecture tours, three newsletters each year, a regional internship guide, and student awards for scholarship and research. An active regional membership is vital to assuring the Chapter's success in meeting our goals. I encourage you to get involved on the regional level. I have included a list of the 1993 Chapter Officers in this Conference Proceedings. Please give one of us a call. We would appreciate your input and will "put you to work" on Chapter projects as needs develop. I should also point out that those interested in Fellow status at the national level must now demonstrate involvement in the regional chapter level as a prerequisite. Lastly, I encourage you to attend the Chapter's Business Meeting scheduled for 7:30 p.m. on Thursday night.

From the Program Planning Committee's standpoint, I hope that you will find this year's meeting interesting and informative. The program includes four invited lecturers, eighteen free communications, and eleven poster presentations. Our keynote lecture entitled "Exercise, Free Radicals, and Antioxidant Supplementation" will be given by Mitchell M. Kanter, Ph.D. Dr. Kanter, from the Gatorade Exercise Physiology Laboratory, has conducted research on free radicals for the past decade and is a dynamic speaker. I am sure you will appreciate his lecture. You are also encouraged to attend both the Welcome Reception on Wednesday evening and the Chapter Social on Thursday evening to meet and converse with your colleagues. Thanks go to Rafael Bahamonde, Tony Mahon, and Doug Weeks, all on the faculty at Ball State University, for their assistance with planning and administering the socials. I also wish to acknowledge the sponsors (listed in the back of the Conference Proceedings) for donating the items to be used for the raffle. Proceeds from the raffle will support the two student awards to be given, one for the best poster presentation and one for the best free communication. Additionally, I want to thank the two major sponsors of our meeting: the Gatorade Sport Sciences Institute and Boehringer Mannheim Corporation. If you have the opportunity to utilize the products or services of any of our sponsors, please express your appreciation of their support of our Chapter. Finally, I want to thank Greg Dwyer and Mitch Whaley, my partners on the Program Planning Committee, for all their efforts over this past year.

Enjoy the meeting and best wishes for a successful 1993!

Lenny Kaminsky
President, MWACSM

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MIDWEST CHAPTER ACSM WINTER MEETING
BOYNE MOUNTAIN, MICHIGAN
FEBRUARY 3-5, 1993
SCHEDULE OF EVENTS

WEDNESDAY, FEBRUARY 3, 1993

4:15-5:15 p.m.	Registration
6:00-6:15 p.m.	Poster Presentation--Author set-up
6:15-7:00 p.m.	*"Paralympics--The Sports Medicine Perspective"* Mike Ferrara, Ph.D., Ball State University
7:00-8:00 p.m.	Poster Presentation--viewing
7:30-9:30 p.m.	Welcome reception
8:00-9:30 p.m.	Poster Presentation--Authors present
7:00-9:30 p.m.	POSTER PRESENTATIONS

"Regular Sauna Bathing Does Not Influence Body Composition or Cardiovascular Fitness" byTodd L. Grover

"Lifting Capacity of Patients Measured Four Weeks After Lumbar Laminectomy" by Stephen A. Barr, Ph.D.

"Acute Physiological Responses to Steady-rate Weighted Walking Using a Shoulder-worn Load Carriage System" by Carl R. Smith

"A Comparison of the Traditional and Modified Sit and Reach Tests in Measuring Flexibility in Elementary School Children" by Kristen Drake

"The Efficacy of Early Rehabilitation for Post-operative Lumbar Microdiscectomy Patients" by Lucinda E. Bouillon

"Evaluation of Conventional and New Maximum Heart Rate Prediction Models for Individuals" by Luis F. Aragon-Vargas

"Effect of Upper Body Exercise Intensity and Duration on Post-exercise Oxygen Consumption" by Kevin R. Short

"Ventilatory Kinetics During Transition from Light to Moderate Exercise" by Stephen C. Glass

"Evaluation of a Standardized Submaximal Exercise Test for the Detection of Elevated Diastolic Blood Pressure Responses" by Timothy C. Schell

"The Effect of Heat Stress on Excess Post-exercise Oxygen Consumption" by Christopher Miller

"Age-related Changes in Scaling of Postural Responses Accompanying Upper-body Movement: Female Data" by Douglas L. Weeks

THURSDAY, FEBRUARY 4, 1993

7:00-8:00 a.m.	MWACSM Board of Trustees Meeting
7:30-8:00 a.m.	Registration
8:15-11:00 a.m.	FREE COMMUNICATIONS PAPER PRESENTATIONS
8:15-8:30 a.m.	"Mood State and Subjective Responses to a 24 Hour Race" by Heather L. Hall
8:30-8:45 a.m.	"The Response of Lymphocyte Subpopulations and Selected Hematological Parameters to a 24 Hour Race" by Carol W. Weideman
8:45-9:00 a.m.	"Lymphocyte Mitogenesis and Natural Cell-Mediate Cytotoxicity (NCCM) Following a 24 Hour Run" by Kathy K. Carroll
9:00-9:15 a.m.	"Characteristics of Women Triathletes in an All Women Triathlon" by Robert J. Hanisch
9:15-9:30 a.m.	"Comparison of Anthropometric Standardization Reference Manual Skinfold Site Descriptions to Jackson and Pollock Descriptions" by Amy P. Lueking
9:30-9:45 a.m.	COFFEE BREAK
9:45-10:00 a.m.	"Biochemical Difference in Power Walking and Jogging at Similar Levels of Aerobic Intensity" by George Stylianides
10:00-10:15 a.m.	"The Relationship Between Isokinetic Thigh Muscle Strength and Balance Among Older Adults" by Karen Bawel
10:15-10:30 a.m.	"The Effect of Mode and Cadence on Ground Reaction Forces Associated with Aerobic Dance Maneuvers: High & Low Impact" by Brenda D. Reeves
10:30-10:45 a.m.	"Influence of Ankle Joint Instability on Proprioception" by Cynthia M. McKnight
10:45-1:30 p.m.	LUNCH BREAK
1:30-3:00 p.m.	"*The Injured Athlete: Trauma, Repair & Conditioning of Musculo-tendinous Tissue*" Tim Curtis, M.S., C.S.C.S., Prescription Fitness, Inc., Waterford, MI
3:00-7:30 p.m.	BREAK
7:30-8:00 p.m.	Midwest Chapter--ACSM Business Meeting
8:00-9:00 p.m.	**Keynote Address** "*Exercise, Free Radicals, and Antioxidant Supplementation*" Mitchell M. Kanter, Ph.D., Gatorade Exercise Physiology Lab, Quaker Oats Co.
9:00-10:30 p.m.	Midwest Chapter--ACSM Social

FRIDAY, FEBRUARY 5, 1993

8:00-9:00 a.m.	FREE COMMUNICATIONS PAPER PRESENTATIONS
8:00-8:15 a.m.	"Time Versus Distance Protocols for the Blood Lactate Profile" by Matthew Schrager
8:15-8:30 a.m.	"Comparison of the Bruce Protocol and a Ramp Protocol" by M. Scott Roecker
8:30-8:45 a.m.	"Glycemic Response to Sport-Performance Beverages" by Barbara A. Kooiker
8:45-9:00 a.m.	"Reliability of VO_2 Max Estimates from the ACSM Submaximal Cycle Ergometer Test" by Jeffrey G. Greiwe
9:00-9:25 a.m.	*"Sports Nutrition Update"* Julie H. Burns, M.S., R.D., Rush-Presbyterian-St. Luke's Department of Medicine
9:25-9:50 a.m.	*"Sports Nutrition--Discussion and Questions"* Mitchell M. Kanter, Ph.D., & Julie H. Burns, M.S., R.D.
9:50-10:00 a.m.	COFFEE BREAK
10:00-11:15 a.m.	FREE COMMUNICATIONS PAPER PRESENTATIONS
10:00-10:15 a.m.	"Determinants of 3 KM Running Performance in Children" by Pedro del Corral
10:15-10:30 a.m.	"Postprandial Lipemia in Abdominally Obese and Non-obese Males" by Laurie Wideman
10:30-10:45 a.m.	"FFA Oxidation and Perceived Exertion at Varied Intensity" by Peggy Arnos
10:45-11:00 a.m.	"Evaluation of a Shallow Water Running Test for Estimating $V0_2$ Max" by K. Wayne Wehrli
11:00-11:15 a.m.	"Adrenalectomy and Exercise Effects on Skeletal Muscle Glucose Transport in Obesity" by Jeffery J. Betts
11:30 a.m.	Presentation of Student Awards

Wednesday, February 3
6:15-7:00 p.m.

"The Paralympic Experience: A Sports Medicine Perspective"

Presented by

Michael S. Ferrara, Ph.D., A.T.C.,
School of Physical Education
Ball State University
Muncie, Indiana

The Paralympics are the Olympic level competition for athletes with physical and sensory impairments. There were 6,100 competitors at the Barcelona Paralympics of which 360 athletes were from the United States. There were four disabled sport organizations representing the United States: National Handicapped Sports, National Wheelchair Athletic Association, United States Association of Blind Athletes, and United States Cerebral Palsy Athletic Association. Athletes competed in 14 sports during 12 days of competition.

Historically, there has been very little injury research for athletes with disabilities. The purposed of this project was to describe the injury experience of the U.S. athletes who competed in Barcelona. There were 382 injuries reported during the Paralympics. Seventy-six percent of the injuries were acute in nature and fifty-six percent of the injuries occurred in non-sport related conditions. Illnesses were the most common injury (35%) followed by strains (27%). The upper extremity accounted for 29% of the injury locations followed by the lower extremity at 22%, and respiratory tract at 20%. The injury experience of these athletes were similar to those reported at other large multi-sport events for those without disabilities.

Ball State University

Wednesday, February 3
7:00-9:30 p.m.

Regular sauna bathing does not influence body composition or cardiovascular fitness.

T.L. Grover and R. L. Hammer, Human Performance Laboratory, Central Michigan University, Mt. Pleasant, Michigan 48859.

Many people sauna bath in the United States and throughout the world. Claims of health benefits from sauna bathing include improved weight control, increased cardiovascular fitness, reduced stress and increased relaxation, better circulation and organ function. The purpose of this study was to test how a ten week program of sauna bathing compared with a walk/jog program of equal time commitment on body composition and cardiovascular fitness. Thirty healthy male volunteers aged 19-43 years were randomly assigned to one of three treatments: sauna bathing (S), cardiovascular exercise (E), or control (C). Subjects in the S and E groups were involved in a program of either sauna bathing or walking/jogging three days per week for 25 minutes per session. Exercise was performed at between 55-85% of heart rate maximum. Sauna bathing was done at an ambient temperature of 68°C. Following the treatment period, subjects in the E group were found to have reduced their percentage of body fat, and increased VO_2 Max whereas no significant changes occurred in the S or C groups (see table below).

		Body Fat (%)		$\dot{V}O_2$ Max (ml/kg/min)	
	n	pre	post	pre	post
S	10	21.6	22.1	42.7	44.3
E	10	19.5	17.2*	50.7	55.7*
C	10	23.9	24.3	48.5	50.1

***Pre to post change different than S and C ($p < .05$)**

It is concluded that a walk/jog program is more effective than sauna bathing in reducing body fat and improving cardiovascular fitness.

Wednesday, February 3
7:00-9:30 p.m.

Lifting Capacity of Patients Measured Four Weeks After Lumbar Laminectomy

Stephen A. Barr, Ph.D., John H. Margolis, M.D.,F.A.C.S., Raymond J. Poelstra, M.D.,F.A.C.S. Todd Vitas, B.S. Wright State University School of Medicine, Department of Surgery, Dayton, Ohio 45437

Lower back pain affects approximately 85% of the adult population in industrialized countries. Fortunately, only a small portion of the low back pain patients go on to lumbar laminectomy/diskectomy surgery. Treatment following surgery is widely variable, ranging from bed rest to exercise as soon as four weeks post surgery. Guidelines are needed to determine when patients can resume full activity following low back surgery. Lifting capacity is a good measure of the total body function and provides an important guide for determining if and when patients can return to full activity. Analysis of patients' lifting capacities following lumbar laminectomy is useful for directing post surgical care. Little information is available, however, concerning lifting capacity following lumbar laminectomy. Therefore, the purpose of this study is to determine the lifting capacity of patients following lumbar laminectomy surgery. For this, 43 males ($\overline{X}$ age = 42.6 $\pm$12.4 yr., $\overline{X}$ wt = 89.2 $\pm$ 15.3 kg, $\overline{X}$ Ht = 177.9 $\pm$ 7.2 cm) and 33 females ($\overline{X}$ age = 42.2 $\pm$ 9.8 yr., $\overline{X}$ wt = 75 $\pm$ 17.5 kg, $\overline{X}$ Ht = 165.4 $\pm$ 7.1 cm) were tested isokinetically on a Cybex Liftask device at speeds of 12, 18, 24, and 36 "/sec, four weeks following lumbar laminectomy surgery. Three test lifts followed four practice lifts at each speed. Mean data are as follows:

Speed	12 "/sec	18 "/sec	24 "/sec	36 "/sec
Peak Torque M (Ft-Lb.)	179.5 $\pm$ 54.0	173.8 $\pm$ 52.6	166.8 $\pm$ 49.8	158.1 $\pm$ 48.8
Peak Torque F (Ft-Lb.)	101.3 $\pm$ 36.1	98.4 $\pm$ 38.8	91.7 $\pm$ 41.5	79.6 $\pm$ 39.4

Values are significantly lower than normal (found in the literature) for males at 12 and 18 "/sec and significantly higher for females at 36 "/sec. All other speeds were not different than normal. In conclusion, lifting capacity is impaired when measured four weeks after surgery at slower speeds which most closely compare to lifting occupations in the work place, however, at faster speeds, values are normal. It is our impression that most patients have sufficient functional capacity to begin an exercise program as soon as four weeks post surgery. We further believe that patients will benefit from a reconditioning program and now there are data which support temporary restrictions on the amount a patient should lift after lumbar laminectomy.

Wednesday, February 3
7:00-9:30 p.m.

ACUTE PHYSIOLOGICAL RESPONSES TO STEADY-RATE WEIGHTED WALKING USING A SHOULDER-WORN LOAD CARRIAGE SYSTEM

C.-R. Smith, H.-J. Engels, & J.C. Wirth, Wayne State University, Detroit, Michigan 48202

The use of additional weights (usually carried at ankle and wrist locations) is commonly practiced in the belief of eliciting greater training improvements. The purpose of this study was to examine the acute physiological responses during steady-rate treadmill walking with and without additional weight (10 lbs) carried at shoulder level. Sixteen healthy subjects (age range: 18-35) completed two randomly assigned 10-min treadmill walks at 3mph speed with and without wearing a harness-type shoulder load carriage system ("Endurance Enhancer", Bollinger Health Care, Irving, TX). Respiratory gas exchange (VO_2, RER, VE) was measured using open circuit spirometry methods. Heart rates were determined from 5-sec ECG strips (Quinton Telemetry) and arterial blood pressure responses were assessed using a standard auscultatory method (Little, 1985). Borg's (1982) original rating scale was used to evaluate the sense of effort during walking. Data were statistically analysed using a paired t-test. It was observed that VO_2 (+ 0.44 ml/kg/min; + 0.03 L/min), VE (+ 0.81 L/min), caloric cost (+ 0.15 kcal/min) and RPE scores during walking were elevated in experimental trials ($p<.05$). RER values, heart rate (+3bpm) and blood pressure responses (SBP +4.5mmHg, DBP +1.3mmHg) were not significantly changed ($p>0.05$). In magnitude, the observed changes between experimental and control trials were generally very small. It is concluded that walking using the shoulder load carriage system provides only a minimal stimulus for enhancement of training improvement.

Wednesday, February 3
7:00-9:30 p.m.

A Comparison of the Traditional and Modified Sit and Reach Tests in Measuring Flexibility in Elementary School Children

K. Drake, Wm. Saltarelli, PhD., A. Kitchen and S. Goroski, Central Michigan University, Mt. Pleasant, MI

The purpose of this study was to investigate the relationship between the traditional sit and reach (TSR) and the new modified sit and reach (MSR) tests of low back, hip and hamstring flexibility with elementary school children. Following a standard warm-up, all 54 subjects (30 females, 24 males: mean age 10.9 years) performed the TSR and MSR flexibility tests. Arm length, leg length, trunk length and angle of hip flexion were recorded while subjects performed the TSR/MSR tests. The Pearson correlation for TSR and MSR was 0.92. Correlation for TSR and hip angle was -0.77 and -0.68 for MSR and hip angle. Analysis of the data indicated that those not meeting the Physical Best standard of 25cm exhibited a higher probability of not meeting the standard when the arm/leg ratio was small (< 0.78). The authors conclude that the positive correlation of TSR and MSR is consistent with hip angle during flexion but that children with long legs may be disadvantaged when the TSR is employed. Further investigation is needed to establish if the MSR corrects for limb length bias.

Wednesday, February 3
7:00-9:30 p.m.

THE EFFICACY OF EARLY REHABILITATION FOR POST-OPERATIVE LUMBAR MICRODISCECTOMY PATIENTS.
L. E. Bouillon, Univ. of Toledo, Toledo, OH 43606

Patients who receive early rehabilitation for work-related injuries are reportedly more likely to return to work sooner. However, many physicians continue to prescribe protracted periods of rest prior to initiating rehab. This study evaluates the efficacy of early versus delayed rehab for post-operative lumbar microdiscectomy patients. Twenty-six male subjects with a mean age of 34.6 yr participated in an aquatic and land-based therapeutic exercise program. The aquatic program consisted of adaptive swimming strokes and isolated lumbar exercises. The land-based protocol was composed of sit-ups, reverse curls, double leg and trunk extension exercises. Initial, mid-point, and final straight leg raise and sit-and-reach measurements were taken. The number of reps for flexion and extension exercises were also recorded at the mid-point and completion of the program. A comparison of means revealed a significant difference between early (< 18 days) and late (> 18 days) post-operative referrals for extension reps ($F = 2.44$, $p < .02$) and flexion reps ($F = 2.51$, $p < .01$). Those patients referred early performed 107 reps for extension compared to 51 reps by patients who were referred to rehab later. Patients who were referred earlier were also able to perform 110 flexion reps compared to 48 reps by patients referred later. In addition to greater number of reps for trunk exercises, subjects who were referred to rehab earlier returned to work 36.4 days sooner ($F = 6.52$, $p < .01$). Moreover, patients referred earlier were able to return to the same job held prior to surgery ($F = 10.27$, $p < .001$) as opposed to finding different occupations. It was also found that patients with a chronic lumbar history returned to work 36 days later than those with first time occurrences ($F = 8.07$, $p < .01$). This study may be used to support the efficacy of early rehab in the treatment of post-operative lumbar microdiscectomy patients with the objective of enhanced functional capacity and, ultimately, return to gainful employment.

Wednesday, February 3
7:00-9:30 p.m.

EVALUATION OF CONVENTIONAL AND NEW MAXIMUM HEART RATE PREDICTION MODELS FOR INDIVIDUALS

Luis F. Aragón-Vargas, M.A. Schork*, D.W. Edington, The University of Michigan, Ann Arbor, MI

The purpose of this study was to develop a regression model to predict maximum heart rate (HRmax) from basic sociodemographic variables and to compare it with the 220-age rule of thumb. Data were obtained from 635 adults of all ages, gender, and physical activity levels, rigorously tested for maximum aerobic capacity. HRmax was found to be significantly correlated ($p<.05$) to age, tobacco use in the past, current tobacco use, and self-reported physical activity. There was no evidence of a difference in HRmax between males and females ($p=.997$). Several significant ($p<.00005$) linear regression models involving these variables were developed, but their ability to explain the variation in HRmax was only slightly better than a model that relied on age alone. Based on R^2 values, the age model was able to explain 44.9% of the variation in HRmax, compared to 48% when using the most complicated model. The 220-age rule of thumb also gave an $r^2 = .449$ (44.9%), but the average estimate was biased (-8 beats per minute [bpm]). Individual estimates were highly inaccurate: 50.5% of the predicted values were off by ≥ 10 bpm, compared to 27.6% with our simplest model based on age alone. Furthermore, both the 220-age rule and our regression models were very poor predictors when applied to ten-year age subgroups. It was concluded that in spite of a significant correlation between HRmax and other variables, regression models based on these variables are highly inaccurate in the prediction of individual HRmax values. Therefore, the practice of relying on them for individualized exercise prescription and as a criterion for graded exercise test termination is not warranted.

Wednesday, February 3
7:00-9:30 p.m.

EFFECT OF UPPER BODY EXERCISE INTENSITY AND DURATION ON POST-EXERCISE OXYGEN CONSUMPTION.

K.R. Short, J.M. Wiest, D.A. Sedlock, FACSM. Exercise Physiology Laboratory, Purdue University, W. Lafayette, IN 47907

Previous work has shown that exercise intensity is more influential than duration on the recovery oxygen response following cycle ergometry (Sedlock, Fissinger & Melby, 1989). Relatively little is known about the recovery response to upper body exercise (UBE). The purpose of this study was to assess post-exercise oxygen consumption (EPOC) following upper body exercise of 1) two different intensities that produced equal total work and, 2) two different durations at equal intensity. Ten subjects, 5 male and 5 female, (mean ± SD age = 26.7 ± 4.9 years, UBE VO2max = 25.6 ± 5.8 ml kg-1 min-1) performed three counterbalanced tests at least 48 hours apart on an arm crank ergometer: 1) low intensity, short duration (LS) = 35% VO2max for 15 min; 2) low intensity, long duration (LL) = 35% VO2max for 30 min; 3) high intensity, short duration (HS) = 70% VO2max for 15 min. Subjects came to the lab at least 12 hours post-prandial and having refrained from vigorous activity for at least 36 hours. Baseline VO_2 was monitored during a 30 minute seated rest prior to exercise. Exercise energy expenditure was approximately 92 kcal for HS and LL, 45 kcal for LS. Oxygen consumption was continuously monitored following exercise until resting baseline levels were re-established for five minutes. EPOC duration and magnitude (net O_2) were significantly greater following HS ($p<.01$) while LL and LS did not differ in response (mean ± SD duration and magnitudes: HS = 14.0 ± 6.5 min, 7.8 ± 5.9 kcal; LL = 5.5 ± 4.4 min, 3.0 ± 2.1 kcal; LS = 5.7 ± 4.9 min, 2.5 ± 1.3 kcal). HS also had higher HR (73 ± 10 bpm, $p<.01$) and lower RER (0.77 ± 0.09, $p<.01$) at the end of EPOC compared to LL (64 ± 8 bpm, 0.88 ± 0.13), LS (66 ± 8 bpm, 0.88 ± 0.07), and HS baseline values (63 ± 8 bpm, 0.84 ± 0.09). The conclusions of this work are that for UBE under these conditions, exercise intensity is a more important mediator than exercise duration for eliciting EPOC. The differences seen here might be due to greater fat oxidation following the HS condition suggested by the lower RER, and may also be related to the higher recovery HR in the HS condition. Due to the small muscle groups activated during UBE, post-exercise caloric expenditure for the three conditions was minimal and therefore of little importance for weight loss considerations when UBE is used in isolation.

Wednesday, February 3
7:00-9:30 p.m.

Ventilatory Kinetics During Transition from Light to Moderate Exercise

S. C. Glass, R. G. Knowlton, and M. E. Dieter
Department of Physical Education, Southern Illinois University

The purpose of this study was to identify the ventilatory kinetics during the transition from level treadmill walking to running and to grade walking at the same relative intensity. Six male subjects (Age = 26.5 ± 4.9 yr., Wt.= 80.1 ± 4.2 kg, % Fat = 10.4 ±5.5, VO2peak = 54.7 ± 4.1 ml kg min $^{-1}$) walked at 3.0 mph, 0% grade(27% VO2peak) for 5 min. as a baseline exercise. The work intensity was abruptly increased to 60% of VO2peak for 10 min. by an increase in treadmill speed, followed again by 5 min. of walking at 3.0 mph, 0%. The work intensity was then increased again to 60% of VO2peak for 10 minutes by an increase in treadmill grade only. The subjects performed a walking and running trial on one occasion, and performed the same treatments on a second occasion with the order of the treatments reversed. Ventilatory data were collected every 15s and the average of each of the two treatments analyzed. Half times (T 1/2) of the fast and slow components of the kinetic curves were identified using semi-log plots and determining the line of best fit.

T1/2 (in s.)for Fast and Slow Components of Gas Exchange Variables at 60% VO2peak

	Ve slow	Ve fast	VA slow	VA fast	VCO2 slow	VCO2 fast
Run	238.0 ± 57.2	29.8 ± 7.8	203.0 ± 104.7	39.5 ± 20.6	234.0 ± 65.0	29.2 ± 4.4
Walk	47.7 ± 16.7	—	56.7 ± 20.3	—	38.0 ± 10.5	—

Results showed that the running trial elicited a fast and a slow component for the increase inVE, VA, VO2 and VCO2, but no fast component was identified for respiratory rate, tidal volume or the dead space to tidal volume ratio. A fast component was absent for all variables during the walking trial. The T 1/2 of the fast component f VA was 25% slower than that of VE. There were no differences between trials for steady state variables with t exception of a higher respiratory rate in the running (29.3 ± 3.4) vs walking (26.8 ± 2.2) trial. These results indicate that mechanisms other than the change in work intensity from light to moderate exercise are responsible for the fast component of ventilatory kinetics during the transition from light to moderate exercise. In addition, the fast component for VA lags behind VE due to the lack of any rapid adjustments in tidal volume at the onset of running.

Wednesday, February 3
7:00-9:30 p.m.

EVALUATION OF A STANDARDIZED SUBMAXIMAL EXERCISE TEST FOR THE DETECTION OF ELEVATED DIASTOLIC BLOOD PRESSURES RESPONSES

TC Schell, LA Naftzger, LA Kaminsky, FACSM, MH Whaley.
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Recently, it has been suggested that blood pressure (BP) response during exercise may be a predictor of future hypertension (HTN). There presently is no simple standardized, exercise test that can effectively identify individuals at risk for future HTN. The purpose of this study was to compare the exercise diastolic BP response of subjects with a history of exercise induced HTN between a submaximal exercise test and a maximal Bruce treadmill protocol. Seven men and four women subjects with a mean age of 49 ± 2 years were recruited for the study. All subjects were selected based on a previous elevation of exercise diastolic BP ≥ 10 mmHg during a maximal exercise test. Subjects completed a submaximal 3-3-3 test (walking at a 3% grade, at 3 mph, for 3 min.) on one day and the Bruce protocol on a different day with a minimum of 24 hours between tests. Test administration order was randomized and all tests were done at the same time of the morning with all BPs taken by the same technician with a mercury manometer. There was a significant difference ($p<0.004$) between the increase in diastolic pressure from rest when comparing the 3-3-3 (3.4 ± 2.6 mmHg) to the Bruce protocol (15.4 ± 2.4 mmHg). The BP at Stage I of the Bruce protocol was increased 9.9 ± 2.0 mmHg, which was not significantly different than the peak 3-3-3 or Bruce responses. The mean heart rate (HR) and systolic BP response from rest of the 3-3-3 protocol, 99.5 ± 5.2 bpm, and 27.3 ± 5.3 mmHg respectively, were not significantly different from the mean HR and systolic BP response from rest during the third minute of Stage I of the Bruce protocol, 105.3 ± 6.3 bpm, and 39.9 ± 4.2 respectively. The 3-3-3 protocol was not able to elicit the same rise in diastolic BP as the Bruce treadmill test in this population however. The deviation in diastolic BP during the Bruce Stage I implies that submaximal treadmill testing may be a feasible method to screen for the presence of an exaggerated diastolic BP response to exercise.

Partial support for this project was provided by Searle and the Ball State University Office of Research and Sponsored Programs.

Wednesday, February 3
7:00-9:30 p.m.

THE EFFECT OF HEAT STRESS ON EXCESS POST EXERCISE OXYGEN CONSUMPTION.

C. Miller, D.E. Martin, L.A. Kaminsky, & M.H. Whaley.
Human Performance Laboratory, Ball State University, Muncie, Indiana

Following exercise, oxygen consumption remains elevated above pre-exercise levels for some time and is referred to as excess post-exercise oxygen consumption (EPOC). Although numerous factors have been suggested to contribute to EPOC, little is know about the contribution that thermal stress may have on EPOC. Therefore, the purpose of this study was to determine the magnitude and duration of EPOC following an exercise bout in the heat. Seven healthy, active subjects (4 female, 3 male; 23.9 ± 2.0 years of age) performed one maximal oxygen uptake (VO_{2max}) test on a cycle ergometer and then performed 4 randomized trials: in a moderate (23°C, 50% humidity) environment, one control and one exercise trial (MC and ME) and in a hot (35°C, 50% humidity) environment, one control and one exercise trial (HC and HE). Each exercise trial was performed on a cycle ergometer for 45 minutes at 65% of VO_{2max}. Oxygen consumption (VO_2), heart rate (HR) and rectal temperature (RT) were monitored until post exercise VO_2 had returned to within ± 2% of baseline. Total time post exercise until baseline was achieved was 35, 44, and 51 minutes for HC, ME, and HE respectively. During the first 15 minutes (acute) post exercise, a significant EPOC ($p<0.002$) was observed in both exercise conditions (ME - 3.517 ± 1.290 L, HE 3.932 ± 1.342 L) compared to control conditions. During the slow phase (>15 minutes post exercise baseline), there was no significant difference in EPOC between HC, ME, or HE. The EPOC/EOC (exercise oxygen consumption) ratio was 4.5% for ME and 5.2% for HE. In conclusion, these data would suggest that exercise in the heat does not result in a prolonged or high magnitude EPOC.

Age-related Changes in Scaling of Postural Responses Accompanying Upper-limb Movement: Female Data. Douglas Weeks and Shawn Fluharty, Ball State University, Muncie, IN, 47306

A decrement in the ability to appropriately time postural activity in response to a forceful upper-limb movement could be a contributing factor to diminished postural stability in elderly females. To examine this notion, this study compared electromyographical (EMG) burst onset characteristics in postural muscles in younger (M=24.8 years) and older (M=71.3 years) female subjects performing a forceful upper-limb movement to determine whether onset characteristics differed across ages. The upper-limb movement was an abrupt pull with the right arm performed against a load cell apparatus while standing. EMG was collected via surface electrodes from the focal movement prime mover (posterior deltoid), right hamstring (RH), left hamstring (LH), right quadriceps (RQ), and left quadriceps (LQ) muscles. Subjects performed 20 pulls at varying force levels from 100% to 50% of a subject-determined maximum effort. Regression equations were developed for each postural muscle for each group using force production values as the independent variable and postural muscle onset latencies (relative to deltoid onset) as the dependent variable. Regression analyses revealed correlations of .65, .67, .71, and .63 for the RH, LH, RQ, and LQ for the Young group. Correlations of .44, .45, .35, and .33 were obtained for the RH, LH, RQ, and LQ of the Elderly group. The lower correlations for the Elderly group indicated a reduced ability to scale postural muscle onset latencies with variations in the force of an upper-limb movement. Instability due to senescence may, therefore, be contributed to by a decreased ability to temporally scale postural activity in response to a forceful voluntary movement.

Thursday, February 4
8:15-8:30 a.m.

MOOD STATE AND SUBJECTIVE RESPONSES TO A 24 HOUR RACE.
H.L. Hall, M.G. Flynn, FACSM, P.G. Brolinson, K.K. Carroll, C.A. Weideman, and L. Fruth. University of Toledo Exercise Physiology Lab and The Toledo Hospital Sports Medicine Program Toledo, OH 43606.

The primary purpose of this study was to examine the changes in mood state that occur following a 24 hour race. One hour before the race, subjects (N=11; mean 43.9 ± 2.4 yr) completed a profile of mood states (POMS), muscle soreness scale, and signs and symptoms form assessing the week leading up to the race. Subjects completed the same battery of tests following the race (mean distance = 78.9 ± 6.3 miles) and every 2 days over the next 2 weeks. Subjects were asked to select a control that they would come in contact with on a daily basis. Controls (C) were asked, through written instructions, to complete the POMS and signs and symptoms forms every 2 days for the same 2 week period. The global mood state was significantly ($P < 0.05$) increased pre-race (101.8 ± 4.3) to post-race (110.0 ± 4.4) and was reduced by day 2 of recovery (92.8 ± 4.7). The primary factors contributing to the post-race increase in global mood state were a significant reduction in vigor along with a significant increase in fatigue. Runners (R) global mood state was significantly lower than C for the two weeks following the race. C reported a greater number of upper respiratory infection symptoms than R. In conclusion, a 24 hour race significantly increased global mood state, primarily due to a decrease in vigor, which returned to below pre-race values by day 2 of recovery.

Thursday, February 4
8:30-8:45 a.m.

THE RESPONSE OF LYMPHOCYTE SUBPOPULATIONS AND SELECTED HEMATOLOGICAL PARAMETERS TO A 24 HOUR RACE
C.A. Weideman, M.G. Flynn, FACSM, P.G. Brolinson, K.K. Carroll, H.L. Hall, and L. Fruth. Exercise Physiology Laboratories, University of Toledo, and Toledo Hospital Sports Medicine Program. Toledo, OH 43615

The purpose of this investigation was to examine the effect of strenuous exercise on lymphocyte subpopulation and selected hematological parameters. Ten runners (43.9 ± 2.4 yr) reported to the research site one hour before and immediately following a 24 h run and a venous blood sample was obtained. The subjects completed an average of 78.9 ± 6.3 mi. Peripheral mononuclear cells were isolated by the hypertonic lysis technique. Lymphocyte subpopulations were determined using direct immunofluorescence after staining with selected monoclonal antibodies (CD3+, CD4+, CD8+, CD56+). A complete blood count and differential were run on a second (EDTA) whole blood sample. There was a small but significant decline in the percentage of CD3+, CD4+, and CD8+ cells; however, due to a marked leukocytosis (two fold increase) the absolute number of these cells was markedly increased (CD3+ Pre 936.7 ± 72.0, Post 1310.4 ± 178.3; CD4+ 602.2 ± 47.8, 766.7 ± 91.8; CD8+ 322.2 ± 40.6, 470.0 ± 87.8, X ± S.E.). As previously reported, the increase in WBC number was probably due to granulocytosis. The CD4+/CD8+ ratio (helper to suppressor ratio) was decreased ($P= 0.057$) post race (2.2 ± 4.1 to 1.7 3.1). The number and percent CD56+ cells (NK) were essentially unchanged. In conclusion, changes in lymphocyte subpopulations and hematological parameters were similar to those previously reported following endurance activities of shorter duration.

Thursday, February 4
8:45-9:00 a.m.

LYMPHOCYTE MITOGENESIS AND NATURAL CELL-MEDIATED CYTOTOXICITY (NCCM) FOLLOWING A 24 HOUR RUN. K.K. Carroll, M.G. Flynn, FACSM, P.G. Brolinson, H.L. Hall, C. Weideman, L. Fruth, & B.A. Kooiker, Exercise Physiology Laboratories, University of Toledo, and Toledo Hospital Sports Medicine Program, Toledo, OH, 43606.

The purpose of this investigation was to examine the effects of a 24 hour road race on functional assays of the immune system including lymphocyte mitogenesis and NCCM. Ten subjects (9 males, 1 female; 43.5 ± 2.6 yr) participated in this study and completed at least 50 miles ($\bar{X}$ = 76 ± 6; range = 54-117) during a 24 hour period. Blood samples were drawn 1- 2 hours prerace after 15 minutes seated rest, and within 1 hour after the conclusion of the race. Mononuclear cells were isolated by layering whole blood onto Histopaque. Cells ($1x10^6$) for mitogenesis were incubated for 72 hr (5% CO_2 at 37 C) using concanavalin A as the mitogen. Cells were pulsed with 1 uCi ^3H thymidine/well at 48 hrs and harvested onto glass fiber filter paper after 72 hr. NCCM was assessed using a ^{51}Cr release assay (effector: target ratio 25:1), following a four hour incubation. Statistical analysis was performed using a repeated measures ANOVA. ^3H-Thymidine uptake during mitogenesis was not significantly different pre- (22.2 ± 3.5) to postrace (28.7 ± 6.2 cpm x 10^3). The absolute numbers of CD56+ cells (NK) increased somewhat from 335 ± 35 to 371 ± 91 x $10^6 \cdot l^{-1}$ as did the specific activity of NK cells, 32% ± 4.8 prerace to 39% ± 5.3 postrace, but these changes were not significant ($P>0.05$). The results lead us to suggest that immune system function was not suppressed within one hour following a 24 hour race.

Thursday, February 4
9:00-9:15 a.m.

CHARACTERISTICS OF WOMEN TRIATHLETES IN AN ALL WOMEN TRIATHLON.
R. J. Hanisch, A. C. Snyder, FACSM, R. Welsh, Diabetes Treatment Center at Columbia Hospital and University of Wisconsin - Milwaukee, WI.

All women triathlons have drawn over 750 women compared to the typical coed triathlon of only 110 women. The purpose of this study was to characterize female triathletes participating in an all women triathlon (0.75K swim, 12.5K bike, 3.1K run) and compare those competing in their first triathlon (FIRST, n=77) versus triathletes competing in at least their second triathlon (EXP, n=89, X ± SD, 11.6 ± 14.7 races). Overall the typical female triathlete was 165.6 ± 7.3 cm, 59.4 ± 7.4 kg and 31.0 ± 7.3 yrs. The initial sport was running (44.8%), followed by swimming (27.9%), and cycling (12.7%). The women had been training in the individual sports from 3.3 to 5.7 years, but for triathlons the FIRST had trained only 0.5 ± 1.0 yr while the EXP had trained 2.9 ± 2.1 yr. The athletes in general took at least 1 day off per week (FIRST = 82.8%, EXP = 80.5%), but more FIRST athletes took two or more days off (53.9%) than did the EXP athletes (29.9%). The EXP triathletes had higher weekly mileage at a faster average pace for all three activities when compared to the first timers. For the most part (75%) the athletes described their menstrual cycle as regular. However, 56% of the athletes felt that their menstrual cycle sometime/always had a negative effect on their training or racing. Even though height, weight and caloric intake were very similar between the two groups, the EXP athletes were 5 times more likely to have amenorrhea. In summary, while there was similarity in height, weight and caloric intake of the two groups, differences were found in intensity, duration, years of triathlon training and likelihood of amenorrhea.

Thursday, February 4
9:15-9:30 a.m.

COMPARISON OF ANTHROPOMETRIC STANDARDIZATION REFERENCE MANUAL SKINFOLD SITE DESCRIPTIONS TO JACKSON AND POLLOCK DESCRIPTIONS. A.P. Lueking, G.B. Dwyer, J. Richert. Ball State University, Muncie, IN.

The Anthropometric Standardization Reference Manual (ASRM) descr[illegible]s several skinfold sites. The Chest (CH), Midaxillary (MA), Suprailiac (SI), Subscapular (SS), and Abdominal (AB), skinfold site descriptions vary from the commonly used Jackson and Pollock (J-P) descriptions. Can the ASRM descriptions be used with the J-P body composition (%Fat) formulas? Forty-Four subjects (25 men, 18 women) were marked and skinfold thickness measured by the same technician, according to ASRM and J-P descriptions. Anova ($p \leq .05$) compared the ASRM to J-P skinfold sites and %Fat (7 & 3 site formulas):

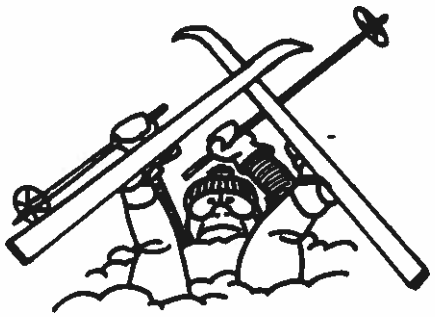
	CH (mm) *	MA (mm)	SI (mm) *	SS (mm)	AB (mm) *	J-P %Fat (7 site)	J-P %Fat (3 site)
ASRM	5.4 ± 3.7	13.0 ± 7.0	21.6 ± 9.6	16.5 ± 8.7	20.1 ± 8.2	26.1 # 14.3 ~	29.8 # 15.3 ~
J-P	11.8 ± 6.2	13.0 ± 7.8	13.3 ± 7.9	16.3 ± 8.0	22.7 ± 10.0	25.9 # 14.5 ~	27.1 # * 20.0 ~ *

* = $p \leq .05$; # = women; ~ = men

Three skinfold site thicknesses (CH, SI, AB) were statistically different, however, the calculated %Fat was not different using ASRM and J-P descriptions when summing 7 sites. The J-P 3 site formula resulted in 2.7 %Fat and 4.7 %Fat difference in women and men, respectively, between ASRM and J-P descriptions. In conclusion, ASRM skinfold site descriptions should not be applied to the J-P 3 site body composition formula.

Thursday, February 4
9:30-9:45 a.m.

COFFEE BREAK



Thursday, February 4
9:45-10:00 a.m.

BIOMECHANICAL DIFFERENCES IN POWER WALKING AND JOGGING AT SIMILAR LEVELS OF AEROBIC INTENSITY. George Stylianides, Shannon Gaul, Cindy McKnight, & Charles Armstrong, Applied Biomechanics Lab, Univ. of Toledo, Toledo, OH 43606

Numerous studies have suggested that many jogging injuries can be attributed to the musculoskeletal stress imposed by the dynamic nature of the activity. In an attempt to lessen the risk of injury, individuals have often switched to power walking (PW). It has been assumed that this activity provides the same aerobic benefits, but with decreased biomechanical stress. However, little is known about the biomechanics of PW at levels of aerobic intensity comparable to those encountered in jogging (JG). Thus, the purpose of this study was to examine the kinetics and kinematics of JG and PW at similar levels of intensity. Selected characteristics of gait-were assessed in 20 normal young adults during bouts of PW and JG. During both, the Ss heart rate was monitored, and exercise intensity adjusted to sustain a rate of approximately 70% of the age-adjusted maximum. Gait kinetics were assessed with a force plate and kinematics evaluated with a computerized video system. In part, the results indicated that although the vertical and anterior/posterior forces of PW were 10% to 15% greater than those reported for normal walking, they were approximately 40% below those of JG. Numerous other kinetic variables showed similar trends that would reflect decreased bio-mechanical stress. In part, these findings may have been due to the increased vertical and horizontal center of gravity displacement of each gait cycle that was observed for the JG condition.

200(cm/sec) walk
250(cm/sec) run

Thursday, February 4
10:00-10:15 a.m.

THE RELATIONSHIP BETWEEN ISOKINETIC THIGH MUSCLE STRENGTH AND BALANCE AMONG OLDER ADULTS

K. Bawel, R. Topp, A. Mikesky, J. Wigglesworth, & J. Edwards
→IU School of Nursing

The purpose of the study was to determine if there is a relationship between balance and isokinetic strength among older adults. Sixty-six volunteers (26 men and 40 women; mean age of 71.2 years) participated in the study. Each subject was evaluated with the following functional tests: (a) gait speed by averaging ten trials through a three meter course; (b) static and dynamic balance using a modified Rhomberg test; and (c) concentric and eccentric strength of the knee extensors and knee flexors using a Kin-Com Isokinetic Dynamometer (60 degrees per second). Significance level was $p < .05$. Static balance was significantly correlated with average concentric ($r = .23$) and eccentric ($r = .39$) extension strength; as well as concentric ($r = .29$) and eccentric ($r = .38$) flexion. Dynamic balance was correlated between average eccentric ($r = .31$) extension strength, as well as the average concentric ($r = .25$) and eccentric ($r = .33$) flexion strength were correlated with dynamic balance. These findings indicate that both eccentric and concentric thigh muscle strength are significantly correlated to both static and dynamic balance. Therefore, a progressive resistance strength training program designed for older adults should emphasize both concentric and eccentric modes of contraction. A program emphasizing both modes of training may be beneficial in decreasing the risk of falling in older adults.

Thursday, February 4
10:15-10:30 a.m.

The Effect of Mode and Cadence on Ground Reaction Forces Associated with Aerobic Dance Maneuvers: High-impact (HIAD) and Low-impact (LIAD).

B. D. Reeves & C. W. Armstrong, University of Toledo.

Currently in the U.S., 23 million women participate in aerobic dance as a form of organized fitness exercise (Garrick, 1988). Unfortunately, in this population there has been a relatively high incidence of orthopedic injuries. It is thought that these injuries occur in response to the forces imposed on the body during aerobic dance maneuvers. This is the first study to examine the effect of the relationships among step, mode and cadence on these ground reaction forces (GRF). The purpose of the study was to compare the GRF responses to four aerobic dance steps during two different modes (HIAD & LIAD) and three different cadences (130, 150 & 170 bpm). College age females (n=6) performed repeated trials of the 24 steps (aggregate total) with their right foot striking an AMTI force platform. Three dependent variables representing the vertical and shear forces were examined. Analysis of variance revealed significant main effects and interactions for step, mode and cadence. Significantly greater vertical forces were observed for HIAD than those observed for LIAD (except for the jumping jack). There were significant differences in vertical forces among cadences for all four steps. As intensity increased, the GRF increased. Vertical forces (Fx) ranged from 1.104-3.405 BW. Lateral forces (Fz) ranged from 0.033-1.022 BW. Propulsive forces (Fy) ranged from 0.01-0.939 BW. The authors concluded that each dance maneuver has a unique GRF pattern. Individuals with orthopedic problems or low fitness levels may not be able to tolerate the increased vertical and shear forces associated with HIAD, increased intensity (exercise cadence) or with selected individual dance steps.

Thursday, February 4
10:30-10:45 a.m.

INFLUENCE OF ANKLE JOINT INSTABILITY ON PROPRIOCEPTION. C.M. McKnight and C.W. Armstrong, Applied Biomechanics Lab, Univ. of Toledo, Toledo, OH 43606

Several studies have examined general balance in an attempt to gain insight into the role of joint proprioception in chronic ankle instability (CAI), a common sport-injury condition. However there has been no research to clearly delineate the specific components of balance that may be influenced by CAI. Therefore, the purpose of this study was to examine characteristics of balance in normal subjects and in those with CAI. Thirty normal adults and 10 with CAI completed multiple trials of three conditions of a balance test, utilizing an AMTI force platform and BalanceTrak software. The three conditions included: eyes closed/double stance (ECD), eyes open/double stance (EOD), and eyes open/single stance (EOS). The results indicated that both groups evidenced significant increases in A/P sway (25%), M/L sway (56%), total sway (59%), and sway velocity (58%) when comparing the ECD condition to the EOD condition. However these two conditions did not appear to distinguish between the two Ss groups. Examination of these same variables for the EOS condition revealed that the CAI group had significantly greater F/A sway and total sway, and they evidenced a general increase in the variability of the tests, when the involved limb was used. These results support the position that CAI may involve compromised joint proprioception, and that quantitative balance assessment may be a useful procedure in the clinical assessment of this condition.

Thursday, February 4
1:30-3:00 p.m.

"The Injured Athlete: Trauma, Repair & Conditioning of Musculo-tendinous Tissue"

Presented by

Tim Curtis, M.S., C.S.C.S.
Director of Health & Fitness
Prescription Fitness, Inc.
Waterford, Michigan

This presentation will examine the physiology of sports-induced injury, repair and strengthening of muscles and tendons. A review of basic muscle and tendon physiology will be followed by an examination of the inflammation process that occurs in these tissues following trauma. The important role of inflammation in strength reduction and joint instability will be discussed. A brief examination of cryo, thermo, and corticosteroid therapies and their roles in reducing inflammation will be included. Factors influencing cellular repair and the healing process will also be described.

The final half of this presentation will examine the primary mechanisms of adaptation in strengthening and conditioning the asymptomatic athlete following physical therapy. Non-traditional and advanced muscle strengthening techniques for the athlete will be presented and specific precautions will be suggested.

Thursday, February 4
8:00-9:00 p.m.

"Exercise, Free Radicals, and Antioxidant Supplementation"

Keynote Address Presented by

Mitchell M. Kanter, Ph.D
Research Scientist
Gatorade Exercise Physiology Laboratory
The Quaker Oats Company
Barrington, Illinois

Dietary antioxidant supplementation has been purported to decrease the risk of developing such diverse disease conditions as cancer and cardiovascular disease. There are also data suggesting that antioxidants may play a role in delaying the aging process.

Research conducted during the past ten years has indicated that free radical production and subsequent lipid peroxidation are normal sequels to the rise in oxygen consumption with exercise. Consequently, it is postulated that antioxidant supplementation may detoxify the peroxides produced during exercise, and can diminish the extent of the muscle damage induced by strenuous physical exercise.

Three nutrients that have shown promise as protective antioxidants are the lipid soluble vitamin E (alpha tocopherol) and beta carotene, and the water soluble vitamin C. Vitamin E, a peroxyl and hydroxyl radical scavenger, is considered the most important lipid soluble antioxidant in humans because of its association with lipid membranes. Beta carotene can prevent free radical reactions by scavenging singlet oxygen (a potentially damaging free radical), and can serve as a chain breaking antioxidant. Vitamin C serves directly as an antioxidant by scavenging aqueous peroxyl radicals, and indirectly by regenerating reduced vitamin E.

Despite the strong link between an increased oxygen consumption and a rise in free radical generation, it is difficult to state with certainty the role (if any) that free radicals play in the development of exercise-induced tissue damage, and the protective role that antioxidants may play. The majority of the current methods used to assess exercise-induced lipid peroxidation are not extremely specific or sensitive; many of our current beliefs regarding exercise and free radical generation are based on data gleaned via these methods. Future research which utilizes more sophisticated methodologies should help to answer many questions involving the use of dietary antioxidants by active people.

Friday, February 5
8:00-8:15 a.m.

TIME VERSUS DISTANCE PROTOCOLS FOR THE BLOOD LACTATE PROFILE

M. Schrager, J. Cohen, K. Donovan, P. Gastrau, P.J. Killian, A.C. Snyder, FACSM, C. Foster, FACSM, Sinai Samaritan Medical Center, Milwaukee, WI.

Laboratory studies of blood lactate accumulation often use a fixed time protocol. For practical reasons, field studies with athletes often use a fixed distance protocol to accomplish the same goal. Whether these variations of protocol are comparable has not been established. We studied 10 subjects in the laboratory during fixed time (4 minute) and fixed distance (2 km) exercise protocols on a racing bicycle attached to a wind load simulator. We also studied the subjects during fixed distance (2 km) rides in the field. In the laboratory there were no systematic differences in the velocity (34.3±4.6 vs 34.2±4.6 $km*hr^{-1}$), VO_2(2.78±0.60 vs 2.84±0.62 $liters*min^{-1}$), or heart rate (159±16 vs 155±14 $beats*min^{-1}$) at OBLA in the fixed time vs fixed distance protocols. The correlation coefficients for velocity (r=0.97), VO_2 (r=0.97) and heart rate (r=0.94) further indicate the similarity of results. In the field study there was a significant difference in velocity (29.9±4.8 vs 34.2±4.6 $km*hr^{-1}$) but not heart rate (155±18 vs 155±15 $beats*min^{-1}$) at OBLA versus the fixed distance laboratory study. The correlations for velocity (r=0.46) and heart rate (r=0.93) support these data. The results suggest that the practical modification of the lactate profile technique of using fixed distance versus fixed time exercise stages does not systematically influence the outcome.

KEY WORDS: onset of blood lactate accumulation (OBLA), lactic acid measurement, cycling.

Friday, February 5
8:15-8:30 a.m.

COMPARISON OF THE BRUCE PROTOCOL AND A RAMP PROTOCOL

MS Roecker, LA Kaminsky, FACSM, MH Whaley, GB Dwyer.
Human Performance Laboratory, Ball State University, Muncie, IN

The most commonly used protocol by clinicians, the Bruce protocol (B), may not be the optimal protocol to use due to it's relatively high initial workload and large increases in work per stage. To avoid these problems ramp protocols have been developed. The purpose of this study was to compare the physiologic responses of the B to the BSU/Bruce Ramp (BR). The BR was designed to match the speed and grade of the B at the end of each 3 minute stage (i.e. 3 min.-1.7/10%) by progressing with small increments of approximately .3 METS/20 sec. Thirty-one subjects (22 M, 9 F) completed both the B and BR protocols on separate days. Mean response at each 3 min. period (* $p<0.05$) during the exercise test were:

	3 MIN N=31		6 MIN N=31		9 MIN N=27		12 MIN N=15	
	B	BR	B	BR	B	BR	B	BR
VO2	14.6*	12.9	21.6*	19.5	31.9*	28.4	45.2*	41.4
HR	105.1	101.5	125.8	121.6	154.9*	146.7	175.9*	171.6
SBP	143.5	139.3	154.5	150.5	163.2	164.0	171.2	169.6
RPE	8.9	8.3	11.9	11.6	14.9*	14.1	16.9*	16.4

Maximal VO2, HR, RER, RPE, VE were not significantly different. Eighty percent of the subjects surveyed preferred the BR. A regression equation to predict VO_{2max} from test time (min) on the BR was calculated to be Y=4.014x-8.7 (±2.68). This equation was cross validated against 20 subjects yielding an r of..987 and a SEE of 2.1 ml/kg/min. Due to the high average VO_{2max}(44.1 ml/kg/min) of the total group, a subgroup of subjects with VO_{2max} below 13 METS was also stu[illegible]. SBP and RPE at 3 and 6 MIN and HR at 6 MIN were significantly higher on the B in the subgroup. The BR protocol is a valid test of functional capacity as compared to the B protocol and has less error in predicting VO2 max as compared to equations for the B protocol (SEE=3-5ml/kg/min).

Friday, February 5
8:30-8:45 a.m.

GLYCEMIC RESPONSE TO SPORT-PERFORMANCE BEVERAGES. Kooiker, B.A., Andres, F.F., & Maylath, N.B., Univ. of Toledo, Toledo, OH 43606

This study demonstrates a means of determining a physiological response to sport-performance beverages which is not available from simple carbohydrate exchanges based on chemical analysis. Nine subjects (3 female, 6 male; age 18-35 yr), all self-reported non-diabetics, reported to the laboratory on four occasions following an overnight fast. In a 10 min period each subject consumed a volume of sport-performance beverage which provided 1 g CHO·kg-1 body mass. One experimental (A) and three commercial (B, C, D) beverages were randomly presented. Glucose polymer (GP), glucose (G), fructose (F), and sucrose (S) concentrations (%) varied among the beverages. Subjects sat quietly while a finger capillary blood sample was taken. Samples were then collected every 15 min for two hr following ingestion of the beverage. The samples were analyzed for blood glucose using an automated monitoring system. A two factor (treatment x time) ANOVA for repeated measures was performed. The treatment x time interaction was significant ($F=1.96$, $p < .007$). Simple main effects analysis showed that the interaction was significant at 30 and 45 min. At 30 min the glycemic response for B and C was higher than for D and at 45 min it was higher for B than for D or A. No other differences were found. The treatment effect for beverage was also significant ($F=3.585$, $p=.028$). No significant differences were found among the areas under the glycemic response curves ($F=0.81$, $p > .25$). Based upon these results, we conclude that beverages with different concentrations of GP, G, F, and S elicit different glycemic responses at 30 and 45 min after consumption. It appears difficult to predict the effect that CHO% of sport-performance beverage will have on blood glucose. Therefore future research examining glycemic response to the consumption of sport-performance beverages during exercise may be warranted.

This project funded in part by the Small Grants Fund, University of Toledo.

Friday, February 5
8:45-9:00 a.m.

RELIABILITY OF VO_2max ESTIMATES FROM THE ACSM SUBMAXIMAL CYCLE ERGOMETER TEST.

JG Greiwe, LA Kaminsky, FACSM, GB Dwyer, and MH Whaley,
Human Performance Lab, Ball State University, Muncie, IN.

Although submaximal exercise tests are widely used in medical and fitness environments to estimate cardiorespiratory endurance, information is lacking on the reliability of these tests. Therefore, the purpose of this study was to determine the reliability and validity of the ACSM submaximal cycle ergometer test. Fifteen healthy volunteers (aged 21-55 yr) performed a maximal cycle ergometer test and two ACSM submaximal cycle ergometer tests. A Monarch ergometer was used for the submaximal tests with (HR) measured by telemetry (TL) and by 15 second palpation (PL) of the radial artery. The trained PL technician was blinded from the telemetry measure. VO_2max was estimated by extrapolation of HR to age predicted maximal HR (220-age).
Measured and predicted VO_2max L/min (mean ± SD) were as follows:

VO_2max	PL1 VO_2max	TL1 VO_2max	PL2 VO_2max	TL2 VO_2max
2.63 ±.88	3.30 ±1.32	3.16 ±1.18	3.07 ±.94	3.27 ±.97

Correlational analysis was performed to determine the reliability between the submaximal tests. A correlation of $r=.87$ and $r=.38$ was found between the two TL trials and two PL trials, respectively. Although no significant differences existed between measured VO_2max and predicted VO_2max the absolute error was 28.5% for PL and 21% for TL. This large error in the estimation of VO_2max from submaximal tests limits the usefulness of these tests for individual fitness assessments. These data suggest that the submaximal test has acceptable reliability when HR is measured by TL, but not when HR is measured by PL.

Friday, February 5
9:00-9:25 a.m.

"Sports Nutrition Update"

Presented by

Julie H. Burns, M.S., R.D.
Manager of Clinical Trial Operations
Rush-Presbyterian-St. Luke's Department of Medicine
Chicago, Illinois

I. Brief Review of Nutrient Requirements
   - A. Protein
   - B. Fat
   - C. Carbohydrate

II. Fluid Replacement Requirements
   - A. Before exercise
   - B. During exercise
   - C. After exercise

III. Working with Professional Athletes (Chicago Blackhawks and Leon Spinks)
   - A. Dietary habits/weight issues
   - B. Strategies for enhancing performance through nutrition
   - C. Eating on the road tips

Friday, February 5
9:25-9:50 a.m.

"Sports Nutrition--Discussion and Questions"

Presented by

Mitchell M. Kanter, Ph.D.
and
Julie H. Burns, M.S., R.D.

Friday, February 5
10:00-10:15 a.m.

DETERMINANTS OF 3 KM RUNNING PERFORMANCE IN CHILDREN

P. del Corral, A.D. Mahon, and M.L. Marsh, Human Performance Laboratory
Ball State University, Muncie, IN

Previous studies examining physiological parameters related to running performance in children have used relatively short running distances (1.5 to of 2 km). The purpose of this study was to examine the influence of body fatness, aerobic and anaerobic variables on 3 km running performance in children. Thirteen children with a mean ± SD age, height and weight of 10.5 ± 1.1 yrs, 143.9 ± 6.5 cm, and 35.6 ± 6.0 kg volunteered for this study. The sum of 6 skinfolds (SS), running economy at 134.0 and 164.8 $m \cdot min^{-1}$, and VO_2max were measured in the laboratory. Run time for 3 km was assessed twice on separate days on a 200 meter indoor track. Prior to each run, each child performed two 55 meter sprints and two vertical jumps (VJ) for height. The best performance in each of these tests was recorded. Mean ± SD values for SS, $\%VO_2max$ at each running speed, VO_2max and 3 km run time were: 34.1 ± 15.9 mm; 69.2 ± 7.5% and 78.9 ± 8.4%; 55.8 ± 4.8 $ml \cdot kg^{-1} \cdot min^{-1}$; 16.73 ± 2.87 min, respectively. Simple and stepwise multiple regression analyses were used to examine the relationship between the independent variables and 3 km run time. Significant ($P < 0.05$) correlations were observed between the following variables and run time: $\%VO_2max$ at 164.8 $m \cdot min^{-1}$ ($r = 0.90$); $\%VO_2max$ at 134.0 ($r = 0.86$); ; SS ($r = 0.85$); VO_2max ($r = -0.81$); VJ ($r = -0.81$); HR at 134.0 $m \cdot min^{-1}$ ($r = 0.80$); HR at 164.8 $m \cdot min^{-1}$ ($r = 0.80$); and, sprint time ($r = 0.61$). Multiple regression analysis indicated that $\%VO_2max$ at 164.8 $m \cdot min^{-1}$ was the only variable that loaded significantly in the prediction of run time (SEE = 1.31 min). This was attributed to the high degree of shared variance between many of the variables. This study suggests that 3 km run time in children is strongly influenced by aerobic and anaerobic indices as well as body fatness, and supports the notion that children, compared to adults, are not metabolic specialists.

Friday, February 5
10:15-10:30 a.m.

POSTPRANDIAL LIPEMIA IN ABDOMINALLY OBESE AND NON-OBESE MALES.

L Wideman, LA Kaminsky, FACSM, MH Whaley.
Human Performance Laboratory, Ball State University, Muncie,IN

Both postprandial lipemia (PPL) and abdominal obesity (AO) have been associated with coronary heart disease (CHD). Metabolic changes in glucose metabolism have been demonstrated in AO, however research on metabolism of triglycerides (TG) in AO is not available. The purpose of this study was to investigate the differences in PPL between AO and non-obese (N) men. Criteria for the AO group was a waist-to-hip ratio (WHR) >0.9 and a body mass index (BMI) >27. Fourteen healthy, normolipidemic men (7 AO and 7 N) with percent body fat 29.0% vs 16.3%, BMI 29.4 vs 23.0 and WHR 0.96 vs 0.85, respectively, participated in the study. Subjects were matched on age (46±10 yr) and activity status. All men were asked to abstain from exercise and alcohol for 72 hours before the test. After an overnight fast, subjects ingested a beverage which contained 78 g of fat and 193 mg of cholesterol. Blood samples were obtained hourly for 8 hours and analyzed for TG, total cholesterol (TC), high density lipoproteins (HDLT, HDL_2 and HDL_3) and glucose. The AO group had significantly higher TG concentrations throughout the 8 hour trial. Area under the TG clearance curve was significantly greater in the AO group (667.0 vs 358.1 mg/dL-time). There was no difference between the 2 groups in the time to reach peak TG concentration (AO 3.9 hrs, N 3.7 hrs). In the 8 hour trial, 4 subjects in the AO group did not return to baseline, compared with 2 in the N group. HDLT was significantly higher in the N group, with no time effect. HDL_2 concentrations were higher in the N group and a significant time effect for HDL_2 over the 8 hours was observed. These results indicate that men with the abdominal fat pattern have greater total PPL than non-obese men of the same age and with similar activity patter Elevated PPL, which has been hypothesized to increase the atherogenic process, may be an important factor explaining the increased risk of development of CHD in AO.

Friday, February 5
10:30-10:45 a.m.

FFA OXIDATION AND PERCEIVED EXERTION AT VARIED INTENSITY. P. Arnos, F. Andres, K. Drowatzky, Dept. of Exercise Science, Univ. of Toledo, Toledo, OH 43606

The amount of energy derived from FFA oxidation during two 300 Kcal exercise bouts was compared. The subjects were ten healthy students (6 M; 4 F, 22.9±4.2 yr, 168.1±12.4 cm, 67.8±16.8 kg, 19.2±7.4% fat) who exercised less than 2 · wk-1. Following a VO_2 max test, the subjects were randomly assigned to cycle ergometry trials at 45 and 70% VO_2 max. Exercise trials were performed after an overnight fast with minimum of 72 hr between bouts. Respiratory gases were analyzed every 30 sec; heart rate and RPE were recorded. No significant difference was found for sex; all data were then collapsed for subsequent analysis.

Condition	Time (min)	HR (bpm)	RPE (6-20)	FFA (Kcal)
70% VO_2 max	30.4±10.2	166.4±11.5	14.3±1.8	65.5±20.6
45% VO_2 max	48.1±15.8	129.9±12.5	9.6±2.1	132.6±22.7

For all variables, significant differences between trials were found using t-test analysis. While exercise mean time increased by 60%, calories derived from fat oxidation doubled at 45% compared to 70% VO_2 max. Furthermore subjects perceived the exercise to be significantly less stressful at the lower intensity. Based on the ACSM guidelines of minimum energy expenditure for weight loss and fitness, significantly more fat will be oxidized with less perceived effort at 45% than 70% VO_2 max.

We wish to acknowledge the financial support provided by The University of Toledo for this study.

Friday, February 5
10:45-11:00 a.m.

EVALUATION OF A SHALLOW WATER RUNNING TEST FOR ESTIMATING VO_{2max}.
KW Wehrli, LA Kaminsky, FACSM, AD Mahon, GC Robbins, DL Powers, MH Whaley, JA Craig. Human Performance Laboratory & School of Physical Education, Ball State Univ., Muncie, IN

Directly measured maximal oxygen consumption (VO_{2max}) has traditionally been the benchmark for the determination of cardiorespiratory fitness (CRF). However, in settings where the direct measure of VO_{2max} is not available, several field tests have been developed to estimate CRF. These tests use activity-specific modes of exercise to assess CRF. Recently, several universities have begun to offer aqua aerobics classes. A 500 yard shallow water run (WR) was developed to estimate CRF for this activity-specific exercise. The purpose of this study was to assess the accuracy of this test in estimating VO_{2max}. Subjects (15 men, 28 women) completed five performance tests; two 1.5 MR, two WR, and one treadmill test to determine VO_{2max}. Subjects were instructed to complete the tests in the least amount of time possible and for the WR were required to run at a depth of the water between their mid-chest and navel. The first of the two field tests was used as a learning trial and was not used in the evaluation. Relative efforts, assessed by HR, RPE, and lactic acid, were similar between WR and 1.5 MR. The correlations between VO_{2max} and the WR and 1.5 MR times were r=.796 and r=.886, respectively. Stepwise regression analysis revealed that percent body fat (BF) and height (Ht) were significant additional predictors of VO_{2max} for the WR (R2=.856). Peak HR was the only other variable that was significantly related to predicting VO_{2max} for the 1.5 MR. (R2=.825). The regression equations were: VO_{2max} = 135.28 - 5.47(Time) - 0.56(BF) - 0.52(Ht) ± 3.19 and VO_{2max} = 102.80 - 1.01(Time) - 0.25(HR) ± 3.52 for WR and 1.5 MR respectively. In conclusion, the WR test provides a reasonable estimation of VO_{2max} and is comparable to the 1.5 MR in terms of error of prediction.

Friday, February 5
11:00-11:15 a.m.

Adrenalectomy and exercise effects on skeletal muscle glucose transport in obesity. J.J. Betts, P.A. King and P.M Valyou. Wartburg College, Waverly, IA and Univ. of Vermont, Burlington, VT.

The obese Zucker rat (OZR) demonstrates skeletal muscle insulin resistance of glucose transport due to a failure of glucose transporter molecule (GTr) translocation to the cell membrane. Bilateral adrenalectomy and acute exercise each have been reported to correct whole body glucose tolerance in the OZR, but their effects on skeletal muscle GTr translocation are unknown. The purpose of this study was to determine if the GTr translocation defect observed in the OZR with insulin stimulation was corrected by these treatments. Bilateral adrenalectomy (AdX, N=17) or sham (Control, N =16) surgery of 5-6 week old OZR was performed according to approved standard procedures. Another group of OZR and lean littermates (10-11 weeks old) were exercised for 1 hour on a treadmill at 15% grade and 15.4 m/min. At 10-11 weeks old, immediately after the exercise session or maximal insulin stimulation via i.p. injection of 10 I.U. of Insulin , the rats were killed and plasma membranes prepared from hindlimb skeletal muscles. Plasma membrane Gtr number was determined by CB binding. Maximal insulin stimulation of AdX rats resulted in a significant increase in membrane GTr number as compared to sham rats. (8.9 $\pm$ 1.0 versus 15.1 $\pm$ 1.2 pmol/mg protein for AdX basal and AdX Max, respectively.) Acute exercise of intact OZR produced a greater increase in GTr number as compared with sed. intact OZR (6.8 $\pm$ 1.1 versus 15.3 $\pm$ 1.5 pmol/mg protein for OZR sed. and OZR Ex., respectively) and not different from lean animals (8.6 $\pm$ 1.2 versus 15.2 $\pm$ 1.9 pmol/mg protein for Lead sed. and Lean Ex., respectively).

These data indicate that AdX and acute exercise in the OZR correct the defect of GTr translocation observed with insulin stimulation. The results of these studies support the hypotheses that exercise and insulin stimulate GTr translocation via different pathways or separate intracellular pools of GTr. Also, they demonstrate that at least part of the improvement observed in oral glucose tolerance after AdX in OZR is due to a correction of the translocation defect.

ADDITONAL SPONSORS OF THE MWACSM WINTER MEETING, 1993

Special appreciation is extended to the following institutions and companies for donating items to be used for a raffle to generate funds for the student research presentation awards:

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PROGRAM EVALUATION

AMERICAN COLLEGE OF SPORTS MEDICINE

Because the Continuing Education Committee of the American College of Sports Medicine (ACSM) has participated in endorsement of this program, we would like to request your evaluation of the program and speakers. Please answer the questions below. Thank you for your cooperation. Please be sure to hand in the evaluation at the end of the program.

TITLE OF MEETING: Midwest Chapter ACSM Annual Winter Meeting DATE OF MEETING: February 3-5, 1993

1. Are you a member of ACSM? ✓ Yes _____ No Fellow of ACSM? _____ Yes ✓ No

2. Are you a student? _____ Yes If yes, _____ Undergraduate _____ Graduate _____ Medical

   ✓ No

3. What distance did you travel to this meeting?

   _____ < 50 miles _____ 50-100 miles _____ 100-200 miles ✓ 200-600 miles _____ > 600 miles

4. What is your area of interest in sports medicine? ✓ Research ✓ Teaching _____ Training

   _____ Rehabilitation _____ Coaching _____ Clinical Treatment _____ Other

5. How did you learn of this program? ✓ Mailing _____ Colleague _____ Other

6. Was the meeting well organized and on time? ✓ Yes _____ No

7. Was the program "as advertised"? ✓ Yes _____ No

8. Were the educational objectives of the program clearly stated in program publicity or at program sessions?

   ✓ Yes _____ No

9. To what extent have you personally learned anything new from this program? Information was:

   _____ Completely new _____ More new than old ✓ More old than new _____ Virtually all old

10. To what extent do you feel that the educational material covered in the program was of value to you personally and/or professionally?

    _____ Exceedingly valuable _____ Moderately valuable ✓ Slightly valuable _____ Little/no value

11. Would you recommend another conference of this nature next year? ✓ Yes _____ No

12. What was the highlight of the program?

13. What was the poorest part of the program?

14. How could the program have been improved?

15. Any additional comments?:

POSTER EVALUATION

Please rate the program poster presentations according to the following scale:

5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Visual Aids	Quality of Presentation Speaker / Content	Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
Todd Grover, " Regular Sauna Bathing Does Not Influence Body Composition or Cardiovascular Fitness"				
Stephen Barr, "Lifting Capacity of Patients Measured Four Weeks After Lumbar Laminectomy"				
Carl Smith, "Acute Physiological Responses to Steady-rate Weighted Walking Using a Shoulder-worn Load Carriage System"				
Kristen Drake, "A Comparison of the Traditional and Modified Sit and Reach Tests in Measuring Flexibility in Elementary School Children"				
Lucinda Bouillon, "The Efficacy of Early Rehabilitation for Post-operative Lumbar Microdiscectomy Patients"				
Luis Aragon-Vargas, "Evaluation of Conventional and New Maximum Heart Rate Prediction Models for Individuals"				
Kevin Short, "Effect of Upper Body Exercise Intensity and Duration on Post-exercise Oxygen Consumption"				
Stephen Glass, "Ventilatory Kinetics During Transition from Light to Moderate Exercise"				
Timothy Schell, "Evaluation of a Standardized Submaximal Exercise Test for the Detection of Elevated Diastolic Blood Pressure Responses"				
Christopher Miller, "The Effect of Heat Stress on Excess Post-exercise Oxygen Consumption"				
Douglas Weeks, "Age-related Changes in Scaling of Postural Responses Accompanying Upper-body Movement: Female Data"				

SPEAKER EVALUATION

Please rate the program speakers according to the following scale:

5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Audiovisual Aids	Quality of Presentation Speaker / Content		Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
Mike Ferrara, "Paralympics-- The Sports Medicine Perspective"					
Heather Hall, "Mood State and Subjective Responses to a 24 Hour Race"					
Carol Weideman, "Response of Lymphocyte Subpopulations and Selected Hematological Parameters to a 24 Hour Race"					
Kathy Carroll, "Lymphocyte Mitogenesis and Natural Cell-Mediate Cytotoxicity (NCCM) Following a 24 Hour Run"					
Robert Hanisch, "Characteristics of Women Triathletes in an All Women Triathlon"					
Amy Lueking, "Comparison of Anthropometric Standardization Reference Manual Skinfold Site Descriptions to Jackson and Pollock Descriptions"					
George Stylianides, "Biochemical Difference in Power Walking and Jogging at Similar Levels of Aerobic Intensity"					
Karen Bawel, "Relationship Between Isokinetic Thigh Muscle Strength and Balance Among Older Adults"					
Brenda Reeves, "Effect of Mode and Cadence on Ground Reaction Forces Associated with Aerobic Dance Maneuvers: High & Low Impact"					
Cynthia McKnight, "Influence of Ankle Joint Instability on Proprioception"					
Tim Curtis, "The Injured Athlete: Trauma, Repair, & Conditioning of Musculo-tendinous Tissue"					

SPEAKER EVALUATIONS (CONTINUED)

Speaker	Quality of Audiovisual Aids	Quality of Presentation Speaker / Content		Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
Mitchell Kanter, "Exercise, Free Radicals and Antioxidant Supplementation"					
Matthew Schrager, "Time Versus Distance Protocols for the Blood Lactate Profile"					
Scott Roecker, "Comparison of the Bruce Protocol and a Ramp Protocol"					
Barbara Kooiker, "Glycemic Response to Sport-Performance Beverages"					
Jeffrey Greiwe, "Reliability of $V0_2$ Max Estimates from the ACSM Submaximal Cycle Ergometer Test"					
Julie Burns, "Sports Nutrition Update"					
Mitchell Kanter and Julie Burns, "Sports Nutrition--Discussion and Questions"					
Pedro del Corral, "Determinants of 3 KM Running Performance in Children"					
Laurie Wideman, "Postprandial Lipemia in Abdominally Obese and Non-obese Males"					
Peggy Arnos, "FFA Oxidation and Perceived Exertion at Varied Intensity"					
Wayne Wehrli, "Evaluation of a Shallow Water Running Test for Estimating $V0_2$ Max"					
Jeffery Betts, "Adrenalectomy and Exercise on Skeletal Muscle Glucose Transport in Obesity"					

REGISTRATION: Pre-registration for the meeting is recommended and will be accepted up through January 27, 1993. Fees are as follows:

	MWASCM Member	Non-Member*
Professional	$20	$35
Professional in training	$15	$30
Students	$5	$10

On-site registration will require an additional $5.00 surcharge.

*Non-member registration includes a 1993 MWACSM membership.

CANCELLATIONS: Full refunds are available if notified in writing by January 20, 1993. After that date, no refunds will be issued.

REGISTRATION FORM

Last Name _____
First name _____ MI _____
Professional Affiliation _____
Position _____
Mailing Address _____
_____
Phone (___) _____
Are you a MWACSM member? ____
Are you a national member? ____
Indicate your area of interest in Sports Medicine:
_____

Total Payment from above rate schedule
$_____

Return this form with a check payable to **Midwest Chapter ACSM** and mail to:

Leonard A. Kaminsky, Ph.D.
Ball State University
Human Performance Laboratory
Muncie, IN 47306

Program Planning Committee:
Greg Dwyer, Ball State University
Lenny Kaminsky, Ball State University
Mitch Whaley, Ball State University

MIDWEST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE

ANNUAL WINTER MEETING

FEBRUARY 3-5, 1993

BOYNE MOUNTAIN MICHIGAN

Midwest Chapter of the American College of Sports Medicine
Annual Winter Meeting,
February 3-5 1993
Boyne Mountain, Michigan

The focus of the Annual Winter Meeting of the Midwest Chapter of the American College of Sports Medicine is to provide Sports Medicine professionals with a quality scientific meeting in a relaxed atmosphere. The meeting is designed to encourage student involvement. The meeting will consist of a blend of established professional and graduate student presentations, a keynote speaker, and some tutorial sessions. The meeting provides an excellent opportunity to meet other professionals in a setting that promotes professional and social discussions. The unique feature of the Winter Meeting is the setting which offers a wide variety of recreational opportunities.

HOUSING: Excellent accomodations are available at Boyne Mountain Lodge and groups can stay relatively economically by lodging in condominiums. To receive conference rates, you must mention you are attending the Midwest Chapter of the American College of Sports Medicine Annual Meeting.

	Single	Double	Double/Double	
Main Lodge:	$119.19	72.00	45.38	Rates are per
Edelweiss:	96.20	65.95	45.38	person/night

Price includes 3 meals/day + gratuities and begins with dinner on arrival date and ends with lunch on departure.

	2 bdrm	2 bdrm w/ loft	3 bdrm	3 bdrm w/ loft
Condos:	$200	275	225	325
Accomodates:	6	8	8	10

Condo rates are per condo/per night + tax
For additional lodging information or to make reservations, contact: Boyne Mountain Lodge
1-800-GO-BOYNE

RECREATIONAL OPPORTUNITIES: Downhill and Cross-country Skiing, Skating, and an Outdoor Heated Pool and Spa are available

STUDENT AWARDS: Two $150 Research Presentation Awards will be given. One for the best poster presentation by a student, the other for the best free communication presentation by a student.

CONTINUING EDUCATION CREDITS: CEC are pending endorsement of the American College of Sports Medicine.

For more information about the meeting contact:
Greg Dwyer,
Ball State University
School of Physical Education
Muncie, IN 47306
(317) 285-8695

THE PROGRAM

Wednesday, February 3, 1993

4:30-5:15 p.m.	*"Paralympics--The Sports Medicine Perspective"* Mike Ferrara, Ph.D. Ball State University
6:30-7:00 p.m.	Poster Presentation - Author set-up
7:00-8:00 p.m.	Poster Presentation - viewing
7:30-9:30 p.m.	Welcome Reception
8:00-9:30 p.m.	Poster Presentation - authors present

Thursday, February 4, 1993

8:00-9:30 a.m.	Free Communications Paper Presentations
9:30-9:45 a.m.	Coffee Break
9:45-11:00 a.m.	Free Communications Paper Presentations
11:00-1:30 p.m.	Lunch Break
1:30-3:00 p.m.	*"The Injured Athlete: Trauma, Repair & Conditioning of Musculo-tendinous Tissue"* Tim Curtis, M.S., C.S.C.S. Prescription Fitness, Inc., Waterford, MI
3:00-7:30 p.m.	Break
7:30-8:00 p.m.	Midwest Chapter - ACSM Business Meeting
8:00-9:00 p.m.	Keynote Address *"Exercise, Free Radicals, and Antioxidant Supplementation"* Mitchell M. Kanter, Ph.D. Gatorade Exercise Physiology Lab, Quaker Oats Co.
9:00-10:30 p.m.	Midwest Chapter - ACSM Social

Friday, February 5, 1993

8:00-9:00 a.m.	Free Communications Paper Presentations
9:00-9:25 a.m.	*"Sports Nutrition Update"* Julie H. Burns, M.S., R.D., Rush-Presbyterian-St. Luke's Department of Medicine
9:25-9:50 a.m.	*"Sports Nutrition - Discussion and Questions"* Mitchell M. Kanter, Ph.D. & Julie H. Burns, M.S., R.D.
9:50-10:00 a.m.	Coffee Break
10:00-11:30 a.m.	Free Communications Paper Presentations
11:30	Presentation of Student Presentation Awards

SPONSORS: BOEHRINGER MANNHEIM CORPORATION
GATORADE SPORT SCIENCE INSTITUTE

Directions: Boyne Mountain is located approximately 170 miles north of Lansing, Michigan. From Lansing travel north on Rt. 27 to I75 North. Exit at Gaylord and travel west on Rt. 32 to Rt. 131 North.

1993 MWACSM Annual Meeting Faculty

Fredrick Andres, Ph.D.
Professor, Department of Health
Promotion and Human Performance
Director, Exercise Physiology Laboratories
University of Toledo, Toledo, Ohio

Steven Keteyian, Ph.D.
Director, Cardiac Rehabilitation
Henry Ford Hospital
Detroit, Michigan

Lynn Millar, Ph.D., P.T.
Associate Professor,
Department of Physical Therapy
Andrews University
Andrews, Indiana

Carl Orringer, M.D.
Assistant Professor
Case Western Reserve University
School of Medicine
Medical Director
University Synergy
University Hospitals of Cleveland
Cleveland, Ohio

Richard Parr, Ed.D.
Professor
Department of Health Science
Central Michigan University
Mount Pleasant, Michigan

Fredric Pashkow, M.D.
Medical Director,
Cardiac Rehabilitation and Stress
Testing Laboratories
Cleveland Clinic
Cleveland, Ohio

William Saltarelli, Ph.D.
Assistant Professor
Department of Health Science
Central Michigan University
Mount Pleasant, Michigan

Jon Robison, Ph.D., M.S.
Co-Director
Michigan Center for Preventive Medicine
Lansing, Michigan

1993 Midwest American
College of Sports Medicine
Annual Meeting

Developing New Paradigms in Clinical Exercise and Cardiac Rehabilitation

November 19-20, 1993
Amway Grand Plaza Hotel
Grand Rapids, Michigan

Hosted By

Butterworth Heart & Vascular Network

AGENDA

FRIDAY, NOVEMBER 19

5:15 P.M.	REGISTRATION
6:45-7:00 P.M.	WELCOME
7:00-7:45 P.M.	NEW VISTAS IN PREVENTIVE CARDIOLOGY - 1993 AND BEYOND CARL ORRINGER, M.D. -SPONSORED BY MERCK, SHARP AND DOME
7:45-8:30 P.M.	CHILDREN AND EXERCIS WILLIAM SALTARELLI, PH.D.
8:30-8:45 P.M.	BREAK
8:45-9:30 P.M.	CONTEMPORARY ISSUES IN THE MANAGEMENT OF THE OBESE RICHARD PARR, ED.D.
9:30-10:15 P.M.	A UNIQUE MODEL FOR ASSESSING AUTONOMIC REGULATION OF CARDIAC FUNCTION DURING EXERCISE: THE CARDIAC TRANSPLANT PATIENT STEVEN KETEYIAN, PH.D.
10:15 P.M.	RECEPTION

SATURDAY, NOVEMBER 20

7:00 A.M.	REGISTRATION
8:00-8:45 A.M.	MUSCULOSKELETAL PROBLEMS OF CARDIAC REHABILITATION PATIENTS LYNN MILLAR, PH.D.,P.T.
8:45-9:30 A.M.	EXERCISE AND THE DIABETIC PATIENT FRED ANDRES, PH.D.
9:30-9:45 A.M.	BREAK
9:45-10:30 A.M.	CONTEMPORARY CONSIDERATIONS IN EXERCISE ECG TESTING FREDRIC PASHKOW, M.D. -SPONSORED BY QUINTON INSTRUMENTS
10:30-11:15 A.M.	PHYSICAL ACTIVITY AND EXERCISE.....OVERCOMING BEHAVIORS JON ROBISON, PH.D.
11:15-11:45 A.M.	BUSINESS MEETING
11:45 A.M.	LUNCH
1:30-2:15 P.M.	*FIRST BREAKOUT SESSION
2:20-3:05 P.M.	*SECOND BREAKOUT SESSION

** BREAKOUT SESSIONS INCLUDE*

1. VIDEO FITNESS - BILL SALTARELLI, PH.D.
2. EXERICSE PRESCRIPTION FOR THE DIABETIC PATIENT - FRED ANDRES, PH.D.
3. RTHOPEDIC EVALUATION - LYNN MILLAR, PH.D., P.T.
4. BEHAVIOR MODIFICATION TECHNIQUES - JON ROBISON, PH.D.

CUT HERE

REGISTRATION FORM

NAME: _____

ORGANIZATION: _____

ADDRESS: _____

_____

CITY: _____

STATE: _____

ZIP CODE: _____

PHONE: _____

ADVANCE REGESTRATION:

NON-MEMBERS $40.00
MWACSM MEMBERS $35.00
NON-MEMBER STUDENTS $25.00
MWACSM STUDENT MEMBERS $20.00

CECs
$5.00/MEMBER
$10.00/NON-MEMBER

FOR ADVANCE REGISTRATION MAIL THIS FORM TO:

BUTTERWORTH HOSPITAL
KIM DE LA FUENTE
CARDIAC REHABILITATION, MAIL CODE 67
100 MICHIGAN N.E.
GRAND RAPIDS, MI 49503

MAKE CHECKS PAYABLE TO: MWACSM

HOTEL ACCOMODATIONS
AMWAY GRAND PLAZA HOTEL (616-774-2000)

PRICES
SINGLE $81
DOUBLE $91
TRIPLE $101
QUAD $111

REGISTRATION: Pre-registration for the meeting is recommended and will be accepted up through January 26, 1994. Fees are as follows:

	MWASCM Member	Non-Member*
Professional	$20	$35
Professional in training	$15	$30
Students	$5	$10

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CANCELLATIONS: Full refunds are available if notified in writing by January 19, 1994. After that date, no refunds will be issued.

REGISTRATION FORM

Last Name _____
First name _____ MI _____
Professional Affiliation _____
Position _____
Mailing Address _____
_____
Phone (___) _____
Are you a MWACSM member? _____
Are you a national member? _____
Indicate your area of interest in Sports Medicine:
_____

Total Payment from above rate schedule
$_____

Return this form with a check payable to Midwest Chapter ACSM and mail to:

Tony Mahon, Ph.D.
Ball State University
Human Performance Laboratory
Muncie, IN 47306

Program Planning Committee:
Tony Mahon, Ball State University
Lenny Kaminsky, Ball State University
Mitch Whaley, Ball State University
Greg Dwyer, Ball State University

MIDWEST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE

ANNUAL WINTER MEETING

FEBRUARY 2-4, 1994

BOYNE MOUNTAIN MICHIGAN

Midwest Chapter of the American College of Sports Medicine
Annual Winter Meeting.
February 2-4, 1994
Boyne Mountain, Michigan

The focus of the Annual Winter Meeting of the Midwest Chapter of the American College of Sports Medicine is to provide Sports Medicine professionals with a quality scientific meeting in a relaxed atmosphere. The meeting is designed to encourage student involvement. The meeting will consist of a blend of established professional and graduate student presentations, a keynote speaker, and some tutorial sessions. The meeting provides an excellent opportunity to meet other professionals in a setting that promotes professional and social discussions. The unique feature of the Winter Meeting is the setting which offers a wide variety of recreational opportunities.

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1-800-GO-BOYNE

RECREATIONAL OPPORTUNITIES: Downhill and Cross-country Skiing, Skating, and an Outdoor Heated Pool and Spa are available

STUDENT AWARDS: Two $150 Research Presentation Awards will be given. One for the best poster presentation by a student, the other for the best free communication presentation by a student.

CONTINUING EDUCATION CREDITS: CECs are pending endorsement of the American College of Sports Medicine.

For more information about the meeting contact:
Tony Mahon, Ph.D.
Ball State University
Human Performance Laboratory
Muncie, IN 47306
(317) 285-1158 FAX: 317-285-1158

TENTATIVE PROGRAM SCHEDULE

Wednesday, February 2, 1994

6:00-7:00 p.m.	Registration
6:30-7:00 p.m.	Poster Presentation - author set-up - Session 1
7:00-7:30 p.m.	Poster Presentation - viewing
7:30-8:30 p.m.	Tutorial Lecture William J. Kraemer, Ph.D. Gatorade Sport Science Institute speaker
8:30-9:30 p.m.	Poster Presentation - authors present - Session 1
9:00-10:00 p.m.	Welcome Reception

Thursday, February 3, 1994

8:00-9:15 a.m.	Free Communications Paper Presentations - Session 1
9:15-9:45 a.m.	Tutorial Lecture Jeff Edwards, Ph.D. Indiana University
9:45-10:00 a.m.	Coffee Break
10:00-11:15 a.m.	Free Communications Paper Presentations - Session 2
11:15-1:30 p.m.	Lunch Break
1:30-3:00 p.m.	
6:30-7:00 p.m.	Poster Presentation - author set-up - Session 2
7:00-7:30 p.m.	Poster Presentation - viewing
7:30-8:30 p.m.	Keynote Address *"Alaskan Sled Dogs: Ultimate Endurance Athletes?"* Ken Hinchcliff, Ph.D. Ohio State University
8:30-9:30 p.m.	Poster Presentation - authors present - Session 2
9:00-10:30 p.m.	Social

Friday, February 4, 1994

8:00-9:15 a.m.	Free Communications Paper Presentations - Session 3
9:15-9:45 a.m.	*"Fit People Recover Faster: Fact or Fiction"* Darlene Sedlock, Ph.D. Purdue University
9:45-10:00 a.m.	Coffee Break
10:00-10:15 a.m.	MWACSM Business Meeting
10:15-12:00 p.m.	Free Communications Paper Presentations - Session 4
12:00 p.m.	Presentation of Student Presentation Awards

SPONSORS: BOEHRINGER MANNHEIM CORPORATION
GATORADE SPORT SCIENCE INSTITUTE

Directions: Boyne Mountain is located approximately 170 miles north of Lansing, Michigan. From Lansing travel north on Rt. 27 to 175 North. Exit at Gaylord and travel west on Rt. 32 to Rt. 131 North.

Please see other side.

1994
MIDWEST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE ANNUAL WINTER MEETING

BOYNE MOUNTAIN, MICHIGAN

FEBRUARY 2-4

Program Planning Committee:
Ball State University's
Human Performance Laboratory and
Adult Physical Fitness Program

Sponsored by

American College of Sports Medicine

Ball State University's Adult Physical Fitness Program

Boehringer Mannheim Corporation

Gatorade Sports Science Institute

This meeting is approved for 10 Continuing Education Credits by the American College of Sports Medicine

TABLE OF CONTENTS

MIDWEST CHAPTER OF THE AMERCAN COLLEGE OF SPORTS MEDICINE

1994 ANNUAL WINTER MEETING

On behalf of the Program Planning Committee and the Board of Trustees, I am pleased to welcome you to the 1994 Annual Winter Meeting of the Midwest Chapter of the American College of Sports Medicine. The Program Planning Committee has developed a comprehensive agenda that includes Dr. William Kraemer from the Gatorade Speaker's Bureau talking about "Strength Training in Youth," and our keynote lecture "Alaskan Sled Dogs: Ultimate Endurance Athletes?" presented by Dr. Ken Hinchcliff from The Ohio State University. We also have Dr. Jeff Edwards doing a tutorial on measuring energy expenditure, and Dr. Darlene Sedlock, who will present a lecture entitled "Fit People Recover Faster: Fact or Fiction?" As always, there are a variety of free communications, and this year we will be having two poster sessions. Student awards will again be given for the best free communication and the best poster.

A meeting of this nature requires a great deal of time and effort from many people, and I thank Dr. Tony Mahon and the other members of the Program Planning Committee for all their efforts. I also want to thank Boehringer Mannheim Corporation and the Gatorade Sport Science Institute as sponsors of this year's meeting.

Again, on behalf of the Program Planning Committee and the Board of Trustees, welcome to the Annual MWACSM Winter Meeting, and I hope that you not only benefit from the meetings but enjoy the pleasures of this beautiful setting.

Tom Ball, Ph.D.
President, MWACSM

Midwest Chapter of the American College of Sports Medicine

The purpose of the organization shall be to promote, at the regional level, the following objectives of the American College of Sports Medicine:

1. To promote and advance medical and other scientific studies dealing with the effect of sports and other physical activities on the health of human beings at various stages of life.
2. To cooperate with other organizations, physicians, scientists and educators concerned with the same or related specialties.
3. To arrange for mutual meetings of physicians, educators and allied scientists.
4. To make available postgraduate education in fields related to these sciences.
5. To initiate, promote and correlate research in these fields.
6. To edit and publish articles and pamphlets pertaining to various aspects of sports, other physical activities and medicine.

MIDWEST CHAPTER AMERICAN COLLEGE OF SPORTS MEDICINE OFFICERS--1994

President:
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(815) 753-1630 (afternoon)
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Members-at-Large

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(419) 537-7719 (FAX)

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Randy Claytor (1992-94)
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Roger Hammer (1993-95)
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Central Michigan University
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(517) 774-3537 (FAX)

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Bill Simpson (1994-96)
University of Wisconsin
Dept. of HPERA
Stevens Point, WI 54481
(715) 346-2720
(715) 346-4655 (FAX)

1994 Midwest Chapter of the American College of Sports Medicine

Reviewers for Abstracts Submitted for Annual Winter Meeting

Special appreciation is extended to the following individuals for reviewing the poster and free communications abstracts that were submitted for possible inclusion in the Annual Winter Meeting of the Midwest Chapter of the American College of Sports Medicine:

Rafael Bahamonde, M.S.
Ball State University

Kevin J. Cole, M.S.
Ball State University

Craig Davidson, M.D.
Ball Memorial Hospital

Ronald Davis, Ph.D.
Ball State University

Gregory B. Dwyer, Ph.D.
Ball State University

Duane Eddy, Ph.D.
Ball State University

Jeff Edwards, Ph.D.
Indiana University

Mike Ferrara, Ph.D.
Ball State University

Mike Flynn, Ph.D.
University of Toledo

Gale Gehlsen, Ph.D.
Ball State University

Chad Harris, Ph.D.
I.U.P.U.I.

Jared Jones, M.D.
Ball Memorial Hospital

Lenny Kaminsky, Ph.D.
Ball State University

Mark J. Kasper, Ph.D.
Eastern Illinois University

Tim Kirby, Ph.D.
Ohio State University

Tony Mahon, Ph.D.
Ball State University

Alan Mikesky, Ph.D.
I.U.P.U.I.

Darlene Sedlock, Ph.D.
Purdue University

Dave Pearson, Ph.D.
Ball State University

Mitch Whaley, Ph.D., Chairman
Ball State University

1994 MWACSM ANNUAL WINTER MEETING
BOYNE MOUNTAIN, MICHIGAN
SCHEDULE OF EVENTS

WEDNESDAY, FEBRUARY 2

6:00-7:00 p.m. Registration

6:30-7:00 p.m. Poster Presentation--authors set-up--Session 1

7:00-7:30 p.m. Poster Presentation--viewing

7:30-8:30 p.m. **Opening Address**
"*Strength Training in Youth*"
William J. Kraemer, Ph.D., FACSM
Sponsored by Gatorade Sports Science Institute

8:30-9:30 p.m. Poster Presentation--authors present--Session 1

8:30-9:30 p.m. POSTER PRESENTATIONS--Session 1

Presenter: Steven D. Freeman, M.D.
Title: "Rhabdomyolysis induced acute renal failure in an ultra-endurance athlete presenting as an upper gastrointestinal bleed"

Presenter: William F. Simpson, Ph.D.
Title: "A cross-sectional body composition profile of 18-21 year o male students"

Presenter: Janie C. Probst
Title: "A cross-sectional body composition profile assessment of undergraduate female students"

Presenter: Gregory B. Dwyer, Ph.D.
Title: "Incidence of ST segment depression during exercise testing and related characteristics of apparently healthy subjects"

Presenter: Julie A. Gay
Title: "Validity of self-assessed pulse rates in phase II and phase III cardiac patients"

Presenter: Joanne Sommers, M.Ed.
Title: "Motivation for exercise in mall walkers utilizing the Health Belief Model"

Presenter: Brenda D. Reeves
Title: "Effects of a pilot exercise program on fitness and health status, and counseling behavior of health care professionals"

Presenter: Carey Beaven
Title: "Awareness and compliance with target heart rate by individuals walking in unsupervised community programs"

WEDNESDAY, FEBRUARY 2 (continued)

Presenter: Christopher R. Miller
Title: "Variability in RPEs at fixed exercise intensities during graded exercise testing in an adult fitness population"

Presenter: Darcy Tataryn
Title: "Effects of massage on recovery leg strength"

9:00-10:00 p.m. Welcome Reception
Sponsored by Boehringer Mannheim Corporation

THURSDAY, FEBRUARY 3

7:40-8:00 a.m. Registration

8:00-9:15 a.m. FREE COMMUNICATIONS PAPER PRESENTATIONS--Session 1
Moderator: Bill Saltarelli, Ph.D.

8:00-8:15 a.m. Presenter: Todd Brickman
Title: "Carbohydrate loading and high intensity performance"

8:15-8:30 a.m. Presenter: Barbara A. Kooiker
Title: "Influence of cross training on indices of training stress and performance"

8:30-8:45 a.m. Presenter: Jennifer J. Sherwood
Title: "Effect of an acute bout of weight bearing exercise on bone growth factors"

8:45-9:00 a.m. Presenter: Helene A. Szczerba
Title: "Body composition and blood lipids in male and female swimmers"

9:00-9:15 a.m. Presenter: Mariane Fahlman
Title: "Mood state and subjective responses to a 24 hour race"

9:15-9:45 a.m. **Tutorial Lecture**
"*A Review of the Methods for Measuring Energy Expenditure: Past and Present*"
Jeffrey E. Edwards, Ph.D., Indiana University
Sponsored by the American College of Sports Medicine

9:45-10:00 a.m. COFFEE BREAK

10:00-11:15 a.m. FREE COMMUNICATIONS PAPER PRESENTATIONS--Session 2
Moderator: Lynn Millar, Ph.D.

10:00-10:15 a.m. Presenter: Kevin J. Cole
Title: "Effect of caffeine ingestion on perception of effort and subsequent work production"

THURSDAY, FEBRUARY 3, (continued)

10:15-10:30 a.m. Presenter: Kathy K. Carroll
Title: "Natural cell-mediated cytotoxicity and lymphocyte mitogenesis following a 24 hour road race"

10:30-10:45 a.m. Presenter: Daniel L. Carl
Title: "The effects of an acute prolonged exercise bout on lymphocyte subpopulations and serum hormone levels"

10:45-11:00 a.m. Presenter: Peter F. Bodary
Title: "TransAm footrace: a case study"

11:00-11:15 a.m. Presenter: Mary C. Sled
Title: "Aging and the response of cardiac vagal activity to increasing exercise intensity"

11:15-1:30 p.m. LUNCH BREAK

1:30-3:00 p.m. **Workshop Session**
"*Development of a New Professional Student Organization*"
Jeffery J. Betts, Ph.D., Central Michigan University

3:00-6:30 p.m. BREAK

6:30-7:00 p.m. Poster Presentation--authors set-up--Session 2

7:00-7:30 p.m. Poster Presentation--viewing

7:30-8:30 p.m. **Keynote Address**
"*Alaskan Sled Dogs: Ultimate Endurance Athletes?*"
Ken Hinchcliff, Ph.D., Ohio State University
Sponsored by the American College of Sports Medicine

8:30-9:30 p.m. Poster Presentation--authors present--Session 2

8:30-9:30 p.m. POSTER PRESENTATIONS--Session 2

Presenter: Sean Humphreys
Title: "Segmental kinematic factors affecting release velocity of the luge start"

Presenter: Michael J. Meyer
Title: "Effects of a commercially available golf swing-aid on clubhead speed, distance and accuracy"

Presenter: Clinton A. Brawner
Title: "Effects of foot orthotics on the GRF during running"

Presenter: Craig Moore
Title: "Sensitivity of the active knee extension test vs. the straight leg raise test for hamstring flexibility"

THURSDAY, FEBRUARY 3, (continued)

Presenter: Donald Melrose
Title: "Effect of eccentric loading on series elastic contribution to vertical jump performance"

Presenter: Daihyuk Choi
Title: "Effect of passive and active recovery on the resynthesis of muscle glycogen"

Presenter: Jill J. Bangart
Title: "Contractile properties of single rat soleus fibers following hindlimb suspension with intermittent weight bearing"

9:00-10:30 p.m. Midwest Chapter ACSM Social
Sponsored by Boehringer Mannheim Corporation

FRIDAY, FEBRUARY 4

8:00-9:15 a.m. FREE COMMUNICATIONS PAPER PRESENTATIONS--Session 3
Moderator: Mike Flynn, Ph.D.

8:00-8:15 a.m. Presenter: Bret H. Goodpaster
Title: "Exogenous carbohydrate oxidation from soluble and insoluble carbohydrate"

8:15-8:30 a.m. Presenter: Cynthia M. Kasper
Title: "L-carnitine supplementation and running performance"

8:30-8:45 a.m. Presenter: Glen E. Duncan
Title: "Plateau in oxygen consumption at maximal exercise in male children"

8:45-9:00 a.m. Presenter: Dawn M. Barry-Bruner
Title: "The effect of resting posture on the duration and magnitude of post-exercise oxygen consumption"

9:00-9:15 a.m. Presenter: Christopher J. Grossmann
Title: "VO_{2max} estimates from the YMCA submaximal cycle protocol are not reliable"

9:15-9:45 a.m. **Tutorial Lecture**
"*Fit People Recover Faster: Fact or Fiction?*"
Darlene Sedlock, Ph.D., FACSM, Purdue University
Sponsored by the American College of Sports Medicine

9:45-10:00 a.m. COFFEE BREAK

10:00-10:15 a.m. MWACSM Business Meeting

FRIDAY, FEBRUARY 4 (continued)

10:15-12:00 p.m.	FREE COMMUNICATIONS PAPER PRESENTATIONS--Session 4 Moderator: Rafael Bahamonde, M.S.
10:15-10:30 a.m.	Presenter: Stephen J. Kinzey Title: "The effects of ankle bracing on postural sway"
10:30-10:45 a.m.	Presenter: Phillip B. Watts, Ph.D. Title: "Physiological effects of a 3000-mile tandem bicycle trek for a subject with down syndrome--a case study"
10:45-11:00 a.m.	Presenter: Lynn B. Panton Title: "Effect of aerobic exercise training on resting hepatic blood flow in young and elderly adults"
11:00-11:15 a.m.	Presenter: Heather L. Hall, Ph.D. Title: "The effects of excessive training and detraining on testicular function"
11:15-11:30 a.m.	Presenter: John R. Stevenson, Ph.D. Title: "3D kinematic contributions to distance thrown by Olympic women shot putters"
11:30-11:45 a.m.	Presentation of Student Awards

AMERICAN COLLEGE OF SPORTS MEDICINE

The American College of Sports Medicine promotes and integrates scientific research, education, and practical applications of sports medicine and exercise science to maintain and enhance physical performance, fitness, health, and quality of life.

Wednesday, February 2
7:00-9:30 p.m.

RHABDOMYOLYSIS INDUCED ACUTE RENAL FAILURE IN AN ULTRA-ENDURANCE ATHLETE PRESENTING AS AN UPPER GASTROINTESTINAL BLEED

Steven Freeman*, Per Gunnar Brolinson, Northwest Ohio Center for Sports Medicine, The Toledo Hospital, Toledo, Ohio

Rhabdomyolysis with secondary acute renal failure in endurance athletes is an unusual but well described clinical entity in the literature. A highly-trained, 37-year old white male ultra-endurance runner who, after running 100.1 miles over an 18-hour period, presented to the medical tent complaining of weakness, nausea with epigastric pain, history of passing dark-colored urine and subsequent hematemises. He stated he had previously been hydrating well. He complained of minimal muscle soreness and had consumed 800 mg of Ibuprofen in the prior 12 hours. He was hemodynamically stable and initially treated with two liters of IV crystalloid and transported to the Emergency Department. Initial laboratory evaluation demonstrated CPK, 107,000 U/L; sodium, 124 mmol/L; potassium, 4.0 mmol/L; creatinine, 1.8 mg/dL; BUN, 46 mg/dL; serum myoglobin, 33,000 mcg/L; urinalysis, large amount of blood on reagent test strip but 0-3 RBC's/hpf on microscopic exam. Despite use of IV crystalloid, mannitol, and renal dose dopamine, BUN and creatinine progressively rose to 73 and 5.2 respectively. The initial creatinine clearance was 7 ml/min. His renal function and creatinine clearance over the course of the next five weeks normalized. The above scenario points out the need for a high index of suspicion for rhabdomyolysis induced acute renal failure, even in highly trained endurance athletes. It further emphasizes the need for appropriate medical coverage of such events. Concomitant use of NSAID's by athletes in such events may be deleterious. Further study may be warranted.

Wednesday, February 2
7:00-9:30 p.m.

A CROSS-SECTIONAL BODY COMPOSITION PROFILE OF 18-21 YEAR OLD MALE STUDENTS

Simpson, William F., Janie C. Probst*, and Joan M. Leiser*. University of Wisconsin, Exercise Physiology Laboratory, Stevens Point, WI

The youth of today are commonly referred to as overweight/fat and more sedentary as compared to youth of the past. In turn, these poor health profiles may be the genesis for young people to increase their risk of cardiovascular disease and related disorders. The purpose of this investigation is to examine a cross section of the male population of a medium sized university. Each semester, approximately 750 students enroll in a general degree health/wellness class. For one course assignment, students participate in a physical fitness assessment which includes height, weight, and body composition using the J-P equation. A total of 294 males ages 18-21 participated in this assessment during one semester. The average height of all students was 1.8±0.8 meters. Body weight for all subjects was 75.75±13 kg. The following table illustrates by age the results of the assessment. ($\bar{X}$±SD)

AGE	[n]	PERCENT FAT	BMI kg/m²	RESTING HEART RATE BPM	SYSTOLIC BP mmHg	DIASTOLIC BP mmHg	EST. V02 ml·kg⁻¹min⁻¹
18	90	11.93±5.1	23.18±3.9	73.5±13.6	133.2±11.7	75.16±8.6	43.67±8.6
19	123	12.08±5.2	23.48±3.6	72.25±3.6	134.1±11.3	74.4±9.2	44±7.6
20	43	10.8±4.3	22.4±2.6	74.3±15.3	132.8±10.3	74.9±9.2	43.6±9.2
21	38	10.5±4.2	23.6±3.4	72.8±10.1	130.2±13.8	73.5±7.4	42.2±8.7

The results demonstrate for body fat percent that this population falls within the acceptable limits [10%-20%] for college age males. Additionally, body mass index [BMI] values are also within normal limits for this population [>26=mildly obese]. The other variables noted suggest that these individuals have normal resting heart rates and blood pressures. Regarding aerobic fitness, all age groups are within an acceptable range for their age groups. The authors of this investigation suggest that this sample of 18-21 year old undergraduate male students do not represent the stereotypical view currently reported about in the popular and scientific literature. This may be attributed to the fact that a major portion of this population comes from small rural farming communities and residents have a tendency to be active year round. Further investigations are warranted to explore this population's health habits that are related to cardiovascular disease.

Wednesday, February 2
7:00-9:30 p.m.

A CROSS-SECTIONAL BODY COMPOSITION PROFILE ASSESSMENT OF UNDERGRADUATE FEMALE STUDENTS. Probst Janie C.*, William F. Simpson, and Joan M. Leiser*. University of Wisconsin, Exercise Physiology Laboratory, Stevens Point, WI

Presently, women on college campuses are subjected to numerous social and peer pressures to be accepted as part of the group. The ACSM's Task Force on Women's Health Issues has identified the Female Athlete Triad [disordered eating, osteoporosis, and amenorrhea] as a major concern. Disordered eating may be a by-product of an undergraduate student attempting to attain control of her environment by controlling her body. A sign that disordered eating is present is a decrease in an individual's body weight, percent fat and body mass index to below a healthy range. The purpose of this investigation is to examine a cross section of the female population of a medium sized university. Each semester, approximately 750 students enroll in a general degree health/wellness class. For one course assignment, students participate in a physical fitness assessment which includes height, weight, and body composition using the J-P equation. A total of 305 women ages 18-21 participated in this assessment during one semester. The average height of all students was 1.6±0.6 meters. Body weight varied by age with the 18 year olds [n=158] mean weight 64.41±11.8, 19 year olds [n=107]mean weight 61.4±10.7, 20 year olds [n=28] mean weight 59.58±11.1 and 21 year olds [n=12] mean weight 57.69±4.2. The following table illustrates by age the remaining results. ($\bar{X}$±SD)

AGE	[n]	PERCENT FAT	BMI kg/m^2	RESTING HEART RATE BPM	SYSTOLIC BP mmHg	DIASTOLIC BP mmHg	EST. V02 $ml \cdot kg^{-1} min^{-1}$
18	158	24.3±5.2	22.8±4	79.2±13	120.5±14.1	72.6±8.8	34.5±8.4
19	107	23.5±5.3	22.3±3.2	77.7±11.9	118.7±11.7	72.2±8.4	36.4±8.9
20	28	22.3±5.2	21.9±4.2	79.3±12.2	116.2±26.8	72.9±7.9	35.4±8.7
21	12	22.2±4.4	21.2±4.4	75.9±5.4	111.1±12.8	72.5±7.7	42.1±9.9

It has been reported that eighteen and nineteen year old students are most vulnerable for disordered eating. The results illustrate that these age groups are within normal limits for body weight, body fat and body mass index [BMI]. There were 2 individuals <12% and 18>30% fat suggesting the presence of at risk students within this population. The other variables suggest a population within normal limits for blood pressure and a fitness category on the low end of normal for their age group. The authors of this investigation suggest that this sample population of 18 to 21 year old females do not exhibit extremely low body weights or body fat percents often seen with those suffering from disordered eating. Body mass index for this population also suggests a generally healthy population. However, these data cannot confirm nor deny the existence of this disorder without further investigation of eating habits and more objective data.

Wednesday, February 2
7:00-9:30 p.m.

INCIDENCE OF ST SEGMENT DEPRESSION DURING EXERCISE TESTING AND RELATED CHARACTERISTICS OF APPARENTLY HEALTHY SUBJECTS.

G.B. Dwyer, M.H. Whaley, L.A. Kaminsky, FACSM, & L.H. Getchell, FACSM, Human Performance Laboratory, Ball State University, Muncie, IN

Graded Exercise Tests (GXT) are performed in adult fitness programs for both screening and exercise prescriptive purposes. The incidence of an abnormal GXT, as defined by ST segment depression (ST_{dep}), and characteristics of subjects with ST_{dep} varies in the literature. The purpose of this study was to report the incidence of ST_{dep} ($\geq$1.0mm horizontal or downsloping) and compare the characteristics of apparently healthy subjects with and without ST_{dep} during a GXT. Over the past two decades, 1476 men (age: 41.2±10.5yrs) and 847 women (age: 40.8±11.3yrs) completed a treadmill GXT to volitional fatigue. Subjects in this study met the following criteria: 1) free of known CHD, 2) attainted an RER_{max} $\geq$1.0 during the GXT, 3) and had no condition known to effect ST segments during exercise. Resting measures included total cholesterol (TC), systolic and diastolic blood pressure (SBP; DBP), cigarette smoking (SMOKE), and body mass index (BMI). Heart rate (HR), oxygen uptake (VO_2), and the electrocardiogram (either CM-5 or 12 lead) were measured during the GXT. 5.6% of men (n=83) and 2.8% of women (n=24) had ST_{dep} during their GXT. Subjects with ST_{dep} were older, had higher SBP, DBP, and TC, and a lower maximal HR and VO_2 compared to subjects with no ST_{dep} ($p<.01$). There were no differences in BMI, SMOKE, or RER_{max} between ST_{dep} groups. Of note, in 76% of men (63/83) and 67% of women (16/24), the HR @ ST_{dep} was >85% of age-predicted HR_{max} (mean=90.4±9% HR_{max}). In conclusion, apparently healthy subjects with ST_{dep} during a GXT have a risk factor profile consistent with the need for a maximal GXT prior to vigorous exercise programs according to ACSM Guidelines (4th ed., 1991). The maximal GXT protocol resulted in defining more subjects with ST_{dep} than would the use of the 85% of age-predicted HR_{max} GXT end-point.

Wednesday, February 2
7:00-9:30 p.m.

VALIDITY OF SELF-ASSESSED PULSE RATES IN PHASE II AND PHASE III CARDIAC PATIENTS

Gay, Julie A., Department of Exercise Science, College of St. Scholastica, Duluth, MN

Unsupervised exercise intensity in the cardiac population is commonly quantitated through assessment of the radial pulse rate upon cessation of activity. The purpose of the present study was to determine the validity of using self-assessed (SA) pulse rates as a method of determining the heart rate (HR) at rest and during a commonly prescribed exercise intensity. Twenty-eight Phase II and III patients (M ± SE age= 63.4 ± 10.8 years) in a supervised cardiac rehabilitation program volunteered as subjects. Their pulse assessment ability was determined at rest, and after 15 minutes of treadmill walking at an intensity equivalent to 60% of their training met level (TML). Two days prior to testing, subjects were given oral and demonstrative instruction to assess their pulse: Using the index and middle finger of one hand, locate the radial pulse on the distal anterio-lateral aspect of the opposite forearm. When the timer indicates, count the number of beats felt (15 sec), beginning with zero, and report this number. All subjects were previously unaccustomed to this procedure. On the day of testing, resting and post-exercise data were collected in the manner previously described. Electrocardiogram recordings (via telemetry) were used to obtain the actual HR during the palpation period. The time interval from stopping the treadmill to locating the radial pulse was also measured. The mean resting and 60% TML pulse rates, standard deviations, and time delay are as indicated:

	SA bpm	HR bpm	Delay sec
rest	75.2 ± 14.3	76.0 ± 16.5	
60% TML	104.3 ± 22.3	105.0 ± 21.7	12.1 ± 13.3

Results indicate that self-assessment of the radial artery may be a valid method of assessing intensity in the cardiac population under resting and exercise conditions. The time delay in locating the radial pulse following exercise indicates that one session of instruction is <u>not</u> sufficient in properly training patients for this self-assessment technique.

Wednesday, February 2
7:00-9:30 p.m.

MOTIVATION FOR EXERCISE IN MALL WALKERS UTILIZING THE HEALTH BELIEF MODEL

J. Sommers, F. Andres, & J. Price, University of Toledo, Toledo, Ohio

The purpose of this study was to determine demographic characteristics of mall walkers and their motivation for exercise, using the Health Belief Model (HBM). An open-format elicitation questionnaire was used to develop the closed-format HBM survey instrument. The final questionnaire was completed by 123 male and female walkers from three different malls. Ten questions pertaining to exercise knowledge were included. Alpha coefficients for reliability measures of the HBM components ranged from .61 for barriers to .86 for susceptibility. Test-retest measures ranged from .64 for benefits and barriers to .86 for susceptibility. Content validity of HBM components was based on the salient beliefs of respondents. Significant differences were found for susceptibility, severity, barriers, and cues to action for those told to exercise by a physician. Significant differences were found in the knowledge and severity variables between educational levels of respondents. Males perceived significantly more barriers to mall walking for exercise than females. Subjects below 65 years of age were more knowledgeable regarding exercise. There were no differences among respondents from the three different malls for any of the variables. In summary, physician advice to exercise appeared to influence beliefs about exercise and participation in mall walking for the subjects in this study.

Wednesday, February 2
7:00-9:30 p.m.

Effects of a Pilot Exercise Program on Fitness and Health Status, and Counseling Behavior of Health Care Professionals

Reeves, B.D., Andres, F.F., Brolinson, P.G., Neuberger, M., The Toledo Hospital and The University of Toledo

Health care professionals (HCP) are being encouraged to provide patients with exercise counseling as a preventive service. In particular, counseling by physicians has been reported to positively influence patient exercise behavior. Unfortunately, the physician's level of fitness may be a barrier to exercise counseling. The purposes of this study were 1) to assess the fitness and health status of HCP before and after an unsupervised individualized exercise program (IEP); and 2) to determine if program participation increased physicians' exercise counseling behavior. Twenty-six subjects (M=4; F=22) were initially evaluated. We identified obesity (11), C-V abnormalities (1), musculoskeletal problems (10), hypertension (3), and NIDDM (2) as health risks or injury factors. After 16 weeks, there were improvements in C-V fitness, lower body endurance, flexibility, and body composition. An ex post facto survey revealed that physicians increased the mean percentage of patients counseled on exercise from 55 to 79. We concluded 1) the incidence of disease patterns, obesity and musculoskeletal problems in HCP closely parallels that of their patient population; 2) the HCP possessed average C-V and strength fitness; 3) HCP had below average flexibility and above average body fat; 4) IEP's of low-moderate intensity can improve the fitness and general health status of HCP; and 5) physicians involved in the program reported that they increased their exercise counseling behavior.

Wednesday, February 2
7:00-9:30 p.m.

AWARENESS AND COMPLIANCE WITH TARGET HEART RATE BY INDIVIDUALS WALKING IN UNSUPERVISED COMMUNITY PROGRAMS.

Carey A. Beaven. Dept. of Physical Therapy, Andrews University, Berrien Springs, MI.

The purpose of this study was to evaluate the knowledge level of individuals participating in unsupervised community walking programs and the relationship between their target heart rate and heart rate actually reached during their routine walk. Ninety adult male and female participants, age 30 to 91 years old, were asked to complete a questionnaire following a routine walk. Radial pulse was also palpated for 10 seconds and exercise heart rate estimated. The mean age was 62.7±11.3 years. The mean estimated heart rate was 110.2±7.9, whereas the mean heart rate attained during the exercise bout was 101.1± 19.1bpm. Of the 90 participants, 24 (26.6%) knew about target heart rate. Of those that knew about target heart rate, 8(33.3% reached their target heart and two (8.3%) know what it should have been. Of those participants who knew about target heart rate, 13 (54.2%) were under a physician's recommendation for exercise and of those only 5 (38.5%) reached their target. In all, only 34% of the participants reached their estimated target heart rate, 35.6% were exercising under the advice of a physician and 2.2% knew what their target heart rate was. These data are significant and they indicate a lack of knowledge regarding appropriate exercise intensity. In addition, many of those who have received some information regarding exercise intensity are not exercising at the recommended levels.

Funded by Andrews University Physical Therapy Research Fund.

Wednesday, February 2
7:00-9:30 p.m.

VARIABILITY IN RPES AT FIXED EXERCISE INTENSITIES DURING GRADED EXERCISE TESTING IN AN ADULT FITNESS POPULATION. C.R. Miller, M.H. Whaley, L.A. Kaminsky, FACSM, G.B. Dwyer. Adult Physical Fitness Program, Ball State University, Muncie, IN

The use of RPE for regulating exercise intensity has gained wide acceptance in exercise programming. The ACSM Guidelines (4th Ed. 1991) recommends use of a general RPE range of 12-16 (Borg 6-20 scale) for exercise training. In addition, the Guidelines suggest that an individual's RPE response during a GXT may be used to specify the appropriate RPE for training. The purpose of this retrospective study was to assess the variability in RPEs during a GXT at 60 and 80% maximal heart rate reserve (MHRR). The subjects for this study included 236 men and women (age = 45 ± 11 years) who completed a GXT (BSU/Bruce ramp protocol) during or prior to entry into a supervised exercise program. The data are presented in the table below.

GENDER	RPE @ 60% MHRR	RPE @ 80% MHRR
MEN: N = 142 (range)	12.9 ± 2.2* (7 to 19)	15.5 ± 1.8* (9 to 19)
WOMEN : N = 94 (range)	11.7 ± 2.4 (6 to 20)	14.5 ± 2.2 (9 to 20)

* Men > Women ($p < 0.001$) (data above are Mean ± S.D.)

As reported in previous research, the men rated each relative exercise intensity significantly higher than the women. The range of RPE scores was extremely large at each exercise intensity within this adult group (≈ 14 pts. at 60% MHRR and ≈ 10 pts. at 80% MHRR). The prevalence of RPE scores outside the general 12-16 RPE range was 37% (88/236) at 60% MHRR and 29% (69/236) at 80% MHRR. The majority of RPEs outside the 12-16 range were below 12 (91%) at the lower intensity, but above 16 (86%) at the higher exercise intensity. No significant relationships were found between age or VO_{2max} and RPE at either 60 or 80% MHRR, suggesting that the variance in RPEs during GXT is not a function of age or physical fitness status. In conclusion, although the mean RPEs at the two exercise intensities mirror the general RPE range (12-16), the extreme variability at each relative intensity would suggest that the use of RPEs recorded during a GXT for prescriptive purposes is questionable.

Wednesday, February 2
7:00-9:30 p.m.

EFFECTS OF MASSAGE ON RECOVERY LEG STRENGTH.
D. Tataryn, L. Tataryn, and A. L. Millar, FACSM. Dept. of Physical Therapy, Andrews University, Berrien Springs, MI.

Massage has been used between bouts of intense exercise with the goal of speeding recovery and reducing the effects of fatigue. However, there is little research investigating the effects of a recovery massage on subsequent performance. Thus the purpose of this study was to evaluate the effects of a recovery massage on leg strength following a bout of exercise. Thirty-four college aged subjects were tested for concentric quadricep strength using a Biodex dynamometer in the isokinetic mode. Subjects were tested at 60 and 120°/sec, then performed a fatiguing bout of exercise following the protocol of Douris. Subjects then either rested or received a recovery massage for the same period of time. All subjects were then retested for quadriceps strength. Mean torque at 60°/sec was 168.0±42.9 ft-lbs and 109.8±31.8 ft-lbs at 120°/sec prior to the exercise bout. There was a significant decrease in torque production following the exercise bout, however, there was no significant difference between groups (p=.046 and .913, respectively). Similarly, the average for total work was 733.65±224.99 ft-lbs (60°/sec) and 399.64±154.34 ft-lbs (120°/sec) before exercise and both decreased following the exercise bout (p=.01 and .036), but there was not a significant difference between the groups. Although the findings do not indicate an effect of recovery massage on leg strength, there was a trend for a smaller decrease in total work production for the group which received massage.
Funded by Andrews University Physical Therapy Research Fund.

Wednesday, February 2
7:30-8:30 p.m.

"Strength Training in Youth"

Opening Address Presented by

William J. Kraemer, Ph.D., FACSM
The Pennsylvania State University
University Park, Pennsylvania

Dr. Kraemer is the Director of Research in the Center for Sports Medicine and an Associate Professor of Applied Physiology at The Pennsylvania State University. He received a masters degree in exercise physiology and his doctoral degree in physiology and biochemistry from the University of Wyoming. He has held scientific and academic appointments with the U.S. Army's Research Institute of Environmental Medicine, Natick, MA as a research physiologist, adjunct assistant professor in the Department of Health Sciences at Boston University and a joint appointment in the Exercise Science Program and the Department of Physiology/Neurobiology at the University of Connecticut, Storrs, CT. He is a fellow in the American College of Sports Medicine (ACSM) and a current member of the ACSM's Board of Trustees and Administrative Council. He also serves on several ACSM committees. He is a past president of the National Strength and Conditioning Association (NSCA). Dr. Kraemer serves on numerous other professional committees including the GSSI Education Advisory Board, the sports medicine committee for the United States Weightlifting Federation and the United States Olympic Committee's Science and Technology Committee. He was awarded the NSCA's Outstanding Sport Scientist Award in 1992 for his scientific contributions to the field of strength and conditioning. He has published over 100 manuscripts in physiology and exercise science and two books, including *Strength Training for Young Athletes.*

"Strength Training in Youth"

Resistance or strength training and youth have been a controversial topic over the past ten years. This controversy has stemmed from the early findings that younger children could not gain strength. In addition, concerns as to the higher potential for injury was also thought to be a negative aspect for participation in a heavy resistance training program for children, especially prepubescents. Recent investigations over the past five years and examination of this activity by medical and scientific societies have come to the opposite conclusions. Children, even prepubescents, can gain strength and enhance performance with a supervised and properly prescribed program of resistance exercise. Strength gains appear to be mediated in younger children via neural mechanisms. In addition, new data indicate that resistance training is one of the more safe training or sport activities for children to be involved with. With the potential for associated adaptations to impact long-term bone health and neuromuscular fitness as well as reduce the severity of sport injuries, strength training for children may be an important activity for children from 5 to 18 years. This presentation will overview the various studies involved with resistance training and youth. In addition, the various position stands taken by various professional organizations will be summarized. Finally, practical guidelines for exercise prescription of resistance exercise in children will be presented.

Thursday, February 3
8:00-8:15 a.m.

Carbohydrate Loading and High Intensity Performance

Brickman, T.M., M.G. Flynn, FACSM, K.K. Carroll, & M.P.Shea, Exercise Physiology Lab, Univ. of Toledo, Toledo, OH 43606

The purpose of this study was to examine the effects of a high carbohydrate diet on 1500 m run performance. Six female collegiate middle-distance runners (19.7 ± 1.4 yr, 57.4 ± 6.6 kg, 168.1 ± 2.5 cm) participated in this double-blind crossover study. Each subject completed two 7 day dietary and training regimens separated by one week. Subjects followed a diet that provided 4 g CHO·kg^{-1}·d^{-1}. During days 4-7 subjects ingested 1 l·d^{-1} of a drink that provided an additional 4 g CHO·kg^{-1}·d^{-1} during the carbohydrate loading (CL) trial and 0 g CHO during the placebo (PLA) trial. The training was the same during both weeks: day 1 = 7 * 1200m, day 2 = 7 * 400, day 3 = 40 min "fartlek," day 4 and 5 = 20 min easy running and day 6 = rest. A 1500 m race was completed on an indoor track on day 7. The diet during day 4-7 of CL and PLA provided 491.6 g CHO·d^{-1} and 245.3 g CHO·d^{-1}, respectively. The 1500 m performance for the CL trial (317.7 ± 15.5 s) and the PLA trial (318.4 ± 15.4 s) were not significantly different. In contrast to previous findings, a carbohydrate loading regimen did not significantly improve high intensity exercise performance.

Thursday, February 3
8:15-8:30 a.m.

INFLUENCE OF CROSS TRAINING ON INDICES OF TRAINING STRESS AND PERFORMANCE

Kooiker, B.A., M.G. Flynn, FACSM, K.K. Carroll, C.A. Weideman, H.L. Hall, P.G. Brolinson C.M. Kasper, University of Toledo and Sports Care, Toledo Hospital, Toledo OH 43606

Twenty well-trained male runners (VO_2max 4.6 ± 0.5 l*min^{-1}) were randomly assigned into either a cycling and running (cross training, CT) or a running only (RT) group for six wk of increased training. In addition to normal run training, three morning sessions were held each wk on bicycle ergometers (CT) or on a running track (RT). Monday sessions were 5*5 min at > 95% VO_2max, Wednesday sessions were 50 min at 70% VO_2max, and Friday sessions were 6*75s at > 115% VO_2max and 3*150s at > 105% VO_2max (work/rest =1). At 0 (PRE), 3 (MID), 6 wk (POST) subjects completed running economy test (10 min at 75% VO_2max) followed by a computer simulated 5km treadmill race. Blood samples were also obtained from CT, RT, and age matched controls for cortisol, free testosterone, and total testosterone at PRE, MID, and POST. There were no significant differences for submaximal HR, R, or VO_2 between RT and CT or among PRE, MID, and POST. There was no treatment effect for RPE but RPE was lower for MID and POST compared to PRE. Performance (5km) was improved for CT (PRE 1119.8 ± 89.5s, MID 1094.9 ± 90.9, POST 1086.9 ± 94.8) and RT (PRE 1073.4 ± 73.2, MID 1057.3 ± 76.8, POST 1050.2 ± 64.11) at MID and POST compared to PRE ($p < 0.05$) but there was no treatment effect. No differences were found in the blood hormone levels. In conclusion, six weeks of increased training with CT or RT did not alter indices of training stress and performance improvements were similar between training regimens.

Supported by a USOC Sports Science Grant.

Thursday, February 3
8:30-8:45 a.m.

EFFECT OF AN ACUTE BOUT OF WEIGHT BEARING EXERCISE ON BONE GROWTH FACTORS. Sherwood*, J.J.,B.W. Craig, Human Performance Laboratory, Ball State University, Muncie, IN.

The purpose of this study was to determine the effect of a single bout of weight bearing exercise on the growth factors that alter bone metabolism. Seven healthy female subjects (age 23 ± 5 yrs.) agreed to participate in the study. A VO_2 max test was administered to each subject. The subjects ran for 40 minutes on the treadmill at 70% of VO_2 max. Blood samples were drawn pre and 1, 2, 3, 4, 5, 10, 15, 20, 30, 45 and 60 minutes post-exercise and assayed for serum growth hormone, calcium, parathyroid hormone, and alkaline phosphatase. No significant change was found in parathyroid hormone, calcium, or alkaline phosphatase serum levels. Growth hormone was found to be significantly decreased 30, 45, and 60 minutes post-exercise as compared to pre-exercise levels (7.089, 5.399, 4.728 and 11.28 ng/ml, respectively). While this indicates that exercise may cause a depression in growth hormone levels during recovery, growth hormone effects are not limited to bone metabolism and, therefore, may not be an accurate indicator of changes in bone metabolism in the absence of alterations in other markers. The results of this study indicate that a single bout of running exercise has little effect on serum markers of bone metabolism.

Thursday, February 3
8:45-9:00 a.m.

Body Composition and Blood Lipids in Male and Female Swimmers

H.A. Szczerba, B.A. Kooiker, K.K. Carroll, F.F. Andres, & M.G. Flynn, FACSM, Exercise Physiology Laboratory, University of Toledo, Toledo, OH 43606

This study was conducted to investigate the effects of swimming on the high density lipoprotein cholesterol (HDL-C), high density lipoprotein subfraction-2 (HDL2), high density lipoprotein subfraction-3 (HDL3), total cholesterol (total-C), and percent body fat in ten apparently healthy, well-trained, male (N=6) and female (N=4) collegiate swimmers. Blood was obtained (0700-0800h) on two consecutive days in the early season (T1-T1A), after 11 weeks of training at 45,000 m·wk^{-1} (T2), on week 13, after one week increased training at 85,000 m·wk^{-1} (T3), after conference championships (T4) and four weeks after cessation of organized practice (T5). Blood was analyzed for HDL-C, HDL3 and total-C. Skinfold measurements were obtained at T1, T2, T3 and T4. Subjects were underwater weighed at T1 and T4. Data from T1 and T1A were averaged for a baseline value (T1). Total-C remained unchanged during the season, but was increased (P 0.05) at T5 177.35 ± 15.12) compared to T3 (144.97 ± 6.52 mg·dl^{-1}). HDL2 increased significantly at T3 (15.34 ± 1.77) compared to T1 and T2 (9.69 ± 1.25 and 8.77 ± 2.23 mg·dl^{-1}, respectively). HDL3 decreased significantly at T3 (40.98 ± 2.74) compared to T2 (49.75 ± 4.43 md·dl^{-1}). HDL-C and percent body fat were not significantly changed. In conclusion, HDL2 was significantly increased and HDL3 was significantly decreased during the most intense training phase of a collegiate swim session. Total-C increased significantly 4 weeks after the cessation of formal training.

Thursday, February 3
9:00-9:15 a.m.

Mood State and Subjective Responses to a 24 Hour Race. M. Fahlman, M.G. Flynn, FACSM, P.G. Brolinson, T. Brickman, D.L. Carl, K.K. Carroll, D. Choi & B. Kooiker, Exercise Physiology Laboratories, University of Toledo, and SportsCare Sports Medicine Program, Toledo, OH 43606

The purpose of this study was to examine the changes in mood state that occurred following a 24 hour race. One hour before the race, runners (R) (N=18; mean 48.2 yr) completed a profile of mood states (POMS), muscle soreness scale, and signs and symptoms form assessing the week leading up to the race. R completed the same battery of tests following the race (mean distance = 132.1 km) and every two days over the next two weeks. Subjects were asked to select a control that they would come in contact with on a daily basis. Controls (C) (N=11) were asked, through written instructions, to complete the POMS and signs and symptoms form every two days for the same two week period. The global mood state (GMS) was significantly ($p < 0.05$) increased pre-race (109.1 ± 4.9) to post-race (137.6 ± 6.9) and had returned to baseline by day 4. The primary factors contributing to increased GMS were significant increases in post race fatigue and confusion and a decrease in vigor. There were no significant differences in GMS between R and C in the two weeks following the race. C reported a greater number of upper respiratory infection symptoms and other illnesses than R in the two weeks following the race. In conclusion, a 24 hour road race significantly increased GMS but did not lead to an increase in infectious episodes for the R.

superficial purpose; limited applicability

Methods of selecting controls?

infectious incidents by self report?

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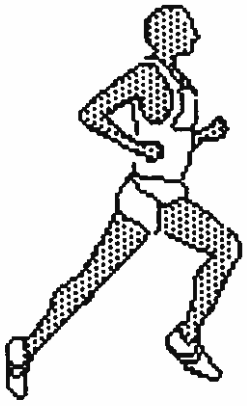

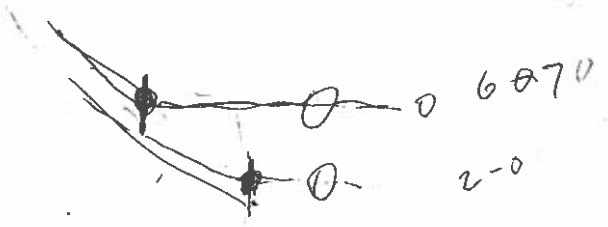
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Thursday, February 3
9:15-9:45 a.m.

"A Review of the Methods for Measuring Energy Expenditure: Past and Present"

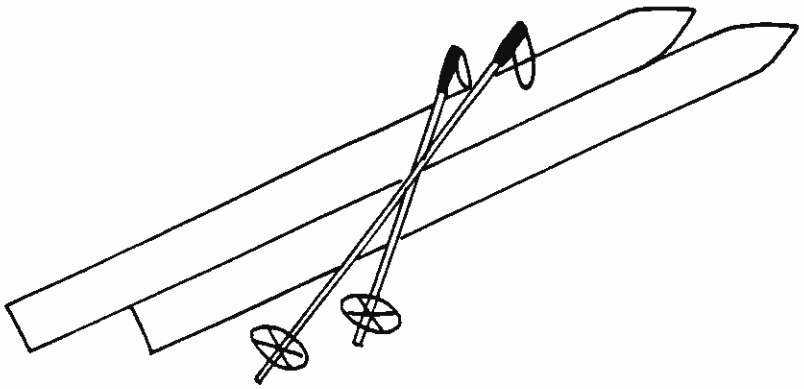
Presented by

Jeffrey E. Edwards, Ph.D.
Indiana University
Bloomington, Indiana

Dr. Edwards received his undergraduate degree from Indiana State University in 1976. He received his Master's degree from Ball State University and was a research assistant at the Human Performance Laboratory, working with both Dr. David Costill and Dr. Bud Getchell. Dr. Edwards was recruited to help in the start-up of the Physiology Laboratories at the USDA Human Nutrition Research Center on Aging at Tufts University in Boston, MA. After several years he returned to Indiana University where he received his Ph.D. in Human Performance with emphases in the areas of physiology and biochemistry. Currently, he is on the faculties of both the Department of Kinesiology and Department of Family Medicine at Indiana University. His primary work has centered around measurement of energy expenditure of both sporting and physical activities using respiratory calorimetry as well as stable isotopic methods of measuring energy metabolism. Dr. Edwards is a reviewer for several journals and is also a past member of the Board of Trustees of the Midwest American College of Sports Medicine as well as the current representative to the ACSM Regional Chapters National Committee and the 1994 National Meeting committee. He speaks regularly to many groups such as the National Athletic Training Association, Conference on Fitness in the Elderly, International Symposium on Sports Nutrition and ACSM certification workshops.

"A Review of the Methods for Measuring Energy Expenditure: Past and Present"

The history of the measurement of energy expenditure extends as far back as 1780 when Lavoisier made the first detailed measurements of heat production by collecting the meltwater generated from a hamster confined to a chamber filled with ice. At the same time, development of indirect calorimetry, which is the measurement of respired gases, was also progressing. The amounts of expired water vapor, oxygen and carbon dioxide production and metabolic heat generation were intimately related and the results from these two methods agreed to within 2%. Subsequent advances in the area of energy metabolism have built on these initial findings with the addition of other methods such as the doubly labeled water method of measuring energy expenditure. These techniques are currently used by sports scientists and clinicians to establish cardiovascular fitness levels, determine necessary nutrient intakes, quantify total energy expenditure and generally to measure energy balance in a broad spectrum of populations for a variety of purposes.



Thursday, February 3
10:00-10:15 a.m.

EFFECT OF CAFFEINE INGESTION ON PERCEPTION OF EFFORT AND SUBSEQUENT WORK PRODUCTION.

K. J. Cole, D. L. Costill, FACSM, R. D. Starling, B. H. Goodpaster, S. W. Trappe, and W. J. Fink, FACSM, Human Performance Laboratory, Ball State University, Muncie, IN

The purpose of this investigation was to determine the effect of caffeine ingestion on work output at various levels of perceived exertion during 30 min of isokinetic variable resistance cycling exercise. Ten subjects completed six trials, each separated by at least 24 hours. The exercise bouts were performed one hour after consuming either 6 ml•kg^{-1} caffeine (3 trials) or a placebo (3 trials) administered in a random, double-blind design. During each trial the subjects cycled at what they perceived to be a rating of 9 on the Borg rating of perceived exertion scale for the first 10 min, a rating of 12 for the next 10 min, and a rating of 15 for the final 10 min. Caffeine ingestion significantly increased systolic blood pressure during the 60 min rest period prior to exercise ($p<0.05$) but had no effect on heart rate either before or during exercise. Total work performed during the caffeine trials averaged 277.8 ± 26.1 KJ while mean total work during the placebo trials was 246.7 ± 21.5 KJ ($p<0.05$). Exercise VO_2 values were significantly higher following caffeine ingestion ($p<0.05$) as were post exercise blood lactate values ($p<0.05$). Blood glycerol and free fatty acid levels increased over time to a significantly greater degree in the caffeine trials than in the placebo trials ($p<0.05$). However, there were no significant differences between conditions in respiratory exchange ratio. These data suggest that caffeine may play an ergogenic role in exercise performance by alteration of both neural perception of effort and substrate availability.

Thursday, February 3
10:15-10:30 a.m.

Natural Cell-Mediated Cytotoxicity and Lymphocyte Mitogenesis Following a 24 Hour Road Race

K.K. Carroll, M.G. Flynn, FACSM, P.G. Brolinson, B.A. Kooiker, S. Freeman, T.M. Brickman, D.L. Carl, D.H. Choi, & M.A. Fahlman, Exercise Physiology Lab, Univ. of Toledo, and Sports Care, The Toledo Hospital, Toledo, OH 43606

The purpose of this investigation was to examine the effects of a 24 hour road race on functional assays of the immune system. Seventeen subjects (16 males, 1 female; 49 ± 10.9 yr) completed 132.7 ± 30.8 km in 24 h. Blood samples were drawn 1-2 h pre-race after 15 min rest (PRE), after 12 h (MID), within 15 min post (POST), and after 2 h recovery (2H). The lymphocyte proliferation (LP) assay used whole blood, diluted 1:5 with growth medium, incubated (5% CO2 at 37 C) with CON A (10ug/ml and 40ug/ml). After 72 h, cells were pulsed with luCi ^{3}H-thymidine/well and incubated for 6 h prior to harvest. Natural cell-mediated cytotoxicity (NK cyt) was assessed using a whole blood ^{51}Cr release assay at four K562 cell concentrations. Serum cortisol was analyzed using RIA. ^{3}H-thymidine uptake during proliferation was not significantly different at any time point, at either concentration of CON A. The absolute number of NK cells (CD16+,CD56+) was significantly lower 2H (144 ± 0.3*10^{6}) compared to PRE (262 ± 0.4*10^{6}) or MID (242 ± 0.4*10^{6}). NK cyt was significantly reduced at MID and remained lower for the POST and 2H samples. Cortisol was not significantly different at any time point. In conclusion, LP was not significantly altered, while NK cell function was suppressed during and following a 24 hour run.

Thursday, February 3
10:30-10:45 a.m.

The Effects of an Acute Prolonged Exercise Bout on Lymphocyte Subpopulations and Serum Hormone Levels.

D.L. Carl, M.G. Flynn, FACSM, K.K. Carroll, B.A. Kooiker, T. Brickman, D. Choi, M.A. Fahlman, & P.G. Brolinson.
Exerc. Phys. Lab, Univ. of Toledo. Sports Care, The Toledo Hospital, Toledo, OH. 43606.

This study investigated the changes in lymphocyte subsets and selected hormones during and following a 24 h road race. Blood samples were obtained from 17 subjects (16M,1F) pre race, after 12 h, immediate post, and 2 h post race. Lymphocyte subsets were determined by direct immunoflourescense for Total T ($CD3^+$), T-helper ($CD4^+$), T-suppressor ($CD8^+$) and Natural Killer Cells ($CD16^+/CD56^+$). The hormones Cortisol (C), Total Testosterone (TT), and Free Testosterone (FT) were analyzed at each time point by use of commercially available RIA kits. WBC count was significantly increased at 12 h, post, and 2 h post compared to pre race ($p<0.001$) while lymphocyte counts were unchanged. $CD3^+$, $CD4^+$, and $CD8^+$ absolute numbers and percentages were not significantly altered. Absolute numbers and percentages for $CD16^+/CD56^+$ cells were significantly lower 2 h post compared to pre and 12 h ($p<0.05$) while NK cell percentages were suppressed pre to post race. Serum TT and FT levels were significantly decreased 12 h, post, and 2 h post from the pre race values ($p<0.001$). However, C values were not significantly different. These results suggest that natural killer cell function was suppressed and serum TT and FT levels decreased during and following a 24 h run while T lymphocyte subsets and serum C were unchanged.

constitutes an uncontrolled & unexplained independent variable.

24 hour race
- poor choice

Thursday, February 3
10:45-11:00 a.m.

TransAm Footrace: A Case Study

Bodary, P.F., M.G. Flynn, FACSM, K.K. Carroll, F.F. Andres, Exer. Phys. Lab, Univ. of Toledo, Toledo, OH 43606

A 34 year old female completed a 64 day race from Los Angeles to New York. The race covered 35 to 97 km·d^{-1} (average 73km·d^{-1}). Each day began at 5am and concluded when the participant had completed that day's mileage. The subject finished third of six finishers (13 starters) and was the first woman to complete the TransAm Footrace. Resting heart rate, blood samples, and POMS data were collected at selected intervals during the race. Venous blood samples were drawn upon waking between 3:30 and 4:30 am and analyzed for free testosterone, total testosterone, cortisol, creatine kinase (CK), follicle stimulatine hormone (FSH), prolactin, hematocrit and hemoglobin.

	pre-	Day 9 (4)	Day 27 (1)	Day 56 (1)
Resting Heart Rate (bpm)	38	47	-	32
Cortisol (ug/dl)	14	22.5	23	17.5
Free Test. (pmol/L)	2.6	3.8	3.6	3.3
FSH (mIU/ml)	8.5	10.5	8.5	5.4
Prolactin (pmol/L)	4.5	12	4.9	14
POMS (Global)	121	-	-	90
Mileage Previous Day	0	35.5	44.9	60.3
Mileage Previous 7 d	85	288	334	355
Cumulative Mileage	-	338	1130	2520

We conclude, rigors of the TransAm Footrace elicited substantial hormone concentration changes. Global mood state was lower on 56 than pre (due to a lower tension and a higher vigor score), possibly related to the impending completion of the race.

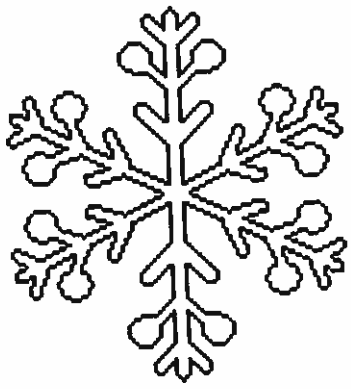
suggested training adaptation for our design took also

Thursday, February 3
11:00-11:15 a.m.

AGING AND THE RESPONSE OF CARDIAC VAGAL ACTIVITY TO INCREASING EXERCISE INTENSITY.

Sled, Mary, T.E. Kirby, and J.P. Dujardin. The Ohio State University, Columbus, Ohio.

The purpose of this study was to assess the rate of withdrawal of cardiac vagal activity (CVA) with exercise a function of age. Male subjects (n=32), age 20-60 years underwent a maximal exercise test on a cycle ergometer with ECG recorded. ECG was later analyzed for CVA by time series analysis of the heart period using a vagal activity monitor. Earlier work has indicated a clear difference in the response of young vs older (>60 yr.) subjects during exercise. CVA significantly ($p<.05$) decreased from 25W to 150W for each age group (20-30,-6.93; 30-40,-2.6;40-50,-5.0;50-60,-5.2). The vagal activity at 25W and 150W was similar for all age groups. Resting vagal tone, however, was significantly greater for the 20-30 group compared to the 50-60 (7.3 vs 5.6). The magnitude of decrease from rest to 150W was larger in the 20-30 group compared to the 50-60 group (4.3 vs 2.8). We conclude that there is no significant change in vagal activity in response to exercise prior to age 50. Differences found in the magnitude of decrease of vagal activity would indicate a tend in the 6th decade of life to reduce the withdrawal of vagal tone during exercise.



Thursday, February 3
1:30-3:00 p.m.

"Development of a New Professional Student Organization"

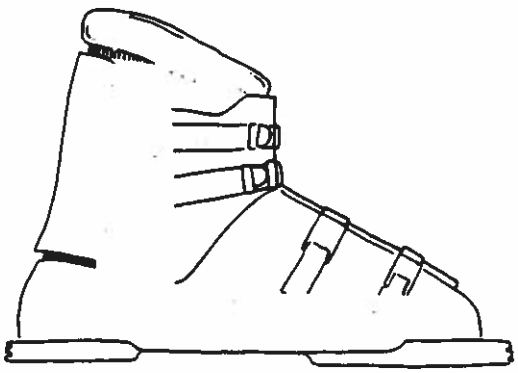
Presented by

Jeffery J. Betts, Ph.D.
Central Michigan University
Mount Pleasant, Michigan

Dr. Betts graduated from Central Michigan University in 1980 with a B.S. in Biology and Exercise Science, and worked for a year in a toxicology laboratory before going to graduate school. He attended Ball State University and obtained Master of Science in Human Bioenergetics (Exercise Physiology), and then returned to CMU as an instructor and coordinator of the Adult Fitness Program. In 1985 he began his doctoral studies at The Ohio State University, and obtained a Ph.D. in Exercise Physiology in 1990. While at OSU, Dr. Betts was selected as the 1988 Obertueffer Award winner. From 1990-92, he was an N.I.H. postdoctoral fellow in glucose metabolism and transport at the University of Vermont in the laboratory of Dr. Edward Horton. During the 1992-93 academic year Dr. Betts served as department chairman and assistant professor Health, Physical Education, Recreation & Dance, and Head Men's & Women's Tennis Coach at Wartburg College in Waverly, Iowa. Presently, he is an assistant professor of Health Science, and Director of the Human Performance Lab, at Central Michigan University. He is a member of ACSM (national & regional), AAHPERD, ADA, Phi Kappa Phi, and Beta Beta Beta Biology Honor Society.

"*Development of a New Professional Student Organization*"

We at Central have begun a student organization aimed at fostering the professional development of its members. The missions are to foster informed career decision-making and promote early professional involvement. Goals are to: (1) provide information about various career opportunities, professional certifications and organizations, and graduate and professional education programs; (2) provide opportunities to apply skills and knowledge; and (3) promote attendance and participation at state, regional, and national meetings of professional organizations. We will present the process we are involved in and the extent of our progress, as well as share ideas and some of the information mentioned in the organizational goals. Attendees will be encouraged to become involved in brainstorming future directions and developments, and take advantage of opportunities for networking.



Thursday, February 3
7:00-9:30 p.m.

SEGMENTAL KINEMATIC FACTORS AFFECTING RELEASE VELOCITY OF THE LUGE START

S. Humphreys and F. Liao, Department of HPER, Northern Michigan University, Marquette, MI

The purpose of this study was to determine the major segmental kinematic factors affecting center-of-mass release velocity of the luge start. Five national level luge athletes were videotaped (side view, shutter speed 1/500 sec) as they performed a series of three start trials. For each athlete, the trial that produced the highest release velocity was selected for analysis. Each trial consisted of a preload and drive phase prior to the release. A nine-point 2-D model was used in the process of raw coordinates acquisition. The raw coordinates were smoothed afterwards using a Butterworth filter. Velocity and acceleration values of the center-of-mass and the upper body segments were determined throughout the preload and drive phases. Segmental factors found to have high and significant ($p<0.05$) correlation with the release velocity included: average acceleration of the upper arm extension ($r=0.89$) during the drive phase. These findings suggest that training should primarily emphasize the proper movement technique of the trunk and of the upper arm.

Thursday, February 3
7:00-9:30 p.m.

Effects of a commercially available golf swing-aid on clubhead speed, distance and accuracy.

Michael J. Meyer and M.G. Flynn, FACSM. Exercise Physiology Lab, The University of Toledo, Toledo, OH

The purpose of this study was to examine the acute effects of an "air resistance" golf swing trainer (AR) on clubhead speed, and ball distance and accuracy. Eight male golfers with a U.S.G.A. handicap index of < 8 were the subjects in this study. Each golfer performed 5 swings without striking a ball (5NB) and 10 swings striking a ball (10B) under three different conditions: following a "typical" warm-up (WU), following three min swinging with a tempo ball (TB), and after fifteen full swings with AR. Clubhead speed was measured during 5NB and 10B using a Beltronics SwingMate$_{TM}$. During 10B trials the golfers were asked to select a club that they could hit to a target at a distance of 163.8 m (180 yd). The same club was used for all three conditions. The golfers were told to aim at the target which was set at the center of a grid so that both distance and accuracy could be measured. There were no significant treatment effects for clubhead speed during 10B; however, clubhead speed was significantly slower during 5B after using the TB (116.9 kph) compared to AR (123.9 kph) and WU (122.8 kph). Scatterplots were constructed for the 80 shots (eight golfers * 10B) struck following each treatment and accuracy was assessed by the number of shots that landed within 13.7 m (15 yd) of the grid center. There were 30 of 80 shots that met this criterion for TB, 40 of 80 for WU and 45 for AR. There were no significant differences for distance when comparing the treatments. In conclusion, a short warm-up with AR prior to ball striking did not affect clubhead speed or distance of the shot.

Thursday, February 3
7:00-9:30 p.m.

EFFECTS OF FOOT ORTHOTICS ON THE GRF DURING RUNNING

A. Brawner & R. Bahamonde, Biomechanics Lab., Ball State University, Muncie, IN 47306

The purpose of foot orthotic devices (FOD) is to reduce the occurrence of lower extremity injuries due to abnormal foot motion. In many instances, the prescription of FOD has been left to a process of trial and error. Proper prescription of FOD is dependent on accurate analysis of rearfoot motions, as well as measurements of ground reaction forces (GRF). The purpose of this study was to analyze the effectiveness of FOD through the analysis of GRF. Ten subjects (6 males and 4 females) wearing identical shoes and orthotics prescribed by their own physician (7 for pronation and 3 for supination) ran at comfortable pace over a Kistler force platform (500 Hz). Three trials with the orthotic (WO) and without the orthotics (WTO) were collected and averaged for each condition. Linear velocity measurement of each trial was taken using photocells. The mean linear velocity for the WTO trials was 4.0 $\pm$ .2 m/s and for the WO trials was 4.1 $\pm$ .2 m/s. Peak GRF and time showed no differences between the WO and WTO. The peak F_z for the WTO trials was 303 $\pm$ 41% (100% equals BW) and 302 $\pm$ 38% BW for the WO trials. The maximum propulsive force F_y was 38 $\pm$ 4% BW for the WTO and 38 $\pm$ 7% BW for the WTO. The minimum F_y (braking force) was -61 $\pm$ 24% BW for the WTO and -64 $\pm$ 10% BW for the WO. Maximum and minimum medio-lateral forces F_x were 17 $\pm$ 8% BW and -23 $\pm$ 8% BW for the WTO trials, and 19 $\pm$ 7% BW and -21 $\pm$ 13% BW for the WO. In conclusion, the use of FOD did not affect the magnitudes and time of ocurrence of the GRF. This suggest the presence of another mechanism responsible for the effectiveness of FOD.

Thursday, February 3
7:00-9:30 p.m.

SENSITIVITY OF THE ACTIVE KNEE EXTENSION TEST VS. THE STRAIGHT LEG RAISE TEST FOR HAMSTRING FLEXIBILITY.

C. Moore, T. Johnston, and A.L. Millar, FACSM. Dept. of Physical Therapy, Andrews University, Berrien Springs, MI.

The purpose of this study was to compare the results of the Active Knee Extension (AKE) test to the Straight Leg Raise (SLR) test, both being used clinically for the determination of hamstring flexibility. Seventy-six subjects (33 female, 43 male) with a mean age of 23 years were test for hamstring flexibility using both the SLR and the AKE tests. The mean for the SLR was 79.9°±11 (90° optimum) and 152.8°±13.1 (180° optimum). To compare the two tests the results were divided into three categories; Tight, Normal, and Optimal. Optimal ranged from the total possible to that value minus 10°. Normal was considered between 10 and 20° les than the optimum. Using this classification 68 of the subjects had tight hamstrings using the AKE while only 12 of the subjects were classified as having tight hamstrings using the SLR. A cross-tabulation was completed to give a more complete picture of this relationship between the tests. Of those classified as having tight hamstrings using the AKE, 17.5% were also classified as Tight using the SLR, however, 47.1% were classified as Normal and 35.5% were classified as having optimal hamstring flexibility. This difference was significant at the .01 level of probability. Importantly, these results suggest that many athletes may be classified as having normal or optimal hamstring flexibility, when in fact their hamstring flexibility should be considered tight and a stretching program should be implemented.

Supported by Andrews University Physical Therapy Research Fund.

Thursday, February 3
7:00-9:30 p.m.

EFFECT OF ECCENTRIC LOADING ON SERIES ELASTIC CONTIBUTION TO VERTICAL JUMP PERFORMANCE

Donald Melrose, Mark Ricard and Donald Kirkendall. Dept of HPERD
Illinois State University, Normal, IL 61790

Eccentric exercise has been shown to result in structural muscle damage. In addition, a decrease in force production has also been noted. Numerous biochemical assays have been attempted to document the presence and degree of damage.Given that muscle is modeled in three components, we decided to see if repetitive eccentric loading might effect the series elastic element of muscle. Healthy, college aged baseball/softball players (m=6, f=6) performed depth jumps (m=100, f=75) from a box approximately 150% of knee height to a box of approximately 100% of knee height. Vertical jumps from a squat (SJ) and from a counter movement (CMJ) were performed on a force platform before and 3' after exercise, 24, 48 and 72 hours after exercise from which positive (upward) and negative (counter movement) Z mechanical energies were calculated (Komi, MSS 10:261, 1978). Perceptual pain was also noted daily. Vertical jumps were nearly 3cm lower at 24 and 48 hours post ($p<.05$) and pain was significant (3-4 on a 6 point scale). Positive mechanical energy declined at 24 and 48 hours similarly for both jumps (8-10%, $p<.05$). The difference between the positive mechanical energies (Δpos) for SJ and CMJ declined with time before recovering ($p<.05$). Maximum decline in this difference was seen at 24 hours (-53%). Elastic contribution to the jump declined by 56% at 24 hours ($p<.05$). The similar decline in elastic contribution and Δpos mechanical energy suggest that series elastic contribution to vertical jump performance was compromised and contributed to the reduction in vertical jump performance. Practically, these results suggest that eccentric loading affects the series elastic element of muscle and recovery is nearly complete at 72 hours implying a recovery interval (for series elasticity) between eccentric bouts of exercise.

Thursday, February 3
7:00-9:30 p.m.

Effect of Passive and Active Recovery on the Resynthesis of Muscle Glycogen

DH Choi, KJ Cole, BH Goodpaster, WJ Fink, and DL Costill, FACSM, Human Performance Laboratory, Ball State University, Muncie, IN 47306

The purpose of this investigation was to determine the effect of passive and active recovery on the resynthesis of muscle glycogen after high intensity cycle ergometer exercise in untrained subjects. In a cross over design, six college-age males performed three, one min exercise bouts, at 130% VO_{2max} with a 4 min rest period between each work bout. The exercise protocol for each trial was identical, while the recovery following exercise was either active (40-50% VO_{2max}) or passive. The initial muscle glycogen values averaged 144.2(±3.8) mmol·kg^{-1} w.w. for the active trial and 158.7 (±8.0) mmol·kg^{-1} w.w. for the passive trial. Corresponding post-exercise glycogen contents were 97.7(±4.4) and 106.8(±5.0) mmol·kg^{-1} w.w., respectively. These differences between treatments were not significant. However, mean muscle glycogen during passive recovery increased 15 mmol·kg^{-1} w.w., whereas it decreased 6.27 mmol·kg^{-1} w.w. following active recovery (P 0.05). The recovery biopsies were sampled 1 hr into recovery. Also, the decrease in blood lactate concentration during active recovery was greater than during passive recovery and significantly different at 10 and 30 min of the recovery period (P 0.05). The major finding of this investigation was that the rate of muscle glycogen resynthesis during passive recovery was significantly greater than that during active recovery. These data suggest that the use of passive recovery following intense exercise result in a greater amount of muscle glycogen resynthesis than active recovery.

Thursday, February 3
7:00-9:30 p.m.

CONTRACTILE PROPERTIES OF SINGLE RAT SOLEUS FIBERS FOLLOWING HINDLIMB SUSPENSION WITH INTERMITTENT WEIGHT BEARING

J.J. Bangart *, J.J. Widrick, and R.H. Fitts, FACSM
Department of Biology, Marquette University, Milwaukee, WI

The purpose of this study was to examine the effects of 4, 15 minute periods of daily weight bearing during 2 weeks hindlimb suspension (HS) on rat single fiber contractile properties. Animals were assigned to 3 groups: 1) hindlimb suspended (HS), 2) hindlimb suspended with standing (HS-S), and 3) non-suspended control (Control). Following HS, single fibers were isolated and mounted between a DC position motor and a force transducer. Diameter was determined from a photograph taken with the fiber suspended in air. Peak isometric tension (Po), maximal unloaded shortening velocity (Vo), and peak power (PP) were determined under conditions of maximal Ca^{2+} activation (pCa 4.5) at 15°C. In agreement with previous studies, HS reduced fiber diameter (-31%), Po (-60%), and PP (-64%) while it increased Vo (+38%) (see below).

Group	Diameter (μm)	Po (mg)	Po ($kN \cdot m^{-2}$)	Vo ($FL \cdot sec^{-1}$)	PP ($mg \cdot FL \cdot sec^{-1}$)
HS	48±2 *	19±1 *	97±5	2.02±0.74 *	0.69±0.04 *
HS-S	52±2 *	25±1 * †	109±5	1.53±0.13 *	1.03±0.05 * †
Control	70±2	48±2	113±5	0.85±0.05	1.81±0.13

FL = fiber length. * = $p<0.05$ vs. Control. † = $p<0.05$ vs. HS

Intermittent weight bearing during HS increased Po by 32% and PP by 49% over HS alone. In addition, diameter and Vo of HS-S fibers fell between those observed for HS and Control. These results suggest that only 1 hour of intermittent weight bearing every 24 hours may be an effective countermeasure to HS-induced alterations in contractile function.

Supported by NASA NAG2-212

Thursday, February 3
7:30-8:30 p.m.

"Alaskan Sled Dogs: Ultimate Endurance Athletes?"

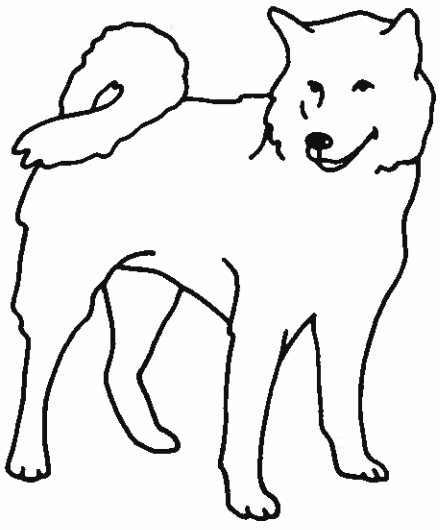
Keynote Address Presented by

Kenneth W. Hinchcliff, Ph.D.
The Ohio State University
Columbus, Ohio

Dr. Hinchcliff graduated (Bachelor of Veterinary Science, First Class Honors) from the University of Melbourne, Australia, in 1980. After several years in private veterinary practice, he completed a Residency in Large Animal Internal Medicine (specialist training) and a Master of Science degree from the University of Wisconsin-Madison in 1987. He obtained a Doctor of Philosophy degree in Pharmacology and Exercise Physiology from The Ohio State University in 1990. Presently, Dr. Hinchcliff is an Assistant Professor in the Department of Veterinary Clinical Sciences, College of Veterinary Medicine, The Ohio State University, with major research interests in exercise physiology and pharmacology of horses, and field exercise physiology of Alaskan sled dogs. He completed a number of field studies on the physiological responses to sustained (several days to two weeks) submaximal exercise by Alaskan sled dogs.

"Alaskan Sled Dogs: Ultimate Endurance Athletes?"

Legendary feats of endurance have been attributed to Alaskan sled dogs. Indeed, the present da, Iditarod Trail sled dog race, from Anchorage to Nome, commemorates the emergency transportation of diphtheria antitoxin along that route by teams of sled dogs. It was surprising to us that, given the apparent extraordinary endurance of these dogs, and the increasing popularity of long distance sled dog racing, there was very little information of the physiological and clinical responses of these dogs to exercise. We initiated a series of studies on dogs competing in actual long distance sled dog races to define some of the physiological responses and to monitor the health of the dogs. The dogs experienced surprisingly few adverse effects despite running 1600 km in as few as 10 days in subzero temperatures. Energy expenditure and water turnover by the dogs is extremely high; energy expenditure during a 300 mile race, at speeds that approximated that of the winning Iditarod team, were 47,086 ± 2500 kJ/D (4423 ± 147 kJ/d/kg$^{0.75}$), approximately 11,200 kcal/d, and water turnover was approximately 250 ml/kg/d. These, and other, adaptive responses to prolonged exercise will be discussed.



Friday, February 4
8:00-8:15 a.m.

EXOGENOUS CARBOHYDRATE OXIDATION FROM SOLUBLE AND INSOLUBLE CARBOHYDRATE.

B.H. Goodpaster*, W.H.M. Saris, A.E. Jeukendrup, F. Brouns, D. Halliday and A.J.M. Wagenmakers. Dept. of Human Biology, University of Limburg, Maastricht, The Netherlands and *The Human Performance Laboratory, Ball State University, Muncie, Indiana

The purpose of this study was to compare the exogenous carbohydrate (CHO) oxidation of naturally-enriched ^{13}C CHO sources of differing solubilities during 150 min of cycling exercise at 70% of VO_2max. The effect of adding a ^{13}C glucose tracer on exogenous CHO oxidation was also examined. In four separate trials, eight healthy subjects consumed, in random order, 28.5 ml/kg body weight of the following test solutions: water for ^{13}C background (W), 15% soluble starch (SS), 15% insoluble starch (IS) and 15% IS with a $^{13}C_6$-glucose tracer added (IS^{13}C). During the W trial, baseline $^{13}CO_2$ values did not differ significantly from resting values. Both the mean (0.84 ± 0.07 g.min^{-1} vs 0.50 ± 0.05 g.min^{-1}) and peak (1.14 ± 0.09 g.min^{-1} vs 0.81 ± 0.09 g.min^{-1}) oxidation rates were greater ($p<0.05$) in the SS trial than the IS trial. The amount of ingested CHO that was oxidized was significantly higher in the SS trial (126 ± 31 g) compared to the IS trial (75 ± 25 g). Further, the amount of CHO oxidized in proportion to the amount delivered to the intestine was 47.8% for the SS trial and 32.3% for the IS trial ($p<0.05$). Calculated mean and peak oxidation rates (0.91 ± 0.11 g.min^{-1} and 1.23 ± 0.15 g.min^{-1}, respectively) from the IS^{13} trial were higher than oxidation rates during the IS trial. These results indicate that the addition of a soluble glucose tracer to an insoluble tracee leads to an overestimation of exogenous oxidation rates, and that a soluble starch is oxidized at a higher rate during exercise than an isocaloric insoluble starch.

Friday, February 4
8:15-8:30 a.m.

L-carnitine Supplementation and Running Performance, C.M. Kasper, B.D. Reeves, M.G. Flynn, & F.F. Andres, Exercise Physiology Lab, University of Toledo, Toledo, OH 43606

The purpose of this study was to measure the effect of L-carnitine supplementation on 5 km running performance, and heart rate and blood lactate concentration during sub-maximal exercise. Seven competitive male distance runners (10 km PR $\bar{x}$=35:31±1:09 S.E., age $\bar{x}$=31.14 yr) completed 3 trials (Control, Trial 1, Trial 2). The control trial was the first trial for all subjects. This double-blind cross over design included random assignment to placebo or L-carnitine (4 g·d^{-1}) for the two sub-sequent trials. L-carnitine or placebo were ingested for 2wk prior to testing with a 7-10d "wash out" period between treatments. Each trial began with a submaximal run (SR); the first 4 min at 0.93 km·h^{-1} slower than the subject's current 10 km race pace (SR1), and the last 4 min at their 10 km race pace (SR2). Heart rate was recorded during each minute of the SR, and a blood sample was obtained for lactate analysis immediately after. The SR was followed by a computer simulated 5 km race. The mean 5 km time for the L-carnitine trial (1068.71 sec ± 31.8 S.E.) was faster than the placebo trial (1078.43 sec ± 30.9 S.E.); however, this difference was not significant (p 0.05). Lactate levels were not significantly different between the L-carnitine trial (2.85 mmol·l^{-1} ± 0.49 S.E.) and the placebo trial (2.88 mmol·l^{-1} ± 0.30 S.E.). Heart rates during SR1 were 148.7 bpm ± 7.6 S.E. for the placebo trial and 1.45 bpm ± 6.1 S.E. (NS) for the L-carnitine trial. SR2 heart rates were 162.57 bpm ± 7.0 S.E. for the placebo trial and 161.86 bpm ± 6.3 S.E. (NS) for the L-carnitine trial. Therefore, L-carnitine supplementation did not significantly improve performance of trained male runners during a 5 km performance run, or decrease blood lactate concentration and heart rate during submaximal running.

Design good; population studied only fair; low N; serum lactates are suspect; minimal contribution

Friday, February 4
8:30-8:45 a.m.

PLATEAU IN OXYGEN CONSUMPTION AT MAXIMAL EXERCISE IN MALE CHILDREN

G.E. Duncan*, A.D. Mahon, P. del Corral and C.A. Howe, Human Performance Laboratory, Ball State University, Muncie, IN.

There is some controversy surrounding the incidence and the factors involved with the achievement of a plateau in VO_2 at maximal exercise in children. With this in mind, the purposes of this study were to: (1) examine the incidence of plateau in VO_2 during graded exercise on a treadmill utilizing protocols of 1 (P1) and 2 (P2) minute stages; (2) examine the role of anaerobic ability on plateau achievement; and, (3) compare the responses at maximal exercise during each protocol. Twenty-five male children (M $\pm$ SD, 10.4 $\pm$ 0.8 yrs.) performed 2 graded treadmill tests to maximal effort and two 200 meter runs on an indoor track. Finger stick blood samples were obtained after each treadmill test and after each 200 meter run in order to assess blood lactate level. A plateau in VO_2 was defined as a delta VO_2 in the last minute of exercise that was less than 50% of the individual mean delta VO_2 calculated for the test. Mean VO_2max on P1 and P2 were 51.4 $\pm$ 5.8 and 50.6 $\pm$ 6.6 ml·kg^{-1}min^{-1}, respectively ($P > 0.05$). Maximal HR and RPE were also similar between protocols ($P > 0.05$). Maximal values for pulmonary ventilation (51.7 $\pm$ 8.9 and 49.6 $\pm$ 7.4 l·min^{-1}), RER (1.11 $\pm$ 0.05 and 1.07 $\pm$ 0.04) and lactate (6.7 $\pm$ 1.3 and 5.8 $\pm$ 1.7 mM·l^{-1}) were higher ($P < 0.05$) in P1 than in P2. The incidence of plateau was 36% on P1 and 40% on P2. No differences ($P > 0.05$) were detected between plateau achievers and non-achievers with respect to maximal exercise responses, 200 meter run time and 200 meter run lactate, regardless of protocol. These findings suggest the following: (1) there is no difference in maximal aerobic responses and anaerobic performance among plateau achievers and non-achievers; (2) the assessment of VO_2max is not dependent on exercise stage duration; and, (3) a plateau in VO_2 is not a requirement for defining VO_2max in children.

ill-designed, some method problems ... reliability? totally read

Friday, February 4
8:45-9:00 a.m.

THE EFFECT OF RESTING POSTURE ON THE DURATION AND MAGNITUDE OF POST-EXERCISE OXYGEN CONSUMPTION.

D.M. Barry-Bruner, K.R. Short, K.D. Smeltzer, D.A. Sedlock, FACSM.
Exercise Physiology Lab, Dept. of HKLS, Purdue University, West Lafayette, IN 47907.

Despite the prevalence of detailed investigations, there remains disagreement about the factors which are thought to control the duration and magnitude of excess post-exercise oxygen consumption (EPOC) following steady state exercise. Methodological variations may account for some of the reported differences in the EPOC period. The purpose of this study was to determine if the resting position (seated vs. supine) of subjects during baseline and recovery would influence the EPOC period. Five men and six women (mean $\pm$ sd age = 25.6 $\pm$ 4.2 yrs, VO_2 max= 40.2 $\pm$ 8.4 ml·kg-1·min-1) performed two identical exercise bouts (70% VO_2 max for 25 min) on a cycle ergometer. The two tests were performed in counterbalanced order at least 48 hours apart, differing only by the resting position of the subject before and after exercise. Participants reported to the lab following a 12 hour over-night fast and 24 hour abstinence from vigorous activity. Prior to exercise, baseline metabolic rate was established during a 30 minute rest in either the seated or supine position. Upon completion of exercise subjects returned to the same position as baseline. Recovery was monitored until a 5-min average VO_2 value was equal to baseline. EPOC duration (seated = 29 $\pm$ 18 min, supine = 37 $\pm$ 16 min; $t_{,10}$ = 1.43, p>.05) was similar in the two conditions while EPOC magnitude was significantly (albeit slightly) higher in the supine (13 $\pm$ 4 kcal) vs. the seated (10 $\pm$ 5 kcal) condition ($t_{,10}$ = 2.77, p=.02). This finding may be related to the trend toward lower baseline O_2 consumption in the supine condition. At both baseline and recovery, HR was significantly lower in the supine than in the seated condition ($F_{1,10}$=76.9, p=.0001). These results suggest that resting position could influence recovery VO_2 and warrant further investigation.

done well, mostly read reliability? limited application

Friday, February 4
9:00-9:15 a.m.

VO_{2max} ESTIMATES FROM THE YMCA SUBMAXIMAL PROTOCOL ARE NOT RELIABLE.

C.J. Grossmann, G.B. Dwyer, L.K. Kaminsky, FACSM, M.H. Whaley,
Adult Fitness Program, Ball State University.

Submaximal exercise tests are being used with increasing frequency in medical and fitness fields to predict maximal oxygen uptake.As the reliability of these types of tests are not well documented, the purpose of this study was to test the reliability of the YMCA Submaximal Cycle Ergometer (YMCA) test. Sixteen male subjects, ages 17 - 26 (22.6±2.7yrs) performed a maximal GXT on an electrically-braked cycle ergometer and three YMCA tests on a Monark ergometer each spaced two days apart. During the YMCA test, HR was measured by telemetry; VO_{2max} was predicted by both the extrapolation method ($YMCA_{ext}$) and use of the ACSM energy equations ($YMCA_{ACSM}$). Both prediction methods were compared to measured VO_{2max} using repeated measures ANOVA. Correlational analysis was also performed to determine the reliability between submaximal tests. Measured VO_{2max} was 3.88 +.52 L/min (range: 2.8-5.0 L/min). In 17 of 48 trials, VO_{2max} was unable to be predicted from the $YMCA_{ext}$ using age-predicted HR_{max}. The $YMCA_{ACSM}$ mean VO_{2max} (4.35±1.4 L/min) was significantly different from measured VO_{2max}. Within the three $YMCA_{ACSM}$ tests, the VO_{2max} were not significantly different (4.42±1.2, 4.32±1.8, and 4.35±1.4 L/min, respectively). The test-retest reliability ranged between .71-.75 for the three $YMCA_{ACSM}$ tests trials. The overall CV of the $YMCA_{ACSM}$ tests was 13.72 ±8.9% (range: 4.12-40.81). Due to the relatively modest r between measured and predicted VO_{2max} and the relatively high CV for the measure, it is concluded that the VO_{2max} cannot be reliably estimated from the YMCA protocol. When using this protocol to predict VO_{2max} caution should be used.

Friday, February 4
9:15-9:45 a.m.

"Fit People Recover Faster: Fact or Fiction?"

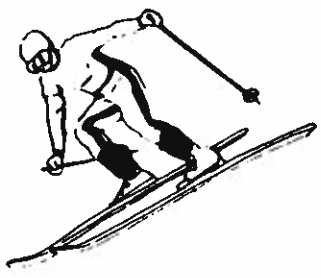
Presented by

Darlene Sedlock, Ph.D., FACSM
Purdue University
West Lafayette, Indiana

Dr. Sedlock received a Bachelor of Science and Master's degree from East Stroudsburg State College and a Ph.D. from Southern Illinois University. She also was a postdoctoral research fellow at the Department of Biomedical Engineering at the University of Southern California. Presently, Dr. Sedlock is an Associate Professor in the Departments of Health, Kinesiology & Leisure Studies and Foods and Nutrition at Purdue University. Her primary research interest has been postexercise energy expenditure, and she has over twenty-five publications in journals such as *Medicine and Science in Sports and Exercise*, *Journal of Applied Physiology*, *European Journal of Applied Physiology*, *American Journal of Clinical Nutrition*, and *Research Quarterly for Exercise and Sport*. She has made over 40 refereed presentations at national and international conferences. Dr. Sedlock is a Fellow of the Research Consortium of the American Alliance for Health, Physical Education, Recreation, and Dance, and she is a member of Sigma Xi. She has been a member of the National ACSM since 1980 and has been a Fellow since 1989. Dr. Sedlock has been a member of the Midwest Chapter of ACSM since 1990, and she served as Member-at-Large to the Board of Directors in 1990-93. She is currently serving as President-Elect of the Midwest Chapter.

"Fit People Recover Faster: Fact or Fiction?"

Maximal aerobic capacity can be estimated from responses to submaximal exercise. One of the earliest of these assessments used the recovery response (i.e., heart rate) to a stepping activity based on the assumption that an individual with a higher level of aerobic fitness will recover more rapidly than one who is not as fit. This phenomenon has since been studied in more depth and is reported in the body of literature examining oxygen uptake (VO_2) kinetics (O_2 deficit/O_2 debt curves). More recently, however, an alternate approach to the study of the metabolic recovery from exercise has emerged, with the more contemporary label of excess postexercise oxygen consumption (EPOC) replacing the term O_2 debt. In contrast to studies of VO_2 kinetics where recovery VO_2 is measured for a relatively short period of time (e.g., 10 min) and is often incomplete at the end of this predetermined time period, researchers of EPOC almost invariably follow the recovery process until VO_2 returns to resting levels. Depending on which body of literature one peruses (i.e., VO_2 kinetics or EPOC), it is possible to arrive at two different answers to the question of whether or not individuals who are more aerobically fit will recover faster than those who are less fit. The literature on VO_2 kinetics indicates that the rate of recovery from submaximal exercise will be faster when one is endurance-trained vs. untrained. Although given less attention in the EPOC literature, studies examining the role of aerobic fitness level in mediating the postexercise response seem to indicate that the time for complete recovery is similar in both the trained and untrained state.



Friday, February 4
10:15-10:30 a.m.

THE EFFECTS OF ANKLE BRACING ON POSTURAL SWAY

S.J. Kinzey, C.D. Ingersoll*, FACSM, K.L. Knight*, FACSM
Applied Biomechanics Laboratory, University of Toledo, Toledo, OH; Sports Injury Research Laboratory, Indiana State University, Terre Haute, IN

The purpose of this study was to determine the effects of three selected ankle braces on postural sway. Twenty-four male volunteers (age; 19 to 27 yrs) without ankle injuries served as subjects. Postural sway variables were measured during a one-legged modified Romberg test with six variations. The bracing conditions used were the Active Ankle Trainer, AirCast Sport Stirrup, the McDavid lace-up brace, and no brace (control). Each subject performed three 16-s trials of each Romberg variation for each brace condition. Center of pressure transmitted through the bottom of the foot was monitored during each trial and transformed into total, anterior-posterior (AP), and medial-lateral (ML) sway. Sway was increased (for AP, $p = 0.029$; ML, $p = 0.028$) during brace wearing when sensory modalities were functioning normally, but not during the five conditions when visual, vestibular, and/or somatosensory systems were eliminated or conflicted. We concluded that braces inhibit somatosensory input at the ankle joint. The proprioceptive role of ankle bracing in injury prevention may be inhibitory rather than facilitory as previously thought.

Friday, February 4
10:30-10:45 a.m.

PHYSIOLOGICAL EFFECTS OF A 3000-MILE TANDEM BICYCLE TREK FOR A SUBJECT WITH DOWN SYNDROME - A CASE STUDY

Phillip B. Watts, Barbara C. Silta, Exercise Science Laboratory, Northern Michigan University, Marquette, MI and James Stray-Gundersen, Baylor/UT Southwestern Sports Science Research Center, Dallas, TX.

Recent study by Pitetti, et al. has documented lower cardiovascular capacities in adults with Down syndrome (DS) when compared with mentally retarded adults without DS. Little information is available on the physiological characteristics of active adults with DS. This study provided the opportunity to observe a number of physiological variables before, during and after a long-distance tandem bicycle trek in an adult with DS and in a non-mentally retarded adult sibling. Subject A was a 40 year old male with DS who regularly exercised 45-60 minutes per day through a variety of activities including weight-lifting, calisthenics and stationary cycle ergometry three to five times per week. Subject B was 59 years old and followed a similar exercise program as A. Over a 47-day period the subjects pedalled a tandem mountain bicycle from Sacramento, CA to Atlanta, GA averaging over 80 miles per riding day for a total of just over 3000 miles. Maximum graded exercise tests using electronically braked isokinetic cycle ergometers, open circuit expired air analysis, and 12-lead electrocardiography were conducted within ten days of the beginning (Test 1) and ending points (Test 2) of the trek and at the approximate mid-point (Test 3) in Dallas, TX. Body composition was assessed via skinfold measurements and body density calculated according to the generalized equations of Jackson and Pollock. Subject B did not complete Test 1 due to illness. Maximum exercise data for Subject A likely reflects submaximum responses due to difficulty in getting a high intensity work effort from this subject. Neither subject experienced more than a five pound weight change over the duration of the ride. Subject A had no change in percent body fat, while subject A experienced a decrease of 2.2%. Subject A had no change in maximum oxygen uptake (VO_{2max}), however, he achieved his highest VO_{2max} of 32.3 $ml \cdot min^{-1} \cdot kg^{-1}$ and highest peak work rate of 165 Watts at Test 2. Subject B had a higher peak work rate at Test 3, 200 vs 262 Watts, however, his VO_{2max} was slightly higher at Test 2, 43.3 vs 42.3 $ml \cdot kg^{-1} \cdot min^{-1}$. It is surprising that the 3000-mile ride had little physiological impact on either subject, however, this case study demonstrates that such a physical challenge is within the capabilities of physically fit persons with Down syndrome.

Friday, February 4
10:45-11:00 a.m.

EFFECT OF AEROBIC EXERCISE TRAINING ON RESTING HEPATIC BLOOD FLOW IN YOUNG AND ELDERLY ADULTS

L.B. Panton, G.J. Guillen, L. Williams, D.T. Lowenthal, J.E. Graves, H. Derendorf, L. Garzarella, C. Vivas, and M.L. Pollock. Departments of Medicine, Exercise and Sport Sciences, and Pharmacology. University of Florida and VA Medical Center, Gainesville, FL 32611

To evaluate the effect of endurance training on resting estimated hepatic blood flow (EHBF), 23 young (Y) (30±5 yr) and 20 elderly (E) (67±5 yr) adults were randomly assigned to 4 months of endurance training (Y:n=12; E:n=10) or nonexercising control (Y:n=11; E:n=10) groups. Training consisted of treadmill walking and/or stairclimbing 3 times per week. Subjects trained initially for a duration of 20 min at 60% of heart rate reserve (HRR) and progressed until they were training for 40 min at 80% of HRR. Estimated HBF, using indocyanine green (ICG) technology was measured at supine rest before and after 4 months of training. Training increased ($p \leq 0.05$) maximal oxygen uptake ($\dot{V}O_2max$) approximately 13% in both the young (34.7±5.2 to 39.0±6.0 $ml \cdot kg^{-1} \cdot min^{-1}$) and elderly (22.5±3.7 to 25.6±4.7 $ml \cdot kg^{-1} \cdot min^{-1}$). Plasma volume (PV) increased ($p \leq 0.05$) approximately 14% following training in both the young (2670±274 to 3079±374 ml) and elderly (2679±471 to 3014±533 ml) training groups. Initial values of EHBF were not different ($p > 0.05$) between the young (1306±378 ml/min) and elderly (1073±354 ml/min). Adjusted post-training means from an analysis of covariance revealed that after training EHBF was not different between the elderly control (1119 ml/min) and training (1057 ml/min) groups. In contrast, the adjusted means for the young training group (1338 ml/min) was significantly higher ($p \leq 0.05$) than the young control group (1126 ml/min). These results provide evidence that 1) EHBF is similar in healthy, untrained elderly and young adults; and 2) endurance training may increase EHBF in young, but not elderly subjects.

Friday, February 4
11:00-11:15 a.m.

THE EFFECTS OF EXCESSIVE TRAINING AND DETRAINING ON TESTICULAR FUNCTION

H.L. Hall, M.G. Flynn, FACSM, K.K. Carroll, P.G. Brolinson, S. Shapiro, B.A. Kooiker, Exercise Physiology Lab, University of Toledo, and Sports Care, The Toledo Hospital, Toledo, OH 43606

Eight male runners (32-64 km/wk; VO2 max=58.7 ml/kg/min; 24.0 yr) and eight age-matched sedentary males (24.5 yr) participated in this study. Subjects provided blood and semen samples every two weeks for eight weeks. Blood samples were a composite of three samples taken at 20 min intervals (0700-1000 hours). The training regimen for the runners was as follows: Week 1-2, normal training (NT), Week 3-4, approximately 143% NT (IT1); Week 5-6, approximately 186% of NT (IT2); Week 7-8, 50% of NT (RT). Controls refrained from exercise throughout the eight weeks. Semen volume, sperm count, density, motility, and morphology were determined. Serum was analyzed for total (TT) and free testosterone (FT), luteinizing hormone (LH), prolactin (PRO), cortisol (COR), and follicle stimulating hormone (FSH) using radioimmunoassay. There were no significant differences observed between runners and controls for TT, FT, LH, PRO, COR, or FSH. In addition, there was no significant treatment effect for semen volume, sperm concentration, total sperm count, motility, or morphology. Two of the runners in this investigation dropped to oligospermatic levels following the IT2 period but total sperm count increased in both subjects following two weeks of RT. In conclusion, four weeks of increased training in runners did not result in significant alterations in total sperm count, sperm concentration, motility, or morphology.

Friday, February 4
11:15-11:30 a.m.

3D KINEMATIC CONTRIBUTIONS TO DISTANCE THROWN BY OLYMPIC WOMEN SHOT PUTTERS.
J.R. Stevenson, K.M. Mustian[a], and R.W. McCoy[b]. Central Michigan University, [a]East Carolina University, [b]College of William & Mary.

The purpose of this study was to quantify the technique of Olympic women shot putters and determine which 3D kinematic variables contribute to the distance thrown. All analyzable throws from the top seven finalists at the 1992 Olympic Summer Games were digitized at 100 Hz using three-dimensional videography and analysis techniques. Twenty-eight 3D kinematic variables along with temporal parameters were calculated for each of 29 legal throws. Regression analysis of these throws of the top seven women produced a step-wise equation using eight non-collinear variables that resulted in a multiple r-square of .51 as compared to a simple regression equation using just release velocity, height, and angle (r-square = .58) in predicting distance thrown. In addition, further analysis of the two best throws of the 12 women finalists, as compared to those of the 12 men finalists, revealed that women put the shot with a higher relative release height (1.19 BH) and higher release angle (39.4°) than the men who used the rotational (35.3°) or glide (35.7°) techniques. The men were able to generate larger release velocities of 13.24 and 13.17 m/s for the rotational and glide techniques, respectively, as compared to the women gliders at 12.68 m/s. These differences show that lower release angles and heights enable the body to generate quicker speed during the shot put movement.

Funding for this study was provided by the IOC Medical Commission & USA Track & Field.

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Special appreciation is extended to the following individuals and institutions for donating items to be used for a raffle to generate funds for the student research presentation awards:

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November 4-5, 1994
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POSTER EVALUATIONS--Session 1

Please rate the program poster presentations according to the following scale:

5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Visual Aids	Quality of Presentation Speaker / Content	Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
Dr. Steven Freeman, "Rhabdom, induced acute renal failure in an ultra endurance athlete presenting as an upper gastrointestinal bleed"				
Dr. William Simpson, "A cross-sectional body composition profile of 18-21 year old male students"				
Janie Probst, "A cross-sectional body composition profile assessment of undergraduate female students"				
Dr. Gregory Dwyer, "Incidence of ST segment depression during exercise testing and related characteristics of apparently healthy subjects"				
Julie Gay, "Validity of self-assessed pulse rates in phase II and phase III cardiac patients"				
Joanne Sommers, "Motivation for exercise in mall walkers utilizing the Health Belief Model"				
Brenda Reeves, "Effects of a pilot exercise program on fitness and health status, and counseling behavior of health care professionals"				
Carey Beaven, "Awareness and compliance with target heart rate by individuals walking in unsupervised community programs"				
Christopher Miller, "Variability in RPEs at fixed exercise intensities during graded exercise testing in an adult fitness population"				
Darcy Tataryn, "Effects of massage on recovery leg strength"				

POSTER EVALUATIONS--Session 2

Please rate the program poster presentations according to the following scale:

5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Visual Aids	Quality of Presentation Speaker / Content	Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
Sean Humphreys, "Segmental kinematic factors affecting release velocity of the luge start"				
Michael Meyer, "Effects of a commercially available golf swing-aid on clubhead speec, distance and accuracy"				
Clinton Brawner, "Effects of foot orthotics on the GRF during running"				
Craig Moore, "Sensitivity of the active knee extension test vs. the straight leg raise test for hamstring flexibility"				
Donald Melrose, "Effect of eccentric loading on series elastic contribution to vertical jump performance"				
Daihyuk Choi, "Effect of passive and active recovery on the resynthesis of muscle glycogen"				
Jill Bangart, "Contractile properties of single rat soleus fibers following hindlimb suspension with intermittent weight bearing"				

SPEAKER EVALUATIONS

Please rate the program speakers according to the following scale:

5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Audiovisual Aids	Quality of Presentation Speaker / Content	Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
Dr. William J. Kraemer, "Strength Training in Youth"				
COMMENTS:				
Dr. Jeffrey E. Edwards, "A Review of the Methods for Measuring Energy Expenditure: Past and Present"				
COMMENTS:				
Dr. Jeffery J. Betts, "Development of a New Professional Student Organization"				
COMMENTS:				
Dr. Kenneth W. Hinchcliff, "Alaskan Sled Dogs: Ultimate Endurance Athletes?"				
COMMENTS:				
Dr. Darlene Sedlock, "Fit People Recover Faster: Fact or Fiction?"				
COMMENTS:				

FREE COMMUNICATIONS SPEAKER EVALUATIONS

Please rate the free communications speakers according to the following scale:
5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Audiovisual Aids	Quality of Presentation Speaker / Content	Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
SESSION 1				
Todd Brickman, "Carbohydrate loading and high intensity performance"				
Barbara Kooiker, "Influence of cross training on indices of training stress and performance"				
Jennifer Sherwood, "Effect of an acute bout of weight bearing exercise on bone growth factors"				
Helene Szczerba, "Body composition and blood lipids in male and female swimmers"				
Mariane Fahlman, "Mood state and subjective responses to a 24 hour race"				
SESSION 2				
Kevin Cole, "Effect of caffeine ingestion on perception of effort and subsequent work production"				
Kathy Carroll, "Natural cell-mediated cytotoxicity and lymphocyte mitogenesis following a 24 hour road race"				
Daniel Carl, "The effects of an acute prolonged exercise bout on lymphocyte subpopulations and serum hormone levels"				
Peter Bodary, "TransAm footrace: a case study"				
Mary Sled, "Aging and the response of cardiac vagal activity to increasing exercise intensity"				

FREE COMMUNICATIONS SPEAKER EVALUATIONS (continued)

Please rate the free communications speakers according to the following scale:
5) Exceptional
4) Very Good
3) Satisfactory
2) Fair
1) Poor

Speaker	Quality of Audiovisual Aids	Quality of Presentation Speaker / Content	Probability of Using Information Presented in Practice	Amount of New Information of Viewpoints Obtained
SESSION 3				
Bret Goodpaster, "Exogenous carbohydrate oxidation from soluble and insoluble carbohydrate"				
Cynthia Kasper, "L-carnitine supplementation and running performance"				
Glen Duncan, "Plateau in oxygen consumption at maximal exercise in male children"				
Dawn Barry-Bruner, "The effect of resting posture on the duration and magnitude of post-exercise oxygen consumption"				
Christopher Grossmann, "VO_{2max} estimates from the YMCA submaximal cycle protocol are not reliable"				
SESSION 4				
Stephen Kinzey, "The effects of ankle bracing on postural sway"				
Dr. Phillip Watts, "Physiological effects of a 3000-mile tandem bicycle trek for a subject with down syndrome--a case study"				
Lynn Panton, "Effect of aerobic exercise training on resting hepatic blood flow in young and elderly adults"				
Dr. Heather Hall, "The effects of excessive training and detraining on testicular function"				
Dr. John Stevenson, "3D kinematic contributions to distance thrown by Olympic women shot putters"				

FALL MEETING REGISTRATION FORM
Midwest Chapter
American College of Sports Medicine
October 26-28, 1995

PRINT OR TYPE INFORMATION
(Name badge information taken from this form)

Name _____

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Affiliation _____

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FEE SCHEDULE (Registration must be postmarked by 10/15/95 to qualify for reduced fee)

	Pre-Registration By 10/15/95	Registration After 10/15/95	Total
MWACSM Members			
Professional and Professional-in-Training	$65.00	$85.00	$_____
Student	$35.00	$45.00	$_____
Non-MWACSM Members (1996 Membership included.)			
Professional and Professional-in-Training	$80.00	$100.00	$_____
Student	$40.00	$50.00	$_____

Health/Fitness Instructor candidates receive 20% discount on registration fee.

PAYMENT METHOD
Check _____ *Make checks payable to *Midwest ACSM*

*If you have a disability which requires special accommodations, please notify us of your needs at least **two weeks** in advance of the program.

Please send registration form with payment to:

Michael G. Flynn, Ph.D.
Health Promotion and Human Performance
University of Toledo
HE-238
Toledo, Ohio 43606
Telephone: 419-537-2434;
FAX: 419-537-4759
E-Mail: MFLYNN@UTNET.UTOLEDO.EDU

INFORMATION

The Midwest Chapter of the American College of Sports Medicine celebrates twenty-five years by hosting its annual meeting at Pheasant Run Resort, in St. Charles, Illinois. The meeting will present the current developments in exercise physiology, sports medicine, sports psychology, biomechanics, and more. Objectives of the MWACSM meeting are to (1) enhance the scientific and clinical understanding of the physiological, biomechanical, and psychological bases for the changes that occur during and following exercise in both normal and pathological states; (2) provide a forum for students to present research related to sports medicine and exercise science; and (3) promote interaction among scientists and clinicians in related fields to provide new approaches to, and perspectives on, problems in exercise science and sports medicine.

- **Registration**

A discount is available through pre-registration. You will not only save money but also time spent in registration lines as well. When completing your registration form, be sure to furnish all information requested to avoid delays. Pre-registration forms must be postmarked by October 15, 1995. On-site registration will begin on Thursday, October 26, 1995 at 1:00 p.m. at Pheasant Run Resort.

- **Cancellations**

A full refund will be given provided that **written** cancellation is received by October 15, 1995. A processing fee of $20.00 will be charged for cancellations received between October 15-22. No refunds after October 22.

- **Continuing Education**

Applications have been filed for Continuing Education Credits and Continuing Medical Education Credits. The number of credit hours is yet to be determined. Individuals requiring credit verification of attendance at the meeting must register and pay a fee of $10 for ACSM members, and a fee of $15 for non-members.

- **Lodging**

A block of rooms has been reserved for meeting participants at the Pheasant Run Resort (4051 E. Main St., St. Charles, IL 60174-5200). Registrants are responsible for making hotel reservations by contacting the resort at 708-584-6300. The resort has reserved a limited number of non-smoking rooms for the MWACSM meeting until **September 26, 1995**. The room rates at Pheasant Run Resort are $79 (single) and $89 (double). The resort offers an on-site restaurant and comedy club in addition to a sports bar. Swimming, golf, fitness equipment, and other recreational opportunities are also available. Other convenient accommodations are available in St. Charles at Econo Lodge, Best Western, Super 8 Motel, or Days Inn.

- **Reminder**

The Program Committee encourages you to submit an abstract for the 1995 annual meeting. The deadline for abstract submissions is August 21, 1995. Students are reminded that they can submit the same abstract to both the MWACSM and national ACSM. Abstract forms are available from Tom Ball, Ph.D., Northern Illinois University, phone: 815-753-8004 or 815-753-1630.

- **Exhibits**

A student forum will be held on Friday morning which will include exhibits from graduate schools and internship sites. Students attending will receive a free continental breakfast. If you would like to exhibit materials, contact Bill Simpson, Ph.D., University of Wisconsin-Stevens Point, phone: 715-346-2720.

- **Health/Fitness Instructor$_{SM}$ Certification**

An ACSM Health/Fitness Instructor$_{SM}$ Certification Examination will be held Thursday morning, October 26. If you are interested in applying for certification, contact the national ACSM office, 317-637-9200. For additional information related to H/FI certification at Pheasant Run, contact Lenny Kaminsky, Ph.D., Ball State University, phone: 317-285-1140.

FACULTY

- **Helaine Alessio**, Ph.D., Miami University, Ohio
- **Rafael E. Bahamonde**, Ph.D., Ball State University, Indiana
- **Karen Ball**, Ph.D., Alma College, Michigan
- **P. Gunnar Brolinson**, M.D., Sports Care, Ohio
- **Barbara N. Campaign**, Ph.D., ACSM National Center, Indiana
- **John W. Chow**, Ph.D., Univ. of Illinois @ Urbana-Champaign
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- **David L. Costill**, Ph.D., Ball State University, Indiana
- **Joan Duda**, Ph.D., Purdue University, Indiana
- **Hermann J. Engels**, Ph.D., Wayne State University, Michigan
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- **Steve Freeman**, M.D., Sports Care, Ohio
- **Leroy "Bud" Getchell**, Ph.D., Indiana University
- **I. Martin Grais**, Ph.D., Clinical Cardiology Group, Ltd., Illinois
- **James G. Hay**, Ph.D., University of Iowa
- **Robert C. Hickson**, Ph.D., University of Illinois
- **Edward T. Howley**, Ph.D., University of Tennessee
- **Reed H. Humphrey**, Ph.D., Virginia Commonwealth Univ.
- **Christopher D. Ingersoll**, Ph.D., Indiana State University
- **Leonard A. Kaminsky**, Ph.D., Ball State University, Indiana
- **Steven J. Keteyian**, M.D., Henry Ford Hospital, Michigan
- **Timothy E. Kirby**, Ph.D., Ohio State University
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- **Judith K. Smouter**, M.S., Professional Fitness Systems, Michigan
- **Mitchell H. Whaley**, Ph.D., Ball State University, Indiana
- **Susan Yoder**, ACSM National Center, Indiana

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- **Leonard A. Kaminsky**, Ph.D., Ball State University, Indiana
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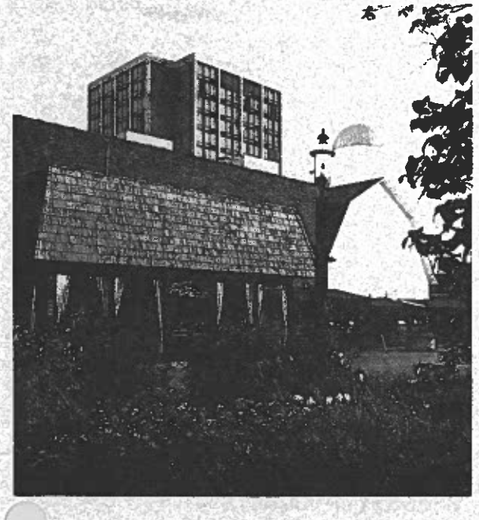
Advance Program

AMERICAN COLLEGE OF SPORTS MEDICINE

MIDWEST CHAPTER
Annual Fall Meeting

Celebrating 25 Years



Pheasant Run Resort, St. Charles, Illinois
October 26-28, 1995

Abstract Deadline is August 21, 1995

ADVANCE PROGRAM

Thursday, October 26, 1995

PRE-PROGRAM

ACSM CERTIFICATION EXAM

7:00 am **Health/Fitness Instructor**
Leonard A. Kaminsky, Ph.D., Certification Director
Ball State University

Mitchell H. Whaley, Ph.D., Site Director
Ball State University

PROGRAM

1:00 pm **REGISTRATION**

"KICK-OFF COLLOQUIA"

2:00 pm **"Healthy People 2000"**
Steven J. Keteyian, M.D., Moderator
Henry Ford Heart and Vascular Institute, Detroit

Hermann J. Engels, Ph.D.
Wayne State University, Detroit, Michigan

Judith K. Smouter, M.S.
Professional Fitness Systems, Warren, Michigan

3:00 pm **"The ACSM Research Grants Program"**
Barbara N. Campaigne, Ph.D.
ACSM National Center

4:00 pm **"Orthotics and Running"**
Steve Simons, M.D.
St. Joseph Medical Center

4:00 pm **"Research Grant Opportunities in Exercise Science and Sports Medicine"**
Barbara N. Campaigne, Ph.D.
ACSM National Center

RESEARCH PRESENTATIONS

7:00 pm **Free Communications**

CLINICAL LECTURE

7:00 pm **"Is Heart Failure A Neuroendocrine or Hemodynamic Disease?"**
I. Martin Grais, M.D.
Clinical Cardiology Group, Ltd., Chicago

BIOMECHANICS

8:00 pm **"Biomechanical Assessment of Brain Injuries"**
Christopher D. Ingersol, Ph.D.
Indiana State University

9:00 pm **"Musculoskeletal Modeling: A Search for Model Parameters"**
John W. Chow, Ph.D.
University of Illinois @ Urbana-Champaign

PHYSIOLOGY

8:00 pm **"Antioxidants and Aging"**
Helaine Alessio, Ph.D.
Miami University of Ohio

9:00 pm **"Exercise and Aging"**
William J. Evans, Ed.D.
Penn State University

Friday, October 27, 1995

STUDENT FORUM

7:00 am **Graduate Schools and Internship Sites Exhibits**

CLINICAL LECTURES

8:15 am **"Fitness Exercise: From the Past to the Future"**
Leroy "Bud" Getchell, Ph.D.
Indiana University

9:05 am **"Clinical Approaches to Exercise Therapy"**
Richard Lampman, M.D.
St. Joseph Mercy Hospital, Ann Arbor

9:55 am **"Concussion: When to Return to Play--The Dilemmas"**
P. Gunnar Brolinson, M.D.
Sports Care, Toledo

SYMPOSIA: ELITE ATHLETES

8:15 am **"Learning from the Best: Expected & Unexpected Findings from Studies of Elite Jumpers"**
James G. Hay, Ph.D.
University of Iowa

9:05 am **To Be Announced**

9:55 am **"The Sport Psychology Component of the USA Women's Gymnastics Program: Bridging the Gap between Research, Practice, and the Sport Sciences"**
Joan Duda, Ph.D.
Purdue University

10[illegible] **BREAK**

RESEARCH PRESENTATIONS

11:00 am **"Poster Sessions: Authors Present"**

11:00 am **"Free Communications"**

12:00 pm **BREAKOUT SESSIONS**

"How Can Biomechanics Help Your Tennis Game?"
Rafael E. Bahamonde, Ph.D.
Ball State University

"Overtraining/Crosstraining"
Michael G. Flynn, Ph.D.
University of Toledo

"Finding a Job and Job Satisfaction in Cardiac Rehabilitation: An Update for Students Entering a Rapidly Changing Field"
Steven J. Keteyian, Ph.D.
Henry Ford Heart and Vascular Institute, Detroit

Timothy E. Kirby, Ph.D.
Ohio State University

"From Exercise Testing to Exercise Prescription"
Leonard A. Kaminsky, Ph.D.
Ball State University

Mitchell H. Whaley, Ph.D.
Ball State University

"Molecular Biology and Exercise"
Robert C. Hickson, Ph.D.
University of Illinois at Chicago

"Common Sport Injuries of the Hand: Evaluations and Treatment"
Steve Freeman, M.D.
Sports Care, Toledo

"Tips on Scientific Presentations"
David L. Costill, Ph.D.
Ball State University

"Exercise Physiology and Physical Therapy"
Lynn Millar, Ph.D.
Andrews University, Dayton

2-5:00 pm **RECREATIONAL EVENTS**

WORKSHOP

2:00 pm **"What the ACSM National Office Can Do For You"**
Susan Yoder, Director of Membership & Chapter Services, ACSM National Center

3:00 pm **SPECIAL INTEREST GROUPS**
If you have a group interested in meeting, please contact Mike Flynn,Ph.D. Univ. of Toledo, phone: 419-537-24[illegible]

5:30 pm **BANQUET**
Awards Presentation
MWACSM Business Meeting

7:30 pm **KEYNOTE LECTURES**

"Psychological Outcomes of Vigorous Physical Activity"
William P. Morgan, Ed.D.
University of Wisconsin-Madison

8:30 pm **"The Aging Distance Runner"**
David L. Costill, Ph.D.
Ball State University

9:30 pm **MWACSM SOCIAL & EXHIBITS**

Saturday, October 28, 1995

CLINICAL LECTURES

8:15 am ***"Guidelines for Exercise Testing & Prescription*: An Analysis of the 5th Edition of ACSM Guidelines"**
Reed H. Humphrey Ph.D., P.T.
Virginia Commonwealth University

9:05 am **Overview of Childhood Musculoskeletal Problems with a Special Emphasis on Spondylolysis"**
Joseph Congeni, M.D.
Children's Hospital of Akron, Ohio

TUTORIAL LECTURE

9:55 am **"Measurement of VO_{2max}: Criteria, Accuracy, & Pitfalls"**
Edward T. Howley, Ph.D.
University of Tennessee

SYMPOSIA: EXERCISE/MOLECULAR BIOLOGY
John Davis, Ph.D., Moderator
Alma College, Michigan

8:15 am **"Exercise and Glutamine Support Inhibit Glutamine Synthetase Expression and Glucocorticoid-induced Muscle Atrophy"**
Robert C. Hickson, Ph.D.
University of Illinois at Chicago

9:05 am **"Protein-Protein Interactions and the Molecular Mechanisms Underlying Myocardial Dysfunction During Acidosis"**
Karen Ball, Ph.D.
Alma College, Michigan

9:55 am **"Neural and Mechanical Regulation of Contractile Protein Genes in Skeletal Muscle"**
Karyn Esser, Ph.D.
University of Illinois at Chicago

RESEARCH PRESENTATIONS

11:00 am **"Free Communications"**

11:00 am **"Poster Sessions: Authors Present"**

Conference Program

American College of Sports Medicine Midwest Chapter

Celebrating 25 years

Annual Meeting

Pheasant Run Resort
St. Charles, Illinois
October 26–28, 1995

Welcome to the Midwest Regional Chapter American College of Sports Medicine Annual Meeting. We are pleased that you could join us to help celebrate our 25th year of service to sports medicine students and professionals. The Program Planning Committee has worked to put together a program that reflects the diversity of the membership in the chapter. We hope that you find the meeting enjoyable and educational.

We encourage you to take advantage of the recreational activities available at the resort and the surrounding community. If you have any questions regarding activities, there will be a host at registration from the St. Charles Convention and Visitors Bureau.

As always, we welcome your comments and ask that you take a moment to fill out the speaker evaluation forms at the back of the brochure.

Thursday, October 26, 1995

Pre-Program	Location
ACSM Certification Exam	Turquoise B
7:00 am *Health/Fitness Instructor*	Jade
Leonard A. Kaminsky, Ph.D., Certification Director	Coral
Ball State University	Sapphire
	Arnold Palmer
Mitchell H. Whaley, Ph.D., Site Director	
Ball State University	
1:00–7:00 pm **Registration**	Pool Solarium
"Kick-off Colloquia"	Salon II
2:00 pm *"Healthy People 2000"*	
Herman J. Engels, Ph.D., Moderator	
Wayne State University	
Judith K. Smouter, M.Ed.	
Professional Fitness Systems, Warren, Michigan	
3:00 pm *"The ACSM Research Grants Program"*	Salon V & VI
Barbara N. Campaigne, Ph.D.	
ACSM National Center	
3:30 pm *"Common Sport Injuries of the Hand: Evaluation and Treatment"*	Salon II
Steve Freeman, M.D.	
Sports Care, Toledo, OH	

4:00 pm *"Research Grant Opportunities in Exercise Science and Sports Medicine."* Salon II

Barbara N. Campaigne, Ph.D.
ACSM National Center

Research Presentations

6:45 pm Free Communications - Slides (Student) Salon II

Moderator: Dr. Sharon Plowman, Northern Illinois University

6:45 *"Effects of Exercise on the Macrophage MHC II Response to Inflammation"*
Michael Ceddia, University of Illinois-Champaign

7:00 *"Reliability of Aerobic Capacity (VO_{2max}) Testing in Young Girls"*
Margaret A. Lauderdale, Michigan State University

7:15 *"Iron Status and Immune Function in Collegiate, Female Swimmers"*
William A. Braun, University of Toledo

7:30 *"Biomechanical Analysis of A Shoulder Abduction Exercise Using Theraband® and Free Weight"*
Evangelos A. Christou, University of Illinois-Champaign

Effects of Exercise on the Macrophage MHC II Response to Inflammation

M.A. Ceddia, C. Kozak, B. Wolters, and J.A. Woods., Department of Kinesiology, University of Illinois @ Urbana/Champaign, Urbana, IL 61801.

Recent evidence supports the hypothesis that moderate exercise enhances, whereas exhaustive exercise suppresses, various measures of immunity. The MHC (major histocompatibility complex) antigens are essential for reactions of immune recognition. While Class I MHC antigens are important in self recognition, Class II MHC antigens are found on antigen-presenting cells, including macrophages (Mϕ's), and play a role in the development of cell-mediated immune responses. In response to inflammation Mϕ cell surface expression of MHC II increases dramatically. The purpose of this investigation was to determine the effects of exercise on the ability of *Propionibacterium acnes* (*P. acnes*) to induce MHC II on Mϕ's. Pathogen-free male Balb/c mice (n=32) were exercised on a treadmill moderately (MOD, 18 m/min, 5% grade, 30 min/day) or exhaustively (EXH, 18-35 m/min, 5% grade, 2-4 hr/day) for a period of 7 days during inflammation. A control group (SC) consisted of animals exposed to the treadmill environment and handling. Inflammation was induced in all animals by i.p. injection of *P. acnes*. Animals were sacrificed on Day 7 and Mϕ's were harvested by peritoneal lavage. Direct immunofluorescent staining was performed by incubated lavage cells (10^6) with an FITC-labeled anti-mouse MHC II (I-A^b) antibody (1.0 ug, Pharmingen). Cells were also left untreated or incubated with an FITC-labeled isotype control antibody to correct for autofluorescence and background. Cells were fixed with paraformaldehyde and analyzed on a Coulter flow cytometer. This analysis allowed us to determine both the number of Mϕ's expressing MHC II (% positives) and the relative amount of MHC II expressed (fluorescent intensity, FI). There was no significant differences among the groups in the percentage of Mϕ's expressing MHC II (SC 53.4±2.59[mean±sem]; MOD 51.8±2.4; EXH 49.1±3.07). However, EXH significantly ($p<.05$) suppressed the expression (FI) of MHC II when compared to MOD (37.1±1.95 vs 49.1±2.15). When each exercise group was compared to SC (43±2.93) there was a trend toward significance ($p=.10$) such that MOD>CON>EXH. This data supports the inverted U hypothesis in that MOD appears to be beneficial when compared to EXH with respect to expression of MHC II in response to inflammation. This may partially explain the increased incidence of infections seen after strenuous exercise or overtraining.

RELIABILITY OF AEROBIC CAPACITY (VO_{2max}) TESTING IN ADOLESCENT GIRLS

M.A. Lauderdale, M.C. Dwyer, and J.M. Pivarnik. Michigan State University; Dept of PEES; East Lansing, MI

Knowing the reliability of measures obtained during VO_{2max} testing is crucial for investigators to determine whether changes and/or differences in fitness are real, or simply represent biological variability. We have little such information in girls, despite the fact their fitness levels are thought to decrease with age. The purpose of this study was to determine the reliability and day to day reproducibility of aerobic fitness measures in adolescent girls. METHODS Thirty-two girls (age 10-16) performed two continuous, incremental VO_{2max} tests on a motorized treadmill (TM). Subjects began at 2.5 mph and 0 grade. Speed was increased to 6.0 mph (0.5 mph each min) after which TM elevation was increased 3% each min until the subject reached volitional exhaustion. Tests were separated by at least 7 days. VO_2 was measured via indirect calorimetry. Heart rate (HR) was monitored by a pulse telemetry unit with values recorded each min. Two of the three following criteria for VO_{2max} must have been met for a subject to be included for statistical analyses: a) <2.0 ml·kg^{-1}·min^{-1} increase in VO_2 with increasing stage, b) respiratory exchange ratio (RER) >1.05, and c) HR >95% of age predicted max at test end. Subjects' VO_{2max}, HR_{max}, RER_{max}, and TM time were analyzed for test-retest differences (ANOVA). Intraclass correlation coefficients were determined using repeated measures ANOVA. RESULTS Mean (±SD) test measures were VO_{2max}: 41.0±5.0 ml·kg^{-1}·min^{-1}, HR_{max}: 198±8 b·min^{-1}, RER_{max}: 1.16±0.06, and TM time: 10.1±1.1 min. Intraclass (Rxx') reliability coefficients were 0.93, 0.92, 0.60, and 0.91 for VO_{2max}, HR_{max}, RER_{max}, and TM time, respectively. Estimated Rxx' from a single test administration based on intraclass reliability was only slightly less at 0.87, 0.85, 0.43, and 0.84. Mean differences were small and ranged from 0.0 to 1.0% between tests (ns). Standard errors of measurement ranged from 2-4 %. CONCLUSION VO_{2max} testing is very reliable in adolescent girls with small day-to-day variability. Additionally, an investigator can be confident that a single administration of a VO_{2max} test should provide a reliable estimate of girls' aerobic fitness levels.

BIOMECHANICAL ANALYSIS OF A SHOULDER ABDUCTION EXERCISE USING THERABAND® AND FREE WEIGHT

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The purpose of this study was to compare the shoulder abduction torque-angle curves obtained using dumbbells and TheraBand® as the source of resistance to the corresponding maximum isometric strength curve. Eleven male subjects (age 22 to 32 years, weight 556 to 1156 N) served as subjects. Each subject performed maximum isometric shoulder abductions in a sitting position at angles of 0°, 30°, 45°, 60°, and 90° on a Cybex II isokinetic dynamometer. After the isometric contractions, the subjects performed a shoulder abduction exercise in a standing position using a barbell or a green /blue color TheraBand® until the 10 repetition maximum (RM) load for each device was identified. To examine the presence of fatigue, another set of isometric trials was performed at the same shoulder abduction angles at the end of the data collection session. All trials were videotaped using a Panasonic AG-455 S-VHS camcorder and the coordinate data of selected landmarks were obtained using a Peak Motion Measurement System. Assuming that the inertial effect was negligible and using the inertial parameters reported in the literature, the resultant shoulder torque (T_r) values were obtained using the moment equation about the shoulder joint. The isometric T_r recorded, ranged from 62.7-88.5 N·m ($\bar{x}$= 71.1±4.6). The dumbbell 10 RM T_r ranged from 8.1-63.7 N·m ($\bar{x}$= 41.9±9.8) and the TheraBand® ranged from 1.4-38.5 N·m ($\bar{x}$= 23.6±6.9). The results indicated that the torque-angle (T_r-θ) curves of the dumbbell and the TheraBand® are similar in shape. However the dumbbell T_r-θ produced higher values than the corresponding T_r-θ curves of the TheraBand®. The shape of the curves differ significantly from that of the strength curve. These results show that both the dumbbell and the Theraband® exercises begin with low resistance and end with high resistance. This is contrary to the T_r-θ characteristic of the shoulder abductors, which show a substantial reduction in force production towards the end of the range of motion. It was concluded that both the TheraBand® and the dumbbell do not provide adequate load to the shoulder abductors through the whole range of motion.

IRON STATUS AND IMMUNE FUNCTION IN COLLEGIATE, FEMALE SWIMMERS

Braun, W. A., M. G. Flynn, D. L. Carl, K. K. Carroll, C. P. Lambert
Exercise Physiology Laboratory, University of Toledo, Toledo, Ohio

Iron deficiency is common in athletes, with this deficiency being most prevalent in female athletes. Iron deficiency has been reported to have adverse effects on the immune system and has been associated with reductions in natural killer cell activity. This preliminary investigation was conducted to determine if a similar relationship exists between iron status and immune function in highly conditioned, female athletes. Ten, collegiate, female swimmers (SWM) and nine inactive, female controls were subjects in this study. Resting blood samples were obtained and analyzed for serum iron, ferritin and natural cell-mediated cytoxicity (NK). No significant relationship was found between iron and NK ($r = .55$, $p = 0.09$), or between ferritin and NK ($r = .33$, $p = 0.35$) for SWM. ANOVA revealed significantly higher ($p < 0.05$) NK activity (51.63% ± 15.79) in SWM than CON (30.34% ± 13.67). NK cell numbers (CD3-CD16+ CD56+) were 297 * 10^6 cells/l ± 100.0 (SWM) and 220 * 10^6 cells/l ± 97.34 (CON). Serum ferritin levels were not significantly different between SWM (20.38 ± 8.62 ng/ml) and CON (16.79 ± 10.53 ng/ml). The results of this study indicate that there was not a significant relationship between iron status and immune function as measured by NK activity in highly conditioned, female athletes. In conclusion, aerobic training may improve NK activity; however, the influence of iron status on immune function requires further evaluation.

Clinical Lectures

6:45 pm *"Is Heart Failure A Neuroendocrine or Hemodynamic Disease?"* Salon V & VI

I. Martin Grais, M.D.
Northwestern University Medical School

Heart failure is defined as inadequate cardiac output to meet the needs of the body despite adequate venous return. Today the most common cause is systolic left ventricular dysfunction due to coronary artery disease. The usual therapy includes revascularization, digitalis, diuretics and vasodilators with nitrates and ACE inhibitors being the most important.

Both ACE inhibitors and cardiac rehabilitation have been shown to significantly increase exercise capacity in patients with systolic heart failure. ACE inhibitors acutely and chronically reduce afterload, increasing cardiac output, and also through vasodilatation increasing peripheral blood flow. They also produce favorable ventricular remodeling long term. Chronic exercise improves exercise capacity in severe heart failure largely through peripheral adaptive mechanisms and, in those with significant myocardial reserve, can also help through central effects.

During this discussion, I will review the pathophysiology of heart failure, emphasizing both the hemodynamic and neuroendocrine aspects and their relevance to exercise adaptations.

7:35 pm *"Exercise Training as an Adjunct to Therapy in Patients with Heart Failure"* Salon V & VI

Steve J. Keteyian, Ph.D.
Henry Ford Heart & Vascular Institute, Detroit, MI

The role of exercise training for the treatment of heart failure remains a paradox in a disease in which exercise intolerance is a characteristic finding. Although not yet widely incorporated into clinical practice, over the past decade several randomized exercise training studies have been conducted in these patients. This presentation will briefly review the response of patients with heart failure to acute exercise. Special attention will be directed toward the prognostic role of measuring peak oxygen consumption in these patients. The beneficial changes in exercise capacity, regional blood flow and skeletal muscle histology/biochemistry which occur as a result of exercise training will also be reviewed. This includes special consideration relative to prescribing exercise in these patients.

Biomechanics

8:00 pm *"Biomechanical Assessment of Brain Injuries"* Salon V & VI

Christopher D. Ingersol, Ph.D.
Indiana State University

This presentation will describe the biomechanics of closed head injuries mechanisms and evaluation methods. Closed head injury has been defined by several authors, but is not agreed upon. Its incidence in sports is relatively small, but because the effects may be catastrophic, must by duly considered. Forces may be applied to the head from different directions, which results in different types of lesions. The anatomical and physiological changes with head injury have been used to explain head injury outcomes. Effects on intelligence and memory have also been reported. Posture has been proposed as a model to examine the subtle effects of head injury. Vision, vestibular input, and somatosensory input are all involved in maintenance of posture. The interaction of these sensory modalities is also pertinent to posture maintenance. Somatosensory input appears to be improperly processed, while vision and vestibular input seem to compensate for lost somatosensation. Attention to regaining the somatosensory component, rather than waiting for compensation to occur, should be addressed in rehabilitation programs. Criteria for return to competition following head injury should also be reconsidered.

9:00 pm *"Musculoskeletal Modeling: A Search for Model Parameters"* Salon V & VI

John W. Chow, Ph.D.
University of Illinois at Champaign

Over the last three decades, musculoskeletal models have been used by biomechanists for various tasks. Because of the difficulties in determining the geometric locations and force of an individual muscle in vivo, most of the model parameters (e.g., muscle geometric data and constant a and b in Hill's characteristic equation) used in musculoskeletal modeling are typically taken from measurements made on cadavers and experiments performed on animal muscles under in vitro condition. In this presentation, the author will describe his work on the in vivo determination of the force-length-velocity relations (Hill's model) of individual quadriceps muscles of a female subject. Muscle geometric data were obtained from radiography and magnetic resonance imaging (MRI). Experimentally determined knee extension torques and muscle shortening velocity data were used to determine the maximum muscle stress and the unknown parameters in the muscle model.

Physiology and Aging

8:00 pm *"Antioxidants and Aging"* Salon II

Helaine Alessio, Ph.D.
Miami University of Ohio

Recently, there has been interest in antioxidants and health. Antioxidants include enzymes such as superoxide dismutase, catalase, and glutathione peroxidase, small molecules such as Vit C, Vit E, beta-carotene, bilirubin, and urate, and macromolecules such as albumin, transferrin, and ceruloplasmin. Antioxidants defend cells against harmful effects of prooxidants. Prooxidants include free oxygen radicals, hydroxyl radicals, and hydrogen peroxide. Both antioxidants and prooxidants affect our health and how we age. Their activity contributes to a condition known as oxidative stress which will be discussed from both theoretical and practical perspectives. Mechanisms of antioxidant activity (how do they work?) and antioxidant cocktails (which ones should I take?) will be discussed to elucidate anti-aging effects, whether more antioxidants is always healthier, potential toxicity from megadoses, performance enhancing effects, and likely benefits and risks from antioxidant supplementation. Studies that have focused on oxidative stress in muscle and brain tissue as a function of age and exercise will be examined.

9:00 pm *"Effects of Exercise on Body Composition and Functional Capacity in the Elderly"* Salon II

William J. Evans, Ph.D.
Penn State University

Frailty in the elderly is characterized, in part, by greatly reduced muscle mass and strength, as well as chronic conditions which predispose to impaired mobility and function. For men and women between the ages of 65 and 69, almost 30% and 46% of their remaining years will be spent dependent on others. Muscle strength is highly related to function in the very old. Data from the Framingham study indicate that 40% of women between 55-64, 45% between 65-74 and 65% between 75-84 could not lift 4.5 kg. In this study, similar percentages of the population reported an inability to perform heavy household work. This striking decrease in strength among the oldest members of our society place them at great risk of dependence and institutionalization. In population studies a significant negative correlation between strength and chosen normal walking speed for both sexes has been seen. In very frail, institutionalized men and women, muscle strength and leg power are closely related to walking speed, chair stand time, and stair climbing ability. Nursing home residents who have been classified as fallers have been shown to be significantly weaker in all of the muscle groups of the knees and ankles. Thirty five percent of a population of 1,042 home-dwelling men and women older than age sixty reported one or more falls in the preceding year. Among a host of factors that distinguished fallers from nonfallers, such as polypharmacy and arthritis, handgrip strength of the dominant hand emerged as the most important factor.

Our laboratory examined the effects of high intensity resistance training (80% of 1RM, 3 days/week) in older men (age 60-72 years). The average increase in knee flexor and extensor strength were 227% and 107% respectively. Total muscle area, assessed by CT analysis, increased by 11.4% while vastus lateralis biopsies showed an increase of 33.5% in Type I fiber area and 27.5% increase in Type II fiber area. We also measured the maximal rate of oxygen consumption (VO_{2max}) before and after strength training and demonstrated that lower body VO_{2max} increased significantly while upper body VO_{2max} did not, indicating that increased muscle mass can increase maximal aerobic power. It appears that the age-related loss of muscle mass may be an important determinant in the reduced maximal aerobic capacity seen in elderly men and women.

Since the sedentary lifestyle of a long term care facility may exacerbate losses of muscle function, we have applied this same training program to a group of frail, institutionalized elderly men and women (mean age 90 3 years, range 87-96). After 8 weeks, the 10 subjects in this study increased muscle strength by 174% and muscle size by 9%. In this population, increased muscle strength also increases gait speed and balance. The fact that significant muscle hypertrophy was seen in this population indicates that age does not decrease the capacity to adapt to a progressive resistance training program. Thus, exercise may minimize or reverse the syndrome of physical frailty which is so prevalent among the oldest old.

Friday, October 27, 1995

Student Forum

7:00 am *Graduate Schools and Internship Sites Exhibits* — Pool Atrium

Opportunity for students to meet representatives from graduate programs and internship sites within the region.
Free Continental Breakfast for Students

Clinical Lectures

8:15 am *"Fitness Exercise: From the Past to the Future"* — Salon II

Leroy "Bud" Getchell, Ph.D.
Indiana University

This presentation will focus on the growth and development of the exercise, fitness and health profession. Past programs and guidelines will be contrasted with current standards and practices. This will include fitness assessment, prescription and leadership trends. The role of health-related exercise and its implications for healthy living will be stressed.

9:05 am *"Clinical Approaches to Exercise Therapy"* — Salon II

Richard Lampman, Ph.D.
St. Joseph Mercy Hospital, Ann Arbor, MI

Individuals with chronic diseases or physical disabilities usually refrain from engaging in routine physical training. This may be due to factors such as pain or weakness, but usually results from lack of knowledge regarding appropriate and safe methods to exercise.

Because of the diversity of disease states, associated cardio-pulmonary limitations, and muscular weaknesses, exercise guidelines are best given on an individualized basis. Formulating recommendations in this way allows for the appropriate integration of frequency, duration and intensity components of the exercise program to best serve the patient's nedds and abilities. Advising patients in this manner promotes exercise safety, optimal progression, enjoyment, adherence and success.

Patients become quickly aware of the therapeutic benefits of exercise training as an adjunct to their medical treatment.

9:15 am *"Concussion: When to Return to Play–The Dilemmas"* — Salon II

P. Gunnar Brolinson, D.O.
Sports Care, Toledo, OH

Over the past few years, there has been significant discussion and interest among sports physicians with respect to treatment of concussion. Interest among the general public has been sparked by articles in such publications as *Sports Illustrated* and *USA Today*, with respect to head injuries sustained by several prominent football players and their subsequent management.

Lehmann and Ravich define concussion as a "self-limited neurophysiologic disruption unaccompanied by significant gross neural anatomic aberrancy." Jordan, writing in *Head Injury in Sports*, suggested that concussion be defined as "the immediate and transient alteration of brain function secondary to mechanical forces (trauma)." The Committee on Head Injury Nomenclature of the Congress of Neurologic Surgeons defines concussion as "a clinical syndrome characterized by immediate and transient post-traumatic impairment of neural function such as

alteration of consciousness, disturbance of vision, equilibrium, etc., due to brain stem involvement."

It is obvious that there is not universal agreement regarding the definition of concussion, much less appropriate clinical management. From a clinical perspective, it is important to note that essentially any impairment of neurologic function indicates concussion, and that brain tissue need not be structurally damaged to produce this disturbance. It is also important to note that one need not become unconscious to have a significant concussion. Numerous algorithms and clinical pathways have been developed by several groups in order to provide "management guidelines." However, nearly all of these are problematic to a greater or lesser degree and oftentimes do not take into account the broad and complicated spectrum of head injuries with which the Sports Medicine clinician can be presented.

The most feared complication of concussion is the so-called "second impact syndrome," of which there have been six reported cases. Apparently, none of the athletes involved in these cases received physician clearance to return to play. Significant controversy now exists among Sports Medicine practitioners regarding diagnosis, management, and return to play issues, fueled in part by reaction to these tragic cases.

The athlete may not be best served by an algorithmic approach to management of head injury which includes arbitrary time lines, which unfortunately are not well-supported in the literature. What is clear is that close clinical follow-up by well-trained Sports Medicine personnel used in combination with appropriate imaging studies and clinical measures of cognitive function are appropriate.

Symposia: Elite Athletes

Salon V, VI

8:15 am *"Learning from the Best: Expected & Unexpected Findings from Studies of Elite Jumpers"*

James G. Hay, Ph.D.
University of Iowa

Over the past decade, we have conducted analyses of the techniques of the country's best long and triple jumpers (the service component of the work) and attempted to increase our understanding of the basic mechanisms underlying performance in jumping (the research component). These efforts have had mixed results. They have shown that skilled jumpers do not achieve accuracy in the approach to the board in the manner that has been taught for many years; that the transition from the approach to the takeoff in the long jump is performed much as expected; and that the optimum landing position is rather different from what the textbooks suggest. In addition, recent developments suggest that the way in which triple jumpers have traditionally distributed their efforts over the three phases may have been to their disadvantage.

9:05 am *"What has Science Brought to the Elite Athlete's Table?"*

Salon V & VI

Gary Winckler, M.S.
University of Illinois at Champaign

I will share some personal experiences that my athletes and I have had with the scientific community in Track and Field, how these have been helpful, how they might have been better, and where I think the focus should be in the future if the marriage of athletics and science is to continue to be mutually beneficial.

I will draw a comparison of the two major groups: Scientists and Coaches/Athletes examining what I perceive to be each groups expectations and frustrations. Included will be a look at specific projects which involved track and field and an examination of the positive and negative aspects of those endeavors.

9:55 am *"The Sport Psychology Component of the USA Women's Gymnastics Program: Bridging the Gap between Research, Practice & the Sport Sciences"* — Salon V & VI

Joan Duda, Ph.D.
Purdue University

At the onset of this presentation, the major findings of sport research stemming from the goal perspective theory of motivation (Nicholls, 1989) will be reviewed. This framework assumes that there are two goal perspectives (namely task and ego involvement) which influence how individuals think, feel and behave in sport settings. Whether one is task-and/or ego-involved is a function of dispositional differences and the motivational climate created by significant others such as the coach or parents. Dispositional and situational goal perspectives have been found to predict such indices of motivation as: 1) beliefs about the causes of success; 2) views about the purposes of sport participation ; 3) anxiety responses and coping strategies' and 4) enjoyment and intrinsic interest. I will then discuss how this theoretically-based work has provided the foundation for multi-discipline research and practice in my consulting activities with the USA Gymnastics Women's Program. In particular, recent studies will be highlighted (Duda & Benardot, 1995) which have examined the correspondence between goal perspectives and the psychological and energy balance correlates of eating disturbances in elite female gymnasts. I will also point out how this line of investigation links to efforts in (gymnastics) coach and parent education.

10:45 am **Break**

Research Presentations

11:00 am *Poster Sessions: Authors Present (abstracts p. 16)* — Outside Salon II

Free Communications - Slides (Student) — Salon II

Moderator: Frederick F. Andres, University of Toledo

11:00 *"The Effect of Elevated Core Temperature Upon Excess Post-Exercise Oxygen Consumption"*
Robert Gibson, Jr., Ball State University

11:15 *"Effect of Maximal Exercise on Autonomic Control of Heart Rate During Orthostatic Stress"*
Carla M. Thomas, Alma College

11:30 *"Treadmill Versus Cycle Ergometer Exercise Testing in Patients with Peripheral Vascular Disease"*
Laura M. Brown, Ohio State University

11:45 *"How Healthy Are Health Care Employees?"*
Christopher R. Miller, University of Toledo

THE EFFECT OF ELEVATED CORE TEMPERATURE UPON EXCESS POST-EXERCISE OXYGEN CONSUMPTION

R.H. Gibson, D.O. Eddy, L.A. Kaminsky, A.D. Mahon. Human Performance Laboratory, Ball State Univeristy, Muncie, IN 47306

The purpose of this study was to determine the effect of elevated core temperature (T_C) on excess post-exercise oxygen consumption (EPOC) through a thermal clamping technique. Eight healthy, active males (mean age 27.5 ± 6.1 years, mean VO_2max 4.3 ± 0.3 L·min^{-1}) underwent two 45 min. exercise trials at ≈70% VO_2max on a cycle ergometer (mean work load 188.1 ± 6.7 watts) in an environmental chamber (36 °C /10% rel. hum.). The trials were followed by a 45 min. seated recovery in either an environmental chamber (42 °C / 10% rel. hum.) wearing insulating clothing and wrapped in a Mylar post-operative warming blanket (EC), or in the ambient conditions of the testing laboratory (22 °C / 42% rel. hum.) without any additional clothing (AM). Oxygen consumption (VO_2), minute ventilation (V_E), heart rate (HR), respiratory exchange ratio (RER), and T_C were recorded prior to, during, and post-exercise. EPOC was determined by subtracting pre-trial VO_2 from the post-exercise VO_2 until the difference equaled zero or until 45 min. had elapsed. Core temperature increased similarly during both exercise bouts from a resting level of 36.74 ± 0.05 and 36.74 ± 0.07 to peak level of 38.95 ± 0.15 and 39.11 ± 0.26, for EC and AM respectively. During the AM recovery T_C fell 1.46 °C, compared to the EC recovery where T_C fell only 0.19 °C. During the AM trial, VO_2 returned to near resting levels ($p = 0.146$) within 25 min. post-exercise. During the EC trial, where T_C was maintained near the immediate post-exercise levels (i.e., thermal clamping), VO_2 remained significantly elevated for at least 45 min. post-exercise, and at minute 45 post-exercise was 105 ml·min^{-1} higher than that during the AM recovery period ($p = 0.027$). Similar to the VO_2 and T_C data all other measured variables (HR, V_E, and RER) were significantly affected during the EC recovery. It is evident that the thermal clamping technique was successful and that an elevated T_C has a direct effect upon EPOC.

EFFECT OF MAXIMAL EXERCISE ON AUTONOMIC CONTROL OF HEART RATE DURING ORTHOSTATIC STRESS.

C.M. Thomas, W.R. Pourcho, and J.E. Davis. Department of Exercise and Health Science, Alma College, Alma, MI, 48801

The purpose of this study was to examine the autonomic control of heart rate during an orthostatic challenge after a maximal bout of exercise. Five healthy subjects participated in two orthostatic tolerance tests (lower body negative pressure, LBNP), a control (C) and after a maximal graded exercise test (MGE). The progressive LBNP protocol began at a negative pressure of -20 mmHg and increased by -10 mmHg every 3 minutes to the onset of presyncopal symptoms. A time series of heart rate was obtained for spectral analysis. Spectral analysis provided the integrated power in the high-frequency spectrum (P_H), low-frequency spectrum (P_L), and total power spectrum (P_T). The P_L/P_H ratio, an index of sympathetic control, increased while the P_H/P_T ratio, an index of parasympathetic control, decreased during both LBNP tests. The P_L/P_H ratio was greater at the start of the MGE LBNP test (12.41± 3.18) as compared to the C test (6.36±1.49) and remained elevated until the later stages of LBNP while the P_H/P_T ratio was lower at the start of the MGE LBNP test (.110± .040) as compared to the C test (.164 ± .039) and stayed lower for the first few stages of LBNP. During the post-test the C LBNP exhibits a higher P_H/P_T ratio (.273± .056) than the MGE LBNP (.137± .028). The difference between pre- and post-test P_H/P_T ratio was greater in the C test (.1087) than in the MGE test (.0272). These data suggest that the higher heart rates observed after exercise during LBNP are a function of greater sympathetic and less parasympathetic nervous system input to the heart. This study provides evidence that the autonomic control of heart rate is altered during orthostatic stress following maximal exercise. Supported by NASA grant NAG-8-999

Treadmill versus cycle ergometer exercise testing in patients with peripheral vascular disease

Brown, L.M., G. Maggiano, T.E. Kirby, D.J. Frid. Laboratory of Exercise Physiology, Division of Cardiology. The Ohio State University, Columbus, Ohio

Exercise testing is a valuable method of determining the functional capability of peripheral vascular disease (PVD) patients with the two most popular modes being treadmill and cycle ergometer. Claudication plays a major role when comparing each mode of testing because it normally is induced with walking causing the PVD patient to stop and rest. It has been hypothesized that maximal cardiovascular performace in PVD patients would be limited by claudication pain during treadmill exercise testing whereas cycle exercise testing would not. The purpose of this study was to examine the possible differences in lower extremity blood flow, peak VO2, maximal heart rate, rate of perceived exerction (RPE), ankle-brachial index (ABI), and respiratory exchange ratio (RER) in response to treadmill and cycle ergometer exercise testing in 20 PVD patients. Significant differences were determined using a t-test involving two means from dependent samples. Alpha level was set at $p<.05$. A significant difference was found in peak VO2 (15.04 ± 0.70 treadmill and 13.05 ± 0.57 cycle ergometer) and maximal heart rate at test termination (128.95 ± 4.56 treadmill and 123.26 ± 4.49 cycle ergometer). No significant differences were found in RPE (14.79 ± 0.70 treadmill and 13.95 ± 0.41 cycle ergometer), ABI (0.458 ± 0.07 treadmill and 0.494 ± 0.060 cycle ergometer), or RER (1.077 ± 0.026 treadmill and 1.109 ± 0.017 cycle ergometer). In contrast to previous expectations, based on this investigation, we conclude that treadmill testing elicits a cardiovascular response greater than or equal to cycle ergometer testing in PVD patients.

HOW HEALTHY ARE HEALTH CARE EMPLOYEES?

C.R. Miller, F.F. Andres, P.G. Brolinson, B. Duncan, C. Bourguignon, B.D. Reeves. The Toledo Hospital and The University of Toledo, Toledo, OH.

The purpose of the study was to assess the risk factors for coronary heart disease (CHD) in health care employees. Over 2 years, health risk appraisals (HRA) were completed as part of an on-going wellness program by 2,385 (M=385, F=2000, 38.6 yr..) employees of a Northwest Ohio metropolitan hospital. Questions related to the primary risk factors for CHD were subsequently assessed. Comparisons by sex and against established CHD risk criteria were performed. To determine if differences in frequencies or means occurred by sex, Chi-squared and t-test analyses were performed respectively. Differences ($p<0.05$) between male and female employees were found for the following: total cholesterol (TC) and HDL-C, physical activity (PA), family history (FH), smoking (S) and blood pressure (BP).

SEX	TC (mg/dl)	HDL-C(mg/dl)	BP (mmHg)	S [1] (%)	PA [2] (%)	FH [3] (%)
Males	146.6 *	23.2 *	114.8 * / 72*	8.6	54.3 / 45.7	46.8
Females	129.4	28.9	108.5 / 67.6	13.1 *	61.7 * / 38.3 *	56.9 *

* ($p<0.05$) 1 = yes 2 = < 1·wk^{-1} / > 3·wk^{-1} 3 = yes

Males had less desirable values for TC, HDL-C, and BP and females for S, PA, and FH. However, mean values for both males and females were lower than established CHD risk criteria except for HDL-C. Since 39.4% of the sample self-reported engaging in PA at least three times per week, and less than 12.2% still smoke, the employees appear to model some behaviors which lower the risk for CHD. To further reduce CHD risk within the sample population, females should be encouraged to decrease S and increase PA behaviors. Both males and female employees need strategies to increase HDL-C.

12:00 pm **Breakout Sessions**

"How Can Biomechanics Help Your Tennis Game?" — Louis Armstrong
Rafael E. Bahamonde, Ph.D.
Ball State University

"Overtraining/Crosstraining" — Coral
Michael G. Flynn, Ph.D.
University of Toledo

"Finding a Job and Job Satisfaction in Cardiac Rehabilitation: An Update for Students Entering a Rapidly Changing Field" — Jade
Steven J. Keteyian, Ph.D.
Henry Ford Heart and Vascular Institute, Detroit

Timothy E. Kirby, Ph.D.
Ohio State University

"From Exercise Testing to Exercise Prescription" — Duke Ellington
Leonard A. Kaminsky, Ph.D. & Mitchell H. Whaley, Ph.D.
Ball State University

"Molecular Biology and Exercise" — Sapphire
Robert C. Hickson, Ph.D.
University of Illinois at Chicago

"Why Pronate? From 'Lucy' to Frank Shorter" — Ruby
Stephen M. Simons, Ph.D.
Ball State University

"Tips on Scientific Presentations" — Turquoise A, B
David L. Costill, Ph.D.
Ball State University

"Exercise Physiology and Physical Therapy" — Pete Fountain
Lynn Millar, Ph.D., P.T.
Andrews University

2–5:00 pm **Recreational Events**
A number of recreational activities are available, e.g. tennis, golf, cycling, volleyball, fitness gym and swimming.

Workshop

2:00 pm *"What ACSM's National Office Can Do For You"* — Ruby
Susan Yoder, Director of Membership & Chapter Services, ACSM National Center

3:00 pm **Special Interest Groups** Turquoise A, B
Clinical Exercise Physiology

5:30 pm **Banquet**
Speaker: Dr. John Hefferon
Team Physician, Chicago Bulls

Awards Presentation
MWACSM Business Meeting

Keynote Lectures

7:30 pm *"Psychological Outcomes of Vigorous Physical Activity"* Salon II, V, VI
William P. Morgan, Ed.D.
University of Wisconsin-Madison

It has been recognized for a number of years that habitual physical activity is associated with desirable mental health traits, and there is correlational evidence demonstrating that adoption of an exercise program is followed by reduced anxiety and depression, as well as enhanced self-esteem. There is also evidence that acute physical activity is associated with both antidepressant and anxiolytic effects. While these effects are no greater than those observed following various relaxation procedures (e.g., autogenic training or non-cultic mediation), or quiet rest, it appears that anxiolytic effects persist for a greater period of time following vigorous exercise. Unfortunately, there is an absence of compelling evidence in support of a causal basis for this association. This is an important consideration since the efficacy of various interventions should be clearly delineated in outcome research. Efforts to elucidate the mechanisms underlying psychological outcomes of physical activity have focused principally on the endorphin, serotonin and norepinephrine hypotheses. There has also been an attempt to quantify the role of temperature and electrocortical activity in the development of exercise-induced euphoric states. These efforts have not produced consistent results in humans, and while the animal research is more convincing, the generalizability of animal models of psychopathology to the human is not without its own problems. Finally, there are numerous methodological problems associated with the existing research in this area of inquiry, and it is apparent that various behavioral artifacts have been responsible for outcomes in much of the published research.

8:30 pm *"The Aging Distance Runner"* Salon II, V, VI
David L. Costill, Ph.D.
Ball State University

In an effort to determine the effects of life-long training on the clinical and physiological changes associated with aging, studies were conducted on 75 previously elite male distance runners who were first studied in the late 1960's. This report will include the results of their changes in body composition, aerobic capacity, submaximal running economy, muscle fiber composition, bone density, and frequency of injuries associated with 25 years of running. The findings of this longitudinal study will be contrasted with data from previously published cross-sectional studies with sedentary and active age-matched men.

9:30 pm **MWACSM Social & Exhibits** Salon I, III, IV

Saturday, October 28, 1995

Clinical Lectures

8:15 am *"Guidelines for Exercise Testing & Prescription: An Analysis of the 5th Ed. of ACSM Guidelines"* Salon II

Reed H. Humphrey, Ph.D. P.T.
Virginia Commonwealth University

The American College of Sports Medicine (ACSM) published the first edition of the Guidelines for Exercise Testing and Prescription in 1975. New editions have been published on a five year cycle, with the most recent edition, the fifth, published in April of 1995. Originally designed as a supplementary resource for clinicians and for those preparing to sit for a personnel certification administered by ACSM, over the years the book has been re-engineered as a true handbook for the clinician involved in preventive and rehabilitative programs. The most recent edition reflects this shift in both size and content; the book was reduced in size to fit comfortably in a lab coat, and text was minimized in favor of including more tables, charts, graphs and figures that would be of assistance to the practicing clinician. In addition, more normative and interpretative information was included than in previous editions. The most recent edition added special sections on children, elderly and pregnant populations in consideration of the trends in the exercise assessment and exercise programming for these populations.

As the ACSM Guidelines moved away from serving as a resource guide for the certification process, ACSM publications were expanded to include a Resource Manual (two editions have been published, the third is underway) to assist those preparing for the certification programs. It is important to draw the distinction between the intention of the Guidelines, which is to serve as a handbook, and the educational companionship of the Resource Manual. For those looking to prepare for the ACSM certification process, both resources are recommended to supplement educational preparation.

For the practicing clinician, the Guidelines should prove to be extraordinarily helpful, particularly with the recent expansion to cover more laboratory values and provide guidelines for both testing and prescription. It is likewise important to recognize that in fact these are guidelines, not standards. When comparing the ACSM Guidelines with other documents, such as the AACVPR Cardiac or Pulmonary Rehabilitation Guidelines, similarities are apparent. However, the intentions of the ACSM and AACVR Guidelines are different, and depending on the intended use, the clinician would be well served to choose the appropriate publication. Most clinicians would probably agree it is important to have the guidelines from both organizations in their library.

9:05 am *"Overview of Childhood Musculoskeletal Problems with a Special Emphasis on Spondylolysis"* Salon II

Joseph Congeni, M.D.
Children's Hospital of Akron, Ohio

This discussion would serve as a review of common musculoskeletal injuries in the young athlete. We will discuss briefly upper extremity injury, including some discussion of comparison and contrast between impingement syndrome and little league shoulder. I will talk in more detail about the pathogenesis and treatment of little league elbow. Next, I would discuss common concerns in the spine of the young athlete with a brief comparison on spondylolysis and Scheuermann's syndrome. In the area of the hip, I will discuss the differences in presentation of injuries to the apophysis versus avulsion fracture. Moving down to the knee we would discuss the common presentation of Osgood-Schlatter's disease and Sinding-Larsen-Johansson syndrome. We would contrast these with a discussion of the classic presentation of osteochondritis dissecans in the knee. Finally, common foot injuries in younger athletes would include Sever's disease at the heel and accessory navicular syndrome in the mid-foot. After briefly discussing these we would conclude the session with a discussion of stress fractures in general and a more in-depth discussion of stress fracture of the pars interarticularis of the facet joint or spondylolysis in more detail.

Tutorial Lecture

9:55 am *"Measurement of VO_{2max}: Criteria, Accuracy, & Pitfalls"* Salon II

Edward T. Howley, Ph.D.
University of Tennessee

This presentation will provide an historical overview of the measurement of maximal aerobic power (VO_2max) as a measure of cardiovascular fitness. Classical studies used as reference points in the development of the criteria for VO_2max (plateau in oxygen uptake, high post-exercise blood lactate value, and elevated respiratory exchange ratio) will be summarized. Concerns will be raised about the degree to which we use the criteria in our current work, and recommendations about how we might proceed in the future will be presented.

Symposia: Exercise/Molecular Biology Salon V & VI

8:15 am *"Exercise and Glutamine Support/Inhibit Glutamine Synthetase Expression and Glucocorticoid-Induced Muscle Atrophy"*

Robert C. Hickson, Ph.D.
University of Illinois at Chicago

Chronically elevated blood levels of glucocorticoid hormones cause marked total body and skeletal muscle atrophy. Increased contractile activity such as regular exercise retards the muscle wasting from this condition. Recent studies now also indicate that glutamine supplementation, individually or in dipeptide form, antagonizes the hormone effects on muscle catabolism. The biochemical basis of the atrophy and muscle sparing are not completely understood. However, glutamine synthetase, a well-defined glucocorticoid-inducible gene in skeletal muscle, appears as a major participant. Specifically, regular endurance training diminishes the hormone-mediated increases in GS mRNA and enzyme activity in mixed muscles and muscle fiber-types (fast-twitch red) that are primarily recruited by the exercise. Glutamine is known to inhibit GS enzyme activity by direct feedback without altering GS mRNA in muscle cell cultures. By contrast, glutamine infusion, in vivo, reduced hormone-mediated induction of GS through changes at the mRNA level as well. Further, the addition of glutamine attenuated GS expression in both types of fast-twitch fibers. Other experiments show that the depression of skeletal muscle protein synthesis by glucocorticoids is partially reversed (50% of the decline) by glutamine supplementation; whereas, exercise alters protein breakdown in preventing muscle atrophy.

9:05 am *"Protein-Protein Interactions and the Molecular Mechanisms Underlying Myocardial Dysfunction During Acidosis"* Salon V & VI

Karen Ball, Ph.D.
Alma College

Acidosis, a reduction in intracellular pH, accompanies ischemic episodes in the heart and leads to inhibition of the contractile capabilities of the myocardium. Interestingly, the neonatal heart is resistant to this effect showing little reduction in contractility with acidosis. This resistance has been attributed to developmental alterations in protein variants, or isoforms, which are expressed. As a result, specific protein-protein interactions crucial to myocardial contraction are modified, with significant effects on the response of the heart to reductions in pH. These interactions as the molecular basis for myocardial dysfunction with acidic pH as well as implications for potential sites of intervention will be discussed.

9:55 am *"Neural and Mechanical Regulation of Contractile Protein Genes in Skeletal Muscle"* Salon V & VI

Karyn Esser, Ph.D.
University of Illinois at Chicago

The acquisition of an adult skeletal muscle phenotype is known to be affected by changes in muscle activity/exercise at the level of transcription of the contractile protein genes. Identifying the molecular mechanisms regulating this adaptation has been difficult due, in part, to the complexity of the exercise stimulus. Using muscle regeneration as our model system, we are able to identify isoform specific gene expression patterns that require the presence of the nerve or weight-bearing activity. The results of these studies demonstrate that 1) both neural and weight-bearing activity are necessary for the acquisition of a slow mRNA phenotype; 2) the presence of a nerve is not necessary for acquisition of a fast mRNA phenotype and; 3) in the absence of the nerve, weight-bearing activity is required for the acquisition of a fast mRNA phenotype.

Research Presentations

11:00 am *Poster Sessions: Authors Present (Abstracts p. 19)* Salon II

Free Communications - Slides (Professional)
Moderator: Dr. Curt Lox, Northern Illinois University

11:00 *"Overload and Skeletal Muscle Fiber Hyperplasia: A Meta-Analysis"*
Dr. George A. Kelley, Northern Illinois University

11:15 *"Brain Activation, Exercise, and Affect"*
Steven J. Petruzzello, University of Illinois, Urbana

11:30 *"Effects of Sampling Interval on Peak Oxygen Consumption in Patients Evaluated for Heart Transplantation"*
Jeffrey S. Johnson, Memorial Medical Center, Grand Rapids

11:45 *"A Procedure to Measure Postural Stability and Lower Extremity Muscle Activity During Standing on Different Floor Surfaces"*
Steve McCaw, Illinois State University

OVERLOAD AND SKELETAL MUSCLE FIBER HYPERPLASIA: A META-ANALYSIS

G. A. Kelley, Physical Education Dept., Northern Illinois University, DeKalb, IL 60115-2854

Recently, a narrative review by Antonio and Gonyea (*MSSE*, Vol. 25, pp. 1333-1345, 1993) has suggested that increases in skeletal muscle fiber number (hyperplasia) occur as a result of increased contractile activity. The purpose of this study was to use the meta-analytic approach to examine the effects of increased contractile activity (overload) on skeletal muscle fiber hyperplasia. Seventeen studies representing 37 effect sizes (ES) and 368 subjects were retrieved from (1) computer searches (Medline - 1966 to 1994), (2) hand searches, and (3) cross referencing. Inclusion criteria were (1) clinical studies published in English-language journals between January 1966 and December 1994, (2) animals (no humans) as subjects, (3) control group included, and (4) experimentally-induced increases in skeletal muscle contractile activity. Overall, increased skeletal muscle contractile activity resulted in sample weighted ES increases in skeletal muscle fiber number (mean ± SD = 0.57 ± 0.79, 95% confidence interval = 0.41 to 0.74). Statistically significant ES differences (QB = 5.97, p = 0.01) were noted when data were partitioned by fiber counting technique (histological = 0.82, nitric acid digestion = 0.39). Significant differences (QB = 16.21, p = 0.003) were also found for type of overload employed, with weightlifting (ES = 0.89) and chronic stretch (ES = 0.76) producing the largest increases in fiber number. No statistically significant differences were noted when data were partitioned by type of animal (QB = 5.70, p = .06), type of muscle (QB = 5.78, p = 0.22), fiber type (QB = 1.97, p = 0.16), and type of control (QB = 1.97, p = 0.16). The results of this study suggest that increased skeletal muscle contractile activity increases skeletal muscle fiber number.

BRAIN ACTIVATION, EXERCISE, AND AFFECT

S.J. Petruzzello, FACSM, C.D. Sliva. Dept. of Kinesiology, Univ. of Illinois, Urbana, IL 61801

Examination of affective responses to acute exercise based on asymmetrical brain activation patterns has shown resting EEG asymmetry to be both an individual difference measure of trait affect and a biological marker of an individual's predisposition to respond affectively to aerobic exercise. Greater resting left anterior hemisphere activation, relative to the right, has been related to more positive trait affect and is predictive of positive affective responses to such emotion-eliciting stimuli. To further examine these relationships with respect to exercise, frontal EEG asymmetry (R-L alpha activity) was assessed before and after treadmill exercise (for 30 min) in 7 subjects (21.4±1.2 yrs). Trait anxiety (TA), Positive Affect (PA), and Negative Affect (NA) were assessed prior to exercise using standardized questionnaires. State anxiety (SA) was assessed before and after (0, 10, 20, 30 min) exercise. Correlations between frontal asymmetry and both trait anxiety (r= -.44) and trait positive affect (r= .38) were in the predicted directions, indicating greater relative left frontal activation with more positive/less negative affect. State anxiety was significantly increased (P= .008) from pre- to immediately post-exercise (*M*s 13.9±1.2 to 18.7±1.6), followed by decreased anxiety at 10 (15.3±.95), 20 (15.1±.81), and 30 min (14.0±.53) post-exercise. This occurred with a concomitant increase in relative right frontal activation from pre- to immediately post-exercise, followed by a shift back toward left frontal activation at 10, 20, and 30 min. The findings indicate that resting EEG asymmetry can serve as a biological marker of affect and ongoing EEG reflects the current affective state of the individual. The present data confirms the utility of combining physiological and psychological measures for examining the affective consequences of exercise.

A PROCEDURE TO MEASURE POSTURAL STABILITY AND LOWER EXTREMITY MUSCLE ACTIVITY DURING STANDING ON DIFFERENT FLOOR SURFACES.

S.T. McCaw & D. Melrose, Biomechanics Lab, Illinois State University, Normal, IL 61790-5120

The anti-fatigue characteristics of flooring are plausibly related to postural stability and lower extremity muscle activity. The purpose of the study was to develop a protocol for collecting measures of stability and muscle activity during a balance task performed on hard and soft floor surfaces. Eight male and 4 female undergraduates performed a barefoot, one-leg balance task of 30s duration on a bare force platform and on a commercially available anti-fatigue floor material laid on the force platform. Subjects performed 2 non-consecutive trials in each condition, with performance order randomized across subjects. Force platform and surface EMG data were recorded using separate computers at 60 and 200 Hz, respectively. The medial-lateral (X) and antero-posterior (Y) positions of the center of pressure (CoP) were calculated for the mid 20s of each trial. The XRange and XSpeed of the CoP were used to quantify stability. EMG was collected from the tibialis anterior, soleus and gluteus medius of the right leg. For each trial, the average EMG value of each muscle was calculated from a linear envelope (EMG rectified & digitally filtered at 3.5 Hz) and expressed as a percent of a normalization value calculated from a standardized task. The 2 trial mean of each variable was calculated for each subject, and used in a mixed factor (gender by floor material) repeated measures ANOVA (α=0.05). Although observed differences were not statistically significant, the mean value of each variable was consistently higher for the anti-fatigue mat condition compared to the bare force plate condition. The data suggest that the comfort of mat flooring may stem from facilitated venous return due to slightly increased muscle activity.

Supported by the Tennessee Nat Company, Nashville, TN.

EFFECTS OF SAMPLING INTERVAL ON PEAK OXYGEN CONSUMPTION IN PATIENTS EVALUATED FOR HEART TRANSPLANTATION

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Preventive Cardiology and Rehabilitation, Blodgett Memorial Medical Center, Grand Rapids, MI 49506

Peak oxygen consumption (VO_2) is a commonly accepted criterion in patient selection for cardiac transplantation. To determine the effect of various gas exchange sampling intervals on the variability of peak VO_2, 15 patients evaluated for cardiac transplantation performed maximal treadmill testing using a ramped protocol. VO_2 was measured via breath by breath (Bx8) analysis of expired air. Peak VO_2 was determined for each test using the following sampling intervals: 60, 30, and 15 second (sec) averages, 8 breath rolling average and true Bx8. Variability between samples was compared using repeated measures of analysis of variance. Measures of peak VO_2 differed significantly ($p<.001$) between the samples. A maximum variability of 20% was noted between the largest and smallest samples (13.8 ± 4.2 ml/kg/min. for 60 sec vs. 17.3 ± 4.2 ml/kg/min. for Bx8). Peak VO_2 did not differ between 15 sec, 30 sec or 8 breath rolling average (14.5 ± 3.9 vs. 14.2 ± 3.7 vs. 14.7 ± 4.3 ml/kg/min.) respectively. We conclude: 1) the sample interval can have a significant effect on peak VO_2, potentially effecting patient selection for cardiac transplantation, and 2) sample intervals longer than true Bx8, but smaller than 60 sec be used for determination of peak VO_2.

TRANSTHORACIC IMPEDANCE MEASUREMENT OF CARDIAC OUTPUT DURING MAXIMAL CYCLE EXERCISE IN HEALTHY YOUNG ADULT FEMALES

Y. Chen, H.-J. Engels, W. Zhu. Division of HPR - Exercise Science, Wayne State University, Detroit, MI, 48202

Previous research indicates the utility of transthoracic bioimpedance to evaluate cardiac responses to maximal cycle exercise in young adult males (Rowland et al., JCR, 1989). The purpose of this study was to affirm these findings in healthy young adult females. Thirty college women (age 23.8±3.9 yrs), following a three-minute baseline resting evaluation, performed an upright maximal cycle ergometer test until exhaustion. Throughout testing, cardiac output and oxygen consumption were measured simultaneously by transthoracic impedance cardiography (NCCOM3, BoMed, Irvine, CA) and open circuit spirometry (OCM2, FITCO, Farmingdale, NY), respectively. Satisfactory cardiac output readings were obtained throughout exercise in 26 out of 30 subjects and they were highly related to directly measured oxygen uptake (r: M=0.97; SD=0.03). However, absolute cardiac output values were higher when compared to previous studies using other standard methodologies. It is concluded that transthoracic impedance can be a useful, safe, and noninvasive technique to measure the relative change in cardiac output during graded exercise.

SPECTRAL QUALITIES OF SWAY WITH ANKLE BRACING

S J Kinzey and C D Ingersoll, FACSM. Applied Biomechanics Laboratory, The University of Toledo, Toledo, OH. Sports Injury Research Laboratory, Indiana State University, Terre Haute, IN.

The purpose of this study was to estimate sensory modality activity under selected ankle brace conditions: Active Ankle Trainer, AirCast Sport Stirrup, McDavid A-101, and no brace (control). Twelve male volunteers (age = 18 to 26 yrs.) without ankle injuries served as subjects. A FFT was performed on 12.8 seconds of anterior-posterior (AP) and medial-lateral (ML) center of pressure data measured during a one-legged modified Romberg test with six variations. The six test conditions: control, eyes closed (EC), visual conflict dome (VCD), foam, foam + EC, and foam + VCD, were designed to systematically conflict or eliminate the three sensory modalities that control posture. Subjects performed three 16-second trials of each Romberg variation for each brace condition. Center of pressure transmitted through the bottom of the foot was monitored during each trial and transformed into AP, and ML sway. Semirigid ankle braces cause less semicircular canal activity than no brace during AP sway ($F(3,838) = 2.71$, $p = 0.04$). Any type of ankle brace decreases the amount of vestibular activity necessary to control AP sway ($F(3,838) = 4.43$, $p < 0.00$). During the control of AP sway, bracing also decreased vision 1 activity ($F(3,838) = 4.99$, $p < 0.00$). Bracing had no effect on the sensory modalities responsible for the control of ML sway ($F(3,838) = 0.75$, $p = 0.52$). When examining AP data, higher levels of semicircular canal, proprioceptive, and vision 2 activity were found in the EC than the control condition ($F(5,838) = 3.02$, $p = 0.01$). The foam condition elicited more vestibular activity than the three non-foam conditions and the control condition caused less reliance on vestibular activity than the foam + EC condition ($F(5,838) = 3.63$, $p < 0.00$) under ML sway. We conclude that bracing has a minor overall effect on the sensory modalities controlling postural sway in the AP direction. We also recommend the development of further methods to isolate the sensory modality function during balance

ELECTROMYOGRAPHIC ACTIVITY AND KINEMATICS OF CYCLING MOVEMENT AT DIFFERENT PEDAL SHAFT WIDTHS

W.S. Chae and G. Gehlsen, Ball State University, Muncie, IN 47304

The purpose of this study was to quantify the electromyographic (EMG) activity of selected lower limb muscles during cycling and to define the relationship between pedal shaft width and muscular involvement. This study has particular significance to female cyclists who by virtue of pelvic width may have a less efficient pedalling force, or an imbalance of applied muscular force. Variables analyzed were hip, knee, and ankle range of motion (ROM), and the EMG values of biceps femoris (BF), vastus lateralis, rectus femoris, and vastus medialis (VM). Five female subjects were tested when cycling at 80 revolutions/min on a roller system. Three pedal shaft widths were used -- normal, 2" longer than normal, and 4" longer than normal. Significant differences among three conditions were examined using repeated measures one-way ANOVA and Newman-Keuls post hoc test. The hip ROM increased significantly ($p \leq .05$) with an increase in pedal shaft width. In contrary, an increase in pedal shaft width significantly decreased the muscle activity of VM. Significant decrease in BF activity was also observed when the pedal shaft width increased from normal to 2" longer than normal. The results suggested that cycling with appropriate adjustment of pedal shaft width may cause alteration in muscular activity patterns and lead to alteration in joint stresses. It is recommended that further studies should use larger sample size and examine the effect of gender.

RELIABILITY OF VERTICAL JUMP AS AN ESTIMATE OF FUNCTIONAL STRENGTH

M.L. Cordova and C.W. Armstrong. Applied Biomechanics Laboratory, The University of Toledo, Toledo, OH 43606

The use of closed kinetic chain (CKC) exercise in the rehabilitation of lower extremity injuries has become a popular area of interest. Sports therapists are realizing the benefits CKC exercises have over open kinetic chain (OKC) exercises in developing functional strength. Much of the present literature regarding CKC exercise has focused on evaluating its effects on functional agility, but not on functional strength. Besides isokinetic OKC testing, no other method has been reported as an alternative in assessing lower extremity functional strength. The one-legged vertical jump (OLVJ) represents a functional movement of the lower extremity common in many sports. Quantifying ground reaction forces during a OLVJ may provide a valid means for estimating lower extremity functional strength following rehabilitation. Thus, the purposes of this investigation were to: 1) determine the test-retest reliability of peak vertical ground reaction force (PVGRF) and vertical impulse (VI) produced during a OLVJ, and 2) determine the relationship between PVGRF and VI produced during a OLVJ. Nineteen healthy volunteers performed 5 jumps with their right lower extremity on an AMTI force platform without arm movement. Subjects were given a one minute rest between trials. All subjects reported to the laboratory 48 hours later and repeated the same jump protocol. Reliability of the PVGRF and VI was assessed using the intraclass correlation coefficient (ICC) formula 2,1. Measurement of PVGRF demonstrated to be very reliable (ICC 2,1 = .94, SEM= .003 %BW), whereas the reliability estimate for VI was not (ICC 2,1 = .22, SEM= .24 %BW sec). Furthermore, a weak negative relationship was found between PVGRF and VI ($r_s = -.28$). We conclude that peak force produced during a OLVJ is reliable and may be used as an alternative to OKC strength testing when assessing lower extremity functional strength.

"STRENGTH AND FUNCTIONAL OUTCOMES OF A SIX WEEK TRAINING PROGRAM USING THE BODYBLADE PRO WITH HIGH SCHOOL BASEBALL PLAYERS."

L. Perez, T. Rose, A.L. Millar. Andrews University, Berrien Springs, MI 49104

The purpose of this study was to evaluate results of training the throwing shoulder using the Bodyblade Pro™. Twenty-one high school baseball players were randomly assigned to three groups: an isolated planar movement group, a functional movement group, and a control group. All subjects continued to participate in traditional baseball training. Subjects were tested for concentric isokinetic strength using the Biodex Dynamometer at speeds of 60 and 180 deg/sec. Motions included internal/external rotation and abduction/adduction of the shoulder in the scapular plane. Muscle ratios following training show the planar group moving toward the normal values of 0.33 in AB/AD at 60 deg/sec, with a final value of 0.99. Ratios for int/ext rotation at both 60 and 180 deg/sec showed the bodyblade groups stayed closer to normal values, while the control group ratio deteriorated (1.06,1.11, 1.04 respectively at 60 deg/sec). There was no difference for concentric isokinetic peak torque values between the three training groups ($p<.05$). Functional output before and after training was assessed by the average and peak velocity of three maximal throws. Average velocity showed a 2.0% mean increase (±5.5 SD) for the functional group. The average throwing velocity for the planar group decreased by 2.8% (±4.0 SD) and the control group decreased by 4.1% (±5.7 SD). Although no difference was found, the researchers feel that positive gains can be obtained using functional sport-related movement. The increase in velocity for the one training group while the other two declined in performance, combined with the IR/ER shoulder ratios, suggests that there were benefits to training with the Bodyblade Pro. Further research with a longer training period would help to discern potential benefits.

CARDIAC VAGAL ACTIVITY RESPONSE TO EXERCISE IN 7-12 YEAR OLD AFRICAN-AMERICAN CHILDREN

F.A. Ramirez, B.A. Smith, FACSM, M. Sled, T.E. Kirby. The Ohio State University, Columbus, OH 43210

A reduction in the rate at which cardiac vagal activity (CVA) is withdrawn with exercise has been observed in older (>50 y.o.) compared to younger (<30 y.o.) males. A protective mechanism against cardiovascular (CV) risks has been proposed. The purpose of this study was to: 1) assess the rate of CVA withdrawal with exercise in a group of 7-12 y.o. African-American children who have at least one CV disease risk factor, and 2) compare the results with those reported on 20-70 y.o. males. Ten children (m=6, f=4, mean age=10.0±1.83) performed a graded exercise test on a cycle ergometer using the James protocol. Electrocardiographic data was stored on audiotape for later analysis of heart rate variability. This allowed the evaluation of CVA by time series analysis on the heart period (R-R interval) using a Vagal Tone Monitor. A repeated measures ANOVA was performed to evaluate the rate of CVA withdrawal with increasing exercise intensities. A one-way ANOVA was used to compare the children's CVA at rest and at peak exercise with other age groups. A significant CVA withdrawal ($p<0.05$) was observed as exercise intensity increased. The children's CVA withdrawal from resting to peak exercise was not different ($p>0.05$) than the observed in 20-30 y.o. males, and was only significantly higher ($p<0.05$) than the 60-70 y.o. group (CVA index = 4.29 and 4.23 vs. 0.82, respectively). The children's resting CVA was only significantly different ($p<0.05$) than the oldest age group (CVA index = 6.43 vs. 4.8). In conclusion, the group of children studied showed a normal CVA response during exercise, which was comparable to that reported in 20-30 y.o. males. Contrary to previous reports, the resting CVA in this group of children was not significantly higher ($p>0.05$) than the resting CVA observed in 20-60 y.o. males.

FUNCTIONAL CHANGES IN RAT ACHILLES TENDON FOLLOWING COLLAGENASE INJURY AND MANUAL SOFT TISSUE MOBILIZATION

Y.T. Lim and G. Gehlsen, Ball State University, Muncie, IN 47304

The purpose of this pilot study was to determine the functional changes due to the Graston Therapeutic Technique (GTT) in an animal model. Since the GTT is newly developed, there have not any studies conducted on this topic. Specifically, this study attempted to verify the biomechanical changes associated with the GTT in order to possibly apply it to humans as a major physical therapy modality. Eighteen adult, male Sprague-Dawley rats were assigned randomly to three groups: (a) not injured plus GTT treatment, (b) injured minus GTT treatment, and (c) injured plus GTT treatment. The GTT therapy began one week after tendinitis was induced to allow for optimum inflammation and scar formation. The animals receiving GTT had six treatments over the course of two weeks. Running tests were performed on a treadmill at a velocity of 22 cm/s prior to the induction of injury, one week after injury, two weeks after injury, and three weeks after injury. Variables analyzed were knee and ankle range of motion (ROM), stride length, and stride frequency. Significance of effect among groups were determined by repeated measured one-way ANOVA, Scheffe's post hoc test, and Newman-keuls post hoc test. Changes in the kinematic measures were apparent when comparing the values obtained in different testing sessions. However, the differences are not statistically significant ($P \leq .05$). The only significant difference was found in the swing phase of knee ROM for the two GTT plus groups. The lack of significant difference observed in this study may be due to the inadequate sample size and testing frequency. Several other shortcomings were also identified and suggestions were made for future studies.

EFFECT OF MAXIMAL EXERCISE ON ORTHOSTATIC TOLERANCE OVER A 24-HOUR PERIOD.

W.R. Pourcho, C.M. Thomas, and J.E. Davis. Department of Exercise and Health Science, Alma College, Alma, MI 48801

Recent studies have reported increased plasma volume and enhanced baroreflex sensitivity 24 hours after an acute, maximal bout of exercise. This raises the possibility of an effective, time-efficient countermeasure to the decreased orthostatic tolerance experienced after extended spaceflight. The purpose of this study was to determine whether a single bout of maximal, aerobic exercise improves orthostatic tolerance over a 24-hour period. Six healthy subjects participated in five progressive lower body negative pressure (LBNP) tests, including a control, to the onset of presyncopal symptoms. Exercise tests consisted of a Bruce treadmill test; orthostatic tolerance was then tested at 0, 3, 6 and 24 hours post-exercise on separate days. Heart rate (HR), systolic and diastolic blood pressures, calf circumference, and forearm blood flow (FBF) were measured during each LBNP test. Orthostatic tolerance as indicated by cumulative stress index (mmHg*min) was significantly reduced immediately following exercise (844.76 ± 92.18 mmHg*min to 706 ± 46.74 mmHg*min), and returned to control level by 24 hours post-exercise (840 ± 162.98 mmHg). HR was higher than control immediately after exercise (98 vs. 74 BPM) and throughout the LBNP test. FBF decreased in the control (4.84 to 2.96 ml/100ml/min), three (4.06 to 2.72 ml/100ml/min), six (4.25 to 2.69 ml/100ml/min), and twenty-four hour (5.20 to 3.42 ml/100ml/min) conditions. FBF was higher than control values right after exercise (7.26 vs. 4.84 ml/100ml/min) and remained elevated throughout the test. These data suggest that orthostatic tolerance is not improved 24 hours after a single, maximal bout of aerobic exercise. Orthostatic tolerance decreased immediately following exercise, possibly because of an altered starting point for the cardiovascular system. Supported by NASA grant NAG-8-999

THE EFFECT OF INOSINE SUPPLEMENTATION ON AEROBIC AND ANAEROBIC CYCLING PERFORMANCE

R.D. Starling, T.A. Trappe, K.R. Short, M. Sheffield-Moore, A.C. Jozsi, W.J. Fink, and D.L. Costill. Human Performance Lab, Ball State University, Muncie, IN 47306

Ten competitive male cyclists completed a Wingate Bike Test (WIN), a 30 min self-paced cycling performance bout (END), and a constant load, supramaximal cycling sprint (SPN) to fatigue following 5 days of oral supplementation (5,000 $mg \cdot day^{-1}$) with inosine and placebo. Blood samples were obtained prior to and following both supplementation periods, and following each cycling test. Uric acid levels were higher ($P<0.05$) following supplementation with inosine versus placebo, but no difference in 2,3-DPG levels was present. The data from WIN demonstrate that there were no significant differences in peak power (617.6 ±24.8 vs. 617.1 ±25.4 W), end power (503.1 ±15.0 vs. 504.3 ±16.7 W), fatigue index (18.1 ±1.8 vs. 17.7 ±1.9%), total work completed (33.1 ±1.2 vs. 33.2 ±1.2 kJ), and post-lactate (12.2 ±0.5 vs. 12.9 ±0.6 $mmol \cdot l^{-1}$) between the inosine and placebo trials, respectively. No difference was present in the amount of work produced (446.0 ±18.3 vs. 442.2 ±20.2 kJ) or post-lactate (8.4 ±1.0 vs. 9.9 ±1.3 $mmol \cdot l^{-1}$) during END between the inosine and placebo trials, respectively. Time to fatigue was longer ($P<0.05$) during SPN for the placebo (109.7 ±5.6 s) versus the inosine (99.7 ±6.9 s) trial, but post-lactate (14.8 ±0.7 vs. 14.6 ±0.8 $mmol \cdot l^{-1}$) was not different between the treatments, respectively. These findings demonstrate that prolonged inosine supplementation does not appear to improve acrobic performance and short-term power production during cycling, and may actually have an ergolytic effect under some test conditions.

This investigation was supported by a grant from the Gatorade Sports Science Institute.

ESTIMATING THE RESIDUAL VOLUME OF FEMALE ADOLESCENT ATHLETES

C.Watkins, J.C.Wirth, H.-J.Engels, J.Smouter. HPR-Ex.Sci., Wayne State U., Detroit, MI 48202

Prediction equations for residual volume (RV) in the normal population have been extensively studied. Recent research has examined whether these equations are valid for highly trained adults, however, there is a lack of similar research regarding adolescent athletes. The purpose of the present study was to assess the accuracy of several equations used to predict RV when applied to a sample of female adolescent athletes. Subjects were twenty-eight highly trained female adolescent athletes (figure skaters, gymnasts, and soccer players; age range: 9.4-17.8 years). The accuracies of five equations (Helliesen,1958; Kaczmarczyk,1967; Morrow,1989; Needham,1954; and Wilmore,1969) were examined as was that of an equation specific to the present population. Results of the development of this latter equation indicated that the one predictor model [$RV=-0.061+0.112(Age(yr))$; $R^2=0.56$, SEE=0.26] was essentially as accurate as the three predictor model (age, height, & weight; $R^2=0.59$, SEE=0.26). Therefore, the one predictor model was used in subsequent analyses. When each of the six equations was applied to the current sample, correlations between measured RV and predicted RV were very similar (range of r's: 0.70-0.75). Also, the standard deviations of the residual scores were all within the range of 0.26 l - 0.30 l with the exception of that from the Wilmore equation which was 0.39 l. Therefore, with the exception of the equation of Wilmore [RV=0.28(FVC)], several pulmonary function equations are equally accurate for the prediction of RV in female adolescent athletes. Additional research is required to examine whether these results are valid for other types of female adolescent athletes.

INTER-LABORATORY ANALYTICAL VARIABILITY OF SUBMAXIMAL AND MAXIMAL GAS EXCHANGE MEASUREMENTS.

E. Yule, L.A. Kaminsky, FACSM, D.A.Sedlock, FACSM[2], B.A. King[3], M.H. Whaley.
Ball State Univ., Muncie, IN., Purdue Univ.[2], West Lafayette, IN., Indiana Univ.[3], Bloomington, IN.

Gas exchange data is routinely used to assess cardiorespiratory fitness and for exercise prescription. Unfortunately, little is known about inter-laboratory analytical variability in gas exchange measurements. Therefore, the purpose of this study was to determine inter-laboratory variability of submaximal and maximal gas exchange measurements. Subjects (n=8) performed three submaximal treadmill trials (5 min each at 3 mph and 5.5 mph) and 3 maximal treadmill tests at 3 separate laboratories using SensorMedics 2900 Metabolic Carts. The same calibration gas and procedures were followed at each laboratory. A standardized maximal incremental protocol was used for all subjects. A minimum time of 48 hours between tests was required and all tests for each subject were performed at the same time of day within 2 weeks. The R values from the submaximal running were found to be significantly higher in lab C (1.03 ± .06) versus labs A (0.92 ± .07) and B (0.97 ± .05) ($p<.05$). Otherwise, no significant differences in metabolic measurements were found with submaximal walking and running ($p<.05$). The means of measures from the maximal tests were:

LAB	VO_2max (ml/kg/min)	VO_2max (l/min)	VCO_2max (l/min)	VEmax (l/min)	TV (l)
A	48.8+4.7*	3.52+.83	3.91+.99	132.79+35.8	2.28+.74
B	42.2+3.9	3.02+.69	3.68+.98	126.91+28.5	2.37+.82
C	42.4+3.0	3.15+.75	3.74+.92	131.61+34.9	2.24+.73

(* significantly different than laboratories B and C)

VO_2max (ml/kg/min) for lab A was ~ 1.9 METS greater than labs B and C. Within subject coefficient of variation was 8.6±2.8% (range 2.5 - 11.3%). In conclusion, although most submaximal and maximal values were stable between labs, caution should be taken when using data from one laboratory at another laboratory.

Supported in part by SensorMedics and Ball State Univ. Office of Research.

OXIDATIVE STRESS IN HEALTHY AND DISEASED MODELS
E. Biasi, T. Peth, H. Alessio. PHS Dept., Miami University, Oxford, OH 45056.

Oxidative stress, caused by an inbalance of proxidant and antioxidant activity, may have deleterious effects on cardiovascular health. The purpose of this study was to investigate proxidant and antioxidant activity in healthy and diseased persons. Subjects were healthy and fit ($\bar{X}$ VO_2max = 50.3 $ml \cdot kg^{-1} \cdot min^{-1}$, ($\bar{X}$ age=47.4 years) cyclists and age-matched men diagnosed with cardiovascular disease (CVD) from a cardiac clinic. Plasma biomarkers of CVD included triglycerides (TG) and glucose (GLU). An antioxidant marker, oxygen radical absorbance capacity (ORAC) and lipid peroxidation (LIPOX), a proxidant marker, were measured pre and post max exercise in cyclists. Only resting blood samples were available for CVD subjects. Cyclists' TG averaged 119.7 ± 15 vs. CVD with 102.7±17 mg/dl. Cyclists' GLU averaged 95.2± 5.3 vs. CVD with 60.5±11.2 mg/dl. Resting ORAC in cyclists averaged 1652±77, increasing to 1961 ± 170 U Trolox/ml post exercise vs. resting CVD $\bar{X}$= 1897± 62.7 U Trolox/ml. LIPOX increased 18% in cyclists post exercise. Resting LIPOX in CVD was 25% and 9% higher than cyclists at rest and post exercise, respectively. Oxidative stress balance (LIPOX:ORAC) of cyclists increased slightly post exercise (.62 to .64), indicating an appropriate antioxidant response to the exercise stress. CVD had a LIPOX:ORAC ratio of .73 at rest, higher than cyclists at rest and post exercise. These results indicate that at rest, CVD subjects showed greater oxidative stress compared to healthy cyclists regardless if the cyclists were measured at rest or after exercise. Greater oxidative stress may be an underlying contributor to CVD

ACUTE AND CHRONIC EXERCISE TRAINING AND STRESS PROTEIN SYNTHESIS
Brickman, T.M., M.G. Flynn, FACSM, E. Sanchez*, W.A. Braun, C.P. Lambert, F.F. Andres, and J. Hu*. Exercise Physiology Laboratory, The University of Toledo and Department of Pharmacology, *Medical College of Ohio, Toledo, OH

Male Sprague-Dawley rats were assigned into groups: acute exercise (D1), 21, 42, and 63 days training (D21, D42, D63), and day 1 and day 63 controls (D1C, D63C). Rats were trained on a motor-driven treadmill for 21, 42, or 63 days, with a terminal intensity of 20 m/min for 30 min, 27 m/min for 60 min, 35 m/min for 60 min, respectively. D1C and D63C did not train. D1, D21, D42, and D63 rats were run at 42 m/min to volitional fatigue, defined as their refusal to run despite manual prodding, and were anaesthetized. Tail blood was analyzed for creatine kinase activity. One soleus (SOL) and white vastus (WV) muscles were analyzed for citrate synthase activity. The other SOL and WV were minced, washed 3 X, incubated with 200 uCi of ^{35}S-methionine and incubated for three hours. The labeled cells were lysed and equal amounts of protein were analyzed by SDS-PAGE. Citrate synthase activity was significantly greater in D21 and D42 samples, than D1C and D1; however, the D63 values were not significantly greater than either D1, D1C or D63C. Creatine kinase activities were reduced as training progressed (D21, 739.4 ±215.4, D42, 424.8 ±143.5, D63, 195.0±77.5). Stress protein synthesis was markedly increased in SOL and WV for the D1 rats compared to D1C, while D21, D42, and D63 showed no greater synthesis than the control groups. Therefore, acute exercise elicited a marked increase in stress protein synthesis in untrained animals while this response was not evident in trained animals.

RESPONSES AT PREFERRED RUNNING INTENSITIES IN MEN AND WOMEN.
J. Emmett. Department of Physical Education. Eastern Illinois University, Charleston, IL 61290

This study investigated the differences in perceived exertion and heart rate between active men and women at preferred running intensities. Eleven men and nine women had maximal oxygen uptake (VO_2max) measured from a graded exercise treadmill test with two minute stages (GXT). Heart rate (HR) and rating of perceived exertion (RPE) were measured at every minute and every other minute, respectively. Ventilatory threshold (Tvent) was determined as described by Wasserman, et al. (1973). Percent body fat was also measured and free-fat weight (FFW) was calculated. On a separate day, each subject was asked to run on an indoor track at their preferred intensity for twenty minutes while a heart rate monitor recorded and stored HR every minute. An overall RPE value was obtained at the end of the run. Statistical analysis showed mean GXT values for maximal HR, RPE and VO_2–expressed in ml/FFW/min–were not different for men and women. The percent of VO_2max, percentage of HR and RPE values at Tvent were similar for men and women. During the preferred intensity run (PIR), HR (168.8 bpm for men and 170.7 bpm for women) and RPE (14.8 for men and 14.7 for women), and percentage of HRmax (88.4% for men and 87.2% for women) were similar between men and women. For both groups, the absolute HR during PIR was not different from HR at Tvent while RPE was significantly ($p<0.05$) higher during PIR compared to Tvent. However, the mean difference in RPE values was 1.2 which may not be physiologically significant. In summary, active men and women both selected a preferred running intensity similar to the intensity level at Tvent. Furthermore, there is no difference in HR or RPE while running at a preferred intensity level between men and women with similar VO_2max (ml/FFW/min) values.

COMPARISON OF POWER AIR BALL, SPIR TUBE, AND ARM MOVEMENT DURING STEP AEROBICS.
L. Dallas, J. Emmett, J. Owen, P. Croisant, K. Ketler. Dept. of Physical Education, Eastern Illinois University, Charleston, IL 61920

This study compared the energy cost between three step aerobic routines (SAR); one without any upper body resistive exercise equipment (ARM), one with a 2 lb Power Air Ball (BALL), and one with a Spri Tube (TUBE). Twenty-seven college aged females familiar with step aerobics volunteered to be subjects. Subjects viewed the same 55 minute video during each SAR so that arm and leg movement and cadence was similar. The order of the SAR was randomly assigned. An Aerosport TEEM 100 metabolic system measured oxygen uptake (VO_2), minute ventilation (VE), and respiratory exchange ratio (RER) every 20 seconds. A Polar heart rate monitor stored heart rates (hR) every 30 seconds and a rating of perceived exertion (RPE) was obtained every 5 minutes. The mean VO_2 (ml/kg/min) for ARM, BALL, and TUBE was 24.91, 26.16, and 24.37, respectively. The mean HR (bpm) for ARM, BALL and TUBE was 159, 166, 159, respectively. Both VO_2 and HR were statistically significant higher during BALL ($p<0.05$). The mean RPE was similar for all three SAR. The findings suggest that although BALL produced higher VO_2 and HR values, it was not perceived as more strenuous than ARM or TUBE during similar SAR.

VALIDATION OF A FACEMASK BREATHING VALVE DURING EXERCISE TESTING IN CHILDREN

K.Q. Kelsey and A.D. Mahon, Human Performance Laboratory, Ball State University, Muncie, IN 47306

The measurement of gas exchange during exercise testing is routinely performed using a mouthpiece and noseclip. Facemasks reduce some of the discomforts associated with the mouthpiece and nose clip, but may be problematic due to leaks. The use of a sealant positioned between the skin and the mask may alleviate this problem. Therefore, the purpose of this study was to compare the VO_2 and V_E during submaximal and maximal treadmill exercise in children (n = 19; Mean ± SD age, 10.5 ± 1.6 yrs) wearing a facemask and sealant (FM) versus a mouthpiece and nose clip (MP). Each child completed an orientation session and 2 graded exercise tests. The exercise test protocol consisted of walking 3.0 mph for 4 minutes, running 5.0 mph for 4 minutes followed by 2.5% increases in elevation every minute until maximal voluntary effort was achieved. VO_2 ($ml \cdot kg^{-1} \cdot min^{-1}$) and V_E ($l \cdot min^{-1}$) were compared between trials at the end of each submaximal stage and at maximal exercise using one-way ANOVA and reliability correlations. At 3.0 mph VO_2 was 17.2 ± 2.8 using MP and 16.8 ± 3.1 using FM ($P > 0.05$; $r = 0.82$), while V_E was 13.2 ± 1.6 using MP and 13.6 ± 2.3 using FM ($P > 0.05$; $r = 0.62$). At 5.0 mph VO_2 was 36.7 ± 3.9 using MP and 36.2 ± 3.9 using FM ($P > 0.05$; $r = 0.92$). At this same speed V_E was 33.4 ± 5.0 using MP and 34.3 ± 5.7 using FM ($P > 0.05$; $r = 0.82$). At maximal exercise VO_2 was 50.1 ± 5.4 using MP and 49.6 ± 5.7 using FM ($P > 0.05$; $r = 0.95$), while V_E was 54.4 ± 12.1 using MP and 55.8 ± 11.1 using FM ($P > 0.05$; $r = 0.91$). In conclusion, the use of a facemask during exercise testing in this age group was more preferred, and produced comparable results to those obtained using a mouthpiece and nose clip.

Supported by Hans Rudolph, Inc.

THE EFFECT OF ELECTRICAL STIMULATION ON THE MECHANICAL PROPERTIES OF MUSCLE ATROPHY INDUCED BY HINDLIMB SUSPENSION IN RATS.

Kim D.H., Y. S. Kim, H. W. Cheon. Department of Physical Education, Chonnam National University, Kwangju, Korea.

The effect of hindlimb suspension on the mechanical properties of contraction of the hindlimb muscles and the effect of the intermittent electrical stimulation on the atrophic response of microgravity muscles were evaluated. Sprague-Dawley rats were subjected to hindlimb suspension and divided into six groups which were hindlimb suspension (HS), suspension with 20Hz electrical stimulation (HS-ES 20), suspension with 40Hz electrical stimulation (HS-ES 40), spontaneous recovery after hindlimb suspension (PHS-SR), electrical stimulation during recovery period (PHS-ES), and control group. The results were as follows: 1. Soleus and gastrocnemius weight was lower in HS compared to HS-ES 20 and HS-ES 40. 2. The 40Hz stimulation group showed greater effect on maximum tetanic tension and fatigue index than 20Hz group. 3. PHS-ES group showed similar value for half relaxation time and fatigue index with control group. In conclusion, the results indicated that the intermittent electrical stimulation was useful in preventing muscle atrophy during hindlimb suspension.

EFFECT OF A HOSPITAL WEIGHT MANAGEMENT CHALLENGE

MS Lager, LLStuber, BD Reeves, CR Miller, DL Legg, FF Andres, and PG Brolinson, The University of Toledo, The Toledo Hospital, Toledo, Ohio.

Obesity remains one of the most significant health problems in contemporary society. To reduce health care costs associated with obesity, many corporations offer weight management programs to their employees. The purpose of the study was to determine the efficacy of a 10-week hospital - based weight management program which reinforced positive lifestyle behaviors. Dependent variables were body weight (BW), percent body fat (%BF), and body mass index (BMI). A graduated point system was used to reward self-reported food portion control, appropriate dietary composition, and time spent in aerobic and strengthening exercise. One hundred fifteen employees (10 M and 105 F) were placed on teams by department affiliation. Pre- and post-measures of BW, %BF, and BMI were obtained by investigators. Compliers (C) were defined as teams participating in both pre- and post-measurements. Pre/post data and pre-test measures for (C) and noncompliers (NC) were compared using dependent and independent t-test respectively. BMI and BW were significantly less (.547 and 1.4 kg respectively) for C ($p<0.05$). No significant difference was found in %BF. In addition, no significant difference was found between mean values for C vs. NC on any of the pre-test measures.

	BW PRE	BW POST	BMI PRE	BMI POST	%BF PRE	%BF POST
C	75.1±19.1	73.7±18.2	28.2±6.9	27.7±6.6	29.4±7.3	28.9±8.2
NC	78.8±19.2		30.1±7.7		29.8±7.7	

As companies fight back in the continuing "battle of the bulge," weight management programs are becoming popular within the workforce. Using a graduated point system, shaping techniques were successful in increasing a positive diet and exercise behavior. Based on these findings, these techniques may promote lifestyle behaviors that result in favorable changes in BMI and BW.

KINETIC ANALYSIS OF THE PATELLOFEMORAL JOINT DURING LOW IMPACT STEP AEROBICS

Brian K. Lee, Tulane University, New Orleans, LA 70118

The purpose of the study was to determine the magnitude of the torque and joint reaction forces exerting on the patellofemoral joint while participating in step aerobics exercise. Using the Motion Analysis System, six female, college age students (height 1.60±0.10 m; weight 44±5 kg) were filmed at 200 frames per second while performing step aerobics at 120 steps per minute. A force plate was installed on a 20.32 cm high bench and used to record the ground reaction force. The angular acceleration of the moving body, the moment of inertia, the torque acting around the knee joint, and the joint reaction forces on the patellofemoral joint were determined using the static and dynamic analysis. The torque acting around the knee joint was determined to equaled to 3.38±0.03 Nm. The joint reaction forces on the patellofemoral joint were 1763.17±25 N. The magnitude of the joint reaction force was approximately 4.0 times the subjects' body weight. The forces were produced by the subjects' body weight, muscle action, and soft tissue resistance. The author concluded that a low impact step aerobics exercise should be considered a safe form of exercise. However, at a faster cadence or higher step, the joint reaction force will be greater. Therefore, care should be taken not to increase the cadence as well as the height of the step without consideration of the condition of the performers.

RELATIONSHIP BETWEEN STRENGTH AND BALANCE AMONG RESIDENTS OF A LONG-TERM CARE FACILITY. B.A. Priest, J.E. Davis, L. Lawhorne and R. Anderson. Department of Exercise and Health Science, Alma College and Michigan Masonic Home, Alma, MI 48801

Falls are a common problem with institutionalized elderly and often result in significant injury. Few studies have investigated the role of strength in balance control in this segment of the population. In the present study, baseline data was collected to determine the relationship between strength, balance, and falls in a population of institutionalized elderly. Initial testing for this study involved obtaining strength and balance measures on twenty-nine elderly (age=84.7 ± 7.0 years). Strength measures were ascertained using a one-repetition maximum (1RM) for ankle plantarflexion (12.5 ± 10.2 lbs.) and dorsiflexion (7.8 ± 4.5 lbs), and for knee extension (11.7 ± 6.8 lbs.) and flexion (13.8 ± 6.4 lbs.) on the left extremity. Ground reaction forces and EMG data were collected as the subjects performed three balance tests: (a) one-leg stance, (b) chair raise, and (c) postural sway. The mean one-leg stance time was 6.5 ± 9.6 seconds. There was no relationship between any of the strength measures and one-leg stance(r^2 = .066). However, for the subjects that were able to stand more than 5 seconds, there was a significant correlation between one-leg stance and knee extension (r^2 = .516). Postural sway was not related to strength (r^2 = .137). These data suggest that other factors including neurologic deterioration, proprioreceptive alterations and vestibular deficiencies might be more important in determining balance control than strength. Further investigations will be necessary to determine effective interventions for reducing the incidence of falls in the elderly.

EFFECT OF A CORPORATE WEIGHT MANAGEMENT CHALLENGE
L.L. Stuber, M.S. Lager, B.D. Reeves, C.R. Miller, F.F. Andres, P.G. Brolinson.
University of Toledo, The Toledo Hospital, Toledo, Ohio.

Nutrition and weight reduction programs are being offered by some companies to promote healthy lifestyles. The purpose of the study was to determine the efficacy of a 16-week corporate health promotion program which reinforced positive lifestyle behaviors. Dependent variables were body weight (BW), percent body fat (BF), and body mass index (BMI). The relative contributions of positive diet and exercise behaviors were also evaluated. A graduated point system was used to reward self-reported food portion control, appropriate dietary composition, and time spent in aerobic and strengthening exercise. Eighty-eight subjects (27 M and 61 F) with a mean age of 39 ±9.1 yr self-selected membership into 19 teams of 4-6 members. Pre- and post-measures of BW, BF, and BMI were obtained by the investigator. Data were analyzed using dependent t-test. Seventeen teams (89.5%) significantly decreased BW and BMI ($p<0.05$), but not BF. Participants attained 59% of the total points for diet and exercise (diet=43%, exercise=16%).

	%BF PRE	%BF POST	BW PRE	BW POST	BMI PRE	BMI POST
mean	27.36	25.24	79.11	76.57	28.01	27.13
±SD	9.60	8.18	19.41	17.47	6.26	5.82

While participants in the present study demonstrated positive movement on the physical activity continuum, only 16% of the available points were attained for exercise. Dietary behaviors appear to have been more easily modified which may reflect the historical emphasis on diet in Western culture. Field measures of BF may not have detected small changes in body composition. Therefore, BMI and BW may be more appropriate measures when dietary means are the primary method of weight management. Based on this study, people continue to use diet for weight management. More effective strategies need to be developed to increase exercise behavior.

Midwest ACSM Annual Meeting, 1995

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The American College of Sports Medicine's Professional Education Committee has granted a total of **16.5** hours of ACSM Continuing Education Credit for the Midwest Chapter Annual meeting, October 26-28, 1995.

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IMPORTANT: *Please be sure to evaluate both the speakers and the overall meeting using the following forms.* In order to obtain credit, we must return completed forms to the American College of Sports Medicine.

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Midwest Chapter Annual Meeting

October 26-28, 1995
St. Charles, IL

ATTENDANCE VERIFICATION FORM

CEC Verification Form
16.5 hrs. ACSM-CECs

AMERICAN COLLEGE OF SPORTS MEDICINE

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Because the Continuing Education Committee of the American College of Sports Medicine (ACSM) has participated in the endorsement of this program, we would like to request your evaluation of the program and speakers. Please answer the questions below. Thank you for your cooperation. Please be sure to hand in the evaluation at the end of the program.

TITLE OF MEETING: Midwest Chapter Annual Fall Meeting DATE OF MEETING: October 26-28, 1995

1. Are you a member of ACSM? ___ Yes ___ No Fellow of ACSM? ___ Yes ___ No

2. Are you a student? ___ Yes If yes, ___ Undergraduate ___ Graduate ___ Medical
___ No

3. What distance did you travel to this meeting?

___ < 50 miles ___ 50-100 miles ___100-200 miles ___ 200-600 miles ___ > 600 miles

4. What is your area of interst in sports medicine? ___ Research ___ Teaching ___ Training ___Rehabilitation
___ Coaching ___ Clinical Treatment ___ Other

5. How did you learn of this program? ___ Mailing ___ Colleague ___ Other

6. Was the meeting well organized and on time? ___ Yes ___ No

7. Was the program "as advertised"? ___ Yes ___ No

8. Were the educational objectives of the program clearly stated in program publicity or at program sessions?
___ Yes ___ No

9. To what extent have you personally learned anything new from this program? Information was:
___ Completely new ___ More new than old ___ More old than new ___ Virtually all old

10. To what extent do you feel that the educational material covered in the program was of value to you personally and/or professionally?
___ Exceedingly valuable ___ Moderately valuable ___ Slightly valuable ___ Little/no value

11. Would you recommend another conference of this nature next year? ___ Yes ___ No

12. What was the highlight of the program?

13. What was the poorest part of the program?

14. How could the program have been improved?

15. Any additional comments:

AMERICAN COLLEGE OF SPORTS MEDICINE

Title of Meeting: Midwest Chapter Annual Fall Mtg.

Date(s) of Meeting: October 26-28, 1995

SPEAKER EVALUATION
5 - EXCEPTIONAL
4 - VERY GOOD
3 - SATISFACTORY
2 - FAIR
1 - POOR

Speaker's Name	Title of Presentation	Quality of Audiovisual Aids	Quality of Presentation - Speaker	Quality of Presentation - Content	Probability of Using Information	Amount of New Information
Hermann Engels, PhD & Judith Shouter, M.Ed.	Healthy People 2000					
Barbara Campaigne, PhD	ACSM Research Grants					
Steve Freeman, MD	Common Sport Injuries..Hand					
Barbara Campaigne, PhD	Research Grant Opportunities					
I. Martin Grais, MD	Is Heart Failure a Neuro....					
Steven J. Keteyian, PhD	Exercise training as an adjunct					
Christopher Ingersol, PhD	Biomechanical Assess of Brain					
John W. Chow, PhD	Musculoskeletal Modeling					
Helaine Alessio, PhD	Antioxidants and aging					
William J. Evans, PhD	Effects of exercise on body comp...elderly					
Leroy "Bud" Getchell, PhD	Fitness Exercise: Past-Future					
Richard Lampman, PhD	Clinical Approaches to Exerc.					
P. Gunnar Brolinson, MD	Concussion: When to return..					
James G. Hay, PhD	Learning from the Best..jumps					
Gary Winkler, MS	What has science brought to the athlete					
Joan Duda, PhD	Sport Psychology component-women's gymnastics					
Ralph E. Baharonde, PhD	How can Biomechanics- tennis					

AMERICAN COLLEGE OF SPORTS MEDICINE

Title of Meeting: Midwest Chapter Annual Fall Mtg.

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SPEAKER EVALUATION
5 - EXCEPTIONAL
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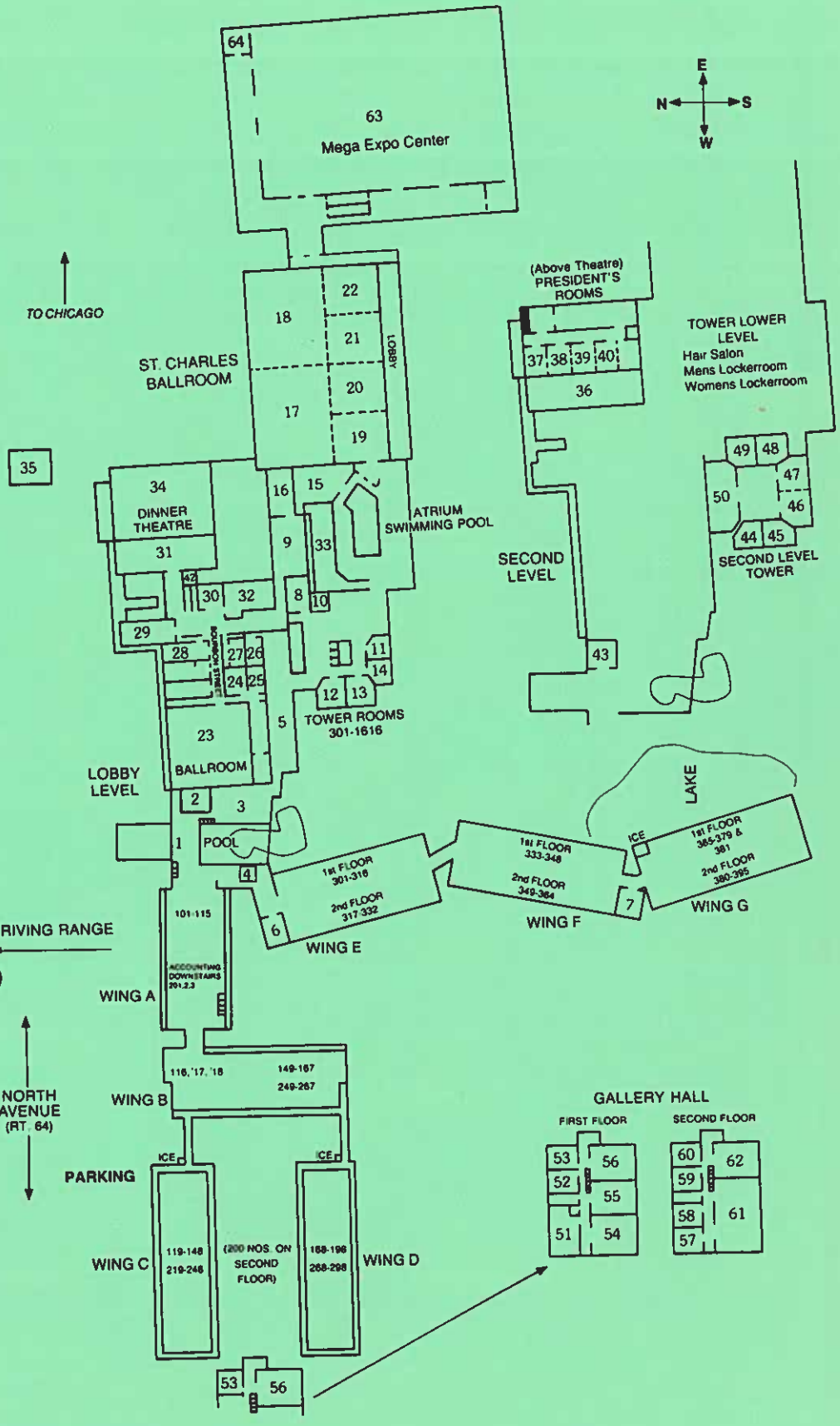
Speaker's Name	Title of Presentation	Quality of Audiovisual Aids	Quality of Presentation - Speaker	Quality of Presentation - Content	Probability of Using Information	Amount of New Information
Michael G. Flynn, PhD	Overtraining/crosstraining					
Steven J. Keteyian , PhD & Timothy E. Kirby, PhD	Finding a job...cardiac rehab					
Leonard A. Kaminsky, PhD Mitchell H. Whaley, PhD	Exercise testing to Exercise prescription.					
Robert C. Hickson, PhD	Molecular Biology & Exercise					
Stephen M. Simons, MD	Why pronate? Lucy to Frank Shorter					
David L. Costill, PhD	Tips on Scientific Presentations					
A. Lynn Millar, PhD, PT	Ex. Physiology and PT					
Susan Yoder	What ACSM can do for you					
William P. Morgan, EdD	Psychological Outcomes of..					
David L. Costill, PhD	Aging distance runner					
Reed H. Humphrey, PhD, PT	Guidelines for Exercise Test					
Joseph Congeni, MD	Overview of Childhood Muscul..					
Edward T. Howley, PhD	Measurement of VO_{2max}...					
Robert C. Hickson, PhD	Exercise and glutamine support					
Karen Ball, PhD	Protein-protein interactions					
Karyn Esser, PhD	Neural and mechanical regul...					

RESORT SITE PLAN

Pheasant Run
RESORT ◆ CONVENTION CENTER

1 - Lobby
2 - Reservation Office
3 - Poolside Solarium
4 - Card Room - Lobby
5 - Card Room - Tower
6 - Kid's Club
7 - King Edward
8 - Food and Beverage Office
9 - Marseilles I & II
10 - Clubhouse Lounge
11 - Golf Shop
12 - Arnold Palmer
13 - Jack Nicklaus
14 - Ben Hogan
15 - Fitness Center/Health Club
16 - Marseilles III
17 - Salon I
18 - Salon II
19 - Salon III
20 - Salon IV
21 - Salon V
22 - Salon VI
COMPLETE ST. CHARLES BALLROOM
23 - New Orleans Ballroom
24 - Pete Fountain Room
25 - Louis Armstrong
26 - Duke Ellington
27 - Lucky Pierre's
28 - Marian's Boutique
29 - Thieve's Market
30 - Bourbon Street Deli
31 - Baker's Wife Restaurant & Lounge
32 - Lillys
33 - Atrium
34 - Dinner-Theatre
35 - Dinner-Theatre Box Office
36 - Zanies Comedy Club
37 - Washington
38 - Lincoln
39 - Jefferson
40 - Eisenhower
COMPLETE PRESIDENT'S ROOMS
42 - Zanies Box Office
43 - Sales/Catering Office (above lobby)
44 - Sapphire
45 - Topaz
46 - Turquoise A
47 - Turquoise B
48 - Coral
49 - Jade
COMPLETE GEM ROOMS
50 - Ruby
51 - Robert Wood
52 - Picasso
53 - Chagall
54 - Utrillo
55 - Vermeer
56 - Gauguin
57 - Matisse
58 - Corot
59 - Van Gogh
60 - Cezanne
61 - Rembrandt
62 - Renoir
COMPLETE GALLERY HALL
63 - Mega Expo Center
64 - Mega Expo Center Box Office



FALL MEETING REGISTRATION FORM

Midwest Chapter
American College of Sports Medicine
October 3-5, 1996

PRINT OR TYPE INFORMATION
(Name badge information taken from this form)

Name _____

Degree/Profession _____

Affiliation _____

Address _____

City/State/Zip _____

Area Code/Phone _____

Fax/e-mail _____

FEE SCHEDULE (Registration must be postmarked by 9/14/96 to qualify for reduced fee)

	Pre-Registration By 9/14/96	Registration After 9/14/96	Total
MWACSM Members			
Professional and Professional-in-Training	$65.00	$85.00	$ _____
Student	$35.00	$45.00	$ _____
Non-MWACSM Members (1997 Membership included.)			
Professional and Professional-in-Training	$80.00	$100.00	$ _____
Student	$40.00	$50.00	$ _____
Single-day Registration			
Professional and Professional-in-Training Date: _____	$35.00	$40.00	$ _____
Student Date: _____	$20.00	$25.00	$ _____

CEQ candidates receive 20% discount on registration fee.

PAYMENT METHOD*
Check _____ Money Order _____ TOTAL $ _____
*Payable to *Midwest ACSM*

*If you have a disability which requires special accommodations, please notify us of your needs at least **two weeks** in advance of the program.

Please send registration form with payment to:
Darlene Sedlock, Ph.D.
Department HKLS
1362 Lambert
Purdue University
West Lafayette, Indiana 47907
Telephone: 317-494-3184
FAX: 317-496-1239
E-Mail: SEDLOCK@VM.CC.PURDUE.EDU

INFORMATION

The 1996 MWACSM meeting is designed to (1) enhance the scientific and clinical understanding of the physiological, biomechanical, and psychological bases for the changes that occur during and following exercise in both normal and pathological states; (2) provide a forum for students to present research related to sports medicine and exercise science; and (3) promote interaction among scientists and clinicians in related fields to provide new approaches to, and perspectives on, problems in exercise science and sports medicine.

- **Registration**

A discount is available through pre-registration if the registration form is postmarked by September 14, 1996. When completing the form, be sure to furnish all information requested to avoid delays. On-site registration will begin on Thursday, October 3, 1996 at 1:00 p.m. at Pheasant Run Resort.

- **Cancellations**

A full refund will be given if a **written** cancellation is ***received*** by September 6, 1996. A processing fee of $20.00 will be charged for cancellations ***received*** between September 6-29. No refunds after Sept. 29.

- **Continuing Education**

Applications have been filed for Continuing Education Credits. The number of credit hours is yet to be determined. Individuals requiring credit verification of attendance at the meeting must register and pay a fee of $10 for ACSM members, and a fee of $15 for non-members.

- **Lodging**

A block of rooms has been reserved for meeting participants at the Pheasant Run Resort (4051 E. Main St., St. Charles, IL 60174-5200). Registrants are responsible for making hotel reservations by contacting the resort at 1-800-474-3272. The resort has reserved a limited number of non-smoking rooms for the MWACSM meeting until **September 2, 1996**. The room rates are $83 (single/double) and $89 (triple/quad) for standard or $88 (single/double) and $94 (triple/quad) for deluxe accommodations. The resort offers an on-site restaurant and comedy club in addition to a sports bar. Swimming, golf, fitness equipment, tennis, and other recreational opportunities are also available on site. Other convenient accommodations are available in St. Charles at Econo Lodge, Best Western, Super 8 Motel, or Days Inn.

- **Reminder**

The Program Committee encourages you to submit an abstract for the 1996 annual meeting. The deadline is July 15, 1996. Students are reminded that they can submit the same abstract to both the MWACSM and national ACSM. Abstract forms are available from James Pivarnik, Ph.D., Dept. of Phys. Educ. & Ex. Sci., Rm. 3 IM Sports Circle Bldg., Michigan State Univ., E. Lansing, MI 48824-1049, phone: 517-355-4734.

- **Exhibits**

A student forum will be held on Saturday morning prior to the luncheon which will include exhibits from graduate schools and internship sites. If you would like to exhibit materials, contact Bill Simpson, Ph.D., Univ. of Wisconsin-Stevens Point, phone: 715-346-2720.

- **Certificate of Enhanced Qualification**

An ACSM CEQ Examination will be held Thursday morning, October 3. If you are interested in applying for certification, contact the national ACSM office, 317-637-9200 or the Certification Resource Center at 1-800-486-5643. For additional information related to CEQ at Pheasant Run, contact Mitch Whaley, Ph.D., Ball State University, phone: 317-285-1140.

- **Program Committee**

Darlene A. Sedlock, Ph.D. Purdue University
Jeff Edwards, Ph.D., Indiana State University
Jim Pivarnik, Ph.D., Michigan State University
Gunnar Brolinson, M.D., Sports Care, Toledo, Ohio
Steve Freeman, M.D., Sports Care, Toledo, Ohio
Bill Simpson, Ph.D., Student Forum, Univ. of Wisconsin, Stevens-Point
Lynn Millar, Ph.D., Continuing Educ., Andrews University, Ohio
Janet Ponichtera-Mulcare, Ph.D., Special Events, Andrews University, Ohio

HUMAN PERFORMANCE LABORATORY
Ball State University
Muncie, Indiana 47306

PROGRAM

Pre-Registration Deadline is September 14, 1996

AMERICAN COLLEGE of SPORTS MEDICINE

MIDWEST CHAPTER
Annual Fall Meeting

Pheasant Run Resort, St. Charles, Illinois
October 3-5, 1996

Abstract Deadline is July 15, 1996

THURSDAY, OCTOBER 3, 1996

PRE-PROGRAM

ACSM CERTIFICATION

8:00 am **Certificate of Enhanced Qualification**
Mitchell H. Whaley, Ph.D., Certification Director
Ball State University

Gregory B. Dwyer, Ph.D., Site Director

PROGRAM

1:00 pm **REGISTRATION**

SYMPOSIUM: HEART HEALTHY DIET

2:00 pm **"Defining the 'Heart Healthy Diet' for Lipid Management"**
Joseph J. Carlson, R.D., M.A.
Blodgett Memorial Medical Center

Ronald VanderLaan, M.D., FACC
Blodgett Memorial Medical Ctr. & Grand Valley Cardiology

4:30 pm **"The Interdisciplinary Team Approach in the Care of the Stroke Patient in an Outpatient Setting"**
Terry L. Nicola, M.D., M.S.
University of Illinois at Chicago

SYMPOSIUM: FRACTIONATION OF ENERGY EXPENDITURE: TECHNOLOGICAL AND METHODOLOGICAL ISSUES

2:00 pm **"Introduction to the Components of Daily Energy Expenditure and Technologies of Measurement"**
Jeffrey E. Edwards, Ph.D.
Indiana State University

2:30 pm **"Methodological Consideration in the Measurement of Human Energy Expenditure"**
Darlene A. Sedlock, Ph.D.
Purdue University

COLLOQUIUM: CERTIFICATE OF ENHANCED QUALIFICATION

3:15 pm **"What is the ACSM Certificate of Enhanced Qualification (CEQ)?"**
Mitchell H. Whaley, Ph.D.
Ball State University

SYMPOSIUM: EXERCISE PROGRAMS FOR OUTPATIENT STROKE PATIENTS WITH MUSCULOSKELETAL DISORDERS

3:45 pm **"Evaluating and Prescribing Exercises for the Stroke Patient in an Outpatient Setting"**
Cheryl L. Dudeck, M.S., A.T.C.
University of Illinois at Chicago

RESEARCH PRESENTATIONS

4:00 pm **Poster Session - (Authors Present 6:45 - 7:45 pm)**
6:30 pm **Free Communications**

KEYNOTE LECTURE

8:00 pm **"Growth and Maturation of Young Athletes: Is Training a Factor?"**
Robert M. Malina, Ph.D.
Director, Institute for the Study of Youth Sport
Michigan State University

FRIDAY, OCTOBER 4, 1996

SYMPOSIUM: EXERCISE AND IMMUNE FUNCTION: RESEARCH AND PRACTICAL APPLICATIONS

8:00 am **"Research Design & Methodology in Exercise Immunology"**
Jeffrey A. Woods, Ph.D.
University of Illinois at Urbana-Champaign

8:30 am **"Exercise and Immune Function: Practical Applications"**
Michael G. Flynn, Ph.D.
University of Toledo

9:00 am **Break**

9:10 am **"Exercise, Microphage Function, and Disease"**
Michael A. Ceddia, M.S.
University of Illinois at Urbana-Champaign

9:25 am **"Resistance Exercise Training and Immune Function in the Elderly"**
William A. "Turi" Braun, M.S.
University of Toledo

9:40 am **"Exercise and Suppressor Cell Function in Multiple Sclerosis"**
Charles P. Lambert, M.S.
University of Toledo

RESEARCH PRESENTATIONS

8:00 am **Free Communications**
8:00 am **Poster Session - (Authors Present 11:00 - 12:00 pm)**

CLINICAL LECTURE

9:30 am **"Weight Training for Adolescents"**
Michael Gunter, M.D.
Sports Care, The Toledo Hospital

SYMPOSIUM: SPORT PSYCHOLOGY

10:00 am **"Extensions of Goal Perspective Theory: Motivational Climate as a Predictor of Percursors of Eating Disorders Among Elite Female Gymnasts"**
Joan L. Duda, Ph.D.
Purdue University
Sport Psychology Consultant, USA Women's Gymnastics

10:25 am **"Self-Efficacy and Psychological Strategies to Overcome Fear of Injury in Physical Activity and Sport"**
Melissa Chase, Ph.D.
Purdue University

11:00 am **Break**

11:10 am **"Enhancing Coaching Behaviors: Conceptual Foundations, Empirical Knowledge & Applied Strategies"**
Robin S. Vealey, Ph.D.
Miami University of Ohio

11:40 am **"A Qualitative and Grounded Theory Approach to the Role of Pregnancy in Elite Women Track and Field Athletes"**
Gloria Balague, Ph.D.
University of Illinois at Chicago
Sport Psychology Consultant, USA Track & Field and USA Women's Rhythmic Gymnastics

SYMPOSIUM: ECCENTRIC EXERCISE, MUSCLE DAMAGE, ACUTE INFLAMMATION: THEORETICAL AND PRACTICAL ISSUES

10:30 am **"Eccentrically Biased Exercise and Mechanisms Inducing Delayed Onset Muscle Soreness"**
Lucille L. Smith, Ph.D.
Northeastern Illinois University

11:00 am **"Initial Sequence of Events Activating the Acute Inflammatory Response"**
Asif Anwar, MBBS
Northeastern Illinois University

11:30 am **"Practical Issues Related to Exercise Induced Muscle Injury and Acute Inflammation"**
Michael Fragen, M.D.
Northeastern Illinois University

SYMPOSIUM: THE APPLICATION OF MAGNETIC RESONANCE TECHNOLOGIES TO THE STUDY OF EXERCISE

1:00 pm **"Basic Theory of Magnetic Resonance and an Overview of Types of Exercise Applications"**
Jeanne Foley, Ph.D.
Michigan State University

1:45 pm **"MRI Assessment of Acute Muscle Recruitment and Delayed Muscle Trauma Responses to Resistance Exercise"**
Roop Jayaraman, M.S.
Michigan State University

2:00 pm **"A Comparison of MRI vs. Conventional Methods of Monitoring Body Composition Changes in Exercising Females"**
Diane Hartmann, M.S.
Michigan State University

CLINICAL LECTURE

2:30 pm **"Overuse Injuries in Adolescents"**
Darin Maccoux, M.D.
Sports Care, The Toledo Hospital

TUTORIAL LECTURES

1:00 pm **ACSM Task Force on Eating Disorders**
Barbara L. Drinkwater, Ph.D.
Pacific Medical Center

2:00 pm **Overview of the Sport Psychology Component of the ACSM Certification Exam**
Joan L. Duda, Ph.D.
Purdue University

3-5:00 pm **RECREATIONAL EVENTS**

RESEARCH PRESENTATIONS

4:00 pm **Poster Session - (Authors Present 6:45 - 7:45 pm)**
6:30 pm **Free Communications**

FOUNDER'S LECTURE

8:00 pm **"Bones: Are Active Men and Women Immune to Osteoporosis?"**
Barbara L. Drinkwater, Ph.D.
Pacific Medical Center

9:00 pm **MWACSM SOCIAL**

SATURDAY, OCTOBER 5, 1996

SYMPOSIUM: PSYCHOLOGICAL CONCOMITANTS OF EXERCISE: PERSPECTIVES AND PARADIGMS

8:00 am **"Physical Activity, Brain Activation, & Mental Health"**
Steven J. Petruzello, Ph.D.
University of Illinois at Urbana-Champaign

8:35 am **"Psychological Responses to Acute & Chronic Exercise"**
John S. Raglin, Ph.D.
Indiana University

9:00 am **"Exercise and the Neurochemistry of Stress"**
Mark S. Sothmann, Ph.D.
Indiana University Medical School

RESEARCH PRESENTATION

8:00 am **Free Communication**

CLINICAL LECTURE

9:00 am **"Low Back Pain in Adolescents"**
Steve Freeman, M.D.
Sports Care, The Toledo Hospital

SYMPOSIUM: SPACE PHYSIOLOGY: ROLE OF EXERCISE IN EXTENDED DURATION MISSIONS

9:45 am **"Alterations in the Control of the Cardiovascular System with Extended Microgravity"**
Jim Pawelczyk, Ph.D.
Penn State University

10:15 am **"Skeletal Muscle Adaptations to Microgravity"**
Robert Fitts, Ph.D.
Marquette University

10:45 am **"Exercise Countermeasures and Extended Spaceflight"**
John E. Davis, Ph.D.
Alma College

CLINICAL WORKSHOP: UNDERSTANDING THE CLINCIAL APPLICATIONS OF GAS EXCHANGE ANALYSIS

10:00 am **"Physiologic Responses to Cardiopulmonary Exercise Testing"**
Jeffrey Johnson, M.S.
Blodgett Memorial Medical Center

10:45 am **"Algorithms and Case Presentations for Differential Diagnosis"**
John Cantor, M.D.
Grand Valley Pulmonary Specialists

STUDENT FORUM

11:15 am **Graduate Schools and Internship Sites Exhibit**

LUNCHEON (Free with paid 3-day registration fee or 1-day Sat.)

12:00 pm **Guest Speaker:**
Scott Parazynski, M.D.
NASA Astronaut Johnson Space Center

Awards Presentation

MWACSM Business Meeting

Conference Program

American College of Sports Medince

Midwest Chapter

Annual Meeting

Pheasant Run Resort
St. Charles, Illinois
October 3-5, 1996

Pasture

4-8 Thurs

8-12 Fri.

Welcome to the 1996 Annual Meeting of the Midwest Regional Chapter of the American College of Sports Medicine. The Program Planning Committee has worked to produce a program that reflects the diversity of the membership of the chapter. We are pleased that you are taking advantage of our efforts to provide our sports medicine students and professionals with this activity, and hope that you find the meeting to be an enjoyable and educational experience.

We encourage you to explore the numerous and varied recreational opportunities that both the meeting site and surrounding community have to offer. If you have any questions about activities in the area, a host from the St. Charles Convention and Visitors Bureau will be at the registration booth.

Your comments about the meeting are important to us, so we ask that you please take a moment to fill out the speaker evaluation forms at the back of this brochure. Again, best wishes for a rewarding and enjoyable meeting.

Registration Information

Registration on Thursday, October 3 will be in the Solarium and will be open from 1:00-7:30 pm. On Thursday and Friday the registration desk will be located in the common area outside of the St. Charles Ballroom Salon II and VI, and will be open during the following hours:

Friday, October 4	7:00 am-4:00 pm
	6:00-7:30 pm
Saturday, October 5	7:00-8:00 am

Accreditation

The American College of Sports Medicine's Professional Education Committee certifies that the 1996 Midwest Chapter Annual Meeting meets the criteria for 15 credit hours of ACSM Continuing Education Credit.

Continuing Medical Education (CME) Category 2 credits for this meeting may be obtained by reporting your attendance to the AMA. Additional program brochures are available at the registration desk so that the precise number of credit hours may be determined by the AMA.

Important: Please be sure to evaluate both the speakers and the overall meeting using the forms in the back of this meeting program. In order to obtain Continuing Education Credit, we must return completed forms to the American College of Sports Medicine.

Thursday, October 3, 1996

Pre-Program **Location**

ACSM Certificate of Enhanced Qualification

8:00 am *Advanced Personal Trainer* Ruby

Mitchell H. Whaley, Ph.D., Certification Director
Ball State University

Gregory B. Dwyer, Ph.D., Site Coordinator
Ball State University

Symposia

2:00-3:30 pm *"Defining the 'Heart Healthy Diet' For Lipid Management"* Salon II

Joseph J. Carlson, R.D., M.A.
Blodgett Memorial Medical Center/Michigan State University

Ronald VanderLaan, M.D., FACC

Blodgett Memorial Medical Center/Grand Valley Cardiology

Numerous coronary artery disease trials have demonstrated that management of blood lipids is necessary for primary and secondary prevention of atherosclerosis. The National Cholesterol Education Program (NCEP) provides specific blood lipid guidelines believed to manage and prevent the progression of atherosclerosis. Regarding interventions, the NCEP guidelines state that "diet should be the first line of treatment of high blood cholesterol, while drug therapy is reserved for patients who are considered to be at high risk for coronary heart disease, despite dietary therapy." Ironically, the dietary regimens suggested by the NCEP guidelines [30% fat American Heart Association (AHA) Step I or II diets] typically do not reduce low density lipoproteins and total cholesterol by ten percent, the minimum amount shown to significantly reduce cardiovascular morbidity and mortality. In fact, several clinical trials suggest that AHA Step I and II diets may contribute to the progression of atherosclerosis. In contrast, at least three non-pharmacological trials have shown lower fat dietary regimens (ranging from 10% to 27% of total calories) in conjunction with a regular exercise program can significantly lower lipids and manage atherosclerosis. The benefits for patients who adhere to efficacious dietary and exercise interventions include: lipid lowering medications may be unneeded or reduced, and overall cardiovascular risk factor status can be improved. To increase patients' chances of achieving positive outcomes, it is important that professionals involved in primary and secondary cardiovascular prevention programs are aware of effective dietary options to offer patients. The purpose of this symposium is to enhance participants' understanding of the scientific clinical basis and principles of effective dietary interventions for the prevention and management of atherosclerosis.

2:00-3:30 pm *"Exercise Programs for Outpatient Stroke Patient With Musculoskeletal Disorders"* Salon V, VI

'The Interdisciplinary Team Approach in the Care of the Stroke Patient in an Outpatient Setting'
Terry L. Nicola, M.D., M.S.
University of Illinois at Chicago

'The Stroke Diagnosis'
Cathy Helgason, M.D.
University of Illinois at Chicago

'Evaluating and Describing Exercises for Stroke Patients in an Outpatient Setting'
Cheryl L. Dudeck, M.S., A.T.,C
University of Illinois at Chicago

'The Neuropsychological Evaluation'
Linda Laatsch, Ph.D.
University of Illinois at Chicago

This symposium will focus on the systematic evaluation and treatment of stroke patients with musculoskeletal disorders by a clinical exercise physiologist. It will also cover guidelines for a safe prescription and progression of home exercise programs. Objectives of the symposium are to: 1) describe the stroke diagnosis, 2) describe the physiatrist's role in the prescription of exercise given the musculoskeletal complications that occur with stroke, 3) describe a systematic initial evaluation and re-evaluation including range-of-motion, strength, aerobic capacity, balance, gait, ADL's, functional independence, BP, HR, blood glucose, medications, nutrition, current lifestyles, and social support systems, 4) describe prescription of a safe home exercise program starting with basic movement exercises and progressing to complex movement patterns, 5) describe methods to determine patient compliance, and 6) describe the need for neuropsychological evaluation for cognitive deficits.

Colloquia

3:45-4:45 pm *"Fractionation of Energy Expenditure: Technological and Methodological Issues"* Salon V, VI

'Introduction to the Components of Daily Energy Expenditure and Technologies of Measurement'
Jeffrey E. Edwards, Ph.D.
Indiana State University

'Methodological Considerations in the Measurement of Human Energy Expenditure'
Darlene A. Sedlock, Ph.D.
Purdue University

A valid and reliable measurement of human energy expenditure is important in our quest to better understand sport performance, health promotion, and disease prevention. A conceptual overview of energy expenditure will be provided, including a discussion of its relationship to heat production, the theoretical basis and advantages and disadvantages of varied measurement techniques (e.g., doubly-labeled water, respiratory calorimetry), the components of daily energy expenditure, and factors that influence energy utilization by the body (e.g., hormones, environmental conditions). Additionally, issues related to obtaining valid measures of caloric expenditure at rest, during exercise, and post-exercise will be discussed. Some of these include pre-measurement preparation, sources of variability, and various ways to standardize and present the data.

3:45-4:45 pm — *"Professional Certifications: What is ACSM's New CEQ?"* — Salon II

Mitchell H. Whaley, Ph.D.
Ball State University
Member, ACSM Certification and Education Committee

The Certificate of Enhanced Qualification (CEQ) has been newly introduced and implemented by ACSM. It is designed to augment the competencies of those who currently hold an ACSM certification. This colloquium will attempt to provide information on the 'who, what, why, and how' of the CEQ.

Research Presentations

4:00-7:45 pm — Poster Presentations (Authors present 6:45-7:45) — Outside Salon IV

6:30-7:30 pm — Free Communication (Slides) — Salon II

Moderator: Steven T. McCaw, Ph.D.
Illinois State University

6:30 *"Effects of a Progressive Resistance Exercise Program on Strength and Balance in the Institutionalized Elderly"*
S.C. Reinbold, Alma College

6:45 *"Resistance Training and Immune Function in Elderly Women"*
W.A. Braun, University of Toledo

7:00 *"Brain Activation and Mental Health as a Function of Physical Activity in Older Adults"*
E.E. Hall, University of Illinois at Urbana-Champaign

7:15 *"The Effects of Acute Maximal Exercise on Natural Killer Cell Cytotoxicity (NKCC) in the Aged"*
B.W. Wolters, University of Illinois at Urbana-Champaign

EFFECTS OF A PROGRESSIVE RESISTANCE EXERCISE PROGRAM ON STRENGTH AND BALANCE IN THE INSTITUTIONALIZED ELDERLY. S.C. Reinbold, M. Campagna, L. Lawhorne, R.L. Anderson and J.E. Davis. Department of Exercise and Health Science, Alma College, Alma, MI 48801

One of the main concerns for older adults is muscle weakness which can result in an increased incidence of falls. Previous research has shown that implementation of a progressive-resistive strength training program results in significant gains in strength. This particular study was designed to determine the effects of a seven week strength training program on strength and balance in elderly individuals. Twelve individuals (aged 85.8± 5.1 yrs) from the independent living section of the Michigan Masonic Home, a continuing care retirement facility, volunteered to participate in the program. Six of the 12 subjects were randomly selected to take part in seven weeks of strength training, whereas the remaining 6 subjects served as a control group. Before any intervention was begun, strength and balance were assessed in each of the 12 volunteers. This involved testing and evaluating balance using a variety of postural control assessments including a timed one- leg stance as well as measuring strength using the repetition maximum (1 RM). The strength training program was a progressive resistive program that included three sets of eight repetitions of each of the following exercises: lateral pull-down, chest press, hip extension, knee flexion, knee extension, plantar flexion, dorsi flexion, inversion and eversion. In order to maintain the correct workload as a percent of 1 RM, the 1 RM was measured every two weeks in the experimental group. When comparing the pre-test and post-test data, significant gains ($P< 0.05$) in strength for an upper body strength index (116.7 ± 59.7 to 130.4 ± 58.3) and a lower body strength index (110.8 ± 60.2 to 148.3 ± 55.6) were observed in the experimental group. Also, the mean one-leg stance time for the experimental group increased ($P< 0.05$) from 2.5 to 6.7 seconds from pre- to post-test. In contrast, no significant changes in strength or balance were observed in the subjects who were part of the control group. Therefore, the implementation of a progressive-resistive strength training program by the institutionalized elderly may indeed be beneficial in the prevention of falls through improving both strength and balance.

RESISTANCE TRAINING AND IMMUNE FUNCTION IN ELDERLY WOMEN

Braun, W.A., M.G.Flynn FACSM, M. Fahlman, C.P. Lambert, L.E. Bouillon, K.M. Jeffrey, P.G. Brolinson and C.A. Armstrong. Exercise Physiology Lab, The University of Toledo, & Sports Care, The Toledo Hospital

The purpose of this study was twofold: 1) To examine whether a single bout of resistance training alters post-exercise immune system function and, 2) To determine if chronic resistance training would improve resting immune system function in elderly women. Following a week of familiarization to weight training, subjects were randomly assigned to either a resistance exercise (RE, n=15) or a non-exercise group (NE, n=14). The RE (72.6 ±3.5 yr) performed three sets of eight lower extremity exercises (8RM, 3 days/wk for 10 wk) while NE (72.9 ±4.9) were asked to maintain normal activity. Blood samples were obtained from RE (and at the same times for NE) after 15 min rest (PRE), immediately following a standard bout of resistance exercise (POST), and two hours after exercise (2H) at the beginning (WK0) and completion (WK10) of the training. Mononuclear cells bearing the cell surface markers CD3+, CD3+/CD4+, CD3+/CD8+, CD3-/CD16+/CD56+, were assessed via direct immunofluorescence using a flow cytometer. Lymphocyte proliferative response to CONA (LP) and natural cell-mediated cytotoxicity (NCMC, ^{51}Cr release) were determined using whole blood assays. Strength increased significantly in RE for all eight exercises (Mean % change 8RM=148%). There were no main effects of group, time or training for CD3+, CD3+/CD4+, or CD3-/CD8+ cells, however there was a significant main effect of time for CD3-/CD16+/CD56+ cells (increased POST for RE and NE) and CD4+/CD8+ ratio (decreased POST for RE and NE). LP was not different between groups, or across time. NCMC was significantly increased POST in both groups and did not significantly decline at 2H. In conclusion, acute resistance training does not significantly alter selected indices of immune system function and 10 weeks of training did not influence resting immune measures.

Supported by an AARP ANDRUS Foundation Grant

BRAIN ACTIVATION AND MENTAL HEALTH AS A FUNCTION OF PHYSICAL ACTIVITY IN OLDER ADULTS

Eric E. Hall & Steven J. Petruzzello, PhD, FACSM. University of Illinois, Urbana, IL 61801

Physical activity participation has been consistently linked to better mental health (e.g., less anxiety & depression, more positive affect, satisfaction with life). Additionally, brain activation patterns have been shown to be related to mental health. Few studies have examined this relationship in older adults. Left and right hemisphere resting EEG (F3, F4, C3, C4, P3, P4, referenced to linked ears), mental health measures [positive affect (PA), trait anxiety (TA), depression (DEP), satisfaction with life (SWL), self-efficacy (SE)], and physical activity measures were obtained from 15 male and 25 female (M age=68.8 ± 5.8 yrs) adults. Resting EEG frontal asymmetry was related to PA (r= .27, P= .042) and SE (r= .23, P= .073), with greater relative left frontal activation related with more PA/SE. Alpha activity at individual EEG sites was also significantly related to PA, TA, DEP, and SE in the frontal (P_s= .007 to .018) and central regions (P_s= .008 to .063). Alpha activity in the parietal regions was significantly related to PA and DEP (P_s= .005 to .028). These relationships indicate that increased alpha (i.e., decreased brain activation) was associated with more negative/less positive mental health. Physical activity was significantly related to PA (r= .49, P= .001), TA (r= -.35, P= .014), DEP (r= -.31, P= .027), and SWL (r= .49, P= .001). Finally, physical activity was inversely related only to frontal alpha activity (r_s = -.26, -.27, $P_s \leq$ .05). It is concluded that physical activity is related to positive mental health and brain activation. As such, brain activity may act as a biological marker for mental health and may be favorably influenced by physical activity, particularly in frontal regions.

Supported by a grant from the University of Illinois Office of Gerontology & Aging Studies

THE EFFECTS OF ACUTE MAXIMAL EXERCISE ON NATURAL KILLER CELL CYTOTOXICITY (NKCC) IN THE AGED

B.W. Wolters, M.A. Ceddia, J. Evans, and J.A. Woods, Department of Kinesiology, University of Illinois @ Urbana-Champaign, Urbana, IL 61801

Researchers have shown that immune function is suppressed in sedentary elderly subjects when compared to young subjects. In addition, research has shown that in young subjects exercise enhances certain parameters of immune function, specifically natural killer (NK) cell function. NKCC provides a nonspecific defense against disease and infection. The purpose of this study was to determine the effect of an acute maximal exercise test on NKCC in sedentary elderly persons. Subjects (n=13) volunteered to perform a Modified Balke Test. Blood samples were collected immediately pre and post-exercise in vacutainers containing EDTA. Peripheral blood mononuclear cells (PBMC'S), containing NK cells, were isolated using Histopaque density gradient. PBMC viability and number was assessed in trypan blue. The PBMC's were used as effector cells in a Chromium release assay to determine NKCC using K562 and Daudi cells as targets. K562 cells are NK responsive while Daudi cells are NK resistant. PBMC's were adjusted to 50, 25, and 12.5:1 effector (NK):target (K562 or Daudi) ratios.. In addition, PBMC's were incubated for 2 hours with interferon-alpha (IFN-α) (125 or 250 units/10^6 cells) in order to assess lymphokine-activated killing (NKCC). Statistical analysis was performed using a One Way Anova with Repeated Measures. Significant differences existed between pre and post exercise at 50 and 25:1 ($p<0.05$). In addition, significant differences exist when we compared 50, 25,and 12.5:1 pre with 50, 25, and 12.5:1 pre (IFN-α), respectively ($p<0.05$). Also, significant differences exist when we compared 50:1 post with 50:1 post (IFN-α) ($p<0.05$). No significant differences exist with respect to the Daudi cells and NKCC. In conclusion, exercise alone has been found to increase NKCC in the aged. In addition, IFN-α alone and IFN-α with exercise have been found to stimulate NKCC in the aged.

VALIDITY OF AGE-PREDICTED MAXIMAL HEART RATE EQUATION FOR CAUCASIAN AND AFRICAN-AMERICAN ADOLESCENT GIRLS. R.C. Jayaraman, P. Katzmarzyk, and J.M. Pivarnik Michigan State University, E. Lansing MI.

The purpose of this study was to compare the age-predicted maximal heart rates from a commonly used equation (Astrand and Christensen, 1964) to the measured values in Caucasian and African-American adolescent girls. Aerobic fitness was assessed in 84 Caucasian adolescent girls (mean (± SD) age 13.3 ± 1.7 yr.) and in 44 African-American girls (13.6 ± 1.6 yr.), using the Bruce treadmill test. Heart rate was continuously monitored by a pulse telemetry unit and the maximal heart rate (HRmax) was defined as the highest heart rate measured during the test. Each subject's predicted maximal heart rate was calculated by the Astrand and Christensen formula: HR = 232 - 2 * age. African-American adolescent girls were significantly heavier compared to their Caucasian counterparts, having a mean body mass of 55.7 ± 12.0 kg compared to 50.3 ± 11.3 kg. However, there was no difference in the mean age, stature or % body fat between the two groups. Linear regression showed age to be the most critical variable in predicting HRmax. The predicted maximal heart rates significantly overestimated the actual values in both groups. Caucasian adolescent girls had significantly higher measured HRmax compared to their African-American counterparts (199 bpm vs 194 bpm; $p<0.001$). The linear regression analysis of the relationship between age and HRmax are as follows: Caucasian adolescent girls: HRmax = 212.7 - 1.01 * age ($r=.26$), African-American adolescent girls: HRmax = 182.0 + .85 * age ($r=.23$), and combined: HRmax = 204.9 - .57 * age ($r=.14$). Linear regression of the relationship between predicted and actual maximal heart rates yielded a regression equation of Measured HRmax = 138.41 + .287 * Predicated HRmax ($r=.14$). Analysis of the standardized residuals of this relationship demonstrated a significant difference between the two groups ($t=4.58$, $p<0.001$), with most of the African-American adolescent girls falling below, and Caucasian adolescent girls falling above the regression line. Results of this study clearly demonstrate age as a critical factor in determining maximal heart rate in adolescent girls. In addition, the results point out that using a prediction equation developed for Caucasian adolescent girls may not be appropriate for African-American adolescent girls.

interesting application of stats - application is limited
- OK

VENTILATORY ENTRAINMENT TO WALKING WHILE SWINGING HAND-HELD WEIGHTS
W. J. Armstrong, J. Schumm, F. F. Andres, The University of Toledo, Toledo, OH 43606.

Eight healthy, active females (age $\bar{X}$= 22 ± 0.7; height $\bar{X}$= 163.5 ± 5.4; weight $\bar{X}$= 64 ± 9.7) were studied to determine if arm swing during exercise elicited changes in breathing patterns. Each subject walked on a treadmill at 3.0 mph for five, 5 min stages with a 2 min active recovery period at 2.5 mph between stages. The randomly assigned stages included: normal gait (NORM); arm swing from umbilicus to sternoclavicular with 1 and 3 lb weights (1SHLG; 3SHLG); and arm swing from the sides extending to the front of the body to form a 90° arc with 1 and 3 lb weights (1VIG; 3VIG). Breathing pattern and heel strike data were recorded electronically. Statistical analysis was performed using a 2x2 repeated measures ANOVA (weight x arm swing) and repeated measures ANOVA of treatment effects. No significant difference was found between weight and arm swing pattern for entrainment ($P > .05$). Furthermore, the weight and arm swing combined was not significantly different than normal gait without weight. The greatest incidence of entrainment occurred with 3VIG ($\bar{X}$ = 13.64 ± 17.58%). 1VIG showed the least evidence of entrainment ($\bar{X}$ = 2.4 ± 6.79%). Only one subject showed no indication of entrainment across the treatment levels. One subject displayed entrainment of 40-48% of breaths in 3 of the 5 levels. The results suggest that entrainment of breathing occurred intermittently, but there was no strong evidence to conclude that swinging hand-held weights while walking provided a stimulus to the central respiratory pattern generator.

WALKING WITH LIGHT EXTERNAL LOADS: THE EFFECT OF LOAD POSITIONING
K. Reeck, H.-J. Engels, FACSM, & J.C. Wirth. Wayne State University, Detroit, MI 48202.

Light external loads are routinely carried during many household, leisure and occupational tasks. The purpose of this study was to examine the physiological responses to load positioning during normal, steady-rate walking. Twenty healthy subjects (10 males, 10 females; age: 18 to 38 yrs) each completed 5 different 10-min level grade treadmill walking trials at a constant 3.0 mph speed in a randomly assigned treatment order. In addition to a no-load control trial, each subject performed 4 trials in which they carried a 4.54 kg external load in the form of soft pillow weights that were positioned either directly on the shoulders, around the waist, or attached to the ankles and wrists, respectively. Respiratory gas exchange (VO_2, RER) was measured by open circuit spirometry. Heart rate (HR) was assessed electrocardiographically (R-R interval) and blood pressure (SBP, DBP) by auscultation. ANOVA revealed that the energy cost of walking was significantly increased in all loading conditions; however, load attachment to the ankles resulted in a significantly greater rise in metabolic rate (+2.45 ml/kg/min) compared to wrist weights (+0.96 ml/kg/min); both of which were significantly higher than waist (+0.58 ml/kg/min) and shoulder load positioning (+0.55 ml/kg/min). While HR and SBP followed a similar pattern as oxygen uptake, no significant difference among trials was found for RER and DBP responses ($p>0.05$). It is concluded, although it is commonly accepted that carrying light external loads can increase the energy cost of normal walking, the site of load positioning is an important determinant of this effect.

A VALIDATION OF TARGET HEART RATE FORMULAS USED IN SWIMMING
T.K. Litwinski, R.M. Zabik, M.L. Dawson, & P.A. Frye, Western Michigan University, Kalamazoo, MI 49008

The purpose of this study was to explore whether procedures used to establish target heart rates (THRs) for running are applicable to front crawl swimming. Eight male and 22 female fitness swimmers from Western Michigan University participated in this study. Their exercise durations under three experimental conditions were compared. The conditions were: (a) Condition 1, a treadmill run at an intensity equal to a THR of 85% of heart rate reserve (HRR); (b) Condition 2, a front crawl swim at an intensity equal to 85% of HRR; and (c) Condition 3, a front crawl swim at an intensity equal to 85% of HRR minus 12 beats per minute (bpm). The ANOVA indicated that significant differences in exercise duration existed. Results of a Turkey HSD test indicated that there was a significant different ($p<.05$) in the mean durations between Condition 1 and Condition 2. An ANOVA was calculated on the two swim conditions using stroke rate (bpm) as the covariate. Results of this analysis indicated a significant difference existed between the two swimming conditions. It was concluded that subtracting 12 bpm from a THR based on the HRR method is a valid procedure when fitness swimmers perform the front crawl.

for what purpose

purpose - "explore"

would certainly differ with efficiency

4

MEDICAL COVERAGE OF HIGH SCHOOL FOOTBALL IN ILLINOIS
Enrique Saguil MD, Rajeev Khanna MD, Preston Wolin MD, Donald Robinson
The purpose of this study was to determine the status of injury detection, rehabilitation and access to medical care for football players in the Illinois high school system. A question survey was mailed to 543 high schools in Illinois with football teams. Of all the schools that responded, 44% have a team physician. Similar studies around the country have ranged from 21-72%. For schools with physicians, 60% were orthopedic surgeons, 22% were family practitioners, the remainder were emergency medicine physicians, pediatricians, internists, physiatrists or chiropractors. One of these specialties was present during football games in 60% of the schools surveyed. This is the first study to identify that percentage. As compared to a 1980 survey performed on a similar geographic area, our results reveal an increase of 8% in athletic trainer coverage and an increase of 10% in physician coverage. Improvement in medical coverage for Illinois high school football in the last 15 years has therefore been modest at best. More over, one third of high schools with football programs have no coverage by a physician and/or athletic trainer. These findings occur despite increased knowledge regarding prevention treatment and rehabilitation of football injuries.

5

ANTIOXIDANT ACTIVITY: VULNERABILITY TO HYPERTENSION AND ACUTE AND CHRONIC STRESS E. R. Blasi, H. M. Alessio, FACSM, and R. H. Cox. Miami University, Oxford, OH 45056

Antioxidants have been shown to be inversely associated with cardiovascular health, specifically hypertension. The purpose of this study was to compare antioxidant activity via oxygen radical absorbance capacity (ORAC), in normotensive (WKY), borderline hypertensive (BHR), and spontaneously hypertensive (SHR) rats under acute and chronic stress. Experiment 1 was designed to compare the effects of acute shock on antioxidant activity and Experiment 2 was designed to compare the effects of chronic adapted stress and acute shock on antioxidant activity. In Experiment 1, antioxidant activity was measured at rest (R) and after acute tail shock (AS). Results indicated that at rest, WKY and BHR had greater antioxidant activity (ORAC) compared to SHR ($p = 0.015$) and ($p = 0.034$), respectively. There were no differences among WKY, BHR, or SHR with AS. In Experiment 2, antioxidant activity was measured at rest in chronically adapted stress groups (CAS) and after acute shock (AS). Results indicated that BHR had higher ORAC than WKY ($p = 0.05$) at rest. There was significantly higher ORAC after CAS in BHR than SHR ($p = 0.02$). These findings suggest that there is an inverse association between antioxidant activity and blood pressure in the control group, and that acute and chronic stress differentially effect antioxidant activity and blood pressure.

— not exercise related

HEMODYNAMIC RESPONSES TO EXERCISE IN CHILDREN OF HYPERTENSIVE PARENTS
K.Q. Kelsey, P.A. Rueckert, S.M. Zajakowski, M. Angelini, A.D. Mahon, P. Hanson. Cardiology Section, University of WI, Madison, WI and the Human Performance Laboratory, Ball State University, Muncie, IN.

Cardiac output (CO) and total peripheral resistance (TPR) are the two hemodynamic variables that determine blood pressure (BP). This study was designed to investigate whether children with a positive parental history of hypertension exhibit an exaggerated BP response due to either an increased CO or an attenuated decrease in TPR during dynamic submaximal exercise. We studied 11 children (12.0 ± 2.4 yrs) of at least one hypertensive parent and 11 children (12.2 ± 1.8 yrs; M ± SE) of normotensive parents who served as the control group. On separate days, each subject completed a graded cycle test to maximal effort and a submaximal exercise bout consisting of 6 min each of steady state cycling at 50 and 80% of maximal heart rate reserve. BP, CO, and TPR were measured at rest and during the last 3 min of each submaximal exercise stage. The data were analyzed using an independent t-test and a 2-way (group x intensity) ANOVA. The groups were similar in age, weight, height, and body fatness ($p<0.05$). At rest, the positive history group had higher systolic BP, diastolic BP (DBP), and mean arterial pressure (MAP) ($p<0.05$). MAP and DBP remained significantly higher throughout exercise. There was a tendency for TPR to be higher at rest and exhibit an attenuated decline during exercise in the positive history group ($p>0.05$). In conclusion, children of at least one hypertensive parent exhibit a significantly higher MAP and DBP at rest and during submaximal exercise. The elevated BPs appear to be due to an early trend toward increased resting TPR and an attenuated decline in TPR during exercise.

This study was supported by the Midwest Chapter of ACSM and the BSU Graduate School.

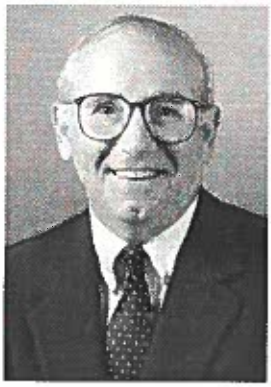
THE EFFECTS OF VITAMIN SUPPLEMENTATION ON SELECTED INDICES OF IMMUNE FUNCTION IN ELDERLY WOMEN
D. Boardley, M. Fahlman, M. Flynn FACSM, W.A. Braun, C.P. Lambert, L.E. Bouillon, C.A. Weideman, K. Jeffery, M. Barber. University of Toledo, Toledo, OH 43606

Previous research has shown that a number of micronutrients are known to be required for optimal cellular immunity. The purpose of this investigation was to examine the effects of vitamin supplementation on selected parameters of immune function. Participants were randomly assigned to either a vitamin (V) group (n=16) or a placebo (P) group (n=15). V (age 76.8±4.8) took a Theragran M tablet once a day for 10 wk (compliance=98%). P(age 77.7+7.3) took a lactose filled placebo once a day for 10 wk (compliance=99%). Blood samples were obtained from V and P at rest after a 10 hour fast prior to the intervention and again at the conclusion of the 10 weeks. Lymphocyte subsets were determined by direct immunofluorescence using flow cytometry. Lymphocyte proliferative response to mitogen (LP) and natural cell-mediated cytotoxicity (NCMC) were assessed using whole blood assays. T cell number (CD3+, CD3+/CD4+, CD3+/CD8+, and CD3-/CD16+/CD56+) remained unchanged after 10 weeks of intervention. The same was true for T cell percents with the exception of CD3+and CD3+/CD8+. Both groups had a significantly ($p=.042$) lower percentage of CD3+ cells at week 10 and V had a significantly lower ($p=.046$) percentage of CD3+/CD8+ at week 10. There was no significant difference in B cells (CD19+) pre to post intervention. NCMC was significantly lower ($p=.001$) at week 10 for both groups. There was no change in lymphocyte proliferation for either Con A or Con 40. In summary, ten weeks of vitamin supplementation resulted no significant group differences for T cell numbers, percents (other than CD3+/CD8+), NCMC, or LP. We concluded that 10 weeks of micronutrient supplementation had little effect on the immune indices that we measured. Further research with longer supplementation periods are recommended.

Keynote Lecture Salon II, V, VI

8:00-9:00 pm *"Growth and Maturation of Young Athletes: Is Training a Factor?"*

Robert M. Malina, Ph.D.
Director, Institute for the Study of Youth Sports
Michigan State University



Intensive training for sport is often indicated as a factor which influences the physical growth and biological maturation of children and youth. Earlier studies (limited largely to boys) suggest positive influences on these processes, while more recent studies (focusing largely on girls) suggest negative influences. The data underlying these conclusions is initially reviewed and evaluated. Growth (size, body composition) and maturity (skeletal, somatic, sexual) characteristics of young athletes in several sports are then summarized. The majority of the available data are cross-sectional, so that causal statements are not warranted. Longitudinal observations on children and youth regularly training for sport are less extensive, but indicate no effect of training for sport on stature and indicators of skeletal and sexual maturation and the timing of the adolescent growth spurt. If the growth and maturation of young athletes is affected, compromised nutritional status and/or severe psychological stress are implicated so that it is difficult to partition the specific influence of training per se. Later menarche in athletes in a variety of sports is often attributed to intensive training. The data, however, are largely retrospective and are not entirely consistent with prospective data and status quo estimates. In addition, the retrospective studies do not consider other factors that are known to influence the timing of the maturational event. On the other hand, training for sport has a positive influence on body composition, particularly the regulation of fatness and enhancement of bone mineral content.

Friday, October 4, 1996

Symposium

8:00-10:00 am — *"Exercise and Immune Function: Research and Practical Applications"* — Salon II

'Introduction: Research Design and Methodology in Exercise Immunology'
Jeffrey A. Woods, Ph.D.
University of Illinois at Urbana-Champaign

'Exercise and Immune Function: Practical Applications'
Michael G. Flynn, Ph.D.
University of Toledo

10 minute break

'Exercise, Macrophage Function, and Disease'
Michael A. Ceddia, M.S.
University of Illinois at Urbana-Champaign

'Resistance Exercise Training and Immune Function in the Elderly'
William A. 'Turi' Braun, M.S.
University of Toledo

'Exercise and Suppressor Cell Function in Multiple Sclerosis'
Charles P. Lambert, M.S.
University of Toledo

The overall objective of this symposium is to introduce to meeting participants current information regarding the role of exercise in immunomodulation. Under this broad objective symposium speakers will: 1) briefly review immunophysiology, 2) evaluate current research design and methodology in exercise immunology, 3) evaluate the current state of knowledge regarding the practical role of exercise in treatment of those with dysregulated immune function (i.e., elderly, immunosuppressed), and 4) present current data from two midwest regional laboratories currently involved in exercise immunology research. This symposium will provide potential exercise immunology researchers with valuable information regarding research design and methodology. Moreover, the data and ideas presented will be of value to members with clinical and applied interests regarding the effects of different exercise intensities on immune function and susceptibility to disease.

Research Presentations

8:00 am-12:00 pm — Poster Presentations (Authors present 11:00-12:00) — Outside Salon IV

CONSUMPTION OF A CARBOHYDRATE DRINK CONTAINING CHROMIUM DURING 60 MINUTES OF INTENSE CYCLING IMPROVES SUBSEQUENT SPRINT PERFORMANCE. J.T. BAER, P.M. VANDERBURGH, FACSM, M.E. HORN. Department of Health and Sport Science, The University of Dayton, Dayton, OH.

The purpose of this study was to investigate the effect of a 7% carbohydrate electrolyte beverage containing chromium (CE-Cr) on sprint capacity immediately following 60 min of intense cycling. Six trained cyclists completed two trials on a Monark stationary cycle ergometer after an overnight fast, each consisting of 60 min at a fixed intensity (75% VO_2) followed by a Wingate Anaerobic Power Test (WAPT). During each trial each subject was given, in double blind order, either 3 ml/kg of CE-Cr or CE distributed at 10,20,30 and 40 minutes. Mean intake of CHO and Cr was 65$\pm$7 g CHO/hr and 188$\pm$10 ug Cr/hr, respectively. Blood glucose was determined pretest. Blood glucose and lactate were determined at minutes 25, 50 and immediately following WAPT. Oxygen consumption, RQ and blood lactate values were not different during the trails. Total work was higher for the CE-Cr trial compared to the CE trial (774.33$\pm$28 W vs. 613.67$\pm$15 W, $p<0.007$). Mean CE-Cr blood glucose was significantly lower at 50 min vs. CE (4.7$\pm$0.3 mmol/L vs. 5.4$\pm$0.2 mmol/L, $p<0.03$). These results suggest that sprint performance following a high intensity time trial of 60 minutes can be improved with periodic consumption of a carbohydrate beverage containing chromium during the ride.

A COMPARISON OF RATINGS OF PERCEIVED EXERTION DURING STAIRMASTER AND TREADMILL EXERCISE K. Budzinski and J. Marett. Northern Illinois University, DeKalb, IL 60115

To determine if differences existed between ratings of perceived exertion (RPE) obtained during StairMaster (SM) and treadmill (TM) exercise, nine subjects (2 males, 7 females) 18-30 yr of age performed 21 min of continuous exercise at approximately 60% VO_{2max} on each mode. Before testing, subjects were extensively trained on each mode and familiarized with testing procedures. During the SM and TM continuous exercise bouts, heart rate (HR) and RPE were measured every 3 min. Results indicated that SM exercise elicited significantly higher HR and RPE ($P < 0.05$) compared to TM exercise (143.2 $\pm$ 13.1 beats·min^{-1} vs 135.0 $\pm$ 14.3 beats·min^{-1}; 12.7 $\pm$ 2.0 vs 11.6 $\pm$ 2.2). HR and RPE across time for SM and TM did not differ ($P > 0.05$). A mode x time interaction effect was apparent for TM 6-min RPE (11.0 $\pm$ 2.1 vs 11.8 $\pm$ 1.9; $P < 0.05$). HR and RPE for SM were more highly correlated than HR and RPE for TM ($r = 0.78$ vs $r = 0.46$; $P < 0.05$). The results of this study suggest that, moderate-intensity SM exercise at the same relative intensity was physiologically (HR) and perceptually (RPE) harder than moderate-intensity TM exercise. The 6-20 RPE scale was found to be reliable for SM exercise ($r = 0.78$).

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HEALTH HABITS, PHYSICAL ASSESSMENTS AND ACTIVITY PATTERNS OF 18 AND 19 YEAR OLD UNDERGRADUATE MALES. Rasmussen Mandy N., William F. Simpson, FACSM and Heather N. Brehm. University of Wisconsin. Exercise Physiology Laboratory, Stevens Point, WI.

Healthy People:2000 [HP:2000] objectives for young adults intend to decrease smoking and alcohol abuse and increase individual exercise behaviors to ultimately decrease the incidence of heart disease and cancer. The purpose of this investigation was to survey the health habits and physical attributes of 18 and 19 year old undergraduates during the spring of 1996. A total of 188 18 and 19 year old students enrolled in a general degree required class that covered general wellness concepts. Included in the class assignments was a required physical fitness assessment and a two page survey addressing their personal health, exercise habits and family history of heart disease and cancer. Results of the survey found that 50% of these students had a history of cancer in their family, the majority being lung, breast and skin cancers. Forty percent of these students had indicated that they had a family history of heart disease. The following table illustrates exercise habits, drinking habits and tobacco use.

AGE	Aer. Exercise Days/week	Resis. Train Days/week	Cigarette Smoke	Alcohol	Drink Socially	Drink to get Drunk	Marijuana Use	Chew Tobacco
18	2.75±1.6	2.27±1.6	.17[.08,.26]	.78 [.68,.88]	.44[.32,.56]	.43 [.31,.55]	.34[.23,.45]	.11[.03,.18]
19	2.5±1.3	2.2±1.6	.10[.05,.15]	.81 [.74,.88]	.40[.31,.49]	.49 [.40,.58]	.30[.22,.38]	.11[.05,.17]

means ±S.D. responding "yes" 95% confidence interval

In high school 89% participated in interscholastic sports while 14% were members of an intercollegiate team. Less than 31% participate in intramural and <10% participate in club sports. The majority of students began smoking before age 18. Drinking behavior takes place on Thursday through Saturday nights. Participants self rated their fitness levels at 3.1 out of 4.0 while the results from aerobic tests estimated a mean metabolic equalivent of 13.7 and mean body fat< 11%. Although these students are below HP:2000 goals for smoking behavior, they exceed them in drinking behavior and fall short of suggested organized exercise guidelines. With the decrease participation in organized activity, these students may be on their way to a sedentary lifestyle. This reinforces the conventional wisdom that still more health education and health promotion programs are needed for this age group in order for HP:2000 goals to be successful met.

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HEALTH HABITS AND PHYSICAL ASSESSMENTS OF 18 AND 19 YEAR OLD UNDERGRADUATE FEMALES. Brehm Heather N., William F. Simpson, FACSM and Mandy N. Rasmussen. University of Wisconsin. Exercise Physiology Laboratory, Stevens Point, WI.

Healthy People:2000 [HP:2000] goals are intended to decrease smoking and drinking behaviors in Americans and increase daily exercise habits. The purpose of this investigation was to survey the health habits and physical attributes of 18 and 19 year old undergraduates. During the spring of 1996 a total of 203 18 and 19 year old students enrolled in a general degree required class that covered general wellness concepts. Included in the class assignments was a required physical fitness assessment and a two page survey addressing their personal health, exercise habits and family history of heart disease and cancer. The following table illustrates exercise habits, drinking habits and tobacco use.

AGE	Aer. Exercise Days/week	Resis. Train Days/week	Cigarette Smoke	Alcohol	Drink Socially	Drink to get Drunk	Marijuana Use
18	2.5±1.6	0.9±1.3	.16[.09,.23]	.64[.55,.73]	.52[.42,.62]	.15 [.08,.21]	.21[.13,.28]
19	2.5±1.4	0.8±1.3	.19[.11,.27]	.71[.62,.79]	.59[.49,.69]	.22 [.14,.30]	.22[.14,.30]

means ±S.D. responding "yes" 95% confidence interval

Prevalence of cancer in student's families was 40% and heart disease was 37%. Lung and breast cancer were the most prevalent cancers. Participation in high school sports was 77% for 18 year olds and 82% for 19 year olds dropping to <20% for club, collegiate and intramural sports. The majority of these women began to smoke between the ages of 16-18. Thurs., Fri. and Sat. nights were the primary nights for students to drink. Results of submaximal fitness assessments found students to be in average shape at 12.5 METS. Mean percent body fat was 22.3±5.1 for 18 year olds and 22.9±5.2 for 19 year olds. These students at the present time are aerobically healthy and have healthy body compositions. However, compared to a previous survey of a similar population at this university, smoking prevalence has increased, there continues to be a high incidence of drinking and activity patterns remain the same. The lack of resistance training could be due to women being afraid and/or intimidated to enter a weight room. This is disturbing due to the risk for osteoporosis in later life. These students demonstrate a pattern of decreasing organized activity from high school to college which may lead them to sedentary lifestyles. Continued health education and health promotion efforts to increase knowledge about the importance of physical activity and the dangers of smoking are warranted in order to continue to address the HP:2000 goals.

THE EFFECTS OF A NASAL DILATOR ON ANAEROBIC EXERCISE PERFORMANCE

B. Bowdoin, D. Thomas, D. Brown, S. McCaw. Illinois State University, Normal, IL.

The "Breath-Right" nasal dilator (CNS Inc.) is advertised as an aid to enhance exercise performance by reducing nasal airway resistance. Research has focused on the effectiveness of the nasal strips during aerobic exercise. However, their primary use has been by anaerobic athletes. Frequently, these athletes also perform their sports while wearing tooth guards. The purpose of this study was to examine the interactive effects of wearing a tooth guard and nasal dilator on anaerobic exercise performance. To date, six subjects age 22-26 yrs. have been analyzed performing the Wingate anaerobic test under six randomly assigned, counterbalanced conditions. These conditions included: 1) control (C), wearing a(n) 2) breathe right nasal strip (BR), 3) athletic tooth guard (M), 4) breathe right nasal strip and athletic tooth guard (BRM), 5) placebo nasal strip (P), 6) placebo nasal strip and athletic toothguard (PM). Means and standard deviations for each condition appear below.

	Peak Anaerobic Power (Watts)						Anaerobic Capacity (Watts)					
	C	BR	BRM	P	PM	M	C	BR	BRM	P	PM	M
Mean	658	626	656	634	721	662	514	504	506	499	496	517
SD	172.2	147.4	154.4	150.7	258.6	160.1	119.8	119.5	122.5	109.6	102.6	126.0

A 2 x 3 repeated measures ANOVA indicated no significant difference for any condition or interaction ($p > .05$). It appears that the use of a breathe right nasal strip and/or athletic tooth guard has no significant impact on anaerobic exercise performance.

MAGNITUDE AND DURATION OF EXCESS POSTEXERCISE OXYGEN CONSUMPTION (EPOC) FOLLOWING SUBMAXIMAL EXERCISE

Man-Gyoon Lee, Sung-Tai Chung, Ui-Soo Kim, Tae-Won Jun, Seoul National University, Seoul, Korea

This study examined EPOC following submaximal exercise. Eight physically active males (20.8 ± 1.2 yr, 70.9 ± 3.9 kg, $\dot{V}O_2max$ = 50.1 ± 5.6 ml/kg/min) exercised on a treadmill for 30 minutes at 70 % of their $\dot{V}O_2max$, and then rested in bed for 10 hr. They were fed a 550 kcal meal at 2 hr of recovery; the meal consisted of rice, beef, egg, carrot, and milk (65 % CHO, 15 % fat, 20 % protein). $\dot{V}O_2$ was measured continuously during exercise and the first hour after exercise, then hourly for the next 9 hr. Heart rate (HR), skin temperature (Ts), and respiratory exchange ratio (RER) were recorded prior to exercise and hourly for the 10 hr after exercise. Results were compared to a control day in which the subjects rested instead of exercising. $\dot{V}O_2$ was greater ($p < 0.05$) during the first 7 hr following exercise than in the control study. Magnitude of EPOC was 32. 6 L which was approximately 9 times greater than oxygen debt (3.7 L) and 28.5 % of total $\dot{V}O_2$ (114.1 L). HR was higher ($p<0.05$) for the 10 hr following exercise than during control. No significant differences were observed in Ts between exercise and control days. RER was lower ($p< 0.01$) following exercise than control during the 10 hr recovery period. The meal taken after cessation of exercise increased $\dot{V}O_2$ markedly ($p<0.05$) in comparison to the increase observed following the same meal in the control experiment. In conclusion, exercise for 30 min. at 70 % of $\dot{V}O_2max$ elicited a prolonged EPOC, magnitude of EPOC was significant with regard to the total energy expenditure, and thermic effect of the meal was exacerbated by the exercise.

EFFECTS OF EXERCISE ON IMMUNE INDICES DURING THE LATE-FOLLICULAR MENSTRUAL CYCLE.

L.E. Bouillon, M.G. Flynn, FACSM, C.P. Lambert, W. Braun, M. Fahlman, K.M. Jeffrey, D.H. Choi, and F. F. Andres. Exercise Physiology Laboratories, University of Toledo, Toledo, OH 43606

The purpose of this study was to examine the effects of training status and acute exercise on indices of immune function. Seven female triathletes (34.3 ± 5 yr, VO_{2peak} 2.71 ± .24 l min^{-1}) and seven recreationally active females (31.3 ± 5 yr, VO_{2peak} 2.4 ± .151 min^{-1}) cycled for 60-min at 65% VO_{2peak} (EXE) during the late-follicular phase (LF)of the menstrual cycle. Before EXE, each subject's menstrual phase was determined by measuring the luteinizing hormone (LH) surge. LF phase was defined as one to two days prior to the urinary LH surge. Blood was drawn 1H pre-exercise (REST), immediately post-exercise (POST), and after 2 H of recovery (2H). Mononuclear cells, CD3+, CD3+/CD4+, CD3+/CD8+, CD3-/CD16+/CD56+, were assessed via direct immunofluorescence using flow cytometry. Lymphocyte proliferative responses to CONA (LP) and natural cell-mediated cytotoxicity (NCMC) were determined using whole blood assays. There were no significant differences between groups for absolute NK cell number (CD3-/CD16+/CD56+); however, resting NK% was significantly higher ($p = 0.05$) in the female triathletes (10.71 ± 4.5) vs. the recreationally active women (7.57 ± 4.7). No differences were found between groups at POST and 2H for NK% and at REST, POST, and 2H for NCMC and LP. POST NK% was higher than REST ($p < 0.001$) and then returned to REST at 2H for both groups. NCMC was increased POST for triathletes ($p < 0.05$) and recreationally active ($p < 0.001$), returning to REST at 2H for both groups. In conclusion, higher resting NK% was observed in the triathletes versus recreationally active females. However, no differences were found between training groups at POST and 2H for NK% nor at REST, POST, and 2H for NCMC and LP.

Supported by Reebok Graduate Student Research Grant from the ACSM Foundation.

THE EFFECTS OF ENDURANCE TRAINING ON IMMUNE FUNCTION IN ELDERLY WOMEN

M. Fahlman, D. Boardley, M. G. Flynn FACSM, W.A. Braun, C.P. Lambert, L.E. Bouillon, C. A. Weideman, K. Jeffery, M. Barber. University of Toledo, Toledo, Ohio

The purpose of this investigation was to examine the effects of endurance training on selected parameters of immune function. Participants self selected to either an exercise (E) group (n=16) or a non-exercise (NE) group (n=15). E (age = 76 ± 5.72) walked at 70% HRR 3d/wk, starting at 20 minutes and increasing by 5 minutes per day until they reached 50 minutes, for 10 wk. NE (age = 78.64 ± 6.33) maintained normal activity. Blood samples were obtained from E and NE at rest, and from E after 20 minutes of walking at 70% HRR and after 2 h recovery. The same sampling procedures were followed after 10 weeks of endurance training. Lymphocyte subsets were determined by direct immunofluorescence using flow cytometry. Lymphocyte proliferative response to mitogen (LP) and natural cell-mediated cytotoxicity (NCMC) were assessed using whole blood assays. There were no changes in CD3+, CD3+/CD4+, CD3+/CD8+ or CD3-/CD16+/CD56+ cell numbers in response to acute endurance exercise, however, CD3+/CD8+ and CD3-/CD16+/CD56+ cell numbers were significantly lower for E post training compared to pre training. T cell percentages also remained unchanged as a result of acute exercise, but CD3+ % were significantly lower post training than pre training for NE, while CD3+/CD8+ percents were significantly lower post training than pre training for E. For CD3-/CD16+/CD56+ cell percents, E were significantly lower than NE after 10 w of training. Neither acute exercise or training resulted in any differences in LP at either Con A 10 or Con A 40. NCMC was significantly higher in E pre to post exercise both before and after training. After training it remained significantly elevated at 2 h post exercise. NCMC was significantly higher pre to post training in both E and NE. In conclusion, ten weeks of endurance training resulted in significant decreases in CD3+/CD8+, CD3-/CD16+/CD56+ cell numbers and CD3+/CD8+ cell percents for E and a significant decrease in CD3-/CD16+/CD56+ cell percents for E compared to NE, while NCMC was increased pre to post training for both E and NE. LP was unaffected.

8:00-9:15 am — Free Communication (Slides) — Salon V, VI

Moderator: James R. Marett, Ph.D.,
Northern Illinois University

8:00 *"The 10-min Cycle Ergometer Test: A Body-Mass Adjusted VO_{2peak} Test"*
P. Vanderburgh, University of Dayton

8:15 *"Reliability and Validity of the Mini-Logger for Estimating Energy Expenditure and Heart Rate in Adolescents"*
K.M. Allor, Michigan State University

8:30 *"Age Differences in Cardiovascular and Hearing Responses to Exercise Training"*
L. Reinart, Miami University, Ohio

8:45 *"Dynamic Resistance Exercise and Resting Blood Pressure: A Meta-Analysis"*
G.A. Kelley, Northern Illinois University

9:00 *"The Effect of Cryotherapy Following Eccentric Exercise"*
D.J. Paddon-Jones, University of Queensland, Australia

Clinical Lecture

9:30-10:15 am — *"Resistance Training for Adolescents"* — Salon V, VI

Michael J. Gunter, M.D.
The Toledo Hospital

As millions of preadolescent and adolescent athletes engage in competitive sports, the question often arises as to the risks and benefits of resistance training (the use of progressive resistance methods to increase one's ability to exert or resist force). Prior to the 1980's, many physicians discouraged resistance training with these athletes because of potential risks of injury to the immature musculoskeletal system. It was also thought that preadolescent athletes could not increase strength because of inadequate circulating androgens. Studies indicate that the majority of injuries occur from improper lifting practices and techniques. In order to achieve maximum benefit and minimize risk of injury, the preadolescent/adolescent athlete should follow certain principles. A preparticipation physical should be performed prior to beginning a resistance training program. The primary focus should be directed at learning the exercises, developing proper technique, and developing an interest for lifting. Studies have shown that properly supervised resistance training is actually beneficial by increasing strength and decreasing the occurrence on injury in the young athlete.

THE 10-MIN CYCLE ERGOMETER TEST: A BODY-MASS ADJUSTED VO_{2PEAK} TEST
P. Vanderburgh[1] FACSM, G. Daniels[2], & T. Crowder[2]. [1]University of Dayton, Dayton, OH, and [2]United States Military Academy, West Point, NY.

Military service academies have used an all-out low torque cycle ergometer test to assess aerobic fitness for injured subjects on a friction-braked ergometer (FBE). Such testing has proven problematic due to the wide range of pedal rates between large/fit and small/less-fit subjects and the failure to adjust for the independent effect of body mass (KG). We examined the validity of a 10-Minute Cycle Ergometer Test (10MCET, its objective: pedal as fast as possible for 10 min.) on VO_{2peak} prediction using an air-braked ergometer (ABE) and applied allometric scaling to create an index of aerobic fitness, $TW10 \cdot KG^{-a}$, (TW10 = total work done in 10 min.) that partials out the independent effect of KG. Because Foster et al. ('96) showed that a free range protocol elicits higher VO_{2peak} than a standard GXT on a cycle ergometer test, we conducted the VO_{2peak} assessment (via indirect calorimetry) and the 10MCET simultaneously. Results revealed that in a sample of 46 college-age men and women the 10MCET was highly predictive of VO_{2peak} ($R = .96$, $SEE = 206\ ml \cdot min^{-1}$) and that for another sample of 157 college-age women and men $TW10 \cdot KG^{-.66}$ was the appropriate body-mass scaled index of aerobic fitness. Furthermore, the ABE pedal rate range, 65-97 rpm, was much smaller than that found in testing on the FBE (57-126 rpm). We conclude that the 10MCET is a superior test because of the ABE's favorable pedal rate characteristics and the use of an appropriate scaling of its resulting fitness index.

Supported by USMA/Dept. of Army, and StairMaster Sports/Medical Products, Inc.

RELIABILITY AND VALIDITY OF THE MINI-LOGGER FOR ESTIMATING ENERGY EXPENDITURE AND HEART RATE IN ADOLESCENTS
K.M. Allor, S.R. Troutman, D.C. Hartmann, and J.M. Pivarnik. Michigan State University; Dept.Of PEES

Researchers studying physical activity in adolescence need valid ways to assess it in both field and laboratory settings. The purpose of this study was to determine the reliability and validity of a new device (Mini-Logger) designed for estimating energy expenditure and heart rate in adolescents. METHODS Thirty-one boys and girls (ages 10-16) exercised on a treadmill and cycle ergometer. Subjects were instructed to walk (TM1) and jog (TM2) for six minutes each on the treadmill, and pedal at a light (Cycle1) and moderate (Cycle2) intensity for six minutes each on the cycle ergometer. The same exercise protocols were performed approximately one week later. VO_2 (indirect calorimetry) and heart rate (Polar Vantage telemetry watch) were measured continuously and used as criterion measures. The Mini-Logger was worn on the subject's right hip with a sensor attached at the right ankle, and energy expenditure was estimated in activity counts. Mini-Logger assessed heart rate from a chest telemetry belt. Each subject also wore a Caltrac accelerometer on the left hip. RESULTS Reliability coefficients for physical activity counts on the Mini-Logger ranged from .05 to .84, and validity coefficients ranged from -.22 to .40. Reliability coefficients for the Caltrac energy expenditure ranged from .73 to .80, and validity coefficients ranged from .62 to .81. Reliability coefficients for the Mini-Logger heart rate ranged from .69 to .82, and validity coefficients ranged from .87 to .97. The Mini-Logger physical activity count was most reliable in the TM2 phase and most valid in the TM1 phase. The Caltrac was most reliable in the TM1 phase and most valid in the TM2 phase. The Mini-Logger heart rate was most reliable and valid in the TM1 phase. All reliability and validity coefficients were higher in the treadmill phases than the cycle phases. CONCLUSION The Mini-Logger showed low to moderate reliability and validity for determining adolescents' physical activity in a laboratory setting. However, the Mini-Logger showed good reliability and validity for measuring heart rate during exercise. The Caltrac showed moderate to good reliability and validity for measuring physical activity in adolescents and was superior to the Mini-Logger in a laboratory setting.

AGE DIFFERENCES IN CARDIOVASCULAR AND HEARING RESPONSES TO EXERCISE TRAINING
L.Reinart, H. Alessio, K.Hutchinson, C. Coliadis. Miami University, Oxford OH 45056

In a previous exercise training study with young adults (X age=21.2±0.8 yrs), we reported that eight weeks of exercise training resulted in a 25% increase in VO_2max (29.8 to 37.4 $ml \cdot kg^{-1} \cdot min$ ($p<.05$), and a concomitant enhanced hearing acuity at two of three frequencies measured ($p<.05$). When the same protocol (twice weekly cycling for 30 min at 70% of VO_2max) was performed by older adults (X age=52.8±5), no significant changes in VO_2max or hearing occurred. The purpose of this study was to determine if a more rigorous exercise training protocol might improve VO_2max and hearing acuity in older adults similar to what we observed in younger adults. Five of 10 subjects have completed the following protocol: cycle for 30 min at 70% of VO_2max thrice weekly for 8 weeks. VO_2max improved 12.2% (23.07±2.3 to 25.9±2.7 $ml \cdot kg \cdot min$), $p=.055$. Pure tone thresholds at 2, 3, and 4 kHz, respectively did not change (12.4±5.3 to 16.8±6.6, 18.8±7.9 to 18.6 ±7, 15.0±6.0 to 15.8±5.5 dB). Older adults did not demonstrate both an increased cardiovascular and hearing ability following 8 weeks of exercise training as did younger adults. Possible explanations include lower VO_2max in the older subjects or a greater resistance to change with age.

DYNAMIC RESISTANCE EXERCISE AND RESTING BLOOD PRESSURE: A META-ANALYSIS
G.A. Kelley, FACSM, Physical Education Department, Northern Illinois University, DeKalb, IL

Previous research has led to conflicting results regarding the role of dynamic resistance exercise on chronic resting blood pressure. The purpose of this study was to use the meta-analytic approach to examine the effects of dynamic resistance exercise on chronic resting systolic and diastolic blood pressure. Of the 22 studies initially reviewed, 12 met the criteria for inclusion. The 12 studies consisted of 24 groups (12 exercise, 12 control) and a total of 332 subjects (177 exercise, 155 control). Across all designs and categories, treatment effect (Δ_3) reductions (mean ± SD) for chronic resting blood pressure were as follows: systolic, -3.71 ± 5.42 mm Hg, 95% CI = -7.15 to -0.27; diastolic, -2.45 ± 3.95 mm Hg, 95% CI = -4.96 to 0.60). Treatment effects (Δ_3) corresponded with decreases of approximately 3% for both chronic resting systolic and diastolic blood pressure. Using the bootstrap technique (10,000 samples) to estimate the reliability of original estimates for changes in blood pressure, significant reductions were shown for both chronic resting systolic and diastolic blood pressure (systolic, 95% CI = -6.62 to -0.66; diastolic, 95% CI = -4.68 to -0.38). In conclusion, quantitative analyses of existing studies suggest that dynamic resistance exercise reduces chronic resting systolic and diastolic blood pressure in humans.

Research Presentations

Free Communications - Slides

Friday, 8:00 am

Salon V, VI

THE EFFECT OF CRYOTHERAPY FOLLOWING ECCENTRIC EXERCISE

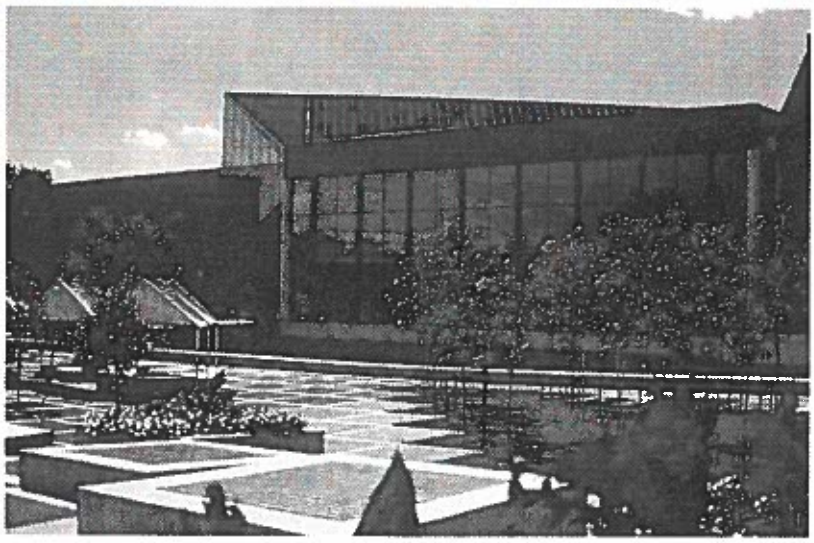
Douglas J. Paddon-Jones and Brian M. Quigley. Department of Human Movement Studies, The University of Queensland, Brisbane Q 4072, Australia.

The purpose of this study was to determine whether a cryotherapy protocol consisting of five, 20 minute ice-water immersions of the elbow flexors could influence the recovery process following intense eccentric resistance exercise. Eight resistance-trained males (23 ± 3 yr) performed an acute eccentric exercise protocol involving the elbow flexors of both arms. One arm then underwent the first of five, 20 minute immersions in a 5 ± 1°C ice-water mixture interspersed by 60 minute rest periods. The non-immersed arm served as the control. Isometric elbow flexor strength, peak isokinetic torque at 60 and 300°·s^{-1}, muscle soreness, resting elbow angle and arm volume were assessed at 24 h intervals for seven days. A main effect for time was observed for all dependent variables except arm volume ($P<0.05$). Isometric strength of the immersed and control groups (mean ± SE) decreased from 87.9 ± 4.5 Nm to 65.2 ± 4.5 Nm immediately post-exercise and required 72 h to return to pre-test values. Post-exercise isokinetic torque at 60 and 300°·s^{-1} decreased from 71.0 ± 3.5 Nm and 48.4 ± 2.8 Nm to 55.8 ± 3.3 Nm and 39.8 ± 3.1 Nm. Both had returned to pre-test levels within 48 and 72 h respectively. Muscle soreness peaked 48 h post-exercise and was evident until 120 h. An 8 ± 1° increase in elbow flexion was observed for 24 h following exercise. Pre-test extension range was regained at 72 h. Mean arm volume (3.71 ± 0.05 L) remained unchanged during post-testing. No significant differences between the immersed and control arms were observed at any stage during the study ($P>0.05$). It was concluded that the cryotherapy protocol used in this study did not alter any of the variables commonly associated with eccentric exercise. These results suggest that an acute reduction of muscle temperature following damaging eccentric exercise may not provide the same therapeutic benefits commonly attributed to cryotherapy following traumatic muscle injury.

1997 MWACSM Annual Meeting

October 9-11

Century Center, South Bend, IN



Symposia

10:00 am-12:00 pm — *"Sport Psychology: Illustrating the Link Between Theory and Practice"* — Salon II

'Extensions of Goal Perspective Theory: Motivational Climate as a Predictor of Precursors to Eating Disorders Among Elite Female Gymnasts'
Joan L. Duda, Ph.D.
Purdue University

'Self-Efficacy and Psychological Strategies to Overcome Fear of Injury in Physical Activity and Sport'
Melissa Chase, Ph.D.
Purdue University

10 minute break

'Enhancing Coaching Behaviors: Conceptual Foundations, Empirical Knowledge, and Applied Strategies'
Robin S. Vealey, Ph.D.
Miami University, Ohio

'A Qualitative and Grounded Theory Approach to the Role of Pregnancy in Elite Women Track and Field Athletes'
Gloria Balague, Ph.D.
University of Illinois at Chicago

Pulling from several theoretical frameworks which guide contemporary research on psychological processes in sport (e.g., goal perspective theory, self efficacy theory, models of leadership and coaching behavior), the reciprocal relationships between theory development, conceptual testing/refinement, applied research and intervention in sport psychology will be delineated. The speakers, who have extensive experience as sport psychology scholars and consultants, will emphasize that such an interplay strengthens both theoretical-based knowledge and practice. The data presented illustrate the employment of both quantitative and qualitative methodologies within the field. Moreover, the investigations described in this symposium involve a wide variety of athlete samples ranging from recreational young gymnasts to elite track and field competitors.

10:30 am-12:00 pm — *"Eccentric Exercise, Muscle Damage, Acute Inflammation: Theoretical and Practical Issues"* — Salon V, VI

'Eccentrically Biased Exercise and Mechanisms Inducing Delayed Onset Muscle Soreness'
Lucille L. Smith, Ph.D.
Northeastern Illinois University

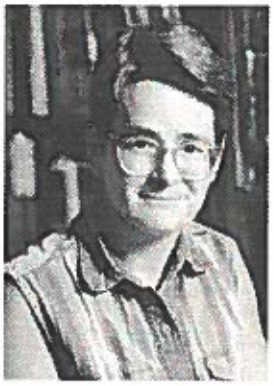
'Initial Sequence of Events Activating the Acute Inflammatory Response'
Asif Anwar, MBBS
Northeastern Illinois University

'Practical Issues Related to Exercise-Induced Muscle Injury and Acute Inflammation'
Michael Fragen, M.D.
Northeastern Illinois University

Eccentrically biased exercise induces delayed onset muscle soreness (DOMS), which appears to be related to muscle micro trauma. The first part of this symposium is directed towards presenting various theories that have been proposed to explain the delay in the subsequent sensation of muscle soreness. It will be proposed that acute inflammation is most likely the underlying cause. In the second part of the symposium, simplified schematic diagrams will be used to elaborate on the orchestration of the initial sequence of events that activates the acute inflammatory response. This will include explanations on the release of cytokines, colony stimulating factors, and cell adhesion molecules. Data from an exercise study will be presented. Practical aspects of a variety of common sport-induced injuries which may reflect acute and/or chronic inflammation will be presented and appropriate treatments will be discussed in the final segment of the symposium.

1:00-2:30 pm *"The Application of Magnetic Resonance Technologies to the Study of Exercise"* Salon V, VI

'Basic Theory of Magnetic Resonance and an Overview of Types of Exercise Applications'
Jeanne M. Foley, Ph.D.
Michigan State University



'MRI Assessment of Acute Muscle Recruitment and Delayed Muscle Trauma Responses to Resistance Exercise'
Roop Jayaraman, M.S.
Michigan State University

'A Comparison of MRI vs Conventional Methods of Monitoring Body Composition Changes in Exercising Females'
Diane Hartmann, M.S.
Michigan State University

MR imaging and spectroscopy are increasingly being used to study questions in the field of exercise physiology. While many students and practitioners of exercise physiology are familiar with the diagnostic applications of MRI, fewer have been exposed to either the underlying principles of magnetic resonance or the applications of this technology to the noninvasive study of the responses to exercise in living humans and animals. This symposium will provide an introduction to this emerging technology and exposure to some of the many applications in the field of exercise physiology. The objectives of this symposium are: 1) to introduce the concept of magnetic resonance, including the components required to produce an MR signal and the use of MR as an imaging tool vs NMR spectroscopic applications, 2) to give an overview of the various applications of MR imaging and NMR spectroscopy to the study of exercise, including structural and functional imaging, MR angiography, and 31P-NMR spectroscopic studies of muscle energy metabolism, and 3) to report in more detail on two applications from our lab at MSU, namely functional imaging studies of muscle recruitment and muscle trauma responses to eccentric/concentric vs eccentric-only resistance exercise, and MRI-based assessment of body composition changes during endurance training in previously sedentary females.

Colloquia

1:00-2:00 pm *"ACSM Task Force on Eating Disorders"* Salon II

Barbara L. Drinkwater, Ph.D.
Pacific Medical Center, Seattle

At an international forum convened by *WomenSport International*, representatives from ACSM, the International Amateur Athletic Federation, International Skating Union, International Gymnastics Federation, International Tennis Association, four USA sports associations, the NCAA, and NFSHSA met to discuss the problem of the Female Athlete Triad - disordered eating, amenorrhea, and osteoporosis - with experts from the areas of sports medicine and eating disorders. The group was unanimous in recommending mandatory education for coaches so they can learn how to avoid actions which encourage undue concern with body weight/fat. USA Gymnastics volunteered to prepare a *Red Flag* list to aid parents and coaches in detecting athletes at risk for disordered eating. Other areas for discussion included age eligibility criteria, yearly physical examinations, role of the media, judges, and sports uniforms in encouraging overemphasis on body shape, and other more direct measures which may be considered if education alone is not enough to improve the situation. A major step forward was the formation of a joint task force with the IOC Medical Commission to address this and other medical issues relating to the female athlete. IOC members of the Task Force are: Arne Ljungqvist, M.D., Sweden, Wolf Dieter Montag, M.D., Germany, and Kenneth Fitch, M.D., Australia.

2:00-3:00 pm — *"Behavioral Component of the ACSM Certification Exam"* — Salon II

Joan L. Duda, Ph.D.
Purdue University

This colloquium is designed to provide an overview and a critique of the competencies and objectives of the psychological component of the various ACSM certifications. Specifically, the presentation focuses on fostering a conceptual understanding of the processes underlying behavior change and maintenance. Issues such as motivation, exercise adherence, and proper goal setting are highlighted.

Clinical Lecture

2:30-3:30 pm — *"Overuse Injuries in Pediatric/Adolescent Athletes"* — Salon V, VI

Darin A. Maccoux, M.D.
The Toledo Hospital

With the boom in both pediatric and adolescent sports participation and the advent of the year-round "multisport" athlete, physicians are seeing accordingly more chronic overuse injuries in these populations. Although the majority of these problems are benign and self-limiting, they can, if ignored, become persistent and result in both initial functional compromise and subsequently long-term physical impairment. The majority of these injuries are the result of overtraining or improper training techniques, combined with inappropriate gear and lack of relative rest. The various overuse pathologies will be broken down by anatomic region and etiology. Important historical and physical findings will be discussed. The importance of appropriate timely diagnostic testing to confirm the diagnosis, combined with appropriate intervention, will be reviewed in the context of the age, gender, and association with other comorbid conditions. The four goals of this presentation are: 1) to discuss the etiology and pathophysiology of overuse injuries in the pediatric and adolescent population, 2) to discuss the important historical and physical findings in the pediatric/adolescent patient presenting with subacute or chronic pain, 3) to elaborate on the use of appropriate and timely diagnostic testing to confirm suspected diagnosis, and 4) to define appropriate initial intervention, treatment, and follow-up of the pediatric/adolescent athlete.

Recreational Events

Please take this opportunity to enjoy the many activities offered by the resort and community.

Research Presentations

6:30-7:30 pm — Free Communication (Slides) — Salon II

Moderator: Roger M. Zabik, Ph.D.
Western Michigan University

6:30 *"Addition of Soluble Fiber to Pre-Exercise Carbohydrate Feedings"*
A.C. Parcell, Iowa State University

6:45 *"Multiple Preexercise Feedings Do Not Prevent Exercise-Onset Hypoglycemia"*
K.R. Short, Ball State University

7:00 *"Energy Intake During 2 H of Recovery From Swimming or Running"*
C.P. Lambert, University of Toledo

7:15 *"The Prevalence, Risk and Trigger Factors for the Development of Eating Disorders in Female Intercollegiate Athletes"*
D. Walsh, University of Evansville

Founder's Lecture

8:00-9:00 pm — *"Bones: Are Active Men and Women Immune to Osteoporosis?"* — Salon II, V, VI

Barbara L. Drinkwater, Ph.D.
Pacific Medical Center, Seattle

Osteoporosis is a "silent" disease. The gradual loss of bone that places women and men at risk for this disease is imperceptible but with time can result in serious fractures leading to years of dependency, discomfort, and depression. Rather than emphasizing treatment for a disease which is essentially irreversible, emphasis must be focused on prevention. There is a growing awareness that strategies for prevention should begin in childhood and continue throughout life. The three most important factors that contribute to healthy bones are hormonal, nutritional, and mechanical. If there is a deficiency in any one of these three areas, bone loss is likely to occur. While exercise has many beneficial effects for women and men of all ages and has the potential to help them reach their biological potential for peak bone mass, there is no evidence that exercise alone can prevent women from losing bone in the postmenopausal years. While healthy, physically active women usually have above average bone mass, the low vertebral bone density observed in young amenorrheic athletes and anorexics suggests an important interaction between estrogen and exercise. Normal estrogen levels, physical activity, and adequate calcium work together to maximize peak bone mass and slow bone loss as men and women age. Even sedentary older adults can increase bone mass slightly with a well-planned exercise program. Whether this small increase in density will be effective in preventing or delaying osteoporotic fractures is unknown. However, exercise may also decrease the likelihood of fractures indirectly by improving neuromuscular coordination, balance, and muscular strength, thereby decreasing the chances of falling and/or minimizing the damage from a fall.

Recreational Events — *"MWACSM Social"* — New Orleans Ball Room

Please join in the festivities of the MWACSM Social! Activities include music played by a live DJ, dancing, cash bar, and the raffle. You won't want to miss this exciting event!

ADDITION OF SOLUBLE FIBER TO PRE-EXERCISE CARBOHYDRATE FEEDINGS

A.C. Parcell, M.L.Ray, K.A.Moss, T.M. Ruden, R.L.Sharp, FACSM,
and D.S.King, FACSM, Exercise Physiology and Biochemistry Laboratory,
Deptartment of Health and Human Performance, Iowa State University, Ames, Iowa

Soluble fiber reduces the plasma glucose and insulin changes after an oral glucose load by reducing the rate of intestinal absorption of glucose. This study evaluated the effects of soluble fiber combined with a pre-exercise CHO feeding on substrate availability and endurance performance in eight college-age males. On three different days, subjects ingested a sweet placebo (CON), 75 g liquid CHO (GLU), or 75 g liquid CHO with 14.5 g encapsulated guar gum (FIB) 45 min prior to cycling for 60 min at 70% VO_2 peak followed immediately by a performance trial. Significant ($p<0.05$) differences were observed in plasma glucose concentrations for GLU and FIB (6.5 $\pm$ 0.2 and 6.3 $\pm$ 0.1 mmol/L, respectively) compared to CON 30 min prior to exercise. Plasma glucose concentrations were lower in GLU (3.6 $\pm$ 0.2 mmol/L) and FIB (3.7 $\pm$ 0.2 mmol/L) when compared to CON, 15 min after the start of exercise ($p<0.05$). Plasma free fatty acid concentrations were greater in CON vs. FIB (0.335 $\pm$ 0.045 and 0.232 $\pm$ 0.046 mmol/L, respectively) only at 60 min of exercise ($p<0.05$). There were no significant differences between trials in glycogen use or performance times. These results demonstrate that soluble fiber, delivered in capsule form with a liquid CHO feeding, has no effect on plasma glucose changes or glycogen use. The absence of differences in plasma glucose responses and performance times may be due to a lack of cycling experience in subjects and/or the method of fiber administration.

Supported in part by the Gatorade Sports Science Institute

MULTIPLE PRE-EXERCISE FEEDINGS DO NOT PREVENT EXERCISE-ONSET HYPOGLYCEMIA.

K.R. Short, M.Sheffield-Moore, A.C. Parcell, D.R. Bolster, and D.L. Costill, FACSM
Human Performance Laboratory, Ball State University, Muncie, IN, 47306

Carbohydrate (CHO) feedings in the hour prior to exercise have been shown to result in a hypoglycemic response at the onset of the activity. This investigation was undertaken to determine whether consuming several smaller feedings, rather than the traditional single bolus, would affect blood glucose and insulin responses during rest and exercise. In addition, the potential for a CHO dose-response was measured. Eight trained cyclists ingested either 22.5, 45, or 75 total grams of maltodextrin and dextrose dissolved in 473 ml of water or an equal volume of placebo (PL). Drinks were divided into 4 portions and consumed at 15 min intervals in the hour before a 120 min ride at 66% VO_2 max. Serum glucose values were elevated by the CHO feedings at rest and fell significantly below baseline and PL at 15 min of exercise. However, glucose concentrations immediately prior to exercise (~5.3 mmol·l^{-1}) and at the 15 min nadir (~3.2 mmol·l^{-1}) were similar in each of the CHO trials and thus, unrelated to the amount consumed. Insulin concentrations also increased rapidly during rest then fell sharply at the onset of exercise. Total area under the insulin curve was higher in the 75 g trial than both 22.5 g and PL while the 45 g trial exceeded PL. No differences were found in CHO oxidation, perceived exertion or other physiological variables among treatments. At least 2 subjects in each CHO trial experienced feelings of fatigue and had blood glucose values < 2.9 mmol·l^{-1} at 15 min, but all recovered by 30 min and successfully completed the exercise. The conclusion is that CHO consumed during the 60 min before exercise, even when taken in several small doses, has the potential to produce transient hypoglycemia at the onset of exercise. Additionally, the magnitude of the response appears to be unrelated to the amount of CHO ingested and the insulin response.

ENERGY INTAKE DURING 2 H OF RECOVERY FROM SWIMMING OR RUNNING.

C.P. Lambert, W.A. Braun, D.J. Boardley, K.K. Carroll, C. Weideman, D. Choi, F.F. Andres and M.G. Flynn. The University of Toledo Exercise Physiology Laboratory, Toledo, Ohio 43606.

Swimmers reportedly have a higher body fat % than runners despite a similar energy expenditure. Lower serum glucose and a greater energy intake after swimming compared to running are potential reasons for this phenomenon. We compared the energy intake, serum glucose, hunger, and thirst of 6 trained triathletes for 2 h after 45 min of running (R) or swimming (S) at 75% of VO_2max. Subjects were placed in a room with a variety of food and beverages for 2 h after R or S. Energy intake (Kcal) during this period was assessed. Subjects were blinded to the purpose of the study. Blood samples for serum glucose were obtained pre-exercise, immediately, 15 min, and 135 min post-exercise. Ratings of hunger and thirst were obtained using a five point Likert scale 15 min post-exercise. No significant difference ($p\leq0.05$) was observed for hunger (3.33 $\pm$0.33; mean $\pm$SE for R and 3.3 $\pm$0.33 for S), but thirst was significantly greater after R (4.17 $\pm$0.40 for R and 3.17 $\pm$0.17 for S). Serum glucose was significantly higher after R than S immediately after exercise (5.6 $\pm$0.4 mmol/L for R and 4.3 $\pm$0.1 mmol/L for S). Energy intake (Kcal/2 h) was significantly greater after R (1214 $\pm$91 kcal/2h) than S (1018 $\pm$65 Kcal/2h). Thus, the greater body fat % of swimmers compared to runners does not appear to be due to a greater energy intake in the 2 hours after a training session.

THE PREVALENCE, RISK AND TRIGGER FACTORS FOR THE DEVELOPMENT OF EATING DISORDERS IN FEMALE INTERCOLLEGIATE ATHLETES

D. Walsh , T. Hines, D. Enzler, D. Rodd. Department of Biology, The University of Evansville, Evansville, IN 47722.

This study examined the prevalence, risk and trigger factors for eating disorders in female athletes. Subjects included were all female intercollegiate athletes at the University of Evansville (n=63), ages 18-23 yrs, representing four sports: cross country, swimming and diving, cheerleading and Ace-ette dancers. The Eating Aptitude Test as well as a survey focusing on symptoms related to anorexia athletica were used to classify individuals at risk for eating disorders. A follow-up questionnaire on trigger factors related to eating disorders was given to the athletes as well. Results indicate an increased prevalence of eating disorders in sports emphasizing leanness or a specific weight than in sports where theses factors were less important. In addition, there was a large discrepancy between how the athletes viewed themselves and their ideal body image versus how the coaches perceived the athletes. Finally, trigger factors associated with the onset of eating disorders were prolonged periods of dieting, frequent weight fluctuations, a sudden increase in training volume and traumatic events.

Saturday, October 5, 1996

Symposium

8:00-9:30 am — *"Psychological Concomitants of Exercise: Perspectives and Paradigms"* — Salon II

'Physical Activity, Brain Activation, and Mental Health'
Steven J. Petruzzello, Ph.D.
University of Illinois at Urbana-Champaign

'Psychobiological Responses to Acute and Chronic Exercise'
John S. Raglin, Ph.D.
Indiana University

'Exercise and the Neurochemistry of Stress'
Mark S. Sothmann, Ph.D.
Indiana University Medical School

Although psychological phenomena have a long history within the exercise and physical activity domain, too often these factors are overlooked. Exercise scientists have been urged for at least 25 years to incorporate a psychophysiological or psychobiological approach when examining such phenomena, yet relatively little progress has been made in this regard. This symposium seeks to highlight the findings from different selected psychophysiological systems or perspectives to demonstrate meaningful interrelationships between physiological function and psychological events. Psychological antecedents and consequences of physical activity will be examined with respect to the brain and central nervous system. The cardiovascular system and its influence on psychological outcomes of exercise will also be explored. Finally, the impact of exercise with respect to stress will be examined from a neurochemical perspective. Each presentation will present results from work using a psychophysiological or psychobiological perspective, and will discuss potential directions for future research. The objective of the symposium will be to demonstrate the interrelationship between physiological and psychological function and the insights that can be gained into the psychology of exercise by examining meaningful physiological factors.

Clinical Lectures

8:00-8:45 am — *"Case Studies: Methods of Gait Training With Children With Cerebral Palsy"* — Salon V, VI

A. Lynn Millar, Ph.D., P.T.
Andrews University

Traditionally, children with cerebral palsy who have gait disturbances are referred to physical therapy. Physical therapy for gait modification usually involves methods ranging from verbal cueing during gait practice to ambulation with various assistive devices, and use of physical techniques during ambulation. A technique which has been used successfully with adult orthopedic and neurologic patients is that of training on the treadmill with a device to reduce the load on the body. This is effected through the use of a harness and weights or pneumatic devices. In this session, results of several case studies are presented in which this type of training has been used with children with cerebral palsy, with analyses of the childrens' gait and movements prior to and following training.

9:00-9:45 am *"Back Pain in the Adolescent"* Salon V, VI

Steven D. Freeman, M.D.
The Toledo Hospital

Back pain in the adult population is ubiquitous with approximately 80 percent of adults experiencing back pain in their lifetimes. Although the occurrence of back pain in the adolescent athlete is less common, the etiologies are often different. It is possible the majority of the time to separate back pain into discogenic and nondiscogenic sources through a detailed history and physical exam. Specific historical findings of concern include associated fever, nocturnal pain, specific trauma, pain unrelieved by relative rest, and increasing discomfort with repetitive hyperextension activities. Physical findings differentiating discogenic versus nondiscogenic sources of pain will be discussed with specific emphasis on herniated disc, spondylolysis/spondylolisthesis, discitis, tumor, and myofacial injuries. The use of appropriate and timely diagnostic testing and individual treatment for these conditions will be discussed. The goals of this presentation are to: 1) discuss the various etiologies/ pathophysiologies of causes of back pain in the athletic adolescent, 2) define important historical and physical exam findings pertinent to establishing the diagnosis, 3) elaborate on appropriate and timely diagnostic tests to confirm the diagnosis, and 4) establish appropriate treatment and follow-up based on the pathology and any comorbid conditions.

Symposia

9:45-11:15 am *"Space Physiology: Role of Exercise in Extended Duration Missions"* Salon II

'Alterations in the Control of the Cardiovascular System With Extended Microgravity'
Jim Pawelczyk, Ph.D.
Penn State University

'Skeletal Muscle Adaptations to Microgravity'
Jeff Widrick, Ph.D.
Marquette University

'Exercise Countermeasures and Extended Spaceflight'
John E. Davis, Ph.D.
Alma College

It is well documented that humans adapt to microgravity. While many of these adaptations are useful during spaceflight, many can be problematic upon returning to a gravitational environment. The purpose of this symposium will be to examine the physiologic adaptations that occur in response to extended periods of microgravity. In addition, the role of exercise as a countermeasure for the negative muscular and cardiovascular adaptations that occur during spaceflight will be examined. Specifically, Dr. Pawelczyk will speak on the changes in the control of the cardiovascular system with extended microgravity. He will focus on the potential changes in baroreceptor function with adaptation to microgravity. Dr. Widrick will speak on skeletal muscle changes with microgravity. He will report on several recent studies on space shuttle missions that were dedicated to the life sciences and muscle function. Dr. Davis will speak on exercise as a countermeasure during extended duration flight. He will summarize recent inflight and ground based studies that have addressed this issue. As the space program contemplates longer duration missions (i.e., space station, trip to Mars), it will be important to understand the basic physiological changes to microgravity and how exercise can be used as a countermeasure for those changes.

10:00-11:30 am *"Understanding the Clinical Applications of Gas Exchange Analysis"* Salon V, VI

'Physiologic Responses to Cardiopulmonary Exercise Testing'
Jeffrey Johnson, M.S.
Blodgett Memorial Medical Center

'Algorithms and Case Presentations for Differential Diagnosis'
John Cantor, M.D.
Grand Valley Pulmonary Specialists

Cardiopulmonary exercise tests (CPXT) are often prescribed to improve clinicians' evaluation of the integrated function of the heart and lungs under stress. By generating precise noninvasive metabolic data, the CPXT provides the linkage between pathologies of the heart and lungs allowing for effective therapeutic decision making for patients presenting with obscure nondescript symptoms. In the clinical setting, exercise physiologists are often charged not only with administering these tests but providing interpretation of the data as well. However, due to the wealth of metabolic data generated by the CPXT and a relative lack of familiarity with various gas exchange concepts, many clinicians fail to utilize this data to its fullest application. The purpose of this symposium is to discuss the value of gas exchange data for the diagnostic, prognostic, and functional assessment of patients with unexplained exertional intolerance. Participants will gain an understanding of the diagnostic utility of the CPXT through review of essential cardiac and respiratory variables examined in the differential diagnosis of exercise impairment. Review of the functional application of gas exchange will include its use in: evaluating the efficacy of therapeutic interventions in patients with cardiac or pulmonary disease, evaluating the prognostic and functional assessment of patients with left ventricular dysfunction, assessing the degree of physical disability as it relates to return to work evaluation, and formulating effective and safe exercise prescriptions. Through the presentation of published algorithms and case studies, an integrated approach to data interpretation will be provided. The symposium will conclude with a demonstration of a CPXT to facilitate the understanding of the methodologies essential for administration of an effective CPXT. With the spread of commercially available metabolic systems appearing in clinical laboratories, an increasing number of MWACSM professionals and students will become involved in conducting CPXTs. With this growth, the ability to properly conduct a CPXT as well as an ability to integrate the data into a meaningful interpretation is quickly becoming a prerequisite to many clinical exercise physiology positions. This symposium can provide a framework to increase the competency of exercise physiologists pursuing careers within this setting.

Student Forum

11:15 am-12:00 pm *"What Should I Do to Prepare Myself..."* Salon I, III, IV

'For Graduate School and the Clinical Work Setting?'
A. Lynn Millar, Ph.D., R.P.T.
Andrews University

'For Graduate School and the Academic Work Setting?'
Robert M. Malina, Ph.D.
Michigan State University

This session is designed to provide a forum to discuss important issues related to professional preparation and preparation for entry into the a) clinical and b) academic work force. The presenters will focus on the important aspects of entrance to a graduate program, e.g., how to identify the type of graduate program that matches your career goals, what do graduate faculty look for when evaluating applications of students, how to maximize your chances of being selected into a graduate program. Additionally, once students enter a graduate program, what can they do to enhance the probability of successfully entering the work force? In other words, earning good grades in your classes is not the only criterion used by potential employers, and perhaps may not even be a major criterion. Therefore, what your credentials should include upon completion of your professional preparation will be discussed. It is the intent of the presenters to allow maximum interaction with the audience in this informal session.

MWACSM would like to acknowledge the Gatorade Company for their generosity in partially supporting the Student Forum and the cost of the Luncheon for student attendees via the Gatorade Regional Chapter Project Grant which is awarded on a competitive basis and administered via the ACSM Foundation.

Luncheon

12:00 pm *"Tales From the Great Beyond"* Salon I, III, IV

Scott Parazynski, M.D.
Johnson Space Center

This session is the culminating event to the 1996 MWACSM Annual Meeting. After enjoying your sit-down luncheon, we invite you to relax and enjoy a presentation by Dr. Scott Parazynski who is a NASA astronaut. Scott has logged over 262 hours in space and has graciously agreed to share with us his experiences in space. After showing a short video, Scott will also discuss the use of exercise equipment that he designed and used in space as a countermeasure to the musculoskeletal changes that occur in a microgravity climate.

Awards Presentation

The awards ceremony will immediately follow our guest speaker presentation. Several individuals, both student and professional will be honored at this time.

Business Meeting

The annual business meeting will be held subsequent to the luncheon and awards presentations. In addition to other items of business, the slate of candidates for election to various MWACSM offices will close at the end of the business meeting. Nominations will be accepted from the floor until this time.

AMERICAN COLLEGE OF SPORTS MEDICINE

Title of Meeting: Midwest Chapter Annual Fall Mtg.

Date(s) of Meeting: October 3-5, 1996

SPEAKER EVALUATION
5 - EXCEPTIONAL
4 - VERY GOOD
3 - SATISFACTORY
2 - FAIR
1 - POOR

	Speaker's Name	Title of Presentation	Quality of Audiovisual Aids	Quality of Presentation - Speaker	Quality of Presentation - Content	Probability of Using Information	Amount of New Information
THURSDAY, OCT. 3	Joseph Carlson,RD	'Heart Healthy Diet'					
	Ronald VanderLaan,MD	'Heart Healthy Diet'					
	Jeffrey Edwards,PhD	Daily Energy Expend					
	Darlene Sedlock,PhD	Energy Expenditure					
	Mitchell Whaley,PhD	ACSM - CEQ					
	Cheryl Dudeck,ATC	Exercises - Strokept.					
	Terry Nicola, MD	Team approach-stroke					
	Robert Malina,PhD	Growth & Maturation					
FRIDAY, OCT. 4	Jeffrey Woods, PhD	Method. in Ex. Immun.					
	Michael Flynn, PhD	Ex. & Immune Func.					
	Michael Ceddia,MS	Microphage Func.					
	William Braun,MS	Resistance Ex.&Elder.					
	Charles Lambert,MS	Suppressor Cell & MS					
	Michael Gunter, MD	Wt. Trng -Adolescents					
	Joan Duda, PhD	Psych - Female Gymnasts					
	Melissa Chase, PhD	Fear of Injury					
	Robin Vealey, PhD	Coaching Behaviors					

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	Speaker's Name	Title of Presentation	Quality of Audiovisual Aids	Quality of Presentation - Speaker	Quality of Presentation - Content	Probability of Using Information	Amount of New Information
FRIDAY, OCT. 4	Gloria Balague, PhD	Pregnancy - T&F					
	Lucille Smith PhD	Eccentric - DOMS					
	Asif Anwar,MBBS	Acute Inflam.Response					
	Michael Fragen,MD	Practical Issues-DOMS					
	Jeanne Foley, PhD	Magnetic Resonance					
	Roop Jayaraman, MS	MRI - ms. recruitment					
	Diane Hartmann,MS	MRI- body composition					
	Darin Maccoux, MD	Overuse injuries					
	Barbara Drinkwater, PhD	ACSM- Eating dis.					
	Joan Duda, PhD	Sport Psych- Exam					
	B. Drinkwater, PhD	Osteoporosis...					
SATURDAY, OCT.5	Steven Petruzello,PhD	Brain activation					
	John Raglin, PhD	Psych - acute ex.					
	Mark Sothmann,PhD	Neurochem. of stress					
	Steve Freeman, MD	Back pain in Adol.					
	Jim Pawelczyk,PHD	Cardiovas. & micrograv.					
	Robert Fitts,PhD	Skeletal ms.-micro.					

AMERICAN COLLEGE OF SPORTS MEDICINE

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SPEAKER EVALUATION
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4 - VERY GOOD
3 - SATISFACTORY
2 - FAIR
1 - POOR

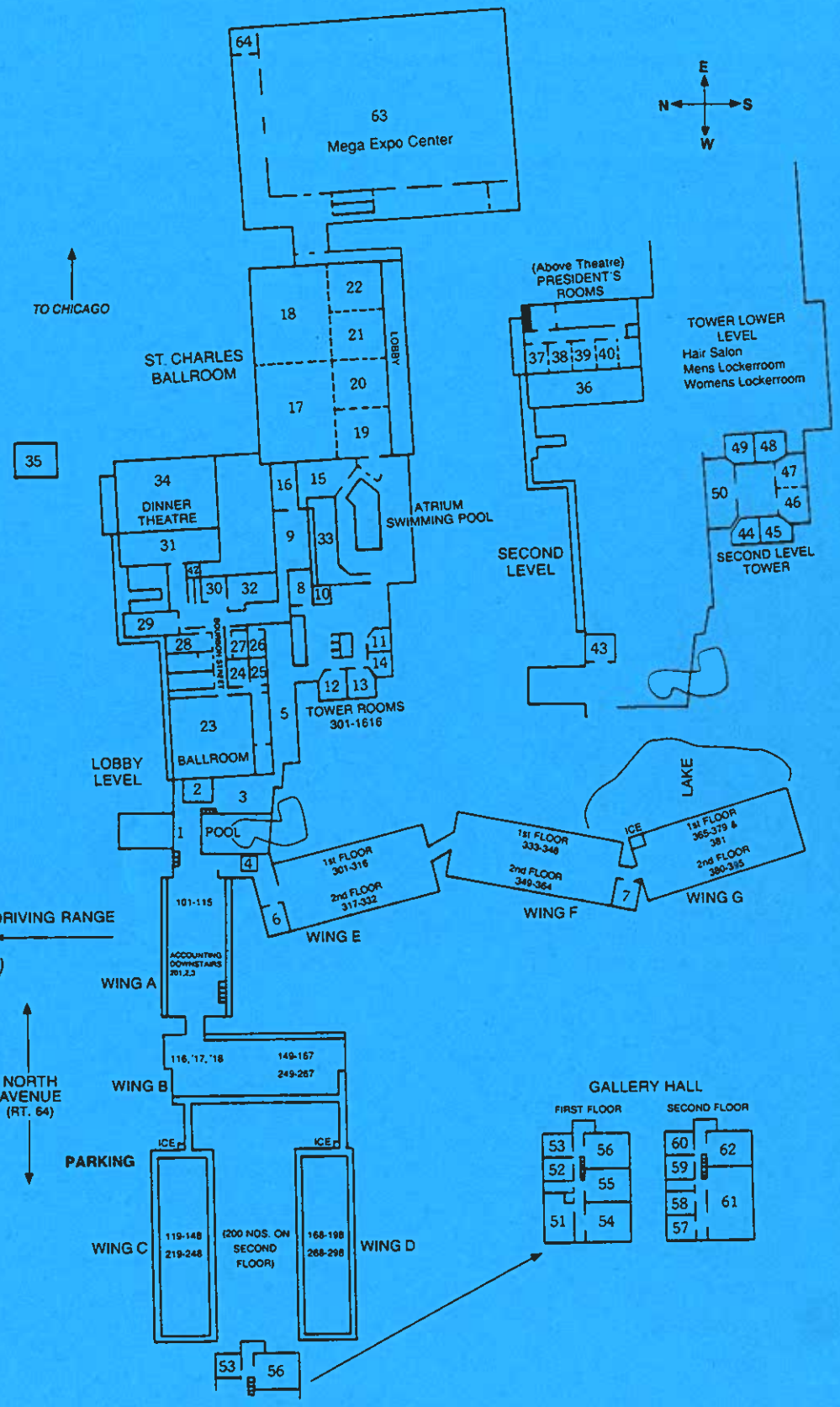
SATURDAY OCT 5

Speaker's Name	Title of Presentation	Quality of Audiovisual Aids	Quality of Presentation - Speaker	Quality of Presentation - Content	Probability of Using Information	Amount of New Information
John Davis,PhD	Ex. countermeasures					
Jeffrey Johnson,MS	Response to Cardio.test					
John Cantor, MD	Differential diagn.					
Scott Parazynski,MD	NASA Space Center					

RESORT SITE PLAN

Pheasant Run
RESORT ◆ CONVENTION CENTER

1 - Lobby
2 - Reservation Office
3 - Poolside Solarium
4 - Card Room - Lobby
5 - Card Room - Tower
6 - Kid's Club
7 - King Edward
8 - Food and Beverage Office
9 - Marseilles I & II
10 - Clubhouse Lounge
11 - Golf Shop
12 - Arnold Palmer
13 - Jack Nicklaus
14 - Ben Hogan
15 - Fitness Center/Health Club
16 - Marseilles III
17 - Salon I
18 - Salon II
19 - Salon III
20 - Salon IV
21 - Salon V
22 - Salon VI
} COMPLETE ST. CHARLES BALLROOM
23 - New Orleans Ballroom
24 - Pete Fountain Room
25 - Louis Armstrong
26 - Duke Ellington
27 - Lucky Pierre's
28 - Marian's Boutique
29 - Thieve's Market
30 - Bourbon Street Deli
31 - Baker's Wife Restaurant & Lounge
32 - Lillys
33 - Atrium
34 - Dinner-Theatre
35 - Dinner-Theatre Box Office
36 - Zanies Comedy Club
37 - Washington
38 - Lincoln
39 - Jefferson
40 - Eisenhower
} COMPLETE PRESIDENT'S ROOMS
42 - Zanies Box Office
43 - Sales/Catering Office (above lobby)
44 - Sapphire
45 - Topaz
46 - Turquoise A
47 - Turquoise B
48 - Coral
49 - Jade
} COMPLETE GEM ROOMS
50 - Ruby
51 - Robert Wood
52 - Picasso
53 - Chagall
54 - Utrillo
55 - Vermeer
56 - Gauguin
57 - Matisse
58 - Corot
59 - Van Gogh
60 - Cezanne
61 - Rembrandt
62 - Renoir
} COMPLETE GALLERY HALL
63 - Mega Expo Center
64 - Mega Expo Center Box Office



BP Δ with resistance training in normal BP.

(see Kelley, analysis 8:00 Friday)

meta

- 12 studies; Quantitative results -
- further study needed

666 Topic - effect of training/exercise on the effects of bedrest / space flight (Pandolf - ESSR (1994?)

REGISTRATION FORM

INFORMATION -- Please print or type

Last Name _____

First name _____ MI _____

Affiliation _____

Position _____

Mailing Address _____

_____

Phone (____) _____

Fax / e-mail _____

Are you a MWACSM member? _____

Are you a national member? _____

Were you a student at Ball State University?: _____

_____

FEE SCHEDULE -- Pre-registration for the Getchell Conference is recommended and will be accepted if postmarked by October 25th.

	Pre-Registration	On-Site	Total
MWACSM Members			
Professionals	$25	$35	$_____
Students	$10	$20	$_____
Non-MWACSM Members (1997 membership included)			
Professionals	$40	$50	$_____
Students	$15	$25	$_____

Banquet Tickets _____ (# of tickets) @ $20 $_____

PAYMENT TOTAL $_____

CANCELLATIONS: Full refunds are available if notified *in writing* by October 30, 1996. After that date, no refunds will be issued.

* *

Return this form with a check payable to ***BSU Physical Fitness Fund*** and mail to:

Adult Physical Fitness Program
Attn.: Getchell Conference
Human Performance Laboratory
Ball State University
Muncie, Indiana 47306

Leroy "Bud" Getchell Conference

1996 Indiana State Meeting

of the

AMERICAN COLLEGE OF SPORTS MEDICINE

November 8-9, 1996

Ball State University Muncie, Indiana

LEROY "BUD" GETCHELL CONFERENCE

1996 Indiana State Meeting of the American College of Sports Medicine

November 8-9th, 1996
Ball State University

The focus of this conference is to honor the professional career of Dr. Leroy "Bud" Getchell, and the 30th anniversary of the Adult Physical Fitness Program at Ball State University. Dr. Getchell was the founder and director of the Program until he left Ball State in 1985. Dr. Getchell plans to retire from his academic position at Indiana University this December. To honor Dr. Getchell's career and the 30th anniversary of the Program, a special conference and banquet are scheduled for November 8-9th. The conference is slated for Friday evening and Saturday morning at Pruis Hall on the Ball State campus, and will serve as the Indiana State meeting of the American College of Sports Medicine for 1996.

A group of internationally known speakers have been assembled for the conference. Each of speakers was a peer of Dr. Getchell's during his days as a doctoral student at the University of Illinois. The speakers are Dr. Paul Ribisil (Wake Forest University), Dr. Michael Pollock (University of Florida), Dr. William Haskell (Stanford University), and Dr. James Skinner (Indiana University). The conference is intended for professionals and students in the field of exercise science, but open to other interested individuals. We are especially encouraging former students who worked with Dr. Getchell during their graduate training at the Human Performance Lab to attend the meeting and the other weekend festivities.

Following the professional conference there will be a banquet in Dr. Getchell's honor on Saturday evening, November 9th. The banquet will take place at the Horizon Center in Muncie and is open to the public. Community residents who participated in the Adult Physical Fitness Program over the years are encouraged to attend the banquet to recognize Dr. Getchell's efforts in establishing the Program. We are encouraging former and current program participants to get involved in helping with the banquet. For more information about the banquet please contact the program office.

For more information about the meeting contact:

Mitchell H. Whaley, Ph.D.
Ball State University
Human Performance Laboratory
Muncie, IN 47306
(317) 285-1158 FAX: 317-285-8596
e-mail: mwhaley@wp.bsu.edu

CONFERENCE SCHEDULE

FRIDAY, November 8, 1996

5:30-6:45 p.m.	**Registration** (Pruis Hall)
6:45-7:00 p.m.	**Welcome**
7:00-7:50 p.m.	**Paul M. Ribisl, Ph.D.** *"Reversing the Aging Trend with Physical Activity: Myth or Reality?"*
7:50-8:40 p.m.	**William L. Haskell, Ph.D.** *"Physical Activity and CHD: An Update?"*
8:50-9:45 p.m.	**Panel Discussion** *"Impact of the Surgeon General's Report on Physical Activity and Health"*
	Panel Members: Ribisl, Pollock, Haskell, Skinner, Getchell

SATURDAY, November 9, 1996

8:00-8:50 a.m.	**Michael M. Pollock, Ph.D.** *"The Quantification of Resistance Training for Fitness and Health: Are All Muscles the Same?"*
8:50-9:40 a.m.	**James S. Skinner, Ph.D.** *"Alternative Approaches to Evaluating Endurance Performance"*
9:40-10:00 a.m.	**Break**
10:00-10:45 a.m.	**Mitchell H. Whaley, Ph.D.** *"Ball State University Adult Physical Fitness Program 1966-96"*
10:45-11:45 a.m.	**Leroy "Bud" Getchell, Ph.D.** *"Physical Fitness: A Way of Life"*

OTHER EVENTS

1:00 p.m.	Ball State Football vs. Kent General admission: $2.00
3:00 p.m.	Human Performance Lab / Adult Physical Fitness Program Tour & Open House
6:00-7:00 p.m.	Reception at Horizon Center
7:00-9:00 p.m.	Banquet at Horizon Interurban Hall

CONFERENCE FACULTY

Leroy H. Getchell, Ph.D.
Professor of Kinesiology
Indiana University
Bloomington, Indiana

William L. Haskell, Ph.D.
Professor
Division of Cardiovascular Medicine
Stanford University
Palo Alto, California

Michael L. Pollock, Ph.D.
Professor & Director
Center for Exercise Science
University of Florida
Gainesville, Florida

Paul M. Ribisl, Ph.D.
Professor & Chair
Health and Sports Science
Wake Forest University
Winston-Salem, North Carolina

James S. Skinner, Ph.D.
Professor
Department of Kinesiology
Indiana University
Indianapolis, Indiana

LODGING

A limited number of rooms (single, executive single, double) have been reserved for conference participants at a variety of hotels near Ball State University. Registrants are responsible for making reservations by contacting the hotel directly. Reserved rooms will be held until October 23, 1996. Please mention you are attending the Getchell Conference to obtain a reserved non-smoking room. [Note: November 8-10 is also Family Weekend at the university, so we recommend making lodging reservations early.]

Amerihost Inn	317-282-0600	Lees Inn	317-28[illegible]57
Comfort Inn	317-282-6666	Signature Inn	317-28[illegible]200
Days Inn	317-288-2311	Super 8	317-286-4333

FALL MEETING REGISTRATION FORM

Midwest Chapter
American College of Sports Medicine
October 9-11, 1997

PRINT OR TYPE INFORMATION

(Name badge information taken from this form)

Name _____

Degree/Profession _____

Affiliation _____

Address _____

City/State/Zip _____

Area Code/Phone _____

Fax/e-mail _____

FEE SCHEDULE (Registration must be postmarked by 9/22 to qualify for reduced fee)

	Pre-Registration By 9/22/97	Registration After 9/22/97	Total
MWACSM Members			
Professional and Professional-in-Training	$55.00	$75.00	$____
Student	$25.00	$35.00	$____
Non-MWACSM Members (1998 Membership included.)			
Professional and Professional-in-Training	$85.00	$105.00	$____
Student	$40.00	$50.00	$____
Single-day Registration			
Professional and Professional-in-Training Date: _____	$30.00	$35.00	$____
Student Date: _____	$20.00	$25.00	$____

PAYMENT METHOD*

Check _____ Money Order _____ TOTAL $_____

*Payable to *Midwest ACSM*

*If you have a disability which requires special accommodations, please notify us of your needs at least **two weeks** in advance of the program.

Please send registration form with payment to:
MWACSM Office
c/o Timothy Kirby, Ph.D.
151 Larkins Hall
337 West 17th Avenue
Columbus, Ohio 43210

INFORMATION

The 1997 MWACSM meeting is designed to (1) enhance the scientific and clinical understanding of the physiological, biomechanical, and psychological bases for the changes that occur during and following exercise in both normal and pathological states; (2) provide a forum for students to present research related to sports medicine and exercise science; and (3) promote interaction among scientists and clinicians in related fields to provide new approaches to, and perspectives on, problems in exercise science and sports medicine.

- **Registration**

A discount is available through pre-registration if the registration form is postmarked by September 22, 1997. When completing the form, be sure to furnish all information requested to avoid delays. On-site registration will begin on Thursday, October 9, 1997 at 1:00 p.m. at South Bend Holiday Inn.

- **Cancellations**

A full refund will be given if a **written** cancellation is ***received*** by September 14, 1997. A processing fee of $20.00 will be charged for cancellations ***received*** between September 14-30. No refunds after Sept. 30.

- **Continuing Education**

Applications have been filed for Continuing Education Credits. The number of credit hours is yet to be determined. Individuals requiring credit verification of attendance at the meeting must register and pay a fee of $10 for ACSM members, and a fee of $15 for non-members.

- **Lodging**

A block of rooms has been reserved for meeting participants at the Holiday Inn - Downtown (213 West Washington, South Bend, Indiana). Registrants are responsible for making hotel reservations by contacting the hotel at 1-219-232-3941. The hotel has reserved a limited number of non-smoking rooms for the MWACSM meeting until **September 9, 1997**. The room rates are $75(single/double) and $85 (triple/quad). The hotel offers an on-site restaurant and lounge and an indoor pool. The hotel is within walking distance to a jogging trails, tennis, golf, fishing, sailing, and major shopping malls. Other convenient accommodations are available in South Bend at the Marriott (219-234-2000), and further information on lodging may be obtained from the South Bend Visitors Bureau at 219-234-0051.

- **Exhibits**

A student forum will be held on Saturday morning prior to the luncheon which will include exhibits from graduate schools and internship sites. If you would like to exhibit materials, contact Jeff Edwards, Department of Physical Education, Indiana State University, Terre Haute, Indiana 47809; 812-237-3908; e-mail: pmedward@scifac.indstate.edu.

- **Annual Meeting Program Committee**

Dr. Fred Andres, FACSM, Toledo University
Dr. Jeffrey E. Edwards, Indiana State University
Dr. Michael Flynn, FACSM, Toledo University
Dr. Ellen Glickman-Weiss, FACSM, Kent State University
Dr. Tim Kirby, Ohio State University
Dr. [illegible]n Millar, FACSM, Andrews University
Dr. [illegible]e Petruzzello, FACSM, University of Illinois
Dr. Jim Pivarnik, FACSM, Michigan State University
Dr. Darlene Sedlock, FACSM, Purdue University
Ms. Cathy D. Stewart, Ball State University

HUMAN PERFORMANCE LABORATORY
Ball State University
Muncie, Indiana 47306

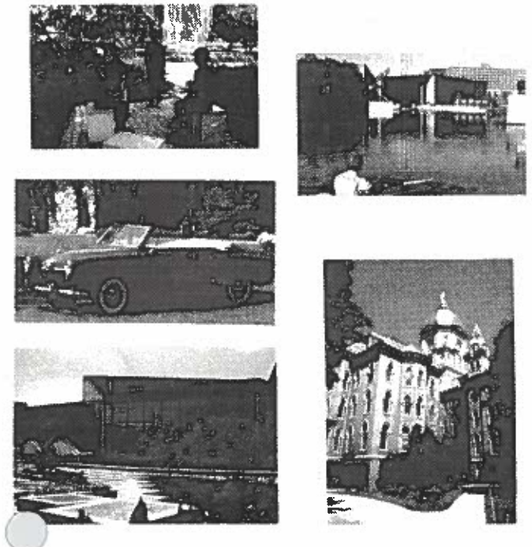
PROGRAM

Pre-Registration Deadline is September 22, 1997

AMERICAN COLLEGE of SPORTS MEDICINE

MIDWEST CHAPTER

Annual Fall Meeting



South Bend Century Center,
South Bend, Indiana
October 9-11, 1997

THURSDAY, OCTOBER 9, 1997

1:00 pm **REGISTRATION**

RESEARCH PRESENTATIONS

2:00-3:30 **Free Communications I**

3:30-5:00 **Free Communications II**

WORKSHOP: PRESCRIBING EXERCISE USING RATINGS OF PERCEIVED EXERTION (Organizer: Ellen Glickman-Weiss, FACSM, Kent State University)

2:00 pm **"New Procedures in Exercise Prescription"**
Chris Dunbar, Ph.D., M.P.H., FACSM
Brooklyn College

SYMPOSIUM: PHYSIOLOGY OF EXERCISE: HEALTHY CHILDREN AND CHILDREN WITH DISEASE (Organizer: Anthony Mahon, Ball State University)

3:30 pm **"Cardiorespiratory and Metabolic Response During Exercise: Children vs. Adults"**
Anthony Mahon, Ph.D., Chair
Ball State University

4:00 pm **"Aerobic Fitness in Children"**
James Pivarnik, Ph.D., FACSM
Michigan State University

4:30 pm **"Exercise and Children with Chronic Disease"**
Patricia Nixon, Ph.D., FACSM
Children's Hospital of Pittsburgh

SYMPOSIUM:PHYSIOLOGICAL AND THERMAL RESPONSES TO COLD EXPOSURE (Organizer: Ellen Glickman-Weiss, FACSM, Kent State University)

6:30 pm **"Factors that Influence Physiological and Thermal Responses to Resting Cold Exposure"**
Ellen Glickman-Weiss, Ph.D., FACSM
Kent State University

7:00 pm **"The Effect of Gender on Thermosensitivity and Responses to the Cold"**
Karen Mittleman, Ph.D., FACSM
Rutgers University

7:30 pm **"Influence of the Aging Process on Exposure to Cold Environments"**
Amy Morgan, Ph.D.
Kent State University

KEYNOTE LECTURE

8:15 pm **"Carbohydrate as an Ergogenic Aid for Endurance and High Intensity Exercise"**
Janet Walberg Rankin, Ph.D.
Gatorade Sports Science Institute
Virginia Polytechnic Institute and State University

KEYNOTE LECTURERS

Janet Walberg Rankin, Ph.D.
Thursday, 8:15 p.m.

Jack Wilmore, Ph.D., FACSM
Friday, 7:30 p.m.

FRIDAY, OCTOBER 10, 1997

RESEARCH PRESENTATIONS

9:00-12:00 **Poster Session I - (Authors Present 9:30 - 10:30 am)**

2:00-5:00 **Poster Session II - (Authors Present 3:00 - 4:00 pm)**

CLINICAL LECTURE

8:00 am **"Delayed Progression or Regression of Coronary Heart Disease with Intensive Risk Factor Modification: Effects of Diet, Drugs and Exercise"**
Barry Franklin, Ph.D., FACSM
William Beaumont Hospital, Birmingham

SYMPOSIUM: INNOVATIVE STRATEGIES FOR COST EFFECTIVE MULTI-DISCIPLINARY LONG-TERM DELIVERY OF CARDIAC REHABILITATION (Organizer: Joseph Carlson, Blodgett Memorial Medical Center)

8:00 am **"Integrating a Cardiology Practice with On-site Medical Direction of Cardiac Rehab--A Way to Increase Physician Involvement"**
Ronald VanderLaan, M.D., FACC, FACP
Blodgett Memorial Medical Center, Grand Rapids

8:30 am **"Innovative Approaches for the Long-term Delivery of Cardiac Rehabilitation"**
Joseph Carlson, R.D., Ph.D. (abd.)
Blodgett Memorial Medical Center; Grand Rapids

9:00 am **"Cost Effective Delivery of Services Through Utilization of Multi-disciplinary Resources"**
Jeffry Johnson, M.S.
Blodgett Memorial Medical Center; Grand Rapids

CASE STUDY (Organizer: Steve Simons, St. Joseph's Medical Center)

9:00-12:00 **"Physician Case Presentations"**
Steve Simons, M.D., FACSM
St. Joseph's Medical Center; South Bend

SYMPOSIUM: PRACTICAL APPLICATIONS OF ALLOMETRIC SCALING TO EXERCISE SCIENCE (Organizer: Paul Vanderburgh, FACSM, University of Dayton)

10:00 am **"Use of Allometric Scaling for Research in Exercise Science"**
Paul Vanderburgh, Ed.D., FACSM
University of Dayton

10:25 am **"Introduction and Demonstration of Allometric Scaling"**
Tanya Miszko, B.S.
University of Dayton

10:45 am **"Use of Allometric Scaling for Fitness Testing"**
Maile Kusano, B.S.
University of Dayton

11:05 am **"Use of Allometric Scaling for Elite Competitive Events"**
Cliff Dooman, B.S.
University of Dayton

SYMPOSIUM: WHAT ROLE DOES HDL-C PLAY IN CAD AND HOW DOES ACUTE AND CHRONIC AEROBIC EXERCISE ALTER ONE'S HDL-C (Organizer: Paul Visich, Central Michigan University)

10:00 am **"Epidemiological Perspective of HDL-Cholesterol's Role on Coronary Artery Disease"**
Robin Anderson, Ph.D.
Alma College

FRIDAY, OCTOBER 10, 1997 (continued)

10:30 am **"Acute Effect of Exercise on HDL-C"**
Paul Gordon, Ph.D.
West Virginia University

11:00 am **"Chronic Effect of Exercise on HDL-C"**
Paul Visich, Ph.D., M.P.H.
Central Michigan University

11:30 am **BREAK**

SYMPOSIUM:NON-INVASIVE CARDIAC OUTPUT MEASUREMENT TECHNIQUES AND THEIR APPLICATION (Organizer: Timothy Kirby, Ohio State University)

2:00 pm **"Cardiac Output Determinations Using CO_2 Rebreathing"**
Timothy Kirby, Ph.D.
Ohio State University

2:30 pm **"Cardiac Output Determinations Using Impedance Cardiography"**
Janet Buckworth, Ph.D.
Ohio State University

3:00 pm **"Applications of Non-invasive Cardiac Output Determinations"**
Anthony Mahon, Ph.D.
Ball State University

SYMPOSIUM:EXERCISE SCIENCE AND CLINICAL CORRELATES IN DISEASED POPULATIONS (Organizer: A. Lynn Millar, FACSM, Andrews University)

2:00 pm **"Exercise for the Cancer or Pulmonary Patient"**
Cindy Pfalzer, Ph.D., P.T., FACSM
University of Michigan -- Flint

2:45 pm **"Peripheral Vascular Disease and Exercise -- Clinical Concerns"**
A. Lynn Millar, Ph.D., P.T., FACSM
Andrews University

COLOQUIA

4:00 pm **"Single Fiber Physiology: Application for Human Research"**
Scott Trappe, Ph.D.
Ball State University

TUTORIAL LECTURE

4:00 pm **"Applied Statistics for the Exercise Scientist--Should I Use ANOVA, Regression, or Chi-Square?"**
Janet Wigglesworth, Ph.D.
Ithaca College

5:00 pm **BREAK**

KEYNOTE LECTURE

7:30 pm **"Combating the Increasing Prevalance of Obesity in the United States: the Role of Physical Activity"**
Jack Wilmore, Ph.D., FACSM
University of Texas

9:00 pm **MWACSM SOCIAL**

SATURDAY, OCTOBER 11, 1997

SYMPOSIUM: RESISTANCE TRAINING AND THE OLDER ADULT (Organizers: Alan Mikesky, FACSM, Rafael Bahamonde, IUPUI)

8:00 am **"Muscle Adaptations to Resistance Training"**
Bruce Craig, Ph.D.
Ball State University

8:30 am **"Effects of Strength Training on Balance"**
Nancy Dayhoff, Ed.D.
Indiana University / Purdue University--Indianapolis

9:00 am **"Effects of Strength Training on Gait"**
Rafael Bahamonde, Ph.D.
Indiana University / Purdue University--Indianapolis

CLINICAL LECTURE

8:00 am **"Chronic Disease and Exercise"**
Steve Keteyian, M.D., FACSM
Henry Ford Hospital; Detroit

CLINICAL LECTURE

10:00 am **"Body Composition Analysis for the Fitness Leader"**
Wayne Sinning, Ph.D., FACSM
Kent State University

STUDENT FORUM

11:30 am **Graduate Schools and Internship Sites Exhibit**

LUNCHEON (Free with paid 3-day registration fee or 1-day Sat.)

12:00 pm **Guest Speaker**

Awards Presentation

MWACSM Business Meeting

PROGRAM FACULTY

Dr. Robin Anderson, Alma College
Dr. Rafael Bahamonde, IUPUI
Dr. Janet Buckworth, Ohio State University
Dr. Joseph Carlson, Blodgett Memorial Medical Center
Dr. Bruce Craig, Ball State University
Dr. Nancy Dayhoff, IUPUI
Cliff Dooman, University of Dayton
Dr. Chris Dunbar, Brooklyn College
Dr. Barry Franklin, FACSM, William Beaumont Hospital
Dr. Ellen Glickman-Weiss, FACSM, Kent State University
Dr. Paul Gordon, West Virginia University
Dr. Jeffry Johnson, Blodgett Memorial Medical Center
Dr. Steven Keteyian, FACSM, Henry Ford Hospital
Dr. Tim Kirby, Ohio State University
Maile Kusano, University of Dayton
Dr. Anthony Mahon, Ball State University
Dr. Lynn Millar, FACSM, Andrews University
Tanya Miszko, University of Dayton
Dr. Karen Mittleman, FACSM, Rutgers University
Dr. Amy Morgan, Kent State University
Dr. Patricia Nixon, FACSM, Children's Hospital of Pittsburgh
Dr. Steve Petruzzello, FACSM, University of Illinois
[illegible]ndy Pfalzer, FACSM, University of Michigan--Flint
[illegible] Pivarnik, FACSM, Michigan State University
[illegible]arlene Sedlock, FACSM, Purdue University
Dr. Steve Simons, FACSM, St. Joseph's Medical Center
Dr. Wayne Sinning, FACSM, Kent State University
Dr. Scott Trappe, Ball State University
Dr. Paul Vanderburgh, FACSM, University of Dayton
Dr. Ronald VanderLaan, FACC, FACP, Blodgett Memorial Medical Center
Dr. Paul Visich, Central Michigan University
Dr. Janet Walberg-Rankin, Virginia Polytechnic Institute & State University
Dr. Janet Wigglesworth, Ithaca College
Dr. Jack Wilmore, FACSM, University of Texas

CONFERENCE PROGRAM

MIDWEST CHAPTER

Annual Meeting

Holiday Inn
Lakeside City Center
Cleveland, Ohio
October 8-10, 1998

Table of Contents

Welcome to Cleveland, Ohio and the 1998 Midwest ACSM Annual Meeting

Lynn Millar
President, MWACSM

Welcome to the 1998 Annual Meeting of the Midwest Chapter of the American College of Sports Medicine. The program includes symposia and tutorials which we believe address the mission of the American College of Sports Medicine and reflect the three broad areas of interest - Basic and Applied Sciences, Education and Clinical Medicine. We hope that you will find the meeting both educational and enjoyable.

Cleveland offers a variety of exciting activities that we hope you will take time to explore when not in the meeting. During the meeting we will be suggesting places for MWACSM members to get together at during the evening hours and we hope that you will join us.

As with most chapters, we continue to grow and wish to make our meetings and services address your needs. Please make sure to fill out the meeting evaluation forms, as they provide us with important feedback. Please do not hesitate to contact any of the board members with suggestions. Again, welcome to the annual meeting of MWACSM.

SCHEDULE OF EVENTS

Thursday October 8, 1998

12:00 Registration Begins

2:00-4:00 **Symposium: Benefits of Exercise on Mother and Fetus.** (Superior Room)
K.D. Little, J.F. Clapp, J. Rivera, and J. Pivarnik. Youngstown State University, Youngstown OH, Metrohealth Medical Center, Cleveland OH, and Michigan State University, East Lansing MI.

In 1994, the American College of Obstetricians and Gynecologists (ACOG) issued new guidelines for exercise during pregnancy based on research which indicated that previous limits on intensity and duration (ACOG, 1985) were not warranted. Further investigation has been and continues to be undertaken to expand our knowledge on the interaction of the physiology of pregnancy and exercise. The purpose and objectives of this symposium is to provide a brief, up-to-date review of what is currently known about the interaction of the physiology of pregnancy and exercise, followed by presentations of recent and/or ongoing investigations which address specific issues aimed at further enhancing our understanding of this topic. Specifically, Dr. Clapp will discuss important maternal benefits of exercise relative to pregnancy symptoms and labor outcome, as well as potential fetal benefits relative to short- and long-term body composition and neurodevelopment effects. Dr. Little will discuss the effects of exercise during pregnancy and the post partum on maternal body composition relative to weight and fat gain and loss, respectively, as well as bone density changes which may have important implications for future risk of osteoporosis. Finally, Dr. Pivarnik will discuss techniques for quantifying both leisure time and work-related physical activity in terms of energy expenditure, an issue which is crucial for accurately evaluating the role of exercise on pregnancy outcome in future studies. This symposium will provide valuable information to exercise scientists interested in the interaction of the physiology of pregnancy and exercise, as well as to exercise professionals responsible for designing and supervising exercise programs for pregnant women.

2:00-4:00 **Symposium: Presentation Strategies; How and Why to Present with a Portable Computer/Projector System.** (Ontario Room) *G.B. Dwyer, A.D. Mahon, L.A. Kaminsky, Ball State University, Muncie, IN*

Presentations with a portable computer and LCD projector are now a viable option along with slides and/or overhead transparencies. The pros and cons of using this newer technology option will be explored by way of examples of slides, overheads as well as computer presentations. The presenters will share not only the advantages of computer presentation technology but also the perils and pitfalls of the computer in live presentations.

4:00-5:30 **High Tea/Social with interest group tables.** (Lakeside Room)

The purpose of this social is to informally meet old friends and make new friends that share some common interests. Tables will have signs that identify specific interest areas for teaching, research and service. As you walk around, stop by some tables with signs that interest you – you'll find others there with similar interests. Enjoy complementary snacks as you mingle with old and new friends and colleagues.

5:30-6:30 **Keynote Address: From Amino Acids to Zinc: The Quest for a Performance Edge.** (Superior and Ontario Rooms)
D. Lamb, The Ohio State University, Columbus OH.

David Lamb, a world renown scientist and author in Exercise Physiology, will discuss criteria for concluding that a purported ergogenic aid really is ergogenic. Caffeine, carnitine, carbohydrates, creatine are some examples of ergogenic aids that will be discussed.

6:30-9:30 **Board Meeting** (Conference Room)

Friday, October 9, 1998

7:30 **Continental Breakfast** (Superior and Ontario Rooms)

8:00-9:00 **Free Communication I** (Superior Room) see abstract section

8:00-9:00 **Symposium: Antioxident Supplementation, Aerobic and Anaerobic Exercise.** (Ontario Room)
S. Ayres, H. Alessio, and J. Baer, University of Dayton OH and Miami University, Oxford OH.

An exercise induced increase in oxidative stress can result in lipid peroxidation, which has been implicated in a number of destructive biological processes including DNA and cellular membrane damage. Variables associated with promoting lipid peroxidation include type, duration, and intensity of exercise. Variables associated with attenuating lipid peroxidation include antioxidant supplementation. To date, studies involving exercise-induced oxidative stress have almost always included an aerobic exercise model. Recently, resistance training was reported to increase oxidative stress. This implies that factors other than elevated oxygen consumption cause oxidative stress. Another factor warranting consideration in level of oxidative stress is estrogen status. A protective role has recently been demonstrated for estrogens as free radical scavengers. Estrogens have been shown to inhibit LDL peroxidation in vitro and in vivo. The objectives of the present seminar are to : 1. discuss recent research in which exhaustive aerobic and isometric exercise were used to induce oxidative stress, 2. demonstrate the role of estrogen in influencing lipid peroxidation in both eumenorrheic and amenorheic athletes following aerobic and nonaerobic exercise, and 3. review recent recommendations for antioxidant supplementation via food and supplement delivery.

8:00-10:00 **Physical Therapy Clinical Case Studies** (Rm. 207)
Coordinator: John Jezioworski, LPT, Ph.D.

This session will include clinical case studies by several licensed therapists, describing interesting cases, interventions, and problems.

9:00-10:00 **Tutorial: Stress Testing** (Superior Room)
S. Harvey, The Cleveland Clinic, Cleveland OH

The tutorial will include: a brief overview of the current technology in stress testing equipment, how to select the best type of stress test to answer the clinical question, how to minimize the risk of stress testing complications, special considerations for high risk populations, and current trends in stress test interpretation.

10:00-12:00 **Symposium: Clinical, Corporate, and Community Health: New Findings and New Directions.** (Superior Room)
J. Johnson, B. Reeves, R. Page, C. Kuntzleman, Blodgett Memorial Medical Center, Grand Valley State University, Steelcase, University of Michigan.

The Surgeon General and Centers for Disease Control and Prevention have identified physical activity and lifestyle control as having significant impact on both quality of life and health care cost containment. As the nation moves towards managed health care, a shift to a wellness model within the health care system would compress morbidity, decreasing the amount of intensive medical care and infirmity. Blodgett Medical center and Grand Valley State University are initiating programs in direct response to this issue. These programs focus on risk factor management or case management of clients. Both institutions will provide models as well as preliminary findings. The American College of Medicine also recognizes the public health aspect of physical activity. The importance of providing this information to the general public goes beyond traditional Public Health Agencies. What roles do employers and other agencies play in promoting physical activity within the community?

Steelcase has done some landmark research in the area of corporate fitness with the University of Michigan. Their latest study looks at the relationship between physical fitness and effectiveness among company executives. The outcome of this study would lend support to the concept of paying employees to exercise during work hours.

The State of Michigan has been successful in developing regional fitness councils to promote physical activity. A representative from the Michigan Governor's Council of Physical Fitness, Health and Sports

will discuss their model for creating partnerships and developing programs which emphasize physical activity for the residents of Michigan. In addition, a consortium of 8 universities/colleges will be involved in a state wide assessment project based on MI-EPEC and Fitness for Youth.

10:00-12:00 **Symposium: Age and Movement. Does Lower Extremity Strength Contribute to Stability in Older Adults?** (Ontario Room)
M.J. Pavol, T.M. Owings, W.P. Berg, M.D. Grabiner, The Cleveland Clinic Foundation, Cleveland, OH., Miami University, Oxford, OH

Aging is associated with both a decline in muscle strength and an increased susceptibility to stability problems such as falls. These falls are a significant source of morbidity and mortality in older adults, and it has been shown that poor ankle and knee strength are associated with an increased risk of falling. As a result of such findings, it is often assumed that the relationship between strength loss and instability is casual, that is, muscle weakness contributes directly to instability and falls. Therefore, strength training is often suggested as a means by which older adults can improve stability and prevent falls.

Unfortunately, the specific means by which the decline in muscle strength with aging may influence fall risk, if indeed such a casual relationship exists, are not well established, especially among healthy-independent older adults. This symposium will explore the contribution of lower extremity strength to stability. The results of three studies will be presented, followed by reactions to the presentations and a summary of the symposium. Specific objectives of the symposium include: a) to provide an overview of the relationship between lower extremity strength and stability in older adults, b) to critically consider means by which strength may influence stability, c) to consider three studies which raise doubts about the extent to which strength contributes to stability, and d) to consider the value of strength training as a means of improving stability and preventing falls in older adults. Given the increasing population of older adults in the United States and the considerable attention currently devoted to understanding the effects of exercise on health, as well as the use of exercise to improve health, this symposium will be of value to members of MWCSM.

10:00-12:00 **Personal Training Case Studies** (Rm. 207)
Coordinator: Wayne Brooks, Ph.D., Cincinnati Exercise Physiologists, Inc. and Laura Rommick, M.A.

This session will include personal training case studies by several Personal Trainers, describing interesting cases, interventions, and problems.

12:00-2:00 **Lunch** (free) (Lakeside Room)
Keynote Address
Mr. Dick Ambrose

Mr. Dick Ambrose, former Cleveland Browns football player, is currently a lawyer who works for the legal firm of Nischwitz, Pembridge, and Chriszt. His specialty is in legal cases that involve post-athletic career medical problems. Mr. Ambrose will present cases and information about professional athletes, the injuries they suffer, the long term consequences of those injuries, and medical and legal issues surrounding these health problems.

2:00-2:30 **Business Meeting**

2:00-2:30 **Poster Session I** : Setup (Foyer)

2:30-4:00 Authors Present : see abstract section

Friday, October 9, 1998

3:00-4:00 **Symposium: Corporate Wellness: An Overview Addressing Wellness Programs at Two Different Worksites.** (Superior Room)
C. Fitzgerald, Mitsubishi Inc.

This seminar will discuss the similarities and differences of corporate wellness programs at two different sites. It will help develop strategies for programming, implementation and promotion of a corporate wellness program. Strategies are introduced to tailor to the needs of the population at each site, while maintaining some basic features that should be common with all programs. Program startup, implementation, strategic planning and administration will be addressed.

3:00-4:00 **Free Communication II** (Ontario Room) see abstracts section

3:00-4:00 **Update: Development and Status of a Clinical Exercise Physiologist Registry.** (Lakeside Room)
L. Kaminsky, Ball State University, Muncie, IN

ACSM is supporting the development of a Registry for Clinical Exercise Physiologists. Dr. Kaminisky is a member of the Advisory Board for this new group. This presentation will provide an informational lecture on the development and the status of the Registry.

4:00-5:30 **Symposium: Wellness and Sportsmedicine and Public Schools: Community Outreach in Strength and Conditioning.**
C. Miller, M. Heifferon. Sports Care and Welltrack, Toledo, OH

Sports Care and Welltrack are teaming up with Toledo Public Schools, committing to work with each individual school's athletic program to develop the most effective program for the coaches and student athletes. Sports Care and Welltrack provide fitness and wellness information services including annual physicals to each junior high and high school athlete prior to their participation in supervised practice, education for coaches regarding off-season conditioning programs for male and female athletes, annual first aid and CPR seminars, athletic trainer coverage for male and female sports, and exercise specialists in school weight room. Currently, representatives from Sports Care and Welltrack are meeting with each school's athletic director and coaching staffs to create the best program for each school.

4:00-5:30 **Symposium: Atherogenic Muscle Inhibition: The Limiting Factor.** (Ontario Room) *C.D. Ingersoll, J.E. Edwards, M. Cordova, J.T. Hopkins, Indiana State University, Terra Haute, IN*

Injury in sports in inevitable, and joint trauma is one of the most frequent incurred. Fortunately, the rehabilitative procedures involved in treating injuries has advanced to the point where an athlete can often return from major surgery to the playing field in as little time as sixty days. One major factor slowing the rehabilitate process is the inhibition of the surrounding musculature following joint injury, a condition known as arthrogenic muscle inhibition (AMI). AMI attenuates the voluntary contraction of the muscles surrounding the joint, as well as hinders the athlete's ability to regain strength which then leads to muscle atrophy. Rehabilitation techniques including: voluntary muscle contraction, electrical muscle stimulation, and biofeedback have been implemented but with little success. The purpose of this presentation is to (1) present the problem posed by AMI, (2) understand the purported neural mechanisms by which AMI occurs, (3) describe the methods of measuring AMI, and (4) discus the clinical ramifications of AMI.

With a better understanding of AMI, new and more effective therapeutic methods of blocking or interrupting the inhibitory process may be devised. Strength recovery following joint injury is often slow and tedious, and the ultimate goal is to improve rehabilitation. Removing inhibition may help enhance injury recovery and diminish residual effects caused by prolonged muscle inactivity.

Friday October 9,1998

5:30-6:30 **Coffee House and Socratic Debate: Creatine Supplementation (Lakeside Room)**
Dr. David Lamb, Ph.D., The Ohio State University, Jessica Ambrose, M.S., CSCS, Head Women's Strength and Conditioning Coach, Miami University, and Mar Merrick, Ph.D., Indiana State Uniersity.

David Lamb, Jessica Ambrose and Mar Merrick will debate both sides of the Creatine Supplementation Debate. Is it safe? Is it effective? Should athletes be allowed to use it? Enjoy complementary coffee, listen, and participate by asking questions or offering your knowledge and experiences about this hot topic, in an informal coffee house setting.

Saturday October 10, 1998

7:30 **Continental Breakfast** (Lakeside Room)

8:00-9:00 **Graduate School and Internship Presentation** (Lakeside Room)

Students and professional members enjoy a complementary breakfast and learn about internships, graduate programs, and career opportunities in the field of Exercise and Sports Medicine.

8:00-11:00 **Physician Clinical Case Studies** (Room 207)
Moderator: Anthony George, M.D.

This session will include clinical studies by several physicians describing interesting cases, interventions, and problems.

9:00-10:00 **Tutorial: Defining Exercise: A Continuum, Not Categories** (Superior Room)
Ronald L. Wiley, Department of Zoology, Miami University, Oxford OH

There exists a continuum of exercise efforts, with "pure" isometric efforts anchoring one extreme and "pure" dynamic efforts at the opposite extreme. Many efforts can be purely isometric, with a static handgrip illustrating one. Most efforts that are labeled dynamic are, in fact, combinations of components of isometric and dynamic, due to the presence of gravity, design of machines, and methods of performing the efforts. Efforts, then, are often categorized as "isometric", "dynamic", "aerobic", "resistive", and other such labels and treated as if they are distinctly different. Many of the methods of measurement of the physiological responses to various forms of efforts, such as changes in heart rate, blood pressure, cardiac output and others, lead to temptation to make comparisons "across categories". Further, differences seen with training are sometimes compared as if exercise efforts are readily classified into the categories, rather than on a continuum with variation in the magnitude of the isometric/dynamic components. This tutorial will discuss those aspects of acute and training responses of examples of "typical" exercises used for examining physiological controls during exercise, with respect to what can be related, if not equated. Further, discussion will present some challenges in the form of questions that deserve to be explored particularly with isometric exercises, and the potential application that research results could have for exercise training and for clinical use.

Saturday, October 10, 1998

9:00-10:00 **Symposium: Exercise and Metabolism: Regulation and Integration of Physiological Systems** (Ontario Room)
M.E. Cabrera, Case Western Reserve, Cleveland OH

This presentation will describe a conference to which MWACSM members may attend free of charge on Saturday. It has been organized by the Department of Biomedical Engineering of Case Western Reserve University. The sessions on Metabolism and Exercise will focus on metabolic responses to exercise, metabolic measurements (in vitro and in vivo), mechanisms of metabolic regulation, metabolic diseases, and model analysis of metabolic control (exercise, fuel selection, substrate metabolism, ATP homeostasis). The invited speakers come from various backgrounds (e.g., physicians, bioengineers, physiologists, nutritionists, and biochemists). We hope these series of symposia will provide the speakers as well as the attendees the opportunity to interact and discuss topics on metabolism and exercise from various perspectives. Emphasis is given to the integration of information at the organelle, cell, organ/tissue, and organism level, as well as to the multi **disciplinary** way of approaching the issues under discussion.

10:00-10:30 **Poster Session II:** set up (Foyer)

10:00-12:00 **Tutorial: Components of Energy Balance and Their Measurement: New Technologies** (Ontario Room)

Precise assessment of human energy balance requires the accurate measurement of three components of energy flux; energy intake, energy expenditure, and energy storage. Studies of the causes of obesity, of energy balance in malnourished populations, and of physical activity and its effects on health and fitness are a few examples of such potential inquiries in humans. Each of the measurement methods currently used for assessment of energy intake, energy expenditure, and energy storage, has its own unique strengths and weaknesses which must be taken into consideration when determining overall energy balance. The validity and reliability of these different methods will be discussed with an emphasis on the newer technologies and the underlying theory for successful application of these measurement techniques.

10:30-12:00 **Poster Session II:** (Foyer) authors present, see abstracts

11:00-12:00 **Physician Hands On Problem Solving** (Room 207)
Moderator: A. George

ABSTRACTS

Authors, title, and abstract are included for Free Communication and Poster Presentation Sessions

Friday, October 9, 1998

Free Communications 1
8:00-9:00 am

VO_2 PLATEAU AT MAXIMAL EXERCISE: BOYS VERSUS MEN

J.D. Brown, A.D. Mahon, D.M. Plank. Human Performance Laboratory, Ball State University, Muncie, IN 47306

It has been suggested that children are less likely than adults to achieve a plateau in VO_2 at maximal exercise. However, direct comparison between children and adults is not apparent in the literature. Thus, the purpose of this study was to compare the achievement of various criteria for maximal effort in boys (10.7 ± 0.6 yrs, n = 17) and men (22.5 ± 2.0 yrs; n = 21). Prior to measuring VO_2max, each subject performed a practice exercise test on a treadmill. On a second day, VO_2max was measured during a treadmill exercise test conducted at 5.0 mph with 2.5% increases in slope every 2 min. VO_2max was 51.8 ± 6.2 $ml \cdot kg^{-1} \cdot min^{-1}$ in the boys and 52.5 ± 5.1 $ml \cdot kg^{-1} \cdot min^{-1}$ in the men ($P > 0.05$). HR (206 ± 5 vs. 196 ± 7 $b \cdot min^{-1}$) at maximal effort was higher ($P < 0.05$) in the boys, while the RER (1.13 ± 0.04 vs. 1.05 ± 0.03) and blood lactate (14.4 ± 2.4 vs. 7.3 ± 2.5 $mmol \cdot L^{-1}$) at maximal exertion were higher ($P < 0.05$) in the men. Comparison of maximal effort criteria indicated that 11.8% of the boys and 23.8% of the men achieved a plateau ($P > 0.05$). All the boys achieved age-specific HR and RER criteria, while in the men 88.9% achieved the HR criterion and 85.7% achieved the RER criterion ($P > 0.05$). A greater ($P < 0.05$) proportion of men (100%) achieved the age-specific blood lactate criterion than boys (81.3%). These results suggest that, with the exception of a blood lactate criterion, boys and men have similar rates of achieving criteria that are typically used to define a maximal effort. However, due to the small sample size, the results should be viewed with caution.

BODY COMPOSITION IN FEMALE ATHLETES

W.C. Fornetti, J.M. Pivarnik, FACSM, J.M. Foley, FACSM, J.J. Fiechtner, J.J. Jallo. Michigan State University; Dept. of Kinesiology; East Lansing, MI 48824

The purpose of this investigation was to determine the reliability and validity of bioelectrical impedance (BIA) and near infrared interactance (NIR) for estimating body composition in female athletes. Dual energy x-ray absorptiometry (DXA) was used as the criterion measure for fat free mass (FFM). Studies were performed on 132 college athletes (age =20.4±1.5 yr). Reliability estimates (repeat and single trial) were 0.987-0.997 for BIA (resistance and reactance) and 0.957-0.980 for NIR (optical densities). Validity of BIA and NIR was assessed by a double cross validation technique. Because correlations were high (r=0.969-0.983), and prediction errors low, a single equation was developed using all 132 subjects for both BIA and NIR. Also, an equation was developed on all subjects using height and weight only. Results from DXA analysis showed FFM =49.5±6.0 kg which corresponded to % body fat (% BF) of 20.4±3.1%. BIA predicted FFM at 49.4±5.9 kg (r=0.981, SEE=1.1, TE=1.1) and NIR prediction was 49.5±5.8 kg (r=0.975, SEE=1.2, TE=1.2). Height and weight alone predicted FFM at 49.4±5.7 kg (r=0.961, SEE=1.6, TE=1.6). When converted to % BF values, prediction errors were ~1.8% for BIA and NIR and 2.9% for height and weight. Results showed BIA and NIR to be extremely reliable and valid techniques for estimating body composition in college-aged, female athletes.

Free Communications 1
8:00-9:00 am

THE GLYCEMIC RESPONSE TO "ENERGY" BARS S. Hertzler, Department of Nutrition, Kent State University, 130 Nixson Hall, Kent, OH 44242

Endurance athletes are advised to avoid simple carbohydrates (sugars), such as candy bars, prior to or during exercise to avoid an excessive insulin response that may result in hypoglycemia during the event. Sports nutrition energy bars are marketed to athletes under the premise that they will result in a less dramatic, more sustained increase in blood glucose compared to a conventional candy bar. However, scientific information regarding the truth of these claims has not been presented. Thus, a randomized, repeated measures protocol was conducted in which 50 g of available carbohydrate from Ironman PR Bar™ (MCB), PowerBar™ (HCB), Snickers™ Bar (CB) and white bread (WB) was fed to 12 healthy, non-diabetic adult subjects following overnight fasting. The blood glucose response was measured at 0, 15, 30, 45, 60, 90 and 120 minutes following the meal. Data are expressed as the mean ± SEM. The blood glucose response to the MCB was significantly lower than for the HCB at 30 minutes (5.52 ± 0.22 versus 6.49 ± 0.34 mmol/L, respectively, $P<0.05$). At 45 minutes, the blood glucose response to the MCB (4.95 ± 0.23 mmol/L) was significantly lower than the HCB (6.18 ± 0.32 mmol/L), the CB (6.23 ± 0.31 mmol/L), and the WB (5.85 ± 0.34 mmol/L), $P<0.05$. The MCB resulted in a significantly lower area under the curve than the CB or WB but a nonsignificantly lower area under the curve compared to the HCB. In conclusion, the MCB caused a more moderate blood glucose response than the other 3 foods. The effect of this glycemic response on exercise performance should be evaluated in future studies.

This project was funded by Kent State University Research and Graduate Studies.

Free Communication II
3:00-4:00

GROUND REACTION FORCES IN ONE & TWO LEG ROPE SKIPPING

V.M. Pittenger, S.T. McCaw, FACSM, D.Q. Thomas, FACSM, & K. Vieau
Biomechanics Lab, Illinois State University, Normal IL 61790-5120

Quantifying lower extremity loading is important to understand injury risks and training effects during human performance. In spite of the popularity of rope skipping in physical education classes and fundraising, little is known about the ground reaction forces (GRF) during this activity. The purpose of this study was to describe and compare the GRF of one and two leg rope skipping. Fourteen 5th grade students (7 male, 7 female) volunteered as subjects. One and two leg rope skipping was simulated for 25 seconds. A force platform was used to collect (960 Hz) vertical GRF data from under the right foot, recording five complete cycles of rope skipping for each leg condition. Leg condition performance order was randomized across subjects. Cadence was set with a metronome. Two general patterns of GRF curves were evident. One was bimodal, similar to the GRF pattern of walking. The other was unimodal, similar to the GRF pattern of running. Individual subjects tended to show the same curve pattern for both one and two leg skipping. The loading rate for one-leg skipping (189.5 ± 103.3 BW$\cdot s^{-1}$) was significantly higher (paired-$t_{(13)} = 3.0$, $p = 0.01$) than that for two leg skipping (105.6 ± 13.4 BW$\cdot s^{-1}$). Future research should focus on the kinematic and joint kinetic parameters that are reflected in the GRF curves.

Supported by a *Jump Rope for Heart* grant from IAHPERD.

NEUROMUSCULAR RESPONSES FOLLOWING RESISTANCE TRAINING IN OLDER MEN.

Williamson, David L., Michael P. Godard, and Scott W. Trappe., *Human Performance Lab, Ball State University, Muncie, IN, USA.*

The purpose of this study was to quantitate the changes in neuromuscular drive (EMG) during submaximal and maximal workloads, as well as changes in CSA, before and after 12 wks. of resistance training. Six healthy men (74.6±0.7yrs, 79.12±4.5kg, 169.5±1.6cm) performed submaximal and maximal isometric EMG, 1-RM, and quantified whole muscle CSA by CT, before and after the resistance training program. EMG of the *v. lat.* and the *v. med.* was performed during 0 deg$\cdot s^{-1}$ at an absolute isometric workload of 27.3 Nm and at 54.6 Nm, while maintaining a fixed knee angle of 30° knee extension (90°=extension). CSA was measured by CT scan of the right leg (mid-thigh). The knee extensor training protocol consisted of 2 sets of 10 repetitions, and a third set to volitional exhaustion at 80% 1-RM, 3 days per week for 12 weeks. 1-RM strength increased by 53±10% from pre-values, as well as CSA, which increased by 7%. Submax EMG (percent of MVC) for the *v. med.* and the *v. lat.* resulted in a 53% and a 12% decrease during the 27 Nm workload, respectively, following training. The 54 Nm submaximal workload also decreased 56% and 28% in EMG for the *v. med.* and the *v. lat.*, respectively. The post-training maximal isometric EMG was 84% and 35% greater in the *v. med.* and the *v. lat.*, respectively. Torque to EMG ratios, indicated no difference in *v. med.* (0.71 and 0.70) or *v. lat.* (0.88 and 0.86), and when comparing torque to CSA, the ratio increased from 1.2 to 1.4, pre- to post-training, respectively. In summary, the resistance training protocol increased CSA, max EMG, and 1-RM, while submax EMG decreased. We can discern that hypertrophy and neural drive were not the only cause for increase in strength, possibly the changes are morphological in nature.

Free Communication II
3:00-4:00

THE EFFECTS OF ISOKINETIC FATIGUE ON BALANCE AND THE RANGES OF POSTURAL CONTROL. J.A. Yaggie and C.W. Armstrong. Applied Biomechanics Laboratory, University of Toledo, Toledo, OH. 43606.

Quasi-static balance and our stability limits are typically maintained through the input of our somatosensory system. If the amount of input from the body wall to the CNS is decreased we may effect our ability to sustain a quiet stance. During the fatigue state an interruption in the pathway occurs disturbing balance, and possibly increasing the likelihood of falls. Th purpose of this investigation was to quantify the changes in balance parameters and the ranges of postural control following a bout of isokinetic ankle fatigue over time. Twenty-four healthy male subjects, mean age = 24.9 years (± 3.92), height = 177.79 cm (± 6.36), weight = 80.78 kg (± 13.22), without ankle trauma within two years, participated as subjects. Subjects performed a 25-second balance test on a force platform; the first 15-seconds consisted of a standard unilateral balance test, and the remaining 10-seconds a lean test (postural limits). Baseline values were obtained prior to the fatigue protocol where each subject performed one set of four ankle exercises (plantar flexion, dorsiflexion, inversion, and eversion) to fatigue, on the Cybex 6000 Isokinetic Dynamometer. The order of the exercise was randomized between subjects. Fatigue was determined by the production of three consecutive contractions less than 50% maximum joint torque (MJT). An immediate post-fatigue balance test was performed followed by additional tests at –10, -20, and –30 minutes post-fatigue. The data were statistically scrutinized using a simple repeated measures ANOVA (w/in factors of time) ($\alpha = 0.05$). The results indicate that fatigue significantly increases body sway in the M/L direction, and impedes the ability to maintain our postural limits in the F/A plane. Additionally, we observed that all balance parameters returned to baseline within 20 minutes of recovery. These changes may be due to a fatigue induced sensory loss that will increase reaction time for corrections in stance. We may also be observing a decrease in the ability to produce internal torque, resulting from a reduction in contractile force. The return to baseline values may be a result of the reduction n the residual effects of fatigue, or may be partially due to the learning process.

TYPE IIX/B FIBER ATROPHY AND ATTENUATED HYPERTROPHY PRECEDES WHOLE MUSCLE ATROPHY IN AGED F1 RATS
S.J. Dech, J. Buckworth (FACSM), and J.K. Linderman (FACSM). The Ohio State University, Columbus, OH. (Sponsor: J.K. Linderman, FACSM).

The purpose of the present investigation was to assess the temporal relationship between the effect of age-associated muscle atrophy (sarcopenia) on skeletal muscle hypertrophy in functionally overloaded plantari and subsequently, try to answer the question of when aged rodent skeletal muscle completely loses its ability to hypertrophy. The plantaris muscle of male hybrid F1 rats aged 8, 28, and 31 months of age was functionally overloaded for 8 weeks by surgical ablation of the gastrocnemius muscle. Plantaris wet weight data did not indicate sarcopenia at neither 30 nor 33 months of age. Type IIX/B fiber cross-sectional area (CSA) data at 33 months of age, however, indicated signs of sarcopenia. Relative to the 10 and 30 month control means, the 33 month type IIX/B fiber mean CSA decreased 39% and 29%, respectively. Furthermore, the type IIX/B fiber population at 33 months of age completely lost its ability to respond to the functional overload stimulus. Previous results from our lab indicated that the onset of sarcopenia occurred between 30 and 36 months of age in male hybrid F1 rats. The present results have narrowed that window of time where sarcopenia attenuates plantaris muscle hypertrophy to 33 to 36 months of age and indicates that sarcopenia and attenuation of muscle hypertrophy is first evident in the type IIX/B fibers

Poster Session I
2:00-2:30 Set up
2:30-4:00 Authors present

INTRAMODAL RELIABILITY OF PERCEPTUALLY-BASED EXERCISE. T.L. Burkhart, J.K. Kim, J.S. Hammersley, W-J Lee, M.H. Whaley, FACSM, L.A. Kaminsky, FACSM. Adult Fitness / Cardiac Rehabilitation Program, Ball State University, Muncie, IN 47306-0270

The purpose of this study was to evaluate the intramodal reliability of perceptually-based exercise intensity among four machines: treadmill (TM), stationary cycle (C), Body Trek elliptical arm/leg device (BT), and Airdyne (AD). Ten subjects (5 M/5 F; age 45±13 yrs) completed two, 15 min production trials (PT) on each machine at self-selected workrates corresponding to target RPEs of 11-12 (Low) and 15-16 (High). Workloads were self-adjusted thru the first 5 minutes and then remained stable for the rest of the trial. Modes were randomly assigned and subjects were blinded to the workload throughout each trial. Physiological data was obtained during the last 5 minutes using the Polar HR monitor and Aerosport TEEM 100. Reliability was assessed using ANOVA, intra-class correlations (ICC), and absolute differences (ABSΔ) in HR and VO_2. (Table below)

Variable	TM	Cycle	AD	Body Trek
HR_{bpm} Low	9.4 (9)	11.0 (9)	11.3 (11)	16.4 (13)
HR_{bpm} High	12.1 (8)	13.9 (10)	11.6 (8)	9.8 (7)
$VO2_{ml/kg/min}$ Low	3.1 (24)	2.4 (15)	2.0 (15)	3.4 (22)
$VO2_{ml/kg//min}$ High	2.7 (11)	3.1 (14)	2.9 (13)	2.7 (12)

ANOVA results revealed that theVO_2 for BT High (22.8±1.4 vs. 20.1±1.2;$p<0.05$) and HR for C Low (112±8 vs. 101±6;$p<0.05$) were the only significant intramodal differences. Intramodal ICCs for HR at the Low & High trials were TM (.91/.89), C (.88/.88), AD (.86/.87) & BT (.82/.89). Intramodal ICCs for VO_2 at the Low & High trials were TM (.65/.95), C (.88/.88), AD (.85/.80) & BT (0.39/0.77). The mean ABSΔ suggests that subjects tended to vary ≈ 10-15 bpm and < 1 MET across PTs. These data suggest that perceptually based exercise can be associated with significant intra-individual variability and thus, we recommend that RPEs serve in adjunct to other phyiological variables.

Study was supported in part by grants from Cross Conditioning Systems and Ball State University Office of Research and Sponsored Programs.

WITHIN-DAY RELIABILITY OF BOD POD BODY COMPOSITION MEASUREMENTS
J.L. Sparks, L.A. Kaminsky, FACSM, M.H. Whaley, FACSM
Adult Fitness/Cardiac Rehabilitation Program, Ball State University, Muncie, IN 47306-0270.

The purpose of this study was to determine the reliability of within-day body composition measurements taken in the BOD POD (BP). Subjects were 24 men and 23 women of varying ages (20-81 yrs), races, and BMI (18.7-43.3 $kg \cdot m^{-2}$). Subjects underwent 3 successful trials, one after another, under ideal conditions set forth by the manufacturer. To be considered a successful trial, measurements needed to meet the manufacturer's criteria for body volume measurements (2 of 3 values within 150 ml) and thoracic gas (TG) volume measurement (acceptable values of merit and airway pressure). Results for the 47 subjects were:

	Body volume (L)	TG (L)	Percent fat
Mean	70.287	3.454	27.4
Range	44.371-126.571	2.102-5.922	3.5-50.7
CV	.093 ± .069%	3.900 ± 3.658%	3.4 ± 6.3%
R	1.000 (p<.0001)	.924-.940 (p<.0001)	.994-.997 (p<.0001)

The mean absolute value of differences in percent fat (%fat) between the three trials was .9 %fat with a range of .1 - 2.5%. When 3 subjects with body fat < 7% were excluded, the CV of %fat decreased to 2.1 ± 1.6%. Reliable measures were also obtained for body volume and thoracic gas volume. In conclusion, these results support that BOD POD measurements of %fat are reliable for a wide range of adults as within-day measures of %fat were ≤ ± 2% trials in most cases (43/47).

Partial support provided by Life Measurement Instruments, Concord, CA.

Friday, October 9, 1998

Poster Session I
2:00-2:30 Set up
2:30-4:00 Authors present

METABOLIC RESPONSES TO WALKING OR CROSS-COUNTRY SKIING ON AN ADJUSTABLE SLIDEBOARD COMPARED TO A MOTORIZED TREADMILL. S.J. McGregor, C.M. Norris, S.R. Rubaszewski. Human Performance Laboratories, University of Toledo, Toledo, OH. 43606

Metabolic parameters of oxygen consumption (l/min), oxygen consumption adjusted for body weight (ml/kg/min) and respiratory exchange ratio (RER) were assessed for two movements, walking (W) and cross-country skiing motion (XC), on a novel exercise device; the Walkabout adjustable slideboard (Fitness Quest). Ten college aged subjects (5 M/5 F), weight 68.95±15 kg, and height 177.1±11.8 cm, performed Wand XC at a cadence of 140 strides per minute (spm) for 5 min at 0, 10 min at 3, and 10 min at 5 percent grades with a 5 min rest between phases on two separate occasions. Subjects also walked on a motorized treadmill (TM) at a speed which elicited a cadence of 140 spm (3.6 mph) at a 0 % grade for 10 min. Respiratory gases were collected and analyzed using a Jaeger Oxycon Alpha (Milbury, OH) breath by breath metabolic system. Values were averaged for the final 3 minutes of each stage and compared using student's t-test (α=.05). VO_2 elicited by W (1.87±.482 l/min) was greater than TM (1.55±.374 l/min), $p<.05$. Relative VO_2 for both W and XC (27.02±2.63 and 25.6±3.74 ml/kg/min) were greater than TM (21.16±2.32 ml/kg/min), $p<.05$. Interestingly, the RER for XC (.96±.067) was greater than both W and TM (.91±.055 and .89±.049), $p<.05$, but W and TM were not different. The greater VO_2 elicited by W may be a result of energy required to overcome frictional forces at the beginning of the stride. Because both VO_2 and relative VO_2 for W were greater than TM, but RER was not significantly different, it may be possible to burn more calories from fat while exercising on the Walkabout compared to walking on a motorized treadmill.

This study was supported by FitnessQuest.

A CRITICAL EXAMINATION OF THE WILKS POWERLIFTING FORMULA
P. Vanderburgh, A. Batterham. HSS Dept, University of Dayton, Dayton, OH 45469-1210 and School of Social Sciences, University of Teeside, Middlesborough, UK.

The International Powerlifting Federation (IPF) has adopted a method of adjusting powerlifting events (bench press, BP; squat, SQ; deadlift, DL, and total lift [the sum of BP, DL, and SQ], TOT) by body mass. This method, the Wilks formula, multiplies one's lift by an index based on body mass so that lifters of different size can be compared on the same event. The Wilks formula is not, however, based on published data and has yet to be critically evaluated. The purpose of this investigation, then, was to analyze the Wilks formula in two ways: 1. By examining residuals bias to verify that the adjusted score does, in fact, lead to no systematic bias based on body mass, and 2. By applying a more theoretically supportable allometric model to the same data and comparing the fit with the Wilks approach. Subjects were the current men's and women's world record holders as well as the top two performers for each event in the IPF's 1996 and 1997 World Championships (a total of 30 men and 27 women for each lift). Data analysis leads to the following conclusions regarding the Wilks formula: 1. No bias for mens or womens BP and TOT; 2. A favorable bias toward intermediate weight class lifters in the womens SQ with no bias for mens SQ; 3. A linear unfavorable bias toward heavier men and women in the DL; and 4. A systematic bias against light and heavy men and women based on the theoretically more sound allometric model. This, however, may be considered acceptable based on the fact that approximately half as many lifters are found in the lightest and heaviest weight classes as compared to the intermediate weight classes. As used currently (BP and TOT only), the Wilks formula appears appropriate.

Friday, October 9, 1998

Poster Session I
2:00-2:30 Set up
2:30-4:00 Authors present

DETERMINANTS OF AEROBIC FITNESS AND PHYSICAL ACTIVITY IN AFRICAN AMERICAN AND CAUCASIAN ADOLESCENT GIRLS

K.M. Allor, and J.M. Pivarnik, FACSM. Department of Kinesiology, Michigan State University, East Lansing, MI 48824

Aerobic fitness (VO_{2max}) is inversely related to coronary heart disease in adult women. Previous studies have shown lower VO_{2max} values in African American women and girls compared to their Caucasian counterparts. Reasons for this difference have not been elucidated. The purpose of this study was to compare VO_{2max} and its potential determinants (pulmonary function, % fat, economy, physical activity, psychological characteristics) between African American and Caucasian girls. METHOD Nine African American and twenty-five Caucasian 6th grade girls (age=11.9±0.5 yr) were tested for VO_{2max}, pulmonary function (MVV), and % fat (skinfolds), and monitored for three days of physical activity (Caltrac). Subjects also completed questions from subscales of Harter's Perceived Competence Inventory for Children and the Children's Attraction to Physical Activity inventory (CAPA). RESULTS There were no significant differences between African American and Caucasian girls in VO_{2max} (40.4±6.0 vs 41.8±7.0 ml kg^{-1} min^{-1}), MVV (88.4±15.7 vs 88.0±13.8 L min^{-1}), or % fat (23.8±6.7 vs 26.1±7.1 %). Running economy and perceived competence were also similar between groups. African American girls were 28% more physically active than Caucasian girls ($P<0.05$). Also, African American girls scored significantly ($P<0.05$) higher than Caucasian girls on the peer acceptance subscale of the CAPA. CONCLUSION For a given aerobic fitness level, African American girls showed greater physical activity and had their physical activity patterns more strongly influenced by peer acceptance than Caucasian girls. These results may have important ramifications for future intervention strategies aimed at increasing aerobic fitness in adolescent girls.

GROWTH STATUS AND ESTIMATED GROWTH RATE OF COMPETITIVE YOUNG DISTANCE RUNNERS.

JC Eisenmann, V Seefeldt, J Haubenstricker, RM Malina. Institute for the Study of Youth Sports, Michigan State University, East Lansing, MI 48824

A mixed-longitudinal design was used to examine the growth status (size attained) and estimated growth rate of competitive young distance runners. Twenty-seven male and 27 female distance runners were selected based on race performance (e.g., consistently placing within the top five finishers of road races 10 km or greater for their age and sex). Subjects entered the study at 8.0 to 15.7 years of age. Twenty males and 16 females were followed at approximate annual intervals for 4 or 5 years. Stature (cm) and body mass (kg) were measured according to the procedures of the International Biology Program. Stature and body mass were plotted relative to age- and sex-specific US reference data, while growth increments of stature (cm/yr) and body mass (kg/yr) were plotted relative to age- and sex-specific Swiss reference data. Mean stature for both males and females approximate the 50th percentile of reference values, while mean body mass is slightly below the 50th percentile for both sexes. Longitudinally, stature and body mass in males and females maintain a relative position to the reference data throughout the age period studied here. When plotted relative to velocity curves, stature and body mass approximate the 50th percentile in both males and females. These findings suggest that intensive endurance training during childhood and adolescence does not effect growth in stature or body mass.

Poster Session I
2:00-2:30 Set up
2:30-4:00 Authors present

EFFECTS OF TEMPERATURE ON THE CARDIOVASCULAR RESPONSE TO ORTHOSTATIC STRESS

B.W. Klump, C.J. Serniak, R.L. Brands, J.E. Davis
Dept. of Exercise and Health Science Alma College, Alma, MI 48801

The purpose of this study was to compare the cardiovascular responses to orthostatic stress at three different temperatures, 21 °C (Control), 30 °C (Hot), and 17 °C (Cold). Six subjects (2 female, 4 male) performed a lower body negative pressure (LBNP) test at each condition to simulate orthostatic stress. Subjects lay supine for 10 minutes and then pressure was reduced to –20mmHg for four minutes. Pressure was decreased by 10mmHg every four minutes until presyncopal symptoms appeared. At each interval cardiac output, stroke volume, forearm blood flow, blood pressure, core and skin temperatures and heart rate were measured. Cardiac output and stroke volume decreased with increasing levels of LBNP. However, there were no differences between conditions. Heart rate increased at –50mmHg LBNP and was higher in the hot (107.56± 26.63 bpm) condition relative to cold (96.05± 9.19 bpm) and control (97.17± 16.73 bpm). Blood pressure measurements were similar between conditions. Lower body negative pressure provides a significant orthostatic challenge to the cardiovascular system. It appears that compensatory mechanisms are adequate to maintain cardiovascular function during hot or cold temperature stresses.

Saturday, October 10, 1998

Poster Session II
10:00-10:30 Set up
10:30-12:00 Authors present

STRESS RESPONSE DURING HIGH INTENSITY TRAINING OF WOMEN'S CREW

Julie Dallas, Tim Demchak, and Janet Buckworth, Dept. of Sport and Exercise Science, The Ohio State University, Columbus, Ohio 43210

Elite collegiate athletes commonly engage in intense training periods, which increase the likelihood of a heightened stress response that could potentially alter personal and team performance. The purpose of this study was to measure the stress response of 25 Division I female varsity crew athletes during an intense training period, as defined by duration of training per day. Baseline measures were taken for 8 weeks pre-, in-, and post-competitive season (CS). During CS the athletes regularly trained for 2.5 h . day -1. The post-season (PS) intense training regimen began one month after conclusion of CS and included 8 days of morning and afternoon training of approximately 6-7 h . day -1. Salivary cortisol and Profile of Mood States (POMS) short form were used as biological and psychological markers of stress. Testing was conducted at the same time of day each morning before CS and PS practice. Salivary cortisol was significantly lower ($P<0.01$) during the first three days PS compared with the CS baseline average, but increased during the remainder of the intense training period. A heightened cortisol response during PS was observed on day 4. PS POMS vigor scores were significantly lower than pre-CS POMS vigor scores ($P<0.0001$). Vigor decreased during CS, did not recover 1 month after CS, and remained lower during PS ($P<0.05$). For our sample, one month post-CS was not enough time to recover to pre-CS vigor levels. There was a disassociation between psychological and biological stress indices that needs further study.

A COMPARISON OF THE EFFECTS OF CONTINUOUS AND DISCONTINUOUS WALKING ON VO_{2MAX}.

H. Lewis, D.Q. Thomas, FACSM, M.J. Adams, S.T. McCaw, FACSM. Dept. of HPER, Illinois State University, Normal, IL 61790

The Surgeon General's Report on Physical Activity (U.S. Dept. of Health & Human Services, 1996) recommends that all Americans accumulate 30 minutes of moderate physical activity on most, if not all, days of the week. Moderate physical activity is defined as movement that uses approximately 150 calories of energy per day, or 1,000 calories per week. Previous research has demonstrated the effectiveness of continuous moderate physical activity for enhancing physical fitness. The implication made by the Surgeon General's Report is that accumulating 30 minutes of physical activity through discontinuous exercise is as effective as continuous 30 minute exercise bouts. The purpose of this study was to determine if three 10 minute bouts of walking were as effective as one 30 minute bout of continuous walking when both were performed three days per week over a 12 week period. Eighteen college-aged subjects were randomly assigned to one of three groups: a non-exercising control group (N = 7); a group (N = 5) performing three 10 minute bouts; and a group (N = 6) performing one 30 minute bout of exercise. Intensity levels were set at 50-65% of estimated maximum heart rate. Subjects performed pre and post Bruce protocol maximal graded exercise tests. A mixed factor 2 x 3 ANOVA (time by group) was used to analyze the data ($\alpha = .10$). The control group experienced a significant decrease in VO_{2max}, while the 10 and 30 minute groups demonstrated no significant change. It appears that continuous and discontinuous walking were equally effective to maintain, but not improve VO_{2max}. Higher intensities may be required to improve VO_{2max}.

Saturday, October 10, 1998

Poster Session II
10:00-10:30 Set up
10:30-12:00 Authors present

EFFECTS OF ISOMETRIC TRAINING ON CARDIOVASCULAR RESPONSES TO AEROBIC EXERCISE

J. Dansand, R. Wiley, R. Cox. Zoology and Physical Education, Health and Sports Studies, Miami University, Oxford, OH 45056

Five weeks of isometric training affects some cardiovascular responses to aerobic exercise in mildly hypertensive individuals. The training group (N=9; mean age 41 ± 2 yr) did isometric training using a handgrip dynamometer at 50% maximum voluntary contraction (MVC) for 3 minutes four times a week for five weeks. The remaining subjects (N=10; mean age 38 ± 2) served as controls. Peak systolic (161 ± 8 mmHg), diastolic (86 ± 5 mmHg), and mean arterial (112 ± 5 mmHg) pressure responses to aerobic testing decreased significantly ($p < .05$) after 5 weeks of isometric training. No significant changes were seen in heart rate. Resting blood pressure was also significantly ($p < .05$) reduced in the training group, whereas no significant changes were found in the control group. Thus, a hypotensive effect of isometric handgrip training at 50% MVC on dynamic performance was confirmed in mildly hypertensive individuals.

EMG ACTIVITY OF THE ABDOMINAL MUSCLES USING TRADITIONAL CRUNCHES vs THE AbROLLER™

J. Avakian, M. Keresztes, B. Oakley, L. Millar. Physical Therapy Program, Andrews University, Berrien Springs, MI 49104

It has been suggested that the use of an assistive device to perform abdominal crunches may help to isolate the activity of the abdominal muscles, thus improving activation and response to training. The purpose of this study was to compare activation of the upper (UA) and lower (LA) abdominal musculature using traditional style abdominal crunches and the AbRoller™. Subjects included 35 individuals, both male and female, with a mean age of 22±5.3yrs. Surface electrodes were placed on the upper and lower rectus abdominus. Subjects were asked to perform six crunches using both the traditional style and the AbRoller™. The order of activities was randomly selected and the subjects were given a short practice session with each. Duration of each muscle contraction was standardized using verbal commands. Peak electromyographic activity was recorded for each repetition and averaged for that trial. EMG activity was rectified and integrated prior to averaging, and final measures were record in microVolts. Mean EMG activity for the UA was 8.49±5.50 μV for the traditional crunches versus 8.17±5.46 μV using the AbRoller™. Average activity for the LA was 5.41±4.27 and 5.69±3.82 μV respectively, for the traditional crunches and the AbRoller' crunches. A paired samples t-test revealed no significant difference ($p>.05$)between the two types of abdominal exercises. The correlation between the UA activities was .93 and .87 for the LA activities. Thus, we conclude that there is no benefit in using an AbRoller™ versus traditional, unassisted, crunches if considering muscle activation.

Saturday, October 10, 1998

Poster Session II
10:00-10:30 Set up
10:30-12:00 Authors present

EFFECTS OF CREATINE MONOHYDRATE SUPPLEMENTATION ON RECOVERY TIME DURING REPEATED BOUTS OF ISOMETRIC HANDGRIP

T.M. Feinstein, E.M. Claybon, R.J. Lund, P. Peters, M.A. Lyle, R.H. Cox, & R.L. Wiley. Department of Zoology, Miami University, Oxford, Ohio 45056

The depletion of muscle's phosphocreatine (PCr) stores, especially in type II fibers, is one of the limiting factors during maximal exercise. Oral supplementation of creatine monohydrate can raise intramuscular PCr levels and increase the rate of PCr resynthesis. The aim of the study was to determine whether creatine supplementation could increase the duration of isometric contractions. We studied 9 males, ages 18 to 23, in a double blind study with a crossover between treatments. Handgrip isometric training consisted of 3 trials in which the subjects held 50% of their maximum voluntary contraction (MVC) until fatigue with a 1 min. rest between trials. A training effect was observed, resulting in an increase in isometric contraction time. However, without the administration of creatine, subjects reached a plateau (i.e. subjects were unable to increase their contraction time beyond a certain level). Moreover, when these subjects were administered creatine, they increased their isometric handgrip contraction time and their metabolic work. The results suggest creatine supplementation delays fatigue via increasing the recovery rate. Our study extends previous findings by showing that creatine supplementation can increase total work output and enhance recovery from repeated isometric efforts.

EFFECTIVENESS OF THERABAND® ON STRENGTHENING THE SHOULDER EXTERNAL ROTATORS. Macko SD, Manley ML, Maul CA, Roth BE, Sakalas MA; Physical Therapy Department, University of Michigan-Flint, Flint, Michigan, USA.

PURPOSE: The purpose of this study was to demonstrate that a home exercise program using Theraband® strengthens the external rotators isometrically and isokinetically of the non-dominant shoulder in normal adult females age 18-30. **SUBJECTS:** Fifty-six female subjects volunteered. Four were excluded from participating due to medical reasons. Of the 52 who began the study, one dropped out due to illness and another did not show up for the post-test. Fifty subjects completed the study. Subjects were randomly divided into one of four groups using the Randomized Solomon-Four-Group design. The groups were divided as follows: 1) completed a pre-test, four weeks upper extremity home exercise strengthening program and post-test (n=11), 2) completed a pre-test and post-test (n=14), 3) completed four weeks of a home exercise strengthening program and post-test (n=13), 4) completed a post-test only (n=12). Ages ranged from 18-30. **METHODS AND MATERIALS:** Subjects completed a medical/activity questionnaire from which age and weight were obtained. Subjects completed an exercise log after each training session from which the following data were collected: color of Theraband® used per set and the maximum number of repetitions achieved per set. Test data were gathered in the non-dominant shoulders (48 left, 2 right) in 90° abduction, in the frontal plane, using the Cybex® 340 dynamometer (Cybex, Division of Lumex, Inc., Rokonkoma, NY). Isokinetic strength was tested at 75°/sec. Isometric strength was tested in 60°, 30°, and 0° of internal rotation, and 30° and 60° of external rotation. Systat 7.0 was used to analyze data. Subjects were given different colors of Theraband® along with a Theraband door anchor®. **ANALYSES:** A repeated measures one-way AVOVA, using the normalized strength to body weight data, was used to determine if isokinetic and isometric mean pre-test and mean post-test scores differed. A Post-Hoc Tukey's HSD was used to determine if there was any pre-test effect or any pre-test and Theraband® interaction. Descriptive statistics such as mean, range, variance and standard deviations were calculated to perform secondary analyses. **RESULTS:** The results indicate that there is a significant difference between mean pre-test and mean post-test peak torque strength results for all tests except 60° of external rotation. Statistical analysis determined that there was no significant pre-test effect as well as no significant pre-test and Theraband® interaction. There was no significant percentage increase in the shortened end of range as measured isometrically. **CONCLUSION:** These results suggest that a home exercise program using Theraband® for three sets of four to six repetitions will show a significant increase in isometric and isokinetic strength of shoulder external rotators in adult females age 18-30.

Saturday, October 10, 1998

Poster Session II
10:00-10:30 Set up
10:30-12:00 Authors present

EXERCISE MODE COMPARISONS OF ACUTE ENERGY EXPENDITURE AT SELF-SELECTED INTENSITIES FOR OBESE ADULTS. J.K. Kim, T.L. Burkhart, J.S. Hammersley, W-J Lee, M.H. Whaley, FACSM, L.A. Kaminsky, FACSM Adult Fitness / Cardiac Rehabilitation Program, Ball State University, Muncie, IN 47306-0270

The purpose of this study was to assess intermodal differences in oxygen consumption (VO_2) and/or heart rate (HR) during self-selected, steady-state exercise in obese subjects. Nine (6 male and 3 female) obese subjects (BMI $\geq$ 29 kg/m^2), aged 37-71 years completed $\geq$ 2 familiarization trials on four exercise machines: treadmill (TM), stationary cycle (C), Body Trec elliptical arm/leg device (BT), Airdyne (AD). Subjects then completed one 15 minute submaximal trial on each machine at a self-selected workload corresponding to a target RPE of 11-12 on the Borg 15 pt. RPE Scale. Machine order was randomly assigned and subjects were blinded to the workload throughout throughout each trial. Workloads were self-adjusted thru the first 5 minutes and then remained stable for the rest of the trial. Metabolic data was obtained during the last five minutes of each trial using the Aerosport TEEM 100. The group means were compared across modes using a one-way repeated measures ANOVA.

Variable	TM	C	AD	BT
$VO2_{L/min}$	1.419±0.16[a]	1.144±0.16	1.350±0.15	1.654±0.15[b]
HR_{bpm}	112±5.0	107±5.1	121±7.5	126±8.1[c]

[a]TM > C (p<0.05); [b]BT > TM, C & AD (p<0.05), [c]BT > C (p<0.05)

Significant differences were observed among modes for VO_2 and HR. Weight-bearing, arm-leg exercise (BT) yielded the highest energy expenditure (EE), while leg only cycling (C) was lowest. These results suggest that perceptually-based exercise prescriptions are not reliable across modes typically found in a fitness center environment, and that weigh-bearing activities optimize EE during self-paced exercise.

Study was supported in part by grants from Cross Conditioning Systems and Ball State University Office of Research and Sponsored Programs.

Midwest ACSM Annual Fall Meeting

PROGRAM

South Bend, Indiana

September 23-25, 1999

WELCOME TO THE
MIDWEST REGIONAL CHAPTER
AMERICAN COLLEGE OF SPORTS MEDICINE
ANNUAL FALL MEETING

September 23-25, 1999
Century Center
South Bend, Indiana

Welcome to the Midwest Regional Chapter American College of Sports Medicine Annual Meeting. The Program Planning Committee has worked to put together a diverse program that we believe includes something from all areas of interest. In addition, we have tried to include several opportunities to meet with colleagues from the Chapter in a more social climate. Some of these activities include a social at the College Football Hall of Fame and a banquet. This year we have also included a community outreach program, something that was done many years ago by the Chapter, but has not been done recently.

We encourage you to take advantage of the many programs that have been planned, and as always, we value your constructive comments following the meeting.

Many thanks!

Lynn Millar, Program Chair

PROGRAM ACKNOWLEDGMENTS

The following individuals are responsible for the planning and implementation of this meeting. They have given unselfishly and generously of their time and resources over the past year, contributing to the success of this meeting. We extend our gratitude and appreciation to the numerous Chapter members for their support.

Program Planning Committee

Lynn Millar - Immediate Past-President

Tony Mahon - President

Michael Flynn - Past-President

Program Chairs

Rafael Bahamonde - Social & raffles

Elaine Betts - Vendors & exhibits

Ellen Glickman-Weiss - Continuing Education application

Lenny Kaminsky - Abstract review

Tim Kirby - Registration

Steve Simons - Clinical abstract review

Amy Jo Sutterluety - Graduate internships & exhibits

Community Outreach Program

Bill Kraemer

Cynthia Cassell

Mark Lavallee

PROGRAM SPONSORS

The Midwest Regional American College of Sports Medicine would like to acknowledge the generous support of the following organizations in the presentation of this meeting:

Sponsors

Gatorade Sports Science Institute

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PROGRAM SCHEDULE

Thursday, September 23

Time	Event	Room
12:00-4:00 pm	Registration	Box Office
1:00-2:45 pm	Oral Research Presentations	River Level Suite #2
1:00-3:00 pm	Symposium: "Physical Fitness Requirements & Evaluations Practiced by Safety Service Organizations"	River Level Suite #3
2:00-4:00 pm	Poster Presentations (Authors Present 3:00-4:00 pm)	C Hall North
4:15-5:15 pm	Roundtable – Youth Sports	C Hall North
5:30-6:30 pm	Keynote Lecture: **Craig Horswill, Ph.D. Gatorade Sports Science Institute "Energy Expenditure and Intake In Youths"**	Bendix Theater
7:30-11:30 pm	Social (Raffle)	College Football Hall of Fame Pressbox

Friday, September 24, 1999

Time	Event	Room
7:00 am – 4:00 pm	Registration	Box Office
8:00-9:30 am	Symposium: "Body Composition Applications"	River Level Suite #1
9:45-11:00 am	Workshop: "Body Composition"	River Level Suite #1
9:00-10:00 am	Tutorial: "Lipoprotein(a): Stepchild of the Lipoprotein Family"	River Level Suite #2
9:00-11:00 am	Poster Presentations	C Hall North
9:00 am – 12:00 pm	Clinical Case Presentations	River Level Suite #3
12:00-2:00 pm	Banquet (Business Meeting) Guest Speaker: **Dave Pouline, Head Hockey Coach Notre Dame**	White Water Suite (12-14)
2:00-3:00 pm	Symposium: "Update on Concussion Guidelines"	River Level Suite #1
2:00-4:00 pm	Symposium: "Cardiorespiratory and Metabolic Adaptations to Endurance Training in Children"	River Level Suite #2
3:15-5:00 pm	Oral Research Presentations	River Level Suite #3
5:30-6:30 pm	Keynote Lecture: **William Kraemer, Ph.D. "Resistance Training and Women"**	Bendix Theater

Saturday, September 25

Time	Event	Room
8:00-9:00 am	Registration	Box Office
9:00-10:00 am	Graduate & Internship Display (Continental Breakfast)	C Hall North
9:00 am – 12:00 pm	Community Outreach Program	
10:00 am -12:00 pm	Symposium: "Effects of Temperature, Posture, & Aging on Skin Blood Flow"	River Level Suite #1
10:00 am -12:00 pm	Symposium: "What Skills Are Employers Really Looking For?"	River Level Suite #3
1:30 pm	Golf Outing	Notre Dame

ORAL RESEARCH PRESENTATIONS

Thursday, September 23
1:00 – 1:15 pm

MR MEASUREMENTS OF MUSCLE DAMAGE, MUSCLUAR STRENGTH LOSS, AND PAIN AFTER ECCENTRIC EXERCISE.

R.C. Jayaraman, J.M. Foley, R.W. Reid, B.M. Prior, and R.A. Meyer. Departments of Kinesiology, Physiology and Radiology. Michigan State University, East Lansing, MI.

It has been reported that the gradual increase in T2 relaxation time after eccentric exercise parallel the development of muscle soreness and damage associated with delayed muscle soreness. The purpose of this study was to examine the prolonged effects of eccentric exercise on T2 values, maximum voluntary contraction (MVC), and pain following eccentric exercise. Eight non-weight trained male subjects were randomly assigned to control, heat, stretch, and heat plus stretch groups. T2-weighted axial MR images (TR/TE = 1500/30.60) of the thigh region were acquired before and at 2, 4, 8, and 15 days following eccentric knee extensions to failure. No statistically significant differences were detected in T2 relaxation time, MVC, and pain between any of the treatment groups across time. With the different treatment groups pooled, the T2 values peaked at 21% above resting values 8d post exercise (35 ± 1.1 ms, mean ± SE, vs. 29 ± 0.2 at rest) and remained elevated by 13% at 15d (32 ± 0.8 ms). The largest reduction in MVC was measured at 2d post-exercise and remained below baseline values by 19% at 15d post-exercise. Exercise pain values also peaked at 2d post-exercise but returned to baseline by 15d post-exercise. Despite the recovery of pain to baseline values, MVC was still significantly reduced and the T2 values were elevated at 15d post-exercise. These results suggest that the reduction in MVC at 15d after eccentric exercise was not related to pain. More importantly, the significantly elevated T2 values at 15d post-exercise suggest that the reduction in MVC maybe related to muscle damage following eccentric exercise.

Thursday, September 23
1:15 – 1:30 pm

THE EFFECT OF HIGH INTENSITY RESISTANCE TRAINING AMONG FEMALE COLLEGIATE BASKETBALL PLAYERS

G.E. Fincher II. Ashland University, Ashland, OH 44805

Purpose: The purpose of this study was to examine the effect of a single-set, high intensity resistance training program on maximal bench press and leg press strength among female collegiate basketball players. **Methods:** Twelve healthy, previously resistance trained female collegiate basketball players were randomly assigned to either a single-set high intensity experimental (N=6) or multiple set control (N=6) group. Both groups performed heavy resistance training for 10 weeks. The experimental group performed one set of 8-12 RM for each exercise. The subjects were then urged to try one additional repetition before terminating the set. The control group performed three sets of each exercise at 8-12 RM, but the subjects were not urged to try an additional repetition. Bench press and leg press 1 RM data were collected at baseline and at 10 weeks. **Results:** Both experimental and control groups demonstrated significant gains in bench press and leg press strength ($p<0.05$). However, the gains demonstrated by the experimental group were significantly greater than the gains shown by the control group ($p< 0.05$). **Conclusion:** Both multiple-set and high intensity single-set resistance training programs led to the development of significant muscular strength among previously resistance trained female athletes, although the single-set high intensity program produced superior strength gains and was more time efficient.

ORAL RESEARCH PRESENTATIONS

Thursday, September 23
1:30 – 1:45 pm

THE EFFECTS OF PRE-MEASUREMENT ON PSYCHOLOGICAL OUTCOMES ASSOCIATED WITH EXERCISE AND AUTOGENIC RELAXATION.

A Wertz Garvin, K. Hamer, H. Hernesman. University of Wisconsin-Whitewater, Whitewater, WI 53190

A Solomon design was used to evaluate the effects of pre-measurement sensitization on the psychological outcomes after 30-mins of cycling exercise (C) and two commonly employed control conditions including autogenic relaxation (AR), and quiet rest (QR). All participants were randomly assigned to experimental and control conditions (C, AR, QR). Measurements of state anxiety (STAI), tension, depression, and total mood state (POMS) were presented to half of the participants before the intervention while the other half did not receive pre-measurement. This allows for comparison of post-intervention measurements between participants who have been pre-measured and those who have not. The data were analyzed with a series of ANOVA's (pretest/no pretest X C/AR/QR) using the post-test variables as dependent measures. Results indicated that affective improvements were observed following all conditions in those groups that received a pre-test. Further analysis revealed that pre-measurement did not appear to interact with the effect of the interventions. It is concluded that the common practice of pre-measurement assessment of psychological variables prior to exercise, autogenic relaxation, and quiet rest does not likely effect post-measurement outcomes.

Thursday, September 23
1:45 – 2:00 pm

THE EFFECTS OF DIFFERENT TRAINING PROGRAMS ON UPPER BODY POWER IN WOMEN

S.A. Mazzetti, W.J. Kraemer *(FACSM)*, J.S. Volek, B.C Nindl, L.A. Gotshalk, and A.L. Gómez. The Human Performance Laboratory, Ball State University, Muncie, IN and The Laboratory for Sports Medicine, The Pennsylvania State University, University Park, PA.

The purpose of this study was to compare the effects of 6 months of periodized, heavy-resistance, calisthenics/manual resistance (CMR), and aerobic training (AER) performed on 3 alternating days per week on upper body power in women. We examined the hypothesis that "explosive" strength/power (SP) resistance training (3- to 8-RM) would result in greater improvements in peak and mean upper body power than hypertrophy (H) resistance training (8- to 12-RM) in untrained women. Sixty women aged 23.3 (SD=3.9) years were randomly assigned to either the SP (n=17), H (n=18), CMR (n=14), or AER group (n=11). All women were tested pre- and post-training for one-repetition maximum bench press strength (1-RM BP) and bench-press-throw peak and mean power output using 30% of 1-RM. Rate of force development (RFD) of the bench-press-throw also was analyzed for comparison between groups. Results (means±SD) indicated that 1-RM BP (12±5 kg), peak power (68±40 W), mean power (8±8 W), and RFD (264±180 N/s) increased significantly ($p < 0.05$) in the SP group following training. Training resulted in increases in 1-RM BP (9±6 kg), peak power (47±44 W), and RFD (166±135 N/s) in the H group; and 1-RM BP (10±2 kg), peak power (57±23 W), and mean power (8±8) in the CMR group. Post-training values for 1-RM BP, peak power, mean power, and RFD were greater in the SP group than the H, CMR, and AER groups. These data indicate that explosive strength/power resistance training elicits superior upper body power and strength adaptations in women as compared to hypertrophy, calisthenics/manual resistance, and aerobic training.

D.O.D U.S. Army Grant 17 95-C-5069 to WJK

ORAL RESEARCH PRESENTATIONS

Thursday, September 23
2:00 – 2:15 pm

CARDIOVASCULAR RESPONSES TO TANNINS AND EXERCISE.
Beatty, M., Alessio, H.M, FACSM, Hagerman, A.E, Romanello, M., Rogers, J., Threlkeld, M., Dimitrova, Y., Muhammed, S., Carando, S. & Wiley, R.L. Exercise Science, Chemistry and Biochemistry, Zoology, Miami University, Oxford, OH 45056

Recent reports have indicated cardiovascular (CV) benefits associated with daily ingestion of tannins or green tea, possibly due to reduced oxidative stress and rate of atherogenesis. This study investigated the effects of 7 weeks of tannin ingestion and acute exercise (AE) on resting systolic blood pressure (SBP), heart rate (HR), blood triglycerides (TG), high density lipoproteins (HDL), and very low density lipoproteins (VLDL). Twenty four male Sprague Dawley rats were pair weighted at 6 months old and equally divided into groups: 1) tannin only, 2) tannin + AE, 3) water only, and 4) water + AE. Tannins were ingested as green tea in Groups 1 and 2, equivalent to approximately 2 daily cups of tea. AE to exhaustion was performed once at the end of the study in groups 2 and 4. For resting SBP and HR, data from groups 1 and 2 and groups 3 and 4 were collapsed. Mean resting HR for tannin and water groups was 412±25 and 419±20 beats•min-1, respectively. Resting SBP was 146±15 and 153±13 mmHg, for tannin and water groups, respectively. Group mean TG were 1) 105±21, 2) 81±13, 3) 94±6, and 4) 81±6 mg•dl-1, mean HDL were 1) 23±3, 2) 20±1, 3) 29±1, and 4) 23±2 mg•dl-1, and mean VLDL were 1) 21±4, 2) 20±1, 3) 19±1, and 4) 16±1 mg•dl-1. Comparison contrast tests indicated that resting BP and HR between the tannin and water drinking groups did not differ significantly ($p<.05$). AE was associated with lower TG in water ($p<.05$) and tannin groups ($p=.05$). AE was also associated with lower HDL in water ($p<.05$) and tannin groups ($p=.05$). VLDL was only affected by AE in the water only group, decreasing by 20% ($p<.05$). These results do not confirm beneficial cardiovascular modifications associated with daily tannin intake.

Funded by National Cancer Institute and Committee on Faculty Research at Miami University.

Thursday, September 23
2:15 – 2:30 pm

Alessio, H.M, Hagerman, A.E, Rogers, J., Hardek, K., Romanello, M., Threlkeld, M., Dimitrova, Y., Muhammed, S., Carando, S. & Wiley, R.L. REACTIVE OXYGEN SPECIES FOLLOWING TANNINS AND ACUTE EXERCISE. Exercise Science, Chemistry and Biochemistry, and Zoology. Miami University, Oxford, OH 45056

Recent reports have indicated that daily ingestion of tannins or green tea is associated with lower risk for many diseases. A proposed mechanism is the antioxidant action of tannins in the gastrointestinal system which salvages other antioxidants from redox reactions in the gut, possibly resulting in a net increase in circulating antioxidants to fight disease. This study investigated the effects of 7 weeks of tannin ingestion and acute exercise (AE) on serum ascorbic acid (Vit C), total thiols (TSH), and oxygen radical absorpance capacity (ORAC). Twenty four male Sprague Dawley rats were pair weighted at 6 months old and equally divided into groups: 1) tannin only, 2) tannin + AE, 3) water only, and 4) water + AE. Tannins were ingested as green tea in Groups 1 and 2, equivalent to approximately 2 daily cups of tea. AE to exhaustion was performed once at the end of the study in groups 2 and 4. ANOVARM and comparison-contrast tests compared group data. Vit C was elevated in tannin groups and following AE ($p<0.05$): Groups 1) 35.2±5.0, 2) 45.2±6.7, 3) 32.9±2.8, 4) 41.9±8.0 ug•ml-1. TSH did not differ among groups: 1) 348± 6, 2) 347±9, 3) 372±32, and 4) 377±39 uM•ml-1. ORAC was elevated in the tannin groups compared to water ($p<0.05$): 1) 3929 ±262, 2) 3789±318, 3) 2540±336, and 4) 3296±242 mM Trolox•ml-1. Results indicated that tannin intake was associated with elevated Vit C and ORAC, compared to the water-only groups. AE tended to increase Vit C for tannin and water drinkers. ORAC increased above rest only in water drinkers, but ORAC was still lower than either tannin groups. Tannins appear to play a significant role in elevating some antioxidants in both a resting and a metabolically active state.
Funded by National Cancer Institute and Committee on Faculty Research at Miami University.

ORAL RESEARCH PRESENTATIONS

Thursday, September 23
2:30 – 2:45 pm

CIRCUIT WEIGHT TRAINING COMPARED TO AEROBIC AND RESISTANCE TRAINING IN POSTMENOPAUSAL WOMEN

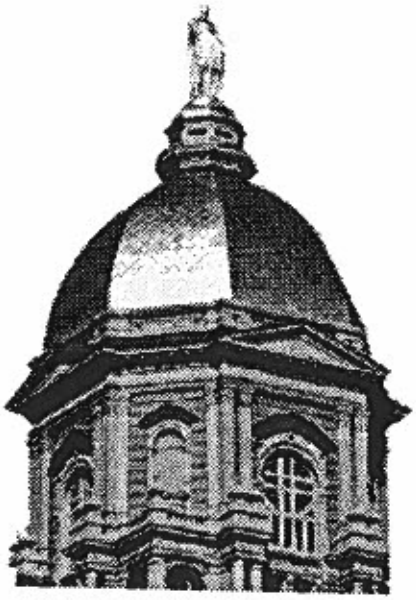
L.D. Wilkin, T.E. Kirby, and J. Buckworth, FACSM, The Ohio State University, Columbus, OH.

Research has established a decline in aerobic capacity and muscular strength with aging, limiting ability to perform activities of daily living and increasing the potential for falls. Thus, efforts are needed to increase exercise participation and adherence in the aging population. The purpose of this study was to compare the physiological and psychological consequences of circuit weight training (CWT) and aerobic and resistance training (AR) in postmenopausal women between 50 and 70 years of age.

Thirty-six women (mean age = 58.5 yrs) were randomly assigned to 12 weeks of CWT, AR or Control (CON). CWT included 3 circuits of continuous exercise at 14 stations [7 aerobic at 50-70% of peak VO_2 initially and 7 resistance training at 40% of one repetition maximum (1RM)] with 30 seconds of work and 30 seconds to move to the next station. AR included 20-30 minutes of aerobic training beginning at 50-70% of peak VO_2 and 8-12 repetitions of resistance training (7 stations) beginning at 40% of 1RM. Dependent variables included peak VO_2, sub-maximal heart rate, upper body strength, lower body strength, social physique anxiety, proneness to boredom, and physical activity enjoyment.

No significant differences were found over time in a repeated measures analysis of variance between the three groups on peak VO_2 in milliliters per kilogram per minute (26.85 ± 0.95, 24.69 ± 1.24, 25.59 ± 2.07), sub-maximal heart rate in beats per minute (138.50 ± 5.55, 133.91 ± 3.25, 130.75 ± 2.52), upper body strength in kilograms (34.66 ± 2.26, 40.49 ± 5.07, 34.85 ± 2.62), lower body strength in kilograms (101.42 ± 11.90, 112.64 ± 9.30, 91.76 ± 9.17) for CON, CWT, and AR respectively (means ± SEM). The CWT group had a significant improvement ($p<0.05$) in physical activity enjoyment compared to the CON group.

The results suggest a combined program of aerobic and resistance training does not lead to a significant improvement in the physiological parameters measured. However, the CWT group had a significant increase in physical activity enjoyment compared to the CON group indicating CWT might lead to increased adherence.



SYMPOSIUM

Thursday, September 23
1:00 – 3:00 pm

"Physical Fitness Requirements and Evaluations Practiced by Safety Service Organizations"

Safety Service occupation agencies, particularly fire departments demand a high level of fitness tomeet the rigorous physical requirements of the job and to ensure the personal health of the individual firefighter. For that reason, Exercise Physiologists have played an increasingly important role in this vocation by providing their services as fitness professionals.

The purpose of this presentation is to describe an overview of Exercise Physiologists' role in dealing with safety service organizations, methods used for developing screening evaluations, and a description of research results from applicant and incumbent firefighter testing.

The objectives are to evaluate and describe statistical results of testing approximately 1500 incumbent firefighters, and to develop a screening evaluation for candidates by identifying suitable categories to incorporate into a testing protocol and setting appropriate standards according to sex and age.

A. *Overview of Safety Service (Fire and Police) Exercise Based Evaluations and the Role of the Exercise Specialist*
Timothy E. Kirby, Ph.D., The Ohio State University

B. *Safety Service Applicant Evaluations and Development and Delivery of Physical Capability Testing in Columbus, Ohio*
Erin McCluskey, B.A., The Ohio State University

C. *Development of and Results of Providing 1 Year of Physical Fitness Testing, with Standards, In Over 1,000 Firefighters*
Carmen J. Babcock, M.A., The Ohio State University

D. *Appropriate Follow Procedures to Enhance Motivation and Training in Safety Service Organizations*
Michelle Bright, B.S. The Ohio State University

NOTES: _____

POSTER PRESENTATIONS

Thursday, September 23
2:00 – 4:00 pm

EFFECT OF HORMONE REPLACEMENT THERAPY ON LEAN BODY MASS AND RESTING METABOLIC RATE IN POST-MENOPAUSAL WOMEN

L. DeBenedictis and J. E. Edwards, Indiana State University, Terre Haute, IN 47809

We investigated the effect of hormone replacement therapy (HRT) on lean body mass (LBM) and resting metabolic rate (RMR) in fourteen post-menopausal women (51.6 ± 3.4 yrs, 3.2 ± 1.6 yrs since menopause). Subjects were classified in three groups by HRT use and VO_{2peak} as measured on a treadmill: physically active users of HRT (HA), VO_{2peak} 38.1 ± 4.3 $ml \cdot kg^{-1} \cdot min^{-1}$; sedentary users of HRT (HS), VO_{2peak} 26.4 ± 2.9 $ml \cdot kg^{-1} \cdot min^{-1}$; and sedentary non-users of HRT (NS), VO_{2peak} 26.4 ± 1.3 $ml \cdot kg^{-1} \cdot min^{-1}$. Separate ANOVAs with Bonferroni post-hoc analysis were used to test for significant differences ($p \leq 0.05$) in LBM and RMR among the groups. LBM was determined by hydrostatic weighing. RMR was determined by respiratory calorimetry. The HA group had significantly less LBM vs. the HS and NS groups ($p \leq 0.05$; 44.4 ± 5.0 kg, 51.9 ± 3.4 kg, and 49.5 ± 3.9 kg, respectively). This may be due to the significantly smaller body weight of the HA group vs. the HS and NS groups ($p \leq 0.001$; 58.7 kg ± 4.2 kg, 75.2 ± 4.7 kg, and 70.6 ± 4.1 kg, respectively). No significant differences in RMR or RMR adjusted for LBM were found. RMR adjusted for total body weight (RMR_{bw}) was significantly higher in the HA group vs. the HS and NS groups ($p \leq 0.026$; 22.0 ± 2.0 $kcal \cdot kg_{bw}^{-1} \cdot d^{-1}$, 19.0 ± 1.9 $kcal \cdot kg_{bw}^{-1} \cdot d^{-1}$, and 20.1 ± 0.8 $kcal \cdot kg_{bw}^{-1} \cdot d^{-1}$). The actual differences in RMR_{bw} were small and may not be physiologically relevant. Based on these results, it was concluded that HRT did not preserve LBM and RMR in these post-menopausal women.

This study was supported by a student research grant from the Indiana State University School of Graduate Studies.

Thursday, September 23
2:00 – 4:00 pm

COMPARISON BETWEEN CLOSED-CHAIN ISOKINETIC TESTING AND VERTICAL JUMP.

N.Gravley, A.VanderMei, T.Rose, W. Perry. Andrews University, Berrien Springs, MI 49104

The purpose of this study was to determine if testing a patient with a closed-chain isokinetic device correlates with a closed-chain functional test, in this case a vertical jump test. This study involved 29 male and female subjects between the ages of 21 and 39. The design was a non-random sample of convenience. Each subject performed a single-leg vertical jump test using a Probotics Inc. jump pad , was then given a 5 minute rest period, and was then tested isokinetically at 300 deg/sec via the closed-chain attachment on a System 3 Biodex. Quadriceps avg peak torque and percentage of avg peak torque to body weight was determined and compared to avg vertical jump height. Average peak torque was 59.6 ft-lbs, avg torque to body weight was 39.9%, and avg vertical jump was 8.7 inches. A Pearson Product Moment Correlation demonstrated that there was a low to moderate correlation between avg peak torque and avg vertical jump height, as $r = 0.49$, $p = 0.007$. Average torque to body weight yielded an r value of 0.509, which was significant at the $p = 0.003$ level when compared to avg vertical jump height. Further analysis was performed using a Stepwise Regression to determine if weight, height, and avg peak torque could be used as predictors for determining avg vertical jump height. An R^2 of .32 suggested an ability to predict avg vertical jump height based on those three factors. When avg peak torque was considered by itself, there was a confidence level of 24%. The Biodex System 3 Pro Dynamometer is a valid instrument for assessing the ability to return to functional, sport related activities. However, for the instrument to be most accurate a stabilizer must be designed for the distal limb attachment that would permit adjustment of the chair in order to achieve proper alignment between the anatomical axis of the knee and the dynamometer head.

POSTER PRESENTATIONS

Thursday, September 23
2:00 – 4:00 pm

THE EFFECTS OF TRAINING WITH THE MERIDIAN ATHLETIC SHOE ON SPRINT AND VERTICAL JUMP PERFORMANCE

N.A. Ratamess, S.A. Mazzetti, J.S. Volek, A.L. Gómez, and W.J. Kraemer, FACSM.
The Human Performance Laboratory, Ball State University, Muncie, IN 47306

The purpose of this investigation was to examine the effects of sprint/plyometric training with the Meridian Elyte shoe on various performance parameters. Seventeen healthy men were randomly assigned to either an athletic shoe training group (AS) or a Meridian shoe training group (MS). Both groups participated in an eight-week training program consisting of weight training and sprint/plyometric training. Anthropometry, muscular strength, speed, power, and rate of force development (RFD) assessments were performed pre and post training. Similar increases in one-repetition maximum (1 RM) squat and bench press, power output and rate of force development during the vertical jump and loaded jump squat were observed in both groups. Similar improvements in 40-yard dash times were observed in both groups but the MS group showed greater improvement in 60-yard dash times (4 vs 2%, respectively). The MS group significantly increased vertical jump height (5.1%) whereas only a trend for improvement ($p = 0.08$) was observed in the AS group (3.4%). Time to produce submaximal plantar flexor isometric torque in the dorsiflexed position improved to a greater extent in the MS group (50 vs 38%, respectively). Compared to two previous studies, the Meridian Elyte shoe showed a lower incidence of pain and injury. In conclusion, the results of the present study indicate that the Meridian Elyte shoe may have an ergogenic effect on performance when used during 8 weeks of sprint/plyometric training.

This study was supported by a grant from Meridian Sports Inc., Indianapolis, IN

Thursday, September 23
2:00 – 4:00 pm

NASAL DILATORS DO NOT AFFECT HEART RATE AND OXYGEN CONSUMPTION DURING RECOVERY FROM ANAEROBIC EXERCISE.

M.R. Rahija, D.Q. Thomas, FACSM, B.M. Larson, S.T. McCaw, FACSM, Illinois State University, Normal, IL 61790

The "Breathe-Right" nasal dilator (CNS Inc.) is advertised to aid recovery from exercise performance by reducing nasal airway resistance. Research has focused on the effectiveness of nasal dilators during exercise. The purpose of this study was to examine the effects of nasal dilators on heart rate (HR) and oxygen consumption (VO_2) during recovery from anaerobic exercise. Thirteen subjects age 19-32 years performed a modified Cunningham-Faulkner (CF) anaerobic treadmill test under three randomly assigned conditions: 1) control, 2) nasal strip, and 3) placebo nasal strip. The CF protocol requires the participant to walk for 1 minute at 2.0 mph, 0% grade, jog for 1 minute at 5 mph, 0% grade, and then sprint at 8 mph, 20% grade. A 10-minute recovery period consisting of 5 minutes of walking (2 mph, 0% grade) and 5 minutes of passive recovery (seated) was completed. During the test and recovery periods, the participant wore a fireman's facemask to allow for simultaneous sampling of nose and mouth breathing. VO_2 and CO_2 production were monitored by a TEEM 100 metabolic analyzer. Each subject wore a Polar Heart Watch to monitor HR every minute during recovery. Mean time to exhaustion was 52.3 seconds ($\pm$ 15.7). A one-way repeated measures ANOVA indicated no significant nasal dilator effect on 5-minute recovery heart rate ($F_{2,24}$= 0.088, p= 0.916) or on 10-minute recovery heart rate ($F_{2,24}$= 0.934, p= 0.407). A second one-way repeated measures ANOVA demonstrated no significant dilator effect on 5-minute recovery VO_2 ($F_{2,24}$ = 0.681, p = 0.516) or on 10-minute recovery VO_2 ($F_{2,24}$ = 0.703, p = 0.505). It appears that nasal strips have no significant impact during recovery from anaerobic exercise performance.

POSTER PRESENTATIONS

Thursday, September 23
2:00 – 4:00 pm

EFFECT OF AEROBIC WALKING ON PHYSIOLOGICAL MEASURES OF FITNESS IN PRE-MENOPAUSAL AFRICAN-AMERICAN WOMEN

R.B. O'Hara, J.T. Baer, University of Dayton, Dayton, OH and R.L. Pohlman, Wright State University, Dayton, OH.

The purpose of this study was to examine the physiological effects of a ten week aerobic walking program on the health promoting lifestyle behaviors (Health-Promoting Lifestyle Questionnaire-HPLP), body weight, BMI, % FAT(dual x-ray absorptiometry-DEXA), blood cholesterol (HDL-C) , and resting BP in middle aged (30-50 yrs) African-American females (n=15). During weeks 1 to 5, each training session included 10-15 minutes of static stretching, 30 minutes of walking at 60% of age-adjusted predicted HR_{max}, 3 d/wk, with 10 min active cool-down. HR was monitored through the use of cardiotachometers (POLAR ELECTRO, Inc). Based upon the groups@ physiological adaptations, duration increased to 60 min/wk by wk 10. Intensity was maintained between 40-70% of age adjusted predicted HR_{max} for all subjects. Data were analyzed by dependent t-test ($p \leq 0.05$). Descriptive statistics were computed for all measures. There were significant changes in pre- to posttest measurements for the following parameters: body weight (M_1=71.6 $\pm$14.3kg; M_2=71.1$\pm$14.2kg; p=0.047); %FAT(M_1=47.0$\pm$4.0%; M_2=42.2$\pm$4.3%; p=0.031); BMI (M_1=31.8$\pm$7.43; M_2=24.2$\pm$4.34; p=0.043); and resting SBP (M_1=140$\pm$2.5 mmHg; M_2=131$\pm$4.23mmHg; p=0.052); and HDL-C (M_1=33 l$\pm$1.7 mg/d; M_2=40$\pm$1.2 mg/dl; p=0.007). Overall mean and subscale scores for the HPLP improved. The results from this study demonstrate that all physiological and behavioral parameters improved significantly after a culturally based aerobic walking program.

Thursday, September 23
2:00 – 4:00 pm

EFFECT OF CREATINE SUPPLEMENTATION ON ISOKINETIC TRAINING PERFORMANCE.

D. Armstrong, S. Nemec, D. Seelbach. Alma College, Alma, MI 48801

Purpose: The purpose of this study was to examine the effects of creatine supplementation in conjunction with isokinetic training on body composition and muscle performance parameters. **Methods:** Sixteen college-aged men were randomly assigned in a double-blind fashion to either a creatine (N = 7) or placebo (N= 9) group. Creatine or placebo solutions were consumed (20 $g \cdot d^{-1}$) for five days followed by a maintenance dose (5 $g \cdot d^{-1}$) for the remainder of the study. Subjects trained three days per week for five weeks on a Cybex Isokinetic Dynamometer. Training consisted of five sets of fifteen maximum leg extensions (180 degrees$\cdot sec^{-1}$) with one minute rests between sets. Isometric strength was measured at mid-extension (45°) pre- and post-training. Best work repetition (BWR) and set total work (STW) were measured during each workout. **Results:** No significant changes in body weight, lean body mass or fat free mass were observed in either group over the course of the study. Isometric strength increased by 21% in the creatine group ($P \leq 0.05$) but did not change significantly in the placebo group. Compared with placebo subjects, creatine subjects demonstrated greater gains in BWR pre- to post-training (31% and 23%, respectively). STW increased to a greater extent in creatine (47%) than placebo (35%) subjects from day 1 to day 15. Increases in total weekly work volume from week 1 to week 5 were greater in the creatine (38%) than placebo (26%) subjects. **Conclusions:** Creatine supplementation had no effect on body composition but gains in isometric strength, best work repetition and total work volume were enhanced

KEYNOTE LECTURE

Thursday, September 23
5:30 – 6:30 pm

"Energy Expenditure and Intake in Youth"

Craig Horswill, Ph.D.
Gatorade Sports Science Institute

Gatorade Sports Science Institute.

Craig A. Horswill is a senior research scientist at the Gatorade Exercise Physiology Laboratory located at the Quaker Oats company in Barrington, Illinois. Prior to joining the company in 1994, Horwill spent six years as a research scientist in the Divisions of Nutrition and Endocrinology, Department of Pediatrics, The Ohio State University and Columbus Children's Hospital, conducting research on carbohydrate and protein metabolism in children with abnormal growth rates. Horswill also spent two years on the faculty in the Human Performance Laboratory at Ball State University. Most of his research there involved studying the effects of diet manipulation and weight loss on high intensity performance.

Originally from Madison, Wisconsin, Dr. Horswill received his B.S. degree in science education (chemistry) and his M.S. degree in physical education (exercise physiology) from the University of Wisconsin. He competed on the varsity wrestling team at Wisconsin from 1972-76, and served as a graduate assistant coach with the team from 1976-79. In 1986, Horswill obtained his Ph.D. in physical education (exercise physiology) at the University of Illinois, Champaign-Urbana. As a doctoral student, he was the head wrestling coach at Central High School in Champaign, Illinois.

Dr. Horswill's current research interests focus on the effects of dehydration and diet on human performance, and general issues on exercise and nutrition in children. He is a member of the American College of Sports Medicine and the North American society for Pediatric Exercise Medicine.

SYMPOSIUM

Friday, September 24
8:00 – 9:30 am

"Body Composition Applications"

The application of body composition methods in the physical fitness setting depends on the selection of appropriate methods and meaningful interpretation of the results. However, exercise specialists frequently have limited knowledge and experience relative to these issues, especially the interpretation of results. The purpose of this symposium is to discuss the use of body composition analysis in the fitness/clinical setting, especially issues related to the selection and application of appropriate field methods such as skinfold analysis and BIA. Dealing with measurement error and the interpretation of the results to clients will be the major focus. Methods recommended in the ACSM's Resource Manual (3rd edition) will be included.

A. *Body Composition Practicum: Measurement Methods and Technique*
Kathleen D. Little, Ph.D., Youngstown State University

B. *Interpreting Body Composition Results to Your Clients*
Wayne E. Sinning, Ph.D., Kent State University

NOTES: _____

WORKSHOP

Friday, September 24
9:45 – 11:00 am

"Body Composition"

The purpose of this workshop is to provide "hands-on" experience in taking and interpreting body composition data. Advanced students and individuals working in fitness/clinical programs are encouraged to enroll. Participants are expected to have attended the symposium, "Body Composition Applications." Two sessions will be conducted: one on taking measurements, where enrollees will work with trained assistants, and the other on interpreting results, where case studies will be discussed. Participants must be dressed in clothes that facilitate taking body composition measures and are encouraged to bring their own skinfold calipers and tape measures. Enrollment is limited to 50 people. PRE-CONFERENCE REGISTRATION required.

A. *Body Composition for Fitness: Selecting the Right Method*
Kathleen D. Little, Ph.D., Youngstown State University

B. *Body Composition Analyses: Interpreting the Results*
Wayne E. Sinning, Ph.D., Kent State University

NOTES:

TUTORIAL

Friday, September 24
9:00 – 10:00 am

"Lipoprotein(a): Stepchild of the Lipoprotein Family"

Paul G. Davis, Ph.D., Central Michigan University

Lipoprotein(a) **[Lp(a)]** is a variant of low-density lipoprotein. Although Lp(a) possesses the same basic characteristics of the other lipoproteins, possession of an additional glycoprotein [apolipoprotein(a) or **apo(a)**] causesit to behave quite differently. This tutorial will begin with a discussion concerning Lp(a)'s relationship with coronary artery disease and the possible roles of apo(a) in this relationship. Although other lipoproteins may respond markedly to both pharmaceutical and behavioral (e.g., diet, exercise) interventions, plasma Lp(a) concentrations are mostly genetic and are largely resistant to outside influences. However, exceptions do exist. The effects (or lack thereof) of drugs and behavior changes on plasma Lp(a) concentrations will be discussed with particular attention being given to the acute and longitudinal effects of exercise. Finally, previous research has suggested Lp(a) as an acute phase reactant involved in tissue repair. Consequently, this tutorial will address ideas for possible research using exercise to investigate Lp(a)'s possible roles as an acute phase reactant to skeletal muscle damage.

NOTES:

POSTER PRESENTATIONS

Friday, September 24
9:00 – 11:00 am

A SURVEY OF SHOES AND INJURY CHARACTERISTICS OF AEROBIC INSTRUCTORS

M. Davis, R.E. Bahamonde. Indiana University-Purdue University Indianapolis, IN 46202

The purpose of this survey was to gather information on the types of injuries incurred by aerobic instructors and determine the incidence of injury in which shoes may have been a factor. Sixty-five aerobic instructors (63F/2M; age 32.9 ± 7.4 yrs; weight 58.6 ± 6.9 kg; height 1.65 ± 6.9 m) completed the 14-question survey. Questions focused on instructor experience, class characteristics, floor type, shoe type and life, and injury characteristics. The majority of instructors (78%) had 3 or more years of aerobic teaching experience. Wood was the floor surface most often used for classes. Most instructors (60%) used aerobic shoes, and 64% of instructors used the shoes for 3-6 months. The most common reasons to discard or change shoes were lack of shock absorption and lack of arch support. The next most reported reason was injury or pain (32%). 80% of subjects reported new and recurrent injuries to the lower extremities, with the most common being plantar fasciitis (28%), shin splints (23%), and knee pain (22%). Among subjects who reported injuries, 54% believed shoes were the primary or secondary cause. Survey results indicate a possible link between shoe degradation and injury. The need for further research is necessary to determine whether or not shoe degradation affects body mechanics and contributes to injury.

Friday, September 24
9:00 – 11:00 am

THE HECHT VAULT: PRE-FLIGHT MECHANICAL VARIABLES AND JUDGES' SCORES

Y. Takei, Northern Illinois University, DeKalb, IL 60115

The pre-flight mechanical variables have an important "causal influence" on the subsequent phases of a vault and overall outcome of performance. The Hecht is one of the basic vaults that provides important carry-over technical elements for learning more advanced vaults with increased safety. Therefore, the purpose of this study was to identify the pre-flight mechanical variables that govern success of the Hecht vault. Subjects were 122 male gymnasts from 30 countries performing the vault at the 1995 World Championships. The vaults were filmed using a 16-mm motion picture camera operating at 100 Hz. Approximately 80 frames were digitized for each vault analyzed. The cubic spline smoothing procedure was applied to the position data. Subsequently, the location of the center of mass (CM) in each digitized frame was computed. A deterministic model was developed to identify the mechanical variables that determine the linear and angular motions of the pre-flight. Correlational analysis was used to establish the strength of the relationship between the causal mechanical variables identified in the model and the judges' score. Significant correlations ($p < .005$) identified the following as important determinants of success: (1) large horizontal, vertical and resultant velocities at takeoff from the board; (2) large vertical distance traveled by CM in pre-flight; and (3) large angular distance of forward body rotation in pre-flight. Furthermore, the horizontal displacement of CM in pre-flight and the body angle at touchdown on the horse were positively correlated ($p < .001$) with the judges' score. In conclusion, success of pre-flight and overall performance of the Hecht vault is most likely when the focus is on achieving: (1) large horizontal velocity at touchdown on the board by sprinting the approach and departing from it with large horizontal and vertical velocities; (2) large horizontal and vertical distances traveled by CM in pre-flight and large forward body rotation in pre-flight by reaching as far forward as possible toward the far end of the horse with the hands (flexion of the humerus) upon take off from the board; and (3) high body angle (but not in excess of 30° above the horizontal to avoid "accidental body

POSTER PRESENTATIONS

Friday, September 24
9:00 – 11:00 am

CHANGE IN LOWER EXTREMITY STIFFNESS IN LANDINGS FROM DIFFERENT HEIGHTS
Leigh A. Mrotek & Philip K. Schot, University of Wisconsin – Milwaukee, Milwaukee, WI

Purpose: Leg stiffness during landings from three different heights was studied using a simple mass-spring model. **Methods**: Seven healthy participants landed 10 times from each of 3 heights (20 cm, 35, cm, 50 cm). Vertical displacement (Δy), maximal force (F_{max}), landing impulse (I), and stiffness (k) were analyzed. One-way repeated measures ANOVAs and paired t-Tests (with Bonferroni adjustment) were applied to all variables. **Results**: Significant height differences were identified; see Table 1. Generally, stiffness increased with the initial increase in drop distance. Landing stiffness responses to a further increase in drop distance varied.

Table 1. Descriptive measures of variables

Drop Height	20 cm	35 cm	50 cm
Δy (m)	0.21 ± 0.05	0.25 ± 0.06	0.29 ± 0.06
F_{max} (N)	2201 ± 557	2648 ± 479	3272 ± 598
I (N·s)	105 ± 48	152 ± 33	185 ± 40
k (N/m)	5032 ± 3362 [a]	6296 ± 2993 [b]	6762 ± 2848 [a,b]

Note: variables sharing a common symbol are not different

Conclusion: It appears that differential leg stiffness adjustments were used by the participants to accommodate the increased drop distance. The manner by which these adjustments were made requires additional study.

Friday, September 24
9:00 – 11:00 am

COMPARISON OF THE UTILITY OF A MODIFIED STEP TEST AND A 1-MILE RUN
M.J. Randall, F. Wang, J.S. Zakrajsek, A.W. Garcia, University of Michigan, Ann Arbor, MI 48109

The purpose of this study was to evaluate the feasibility and accuracy of a shortened step test in assessing children's' cardiovascular fitness. Traditionally, physical educators and health professionals have used some variant of the run/walk to evaluate a child's aerobic capacity. However, the external validity of such tests has been repeatedly questioned especially among participants who lack sufficient motivation to provide their best performance. The Canadian Aerobic Fitness Test (CAFT) has been commended for its simplicity and its ability to rule out motivation as a confounding variable. Unfortunately, the CAFT protocol is not efficient for testing in large groups. With initial pilot work, we developed a revised stepping protocol of the CAFT by changing step height, tempo, and the testing apparatus (from a two-step box to a staircase). The intent of this study was to evaluate the effectiveness of this modified step test to predict maximal oxygen consumption (VO2 max) as compared to the predictive validity of a 1-mile run/walk with the same subjects. Subjects consisted of 20 children ranging in ages from 10 to 15. The subjects completed a treadmill VO2 max test as a criterion for determining maximal oxygen consumption. The three tests, a 1-mile run/walk, the revised step test, and a treadmill test, were completed by each subject within one week. The order of administration was counter balanced. Following the work of Cureton and his colleagues, the multiple regression with mile run time, body mass index (BMI), age, and gender as the predictors, yielded a strong correlation with the treadmill VO2 max. The multiple regression equation with O2 cost of stepping, sum of two skinfolds, heartrate, and age produced only a moderate correlation with treadmill VO2 max. Given these results it appears that the 1-mile run/walk is superior in predicting cardiovascular fitness.

POSTER PRESENTATIONS

Friday, September 24
9:00 – 11:00 am

EFFECTS OF REPEATED ECCENTRIC EXERCISE ON MUSCLE SORENESS IN YOUNGER AND OLDER ADULTS. S. Grant, R.L. Brands, and J.E. Davis. Dept. Of Exercise and Health Science, Alma College, Alma, MI 48801

The purpose of this study was to determine if rapid adaptation occurs in older subjects and to compare muscle soreness markers in younger and older subjects. Six younger subjects (20-22 yrs) and five older subjects (58-76 yrs) performed two bouts of eccentric exercise (40 maximal eccentric contractions) with the biceps brachii of their dominant arm. Each bout of exercise was separated by 2-weeks. Muscle soreness (MS), isometric strength (IS), and relaxed arm angle were measured before and after each exercise. Muscle soreness and relaxed arm angle were measured 1,2, and 5 days following each test. Resting serum creatine kinase (SCK) levels were determined before each test and 5 days following each bout of eccentric exercise. Muscle soreness was significantly lower ($P < 0.05$) in both age groups following the second bout of eccentric exercise relative to the first. However, there were no differences between the younger and older groups. Relaxed Arm Angle, IS and SCK all showed the same patterns in the younger and older subjects. The SCK levels were not significantly correlated with muscle soreness ($P>0.05$) in either group. These data suggest that in older adults the ability to adapt to heavy eccentric exercise is maintained and the rapid adaptation response is still functional. in older adults.

Friday, September 24
9:00 – 11:00 am

EVIDENCE FOR EXERCISE SYMPATHOLYSIS
J.B. Buckwalter and P.S. Clifford, FACSM. Departments of Anesthesiology and Physiology, Medical College of Wisconsin and VA Medical Center, Milwaukee, WI 53295

Attenuation of sympathetic vasoconstriction (sympatholysis) in working muscles during dynamic exercise is controversial. One potential mechanism for sympatholysis is a reduction in α adrenergic receptor responsiveness. The purpose of this study was to examine α_1 and α_2 adrenergic receptor mediated vasoconstriction in resting and exercising skeletal muscle using intraarterial infusions of selective agonists. Six mongrel dogs were instrumented chronically with flowprobes on the external iliac arteries of both hindlimbs and a catheter in one femoral artery. The selective α_1 adrenergic agonist, (phenylephrine) or the selective α_2 adrenergic agonist (clonidine) was infused as a bolus into the femoral artery catheter at rest and during mild and heavy exercise. Intraarterial infusions of phenylephrine elicited reductions in vascular conductance of 76±4, 71±5, and 31±2% at rest, 3 miles/h, and 6 miles/h 10% grade, respectively. Intraarterial clonidine reduced vascular conductance by 81±5, 49±4, and 14±2%. Neither agonist infusion affected systemic blood pressure, heart rate or blood flow in the contralateral iliac artery. These results demonstrate that α_1 adrenergic receptor responsiveness is attenuated during heavy exercise. In contrast, α_2 adrenergic receptor responsiveness is attenuated even at a mild exercise intensity. These results suggest that the mechanism of exercise sympatholysis may involve reductions in postsynaptic α adrenergic receptor responsiveness.

POSTER PRESENTATIONS

Friday, September 24
9:00 – 11:00 am

UTILIZATION OF AIR DISPLACEMENT PLETHYSMOGRAPHY FOR ESTIMATING BODY COMPOSITION IN COLLEGIATE ATHLETES

A. L. Spiller, D. Montie, L. A. Hildebrandt, PhD, RD, R. Hammer, PhD. Dept. of Human Environmental Studies and Dept. of Health Promotion & Rehabilitation. Central Michigan Univ., Mt. Pleasant, MI.

Air displacement Plethysmography (ADP) is a non-invasive, rapid alternative to present methods of estimating body composition. Estimates of body composition using ADP were compared to Hydrodensitometry (HD), Bioelectric Impedance (BEI), and Skinfold measures (SF) in collegiate athletes. Eleven offensive linemen and twelve female track and field athletes participated in this study. The football players participated in this experiment at the end of their spring practice season. Measures were taken from the track and field athletes at the latter part of their competitive season. ADP, Hydrodensitometry, Bioelectrical Impedance, and Skinfold measures were taken on the same day. Body density, bioelectrical impedance, and skinfold measures were converted to percent body fat estimates (Siri, 1961; Lukaski et al., 1986; Jackson and Pollock, 1986, Dempster and Aitkens, 1995). Thoracic air volume was measured directly for estimates of percent body fat using ADP. Nutrient intake was also determined via 24-hour recall and three-day food records with follow up interview. Nutrient intake was compared to nutrient needs. Estimates of percent body fat (% BF) using four different methods are shown below (mean ± SD). No statistically significant difference was observed between the measures used for estimating body composition ($P > 0.05$). These results suggest that ADP is a viable method for estimating body composition in collegiate athletes, when compared to Hydrodensitometry, Bioelectrical Impedance, and Skinfold Measures.

	Weight (lbs)	% BF ADP	% BF HD	% BF BEI	% BF SF
Football	290.36±25.86	28.66±5.02	27.98±5.32	29.91±4.18	23.81±3.45
Track	133.75±22.34	18.40±5.03	15.98±5.53	21.08±4.93	15.07±3.84

MWACSM Golf Outing
Saturday, September 25
1:30 pm
Notre Dame

CLINICAL CASE PRESENTATION

Friday, September 24
9:00 am – 12:00 pm

Left Leg Swelling

G. E. Crovetti, Family Medical Center, Kentucky Clinic
University of Kentucky Lexington, KY 40515
Email: { HYPERLINK mailto:gregcrovetti@usa.net }
(Sponsor R. Hosey, T. Armsey FACSM)

HISTORY: Twenty-four year old white male recreational athlete, with no significant past medical history, presenting with a left leg swelling for 5-6 months. The patient had been seen in the Emergency Department and Urgent Care Center 2-3 times previously for the same problem. He had been given a course of oral antibiotic with no change in symptoms. Per patient, the leg is not significantly painful except during activity, denies night pain, but states the swelling increases throughout the day, worse with activity. He initially noticed the left leg swelling about 12 months prior to presentation. Over the last several months the swelling had worsened so that it now includes the posterior lateral aspect of the thigh as well as the posterior medial aspect. He denied any local bug bites, penetrating trauma, and use of injectable materials into the area. He did note significant weakness in his left hamstring but denies any significant pain. Past medical and surgical history are negative. Social history is negative for tobacco, drugs, alcohol and steroid use. Family history is noncontributory and review of systems is negative for weight loss, change in bowl of bladder, night sweats, back pain, parasthesias, and constitutional symptoms. The patient had no diagnostic work up prior to presenting to the clinic.

PHYSICAL EXAM: Well-developed, well-nourished, white male in no distress. Left lower extremity showed a 4x4 cm erythematous area with some scaling and flaking of the skin, which was non-tender and not raised. A 15-20cm fluctuant mass beginning in the posterior medial aspect of the thigh and moving to the posterior lateral aspect of the thigh was noted by exam. There seemed to be a communicating area that is more indurated between the two more fluid filled compartments. There was no significant adenopathy. Hamstrings showed 4/5 strength on the left, and 5/5 on the right. No significant deficits of the hamstring tendons or biceps femoris were present. Straight leg raise was negative, patient was neurovascularly intact and DTR's were equal bilaterally. He was neurovascularly intact throughout.

CLINICAL CASE PRESENTATION

Friday, September 24
9:00 am – 12:00 pm

Football Player with Left Thigh Pain
Eric Jenkinson MD, Sports Medicine Fellow
Central Indiana Orthopedics, Muncie, IN
E-mail: Eric.Jenkinson@ciocenter.com
Sponsor: Tom Sevier MD

HISTORY: Patient is a running back at a community college presenting with acute left thigh pain. Patient had played a game earlier that day. He had a hit to the left thigh during the last series of the game. Patient has a history of a quadriceps contusion to the left thigh one-week prior. Approximately, four hours after the game, patient presented to the ER with acute left thigh pain that had progressively worsened over the last hour. The pain was exacerbated with motion of that knee. He also noted swelling in the left thigh that had progressively worsened. Patient was otherwise healthy. He took three Advil after the game and had 3-4 beers.

PHYSICAL: HR-84 BP-131/72 RR-20 temp-37
Alter and interactive in no acute distress but severe pain. CV: Regular rate without murmurs Lung: CTA bilaterally Abdom: Nondistended, nontender, no masses or hepatosplenomegaly Lt extremity: Normal ROM of hip-pain free
Anterior thigh swollen and painful to palpation
Pain with passive and active ROM of knee; flexion and extension
No obvious deformities of the thigh
Sensation intact distally, 5/5 strength with ankle dorsi and plantar flexion
Strong distal pulses

DIFFERENTIAL DIAGNOSIS:
1. Femur Fracture
2. Quadriceps Contusion
3. Compartment Syndrome
4. Deep Venous Thrombosis

TESTS AND RESULTS:
X-rays of the hip and femur were negative for fracture.
Anterior compartment pressures of the thigh-45mmHg and 42mmHg

DIAGNOSIS:
Acute compartment syndrome of the thigh secondary to a quadriceps contusion

TREATMENT:
Patient went for immediate fasciotomy. Patient had incision closed on the 2nd post-op day and was discharged on the 4th post-op day. Patient under went physical therapy and made a full recovery.

CLINICAL CASE PRESENTATION

Friday, September 24
9:00 am – 12:00 pm

HAND INJURY – FLAG FOOTBALL

S.Y. Lin, University of Kentucky
Primary Care Sports Medicine, Lexington, KY, USA
Email: samylin@pop.uky.edu
(Sponsor: R. Hosey, T. Armsey FACSM)

HISTORY: A 28 year old recreational athlete injured his left hand during a flag football game. The injury occurred while he dove for a loose ball. He either jammed his middle finger into the ground or someone stepped on his left hand. There was immediate swelling but he continued play. He presented to the sports medicine clinic the following day. At that time he complained of pain and swelling in his left hand. Patient denied any parasthesis, numbness, pain in the fingers.

PHYSICAL EXAM:

Swelling and erythema over the dorsum of the left hand were noted. Tenderness and crepitus were appreciated on palpation over the 3rd metacarpal. Two point discrimination was equal over the dorsum of the hand and fingertips bilaterally. Wrist motion was normal. No scaphoid tenderness was appreciated. Watson test, triquetral compression test, and "piano key" sign were negative. MCP flexion was limited secondary to pain. DIP/PIP motions were normal. On flexion of the MCP the nail beds were parallel, and all 4 fingertips pointed towards the tubercle of the scaphoid. There were no malrotation.

DIFFERENTIAL DIAGNOSIS:

1. Metacarpal fracture
2. Bone bruise
3. Soft tissue contusion
4. Hematoma

CLINICAL CASE PRESENTATION

Friday, September 24
9:00 am – 12:00 pm

ACUTE TRAUMATIC TRANSIENT HEMIPARESIS IN A HIGH SCHOOL WRESTLER

Linda A. Mansfield, M.D., Mark E. Lavallee, M.D.
South Bend Primary Care Sports Medicine Fellowship Program, South Bend, IN

HISTORY – This 14 year old male, during a high school wrestling match, was forcefully rolled onto his head and neck by his opponent. During this maneuver, his neck was excessively bent laterally to the left. No "pop" or "snap" was appreciated by the athlete, but he did experience posterior neck pain. He immediately felt his right arm go numb. There was no loss of consciousness, headache, dizziness, confusion, or amnesia. He walked off the mat without assistance shaking his right arm. He began to experience weakness of his right arm with objective weakness in grip strength. The match was forfeited. Weakness, numbness, and tingling of the right upper extremity persisted for several minutes. Athlete had no allergies and was on no medications or supplements. He denied cutting weight or restricting his diet for this match. Past medical history was significant only for pyloric stenosis as a child. He denied any history of past neurologic injury. When the symptoms did not resolve, the athlete's head and neck were stabilized, and he was transported by ambulance to the E.R. for further evaluation and to rule out c-spine fracture.

PHYSICAL EXAMINATION – Exam at the event revealed the athlete to be alert and oriented. He had tenderness over the spinous processes of C2-4 and right trapezius and paraspinous muscles. There was no deformity noted. Biceps strength was found to be 5/5. Grip strenth was 3-4/5. Biceps, triceps, and brachioradialis reflexes were +1 and symmetric. There was decreased 2-point discrimination along the entire right arm. Spurling's maneuver for a traction injury was positive. Vital signs were within normal limits. By the time he arrived in the E.R. he had begun to complain of numbness/weakness in both his right upper and lower extremities. Motor strength in the right upper extremity decreased to 3/5, while right lower extremity strength was 3+/5. Motor strength on the left side was 5/5 throughout. Two-point discrimination and light touch were decreased in both right extremities and torso while deep pressure and pain sensation was equal in all extremities. Lower extremity reflexes were +1 on the right and +2 on the left. Babinski was down-going bilaterally with no clonus, spasticity, or rigidity noted. Cranial nerves were all intact. He had good rectal tone.

DIFFERENTIAL DIAGNOSIS

1. Brachial plexus injury
2. Cervical spine fracture/subluxation
3. Spinal cord contusion
4. Cervical stenosis
5. Spinal cord tumor
6. Partial spinal cord transection
7. Right vertebral artery aneurysm
8. Acute rupture of cervical disc
9. Cerebrovascular accident
   (ie. stroke, intracranial bleed, AVM)
10. Right sided neuropraxia
11. Psychosomatic reaction

TESTS AND RESULTS – Imaging: Cervical and thoracic spine films showed no evidence of fracture or subluxation. There was loss of normal cervical lordosis. Torg ratio was 1.05 (normal). Cervical flexion and extension views were negative. Head CT without contrast was negative. CT of cervical and thoracic spine revealed no evidence of fracture or subluxation. MRI (T1, T2, and STIR) of cervical spine was within normal limits, showing no cord edema, hematoma, or impingement. Routine serum laboratory tests were all normal.

DIAGNOSIS – 1.) Right sided neuropraxia with possible psychosomatic amplification. 2.) Right trapezius and splenius capitis grade 1 muscle strain.

TREATMENT – Hospitalized for observation. Placed in Philadelphia collar. Given trauma dose of intravenous steroids for 24 hours. Neurologic checks were performed every 4 hours. Once symptoms showed signs of improvement and all imaging studies were negative, physical therapy was initiated. On hospital day #2 physical exam showed some improvement of his right arm paresthesias in a "stocking glove," not dermatomal distribution. He also had a vague complaint of vague right ear numbness. Exam revealed normal cranial nerves except for decreased light touch, deep pressure, and pain immediately around the right external ear. He was discharged on hospital day #3 with instructions to wear the cervical collar at all times except when showering. He was withheld from physical education activities as well as from wrestling until asymptomatic and re-evaluated.

OUTCOME – During the athlete's hospitalization it was realized that his parents had gone through a hostile divorce. However, they were both present in his room for much of the hospital stay. This is when the possibility of a psychosomatic component was considered, as there seemed to be the potential for a significant secondary gain. It was also disclosed by the athlete that he had been quite anxious in anticipation of this being his first high school wrestling match. It was noted by the athlete's mother that symptoms appeared to resolve within 48 hours after discharge. Athlete participated in outpatient physical therapy for less than two weeks and was then discharged secondary to regaining ability to perform all activities without difficulty. He was seen in follow up two weeks after hospitalization and was without symptoms or subjective complaints. Athlete was released and cleared to return to all activities outside of contact sports. He may resume contact sports two months after being symptom-free.

CLINICAL CASE PRESENTATION

Friday, September 24
9:00 am – 12:00 pm

LEG PAIN- WATER SKIER

D.K. Ostlie, Ball Memorial/Central Indiana Sports Medicine Fellowship
3600 West Bethel Ave, Muncie, IN, 47304
e-mail: dlostlie@mindspring.com

HISTORY- 47-year-old male presents with left leg pain 5 days after a water skiing accident. Patient was being towed with two skis while he attempted to "drop" a ski and begin slalom skiing. As he attempted to remove his foot from his left ski, the ski tip caught the water causing hyperflexion at the hip over a fully extended left knee. He had sudden onset left posterior thigh and buttock pain. He had difficulty getting into the boat after the injury and developed extensive ecchymoses over the subsequent 48 hours. He now complains of weakness and posterior thigh pain with ambulation.

PHYSICAL EXAMINATION- Patient ambulates with obvious discomfort in left extremity. Extensive ecchymoses is noted to extend from left buttock to the popliteal area. Significant soft tissue swelling is located along proximal medial hamstring. Patient is mildly tender at left ischial tuberosity and is exquisitely tender along medial hamstring 10 cm distal to ischial tuberosity. Hamstring strength is 4/5 left; 5/5 right. Posterior thigh sensation, quadriceps strength, adductor strength, patellar reflexes, pulses: Normal.

DIFFERENTIAL DIAGNOSIS-
1) Complete hamstring avulsion
2) Hamstring tear to semimembranosus/semitendinosis
3) Avulsion fracture left ischium
4) Quadriceps tear

TESTS/RESULTS-
-Plain X-rays of thigh: Normal
-MRI of Thigh: Complete avulsion of hamstring complex from ischium

FINAL DIAGNOSIS: Hamstring avulsion

TREATMENT-
1) Crutches until weight bearing without pain
2) Physical therapy
3) Surgical referral

CLINICAL CASE PRESENTATION

Friday, September 24
9:00 am – 12:00 pm

HAND PAIN IN A COLLEGIATE BASEBALL PLAYER

M.L. Stovak, M.B. Roush
Ball Memorial Hospital / Central Indiana Sports Medicine
Muncie, Indiana
(Sponsor: T.L. Sevier, FACSM)

HISTORY –
A 20 year-old Caucasion male presented after having acute onset of right hand & wrist pain. He is right-hand dominant and throws right-handed but bats left-handed. He developed the pain suddenly during the follow-through phase of a swing in which he attempted to hit an outside off-speed pitch that "fooled him" & made him swing off-balance. He did not hear or feel a pop & did not develop any numbness or tingling. He was unable to compete in the rest of the game secondary to pain that localized to the dorsal & ulnar hand & wrist.

PHYSICAL EXAMINATION – (of the right hand 24 hours after the injury)
There was no swelling or ecchymosis present, & he had pain with flexion/extension and ulnar deviation of the wrist, but not with radial deviation. He was tender over the dorsal hamate, carpometacarpal joints of the 4^{th} & 5^{th} digits & in the space occupied by the TFCC. He had decreased grip strength as well as decreased strength to flexion and extension of the wrist, especially with ulnar deviation. There was no volar pain over the pisiform or hook of the hamate on exam 24 hours after the injury. However, on repeat examination 48 hours after the injury, he had become quite tender over the hook of the hamate. There was no tenderness in the radial side of the wrist to palpation or with range of motion. Sensation remained normal. Radial pulse was normal & Allen test was negative.

DIFFERENTIAL DIAGNOSIS -
1. Flexor / Extensor Carpi Ulnaris strain
2. Hamate or $4^{th}/5^{th}$ proximal metacarpal fractures
3. Hamate or $4^{th}/5^{th}$ proximal metacarpal contusion
4. Hook of the hamate fracture
5. TFCC tear
6. Ulnarcarpal Ligament sprain

TESTS AND RESULTS –
1. Plain Films (3 views of the wrist – AP, oblique and lateral) – Normal
2. Carpal Tunnel View – Fracture of the base of the hook of the hamate

   MRI – confirmation of the fracture at the base of the hook of the hamate & no evidence of TFCC tear

FINAL DIAGNOSIS –
1. Hook of the hamate fracture

TREATMENT –
He was placed in an ulnar gutter splint with the $4^{th}/5^{th}$ MCP's flexed to 90 degrees & then after Orthopedic consult 3 days later, the fracture fragment was surgically removed.

SYMPOSIUM

Friday, September 24
2:00 - 3:00 pm

"Update on Concussion Guidelines, Pathophysiology, and Neuropsychological Testing"

The scientific understanding of concussion has increased dramatically in the 1990's. The objectives of this symposium are to provide the audience with a more complete understanding of how team physicians take care of concussions in 1999, what the current science is behind concussive brain injury, and how we can use valid measures to know when an athlete can safely return to play.

A. *An Update on Concussion Guidelines and Return to Play*
Jeff Kovan, D.O., Michigan State University

B. *The Pathophysiology of Concussion and Second Impact Syndrome*
James Dunlap, M.D., Michigan State University

C. *New Research in Concussion Neuropsychological Testing*
Michael Collins, Ph.D., Michigan State University

NOTES:

SYMPOSIUM

Friday, September 24
2:00 - 4:00 pm

"Cardiorespiratory and Metabolic Adaptations to Endurance Training in Children"

This symposium will examine the cardiorespiratory and metabolic adaptations to endurance training in preadolescent and adolescent children. The symposium will consist of three segments. The first portion of the symposium will focus on rationales for conducting research on the endurance trainability of children of all ages, aspects related to research design, and ethical issues that may constrain research in this area. In addition, a brief overview of the cardiorespiratory and metaboliic adaptations that are typically observed in adults will be presented to provide a backdrop in which to better understand the pediatric adaptations. In the next segment, the adaptations that have been reported in preadolescent children (defined in this context as under 13 years of age) will be discussed. In particular, adaptations at submaximal and maximal exercise intensities will be discussed along with the underlying mechanisms of adaptation to the extent in which these mechanisms are known. Factors affecting the trainability of the preadolescent child, including initial level of fitness, age and maturation of the subject and volume of training, also will be examined to better understand the influence of each on the endurance trainability of children in this age range. In the last segment of the symposium, the same adaptations will be described in the adolescent child, although there is surprisingly less research conducted on endurance training adaptations in this age group.

A. *Studying Endurance Training Adaptation in Children*
Anthony D. Mahon, Ph.D., Ball State University

B. *Endurance Training Adaptations in Preadolescent Children*
Molly Brooker, B.S., Ball State University

C. *Endurance Training Adaptations in Adolescent Children*
David M. Plank, B.S., Ball State University

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ORAL RESEARCH PRESENTATIONS

Friday, September 24
3:15 – 3:30 pm

THE EFFECTS OF ANKLE BRACES ON GROUND REACTION FORCES DURING DROP LANDINGS

D.J. Dominguese & S.T. McCaw, FACSM. Biomechanics Lab, Illinois State University, Normal

The purpose of this study was to determine if different ankle braces affect vertical ground reaction force (vGRF) during drop landings. Twelve male recreational athletes volunteered as subjects. A force platform was used to collect (960 Hz) vGRF data for the right limb as subjects performed drop landings using stiff (knee flexion < 90°) and soft (knee flexion >90°) landings from 60 cm. Five conditions of ankle bracing were evaluated: no support, standard taping, cloth brace, mechanical hinge brace, mechanical hinge brace with extended plantar support. Landing style was randomized within support condition. Five landings were analyzed in each condition (total landings = 50). Comparisons of vGRF magnitudes (F1&F2), time to force magnitudes (T1&T2), and impulse characteristics were made using a 2x5 repeated measure ANOVA and *post hoc* Tukey HSD ($\alpha = 0.05$). No significant brace by landing style interaction was identified for any variable. A significant main effect of landing style was seen for F1, F2, and impulse to F2, with higher values for stiff landing on all variables. A significant brace effect was identified for F1, and the impulses to F1 and F2, with the *post hoc* identifying the source as differences between the mechanical hinge brace with extended plantar support and the standard taping condition. While the results suggest vGRF are affected by different forms of bracing, future research should focus on the joint kinetics and kinematics responsible for the measured forces.

Friday, September 24
3:30-3:45 pm

RELATIONSHIP BETWEEN PROPRIOCEPTION AND RATE OF LOADING

T.V. Alvey, R.E. Bahamonde, A.E. Mikesky, FACSM. IUPUI, Indianapolis, IN, 46202

Individuals demonstrating heelstrike transient (HST) during gait are thought to be preosteoarthritic, and it has been speculated that they have neuromuscular coordination problems. The purpose of this study was to determine if proprioception, a component of coordination, is associated with the high rates of loading (ROL) common to HST during gait. A sample of 18 women (ages 23.3 ± 2.7) each exhibiting HST were compared to a group of 21 age-matched women demonstrating normal gait. Additionally, a group of 10 elderly female osteoarthitis (OA) patients (ages 73.9 ± 8.0) was compared to a group of 18 age-matched controls. Data were collected from each subject on: 1) the ability to detect passive motion (KA), 2) the ability to reproduce specific joint angles (JAR), and 3) ROL.

	KA (sec)	JAR (degrees)	ROL (xBW/s)
Young Normals	2.41 ± 1.25	2.15 ± 3.67	25.61 ± 13.18†
Heelstrikers	2.27 ± 1.41	2.27 ± 3.00	41.03 ± 16.03
Elderly Controls	2.41 ± 1.04	4.50 ± 3.40	23.40 ± 10.82
Osteoarthritis	2.70 ± 1.26	2.98 ± 1.71	20.71 ± 14.06

Values are the mean ± SD. †P = 0.002 versus heelstrikers.

There were no significant differences found in KA or JAR between groups. ROL was not statistically different between elderly controls and OA subjects, but was statistically different ($p=0.002$) between the HST group and young normals. The correlation between ROL and JAR and/or KA was not significant ($r<0.154$). These data suggest that proprioception as measured by KA and JAR, doesn't explain high rates of loading.

ORAL RESEARCH PRESENTATIONS

Friday, September 24
3:45 – 4:00 pm

EFFECTS OF TREADMILL SLOPE AND SPEED ON VERTICAL GROUND REACTION FORCES DURING WALKING.

V.M. Pittenger[1,2], S.T. McCaw, FACSM[1], M.R. Torry[2], M.J. Decker[2], J.R. Steadman[2], [1]Biomechanics Lab, Illinois State University, Normal; [2]Steadman•Hawkins Sports Medicine Foundation, Vail Colorado.

Weight bearing activity inducing high impact loads on the lower extremity has been implicated with knee joint injury. Although higher vertical ground reaction forces (vGRF) have been measured when subjects walk faster than usual speeds and vGRF are affected by walking surface slope, the interaction of slope and speed has not previously been reported. The purpose of this study was to measure vertical ground reaction forces with grade and speed manipulation. Eleven healthy subjects (5 female, 6 male) volunteered in this study. vGRF data were collected (500 Hz) under the left foot while subjects walked on a motorized treadmill with two speed conditions (self-selected and constant) and six treadmill slopes (-5%, 0%, 5%, 10%, 15%, & 20%). At least 10 trials were collected after the subject had acclimated in each of the 12 randomized conditions. Four variables describing the vGRF were measured from each trial and the 10-trial mean for each subject/variable was entered into a 2x6 repeated measures ANOVA (α=0.05) with Bonferroni modifications to the *post hoc* tests. Results indicated a significant speed x slope interaction on the variables impulse and loading rate, and a significant main effect of slope on first and second maximum force. The results suggest that both slope and speed must be taken into consideration when attempting to reduce the magnitudes of critical vGRF parameters in walking programs.

Friday, September 24
4:00 – 4:15 pm

GROUND REACTION FORCES AT FIRST NON-ASSISTED GAIT FOLLOWING ACL RECONSTRUCTION SURGERY.

T. L. Holmes & S.T. McCaw, FACSM, Biomechanics Lab, Illinois State University, Normal.

Quantifying changes in gait parameters during rehabilitation from anterior cruciate ligament reconstruction (ACLr) surgery is important to monitor rehabilitation and to identify the new locomotion motor program. The purpose of our pilot study was to compare ground reaction forces (GRF) of ACLr patients to normative data. Methods: Three subjects (2 female, 1 male) were tested one-week prior to ACLr surgery and at first non-assisted gait following surgery (≈ 3 weeks post ACLr). Normative data were collected from 3 female subjects free of lower extremity injury. GRF data were collected (960 Hz) from the injured leg of the ACLr subjects and the right leg of the non-ACLr subjects while walking at a freely chosen pace over a force plate. At least five trials were collected for each condition. Unpaired t-tests (α = 0.05) were used to compare mean values. Results: No initial impact peaks were evident in the vertical GRF curves of the ACLr subjects, and it was consistently present for the non-ACLr group. The ACLR subjects also exhibited both a lower loading rate (10.49 ± 2.10 BW/s) and first maximum force (9.58 ± 0.28 N/kg) than the non-ACLr subjects (31.98 ± 5.91 BW/s and 12.30 ± 2.11 N/kg). Mean minimum force (7.59 ± 0.46 N/kg) and mean second maximum force (10.07 ± 0.31 N/kg) values were higher and lower, respectively, for the ACLr subjects than the non-ACLr subjects (MinF: 5.85 ± 2.13 N/kg; 2nd Max: 11.67 ± 0.79 N/kg). The vertical GRF differences reflect the ACLr subjects' utilization of reduced weight acceptance during initial stance, a more rigid leg during mid-stance, and less propulsion during terminal stance. Future research will include lower extremity kinematic and joint energetic analyses.

ORAL RESEARCH PRESENTATIONS

Friday, September 24
4:15 – 4:30 pm The Effects of Artificial Knee Effusion on Soleus H-Reflex Measurements

J Ty Hopkins, MS, ATC, Graduate Student, Athletic Training Department, Indiana State University, Terre Haute, Indiana.

Christopher D Ingersoll, PhD, ATC, FACSM, Professor, Chair, Athletic Training Department, Indiana State University, Terre Haute, Indiana.

Arthrogenic muscle inhibition (AMI) is a presynaptic, ongoing reflex inhibition of musculature surrounding a joint following distension or damage to that joint. In order to study AMI, a model must be established that is not confounded by the presence of pain. Spencer et al. (1984) showed the quadriceps to be inhibited by artificial knee effusion. The soleus H-reflex is much easier to measure, interpret, and may be directly related to quadriceps H-reflex. The purpose of this study was to compare changes in the magnitude of soleus motoneuron excitability using a knee joint effusion model over a 4 hour period. Eleven healthy and neurologically sound volunteers (age 24.0±2.6 yrs, height 173.2±9.6 cm, mass 72.9±8.7 Kg) with no history of lower extremity surgery and no lower extremity pathology in the last year participated in this study. An area superolateral to the patella was cleaned, and injected subcutaneously with 2cc of lidocaine for anaesthetic purposes. With a second disposable syringe 25mL of sterile saline was injected into the superolateral knee joint capsule. The H-reflex was elicited by applying a percutaneous stimulus to the tibial nerve in the popliteal fossa. Seven to 12 stimuli were delivered at 20 sec intervals with varying intensities to find the maximum H-reflex. The maximum H-reflex was measured 5 times at the same stimulus intensity with 20 second rest intervals. Differences between maximum H-reflex measurements were found between hours 3 and 4 and the pre-effusion measurement. Motoneuron pool excitability was increased from pre-injection measurements, creating a facilitation rather than an inhibition. This facilitation could be due to a compensatory reaction by the soleus in response to inhibited quadriceps. Further work needs to be done to determine the extent and duration of quadriceps inhibition elicited by artificial knee effusion.

Friday, September 24
4:30 – 4:45 pm

THE BACKPACK RUN TEST: A MODEL FOR A FAIR AND OCCUPATIONALLY RELEVANT MILITARY FITNESS TEST

S.P. Flanagan, P.M. Vanderburgh, FACSM. Department of Health and Sport Science, University of Dayton, Dayton, OH 45469-1210

Currently, no physical fitness test/event in any military service exists that measures some form of job-related fitness and is free of body size bias. Our purpose in this investigation was to develop and validate a theoretical model for a backpack run test (BRT), based on how fast one can run two miles while wearing a backpack. Using actual unloaded (no backpack) two-mile run test data from 59 male service academy cadets and the ACSM equations, we estimated the average oxygen cost during the run, the equivalent cost if wearing additional weight, and the corresponding estimated run time with the backpack. The correlations between body weight and loaded (backpack weight = 30kg) run times, $r=0.55$ ($p<0.05$) and $r=0.12$ ($p>0.05$), respectively, demonstrate that the bias against heavier runners is eliminated with the backpack run. Given that the BRT requires only standard issue equipment, demonstrates clear occupational and health-related fitness relevance, predicts no apparent body size bias, and measures work and health-related components of fitness, we recommend that military services consider the present data when developing or modifying tests of physical fitness.

ORAL RESEARCH PRESENTATIONS

Friday, September 24
4:45 – 5:00 pm

CHANGES IN PHYSICAL FITNESS STATUS AMONG CAUCASIAN AND AFRICAN AMERICAN MIDDLE SCHOOL STUDENTS

F. Wang, J. Zakrajsek, T. Conner, A.W. Garcia. U of Michigan, Ann Arbor, MI 48109.

In this report, we present changes in physical fitness status during the middle school years, including comparisons between Caucasians and African Americans. A battery of physical fitness tests was administered in 12 middle schools in Southeastern Michigan in the fall of 1996 (6th grade) and the spring of 1999 (8th grade). There were 1510 subjects (50% male, 50% female; 28.5% Caucasian, 44.2% African American, and 27.4% others) who completed testing in both years. The tests included: height, weight, triceps skinfold, blood pressure, sit-ups, push-ups (6th grade only), flexed arm hang (8th grade only), a hamstring flexibility test, and a 600-yard run/walk. By comparing students' scores to national health related norms, the percentage of students who passed the tests was calculated separately by gender. Students' performance was weakest in the sit-up test, across time, gender, and ethnicity, with 16.7% to 53.8% passing. The students also have relatively low passing rates for BMI, an important health indicator, averaging 67.46% across time, gender and ethnicity. The cross-sectional analyses indicated that for the battery as a whole the passing rates of Caucasians are the same or lower than those of African Americans in both years. In an effort to track fitness status, McNemar tests were conducted to compare the passing rates over time by gender and ethnicity. For males, the passing rates decreased significantly for systolic blood pressure, arm strength and hamstring flexibility; for females, BMI, triceps skinfold and arm strength became worse. The only improvement in fitness was found in the sit-ups test for males. No ethnic differences were found in changes in passing rates on any test. In general, it appears that the relatively low fitness status of students as they enter middle school either plateaus or worsens over time. The students' fitness status, especially for Caucasians, deserves more attention, with the emphasis needed in body composition, abdominal strength, and flexibility.

This study was supported by NCI grant # CA68010.

KEYNOTE LECTURE

Friday, September 24
5:30 – 6:30 pm

"Resistance Training and Women"

Willaim J. Kraemer, Ph.D., FACSM
Ball State University

William J. Kraemer, is *The John and Janice Fisher Chair in Exercise Physiology,* Director The Human Performance Laboratory and a Professor of Physical Education, Biology, Physiology and Health Science at Ball State University in Muncie, IN. In addition, Dr. Kraemer is an adjunct Professor of Physiology and Biophysics at the Indiana University School of Medicine. Prior to his recent new appointment at Ball State University he held the rank of Professor of Applied Physiology and Director of the Laboratory for Sports Medicine and Associate Director of the Center for Cell Research at the Pennsylvania State University for almost a decade. He was also the Director of Research in the Center for Sports Medicine in Department of Orthopedics in the College of Medicine at Penn State's Milton S. Hershey Medical Center. Dr. Kraemer is a Fellow in the American College of Sports Medicine and is also a member of the American Physiological Society and the Endocrine Society. Dr. Kraemer serves on numerous scientific journal editorial boards and is the current Editor-In-Chief of the *Journal of Strength and Conditioning Research* and is an Associate Editor for *Medicine and Science in Sports and Exercise*. He also chairs NASA's Committee on Resistance Training for the International Space Station. He has authored and co-authored over 250 manuscripts in the scientific literature and has co-authored four books. His research has focused on understanding the physiological basis for strength training and proper exercise prescription along with the underlying hormonal basis for exercise adaptations.

SYMPOSIUM

Saturday, September 25
10:00 am - 12:00 pm

"Effects of Temperature, Posture and Aging on Skin Blood Flow - A Laser-Doppler Flow Study"

The purpose of this symposium is to present a practical application of the laser-Doppler flowmeter (LDF) technique as a non-invasive tool for the study of curaneous blood flow in humans.

The objectives are three-fold: 1) to present research results using the laser-Doppler technology on temperature regulartion in elite athletes, non-athletes and elderly population, 2) to stimulate discussion on temperature regulation using skin blood flow, and 3) to learn the mechanism of skin blood flow in regulating body temperature during heat exposure and exercise, in aging populations and top-level athletes.

The laser-Doppler technique is a non-invasive research tool and has been employed to study skin blood flow at rest and during exercise in a neutral and hot environment for over two decades. Body temperature regulation also can be assessed by measuring skin blood flow during exercise to exhaustion in a hot environment. The accuracy of LDF in quantifying skin blood flow has been substantiated using other blood flow measurements of skin blood flow such at the plethysmography, heat thermal clearance or Xe^{133} clearance. In addition, the LDF measures of blood flow from the skin surface is not influenced by blood flow to underlying skeletal muscles. Research using the LDF as an index of skin blood flow to study temperature regulation has not been presented at the Midwest Regional Chapter of the ACSM, and this information would be beneficial for research and training.

A. *Skin Blood Flow After 5 Days of Intense Exercise and Heat Exposure in Top Level Athletes*
Michael T.C. Liang, Ph.D., Bowling Green State University

B. *Aging and Skin Blood Flow in a Hot Environment*
Amy Morgan, Ph.D., University of Toledo

C. *Posture and Skin Blood Flow in a Hot Environment*
Lilian Yue Chen, M.S., Bowling Green State University

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SYMPOSIUM

Saturday, September 25
10:00 am - 12:00 pm

"What Skills are Employers Really Looking for and Gorilla Tactics in the Job Search"

Due to the increasing scope of career opportunities in the health and wellness profession, an assessment of the knowledge, skills, and abilities recommended by ACSM's Health Fitness Instructor and Exercise Specialist with employers of Michigan was evaluated. Areas surveyed include desired KSA's/certifications, type of facilities and employment positions available, desired degree, and insufficient skills. Through assessing these areas, curricula may be designed to produce competitive graduates based on community needs.

In addition to academic preparation, graduates-to-be need to be aware of what internship and employment positions are available in the fitness and wellness profession and how to access this information. Sutdents also need to know how to effectively market themselves to potential employers. Critical factors include writing winning resumes, communication skills, technical skills, work experience and leadership abilities.

A. *What KSA's are Today's Fitness and Wellness Service Providers Looking For?*
Rena Hassing, B.S. and Andy Retberg, B.S., Grand Valley State University

B. *What Can I Be When I Grow Up with a Fitness and Wellness Major?*
Brenda Reeves, Ph.D., Grand Valley State University

C. *How to Market Yourself to the Employer*
Ginger Lange, M.A., Grand Valley State University

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