

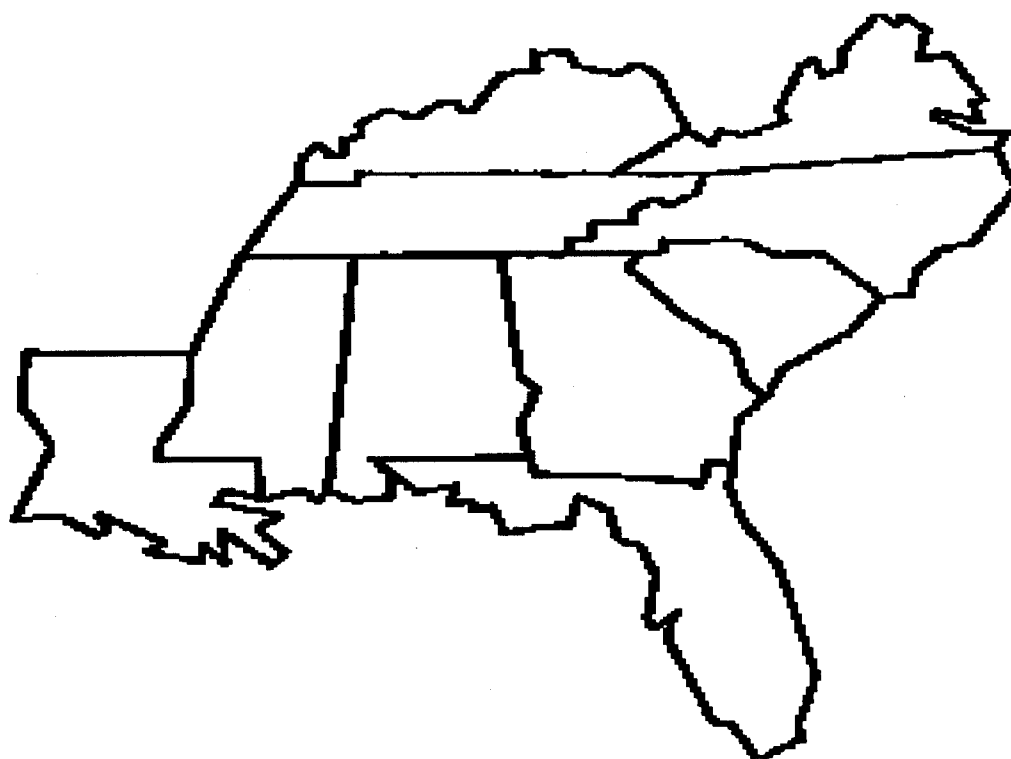
**AMERICAN COLLEGE  
of SPORTS MEDICINE**  
SOUTHEAST REGIONAL CHAPTER

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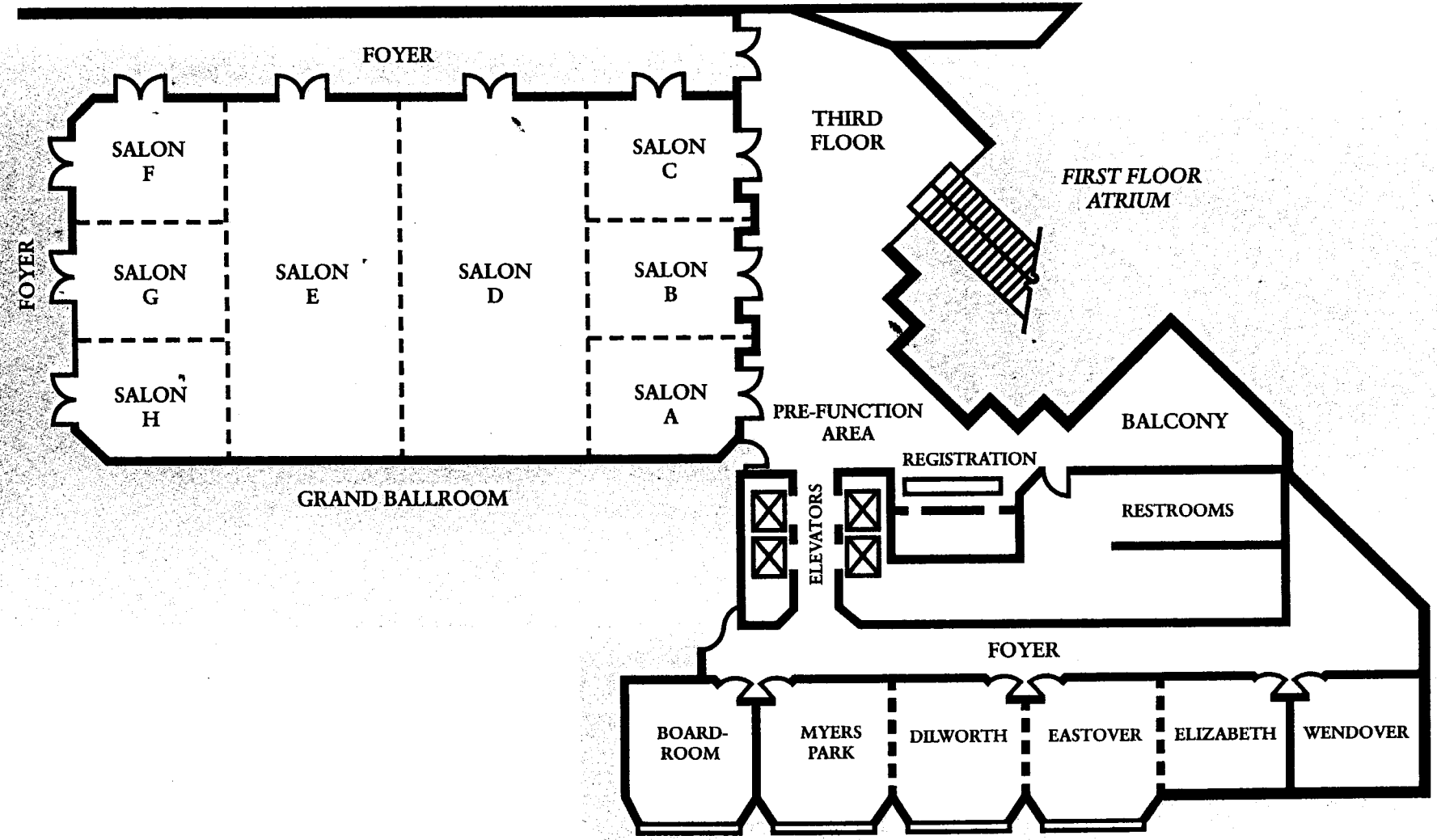
**February 9-11, 2006  
34th Annual Meeting  
Marriott Charlotte City Center  
Charlotte, North Carolina**

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Jointly Sponsored by: The American College of Sports Medicine (ACSM)  
and the Southeast Chapter of the American College of Sports Medicine (SEACSM)

# Floor Plan



**Thirty-Fourth Annual Meeting**

**SOUTHEAST REGIONAL CHAPTER  
AMERICAN COLLEGE OF  
SPORTS MEDICINE**

**Marriott Charlotte City Center  
Charlotte, North Carolina  
February 9-11, 2006**

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Abigail Turpyn, Virginia Tech (Student Rep.)

Debra M. Vinci, University of West Florida

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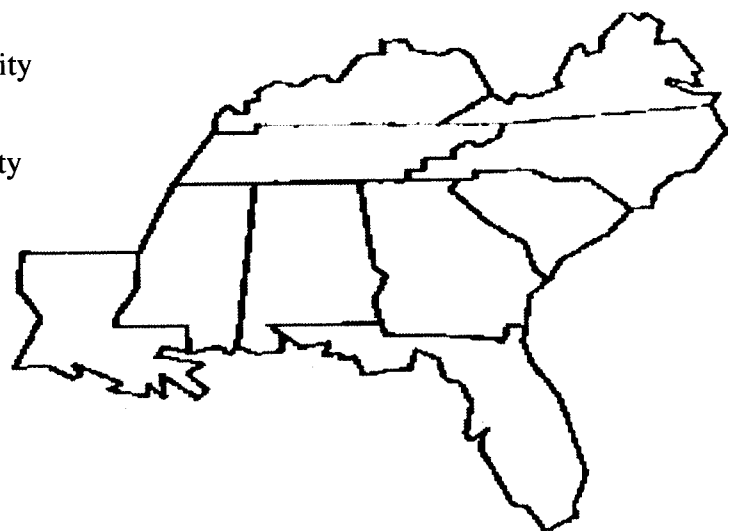
Carolynn Berry, Winston Salem University

**Exhibits, Sponsorships & Fund Raising:**

Liz Dowling, Old Dominion University

**Publisher and Editor:**

Don Torok, Florida Atlantic University



### **Meeting Objective**

At the conclusion of the meeting, participants should be able to:

- Understand the biological, biomechanical, and psychological bases for the changes that occur during and following exercise in both normal and pathological states
- Identify new approaches to problems in exercise science and sports medicine through interaction among scientists and clinicians
- Recognize contemporary controversial issues related to sports medicine and exercise science
- Examine state-of-the-art and innovative basic science, applied science, and clinical information which will increase their knowledge of exercise, fitness, health, physical performance and sports medicine

### **Accreditation**

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American College of Sports Medicine and the Southeast Chapter of the American College of Sports Medicine. The American College of Sports Medicine is accredited by the ACCME to provide continuing medical education for physicians.

### **AMA/PRA**

The American College of Sports Medicine designates this educational activity for a maximum of 15.5 hours in category I credit towards the AMA Physician's Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

### **Continuing Education Credits**

SEACSM is an approved provider for ACSM and NATA (P788). Continuing education credits (CECs) have been applied for through NSCA, AFP and ACE. An attendee form will be available to sign to be eligible to receive CECs from the Commission of Dietetic Registration. Attendance verification forms will be available for these and other organizations upon request.

### **Faculty Disclosure**

In accordance with ACCME requirements, faculty at all educational activities that receive CME credit must provide the audience with (1) disclosure of financial relationships they have with the supporters of this conference or with the manufacturers of products discussed in their presentations, and (2) disclosure of unlabeled or unapproved uses of drugs or devices that are discussed in their presentations. Therefore, the following information is provided:

Mark Fenton reported a consultant relationship with Exel-Nordic Walking Poles. All other faculty returned disclosure forms indicate that they have no affiliation or financial interest in any organization(s) that may have a direct interest in the subject matter of their presentation(s).

### **Disclosure of Unlabeled/Unapproved Uses of Drugs or Devices**

Notice: In accordance with the ACCME Standards for Commercial Support, the audience is advised that one or more presentations in this continuing medical education activity may contain reference(s) to unlabeled or unapproved uses of drugs or devices. Speakers will disclose this information at the time of their presentation.

### **Acknowledgement of Commercial Support**

The Southeast Chapter of the American College of Sports Medicine gratefully acknowledges the unrestricted educational grants from: Pfizer, and Gatorade Sports Science Institute,

Planning Committee

Lynn Berry, Paul Davis, Liz Dowling, Judith Flohr, Allan Goldfarb, Peter Grandjean, Andrew Gregory, Tim Lightfoot, Janet Rankin, Dixie Thompson, Don Torok, Abigail, Turpyn, Debra Vinci

SEACSM List of Reviewers

Kenneth Bielak, Jody Clasey, John P. McCarthy, Jeffrey Johnson, Jesse DeMello, Laurie Wideman, Michael Turner, Joseph Houmard, Walter Thompson, and Gregory Hand. Allan Goldfarb, Timothy Lightfoot

SEACSM Meetings & Officers

	<u>Date/Place</u>	<u>Pres./PastPres./PresElect</u>	<u>Executive Board</u>
1st	Fall 1973 Gatlinburg, TN	Andrew Kozar	
2nd	Fall 1974 Atlanta, GA	Clyde Partin	
3rd	Fall 1975 Charlottesville, VA	Dan Copeland	
4th	Fall 1976 Murfreesboro, TN	Rankin Cooter	
5th	Fall 1977 Lexington, KY	Ed Howley	Steve Blair Ron Byrd Joe Smith
6th	Fall 1978 Columbia, SC	Russ Pate	
7th	Feb. 16-17, 1979 Atlanta, GA	Dennis Wilson Ed Howley Ron Byrd	Earl Allen Thad Crews Art Weltman
8th	Feb. 8-9, 1980 Charlotte, NC	Ron Byrd Dennis Wilson Paul Ribisl	Bruce Gladden Jay Kearney Russ Pate
9th	Feb. 6-7, 1981 Charleston, SC	Paul Ribisl Ron Byrd Bill Herbert	Joe Chandler Tom Cronan Kirk Cureton
10th	Feb. 5-6, 1982 Blacksburg, VA	Bill Herbert Paul Ribisl Russ Pate	Harvey Murphy (ES) Jon MacBeth (ES) Joe Chandler Tom Cronan Kirk Cureton Robert McMurray
11th	Feb. 4-5, 1983 Gainesville, FL	Russ Pate Bill Herbert Kirk Cureton	Jon MacBeth (ES) Earl Allen David Cundiff Scott Powers
12th	Feb. 3-4, 1984 Auburn, AL	Kirk Cureton Russ Pate Chris Zauner	Ron Bos (ES) Emily Haymes Phil Sparling Mike Stone

	<u>Date/Place</u>	<u>Pres./PastPres./PresElect</u>	<u>Executive Board</u>
13th	Jan. 31-Feb. 2, 1985 Boone, NC	Chris Zauner Kirk Cureton Robert McMurray	Ron Bos (ES) John Billings Harry DuVal Diane Spitler J. W. Yates
14th	Jan. 23-25, 1986 Athens, GA	Robert McMurray Chris Zauner Scott Powers	Ron Bos (ES) Terry Bazarre John Billings J. Larry Durstine Russ Pate (N) Diane Spitler
15th	Jan. 29-31, 1987 Charleston, SC	Scott Powers Robert McMurray Diane Spitler	Ron Bos (ES) Terry Bazarre J. Larry Durstine Steve Messier Allen Moore (S) Russ Pate (N) Janet Walberg
16th	Jan. 28-30, 1988 Winston-Salem, NC	Diane Spitler Scott Powers Phil Sparling	Ron Bos (ES) Dalynn Badenhop Gay Israel Steve Messier Russ Pate (N) Janet Walberg Rankin Mark Senn (S)
17th	Jan. 19-20, 1989 Atlanta, GA	Phil Sparling Diane Spitler Emily Haymes	Ron Bos (ES) Dalynn Badenhop Kirk Cureton (N) Mark Davis Gay Israel Ben Kibler (MD) David Peltzer (S) Art Weltman
18th	Feb. 1-3, 1990 Columbia, SC	Emily Haymes Phil Sparling Harry DuVal	Ron Bos (ES) Jerry Brandon Maria Burgess (S) Kirk Cureton (N) Mark Davis Ben Kibler (MD) Dianne Ward Art Weltman
19th	Jan. 31-Feb. 2, 1991 Louisville, KY	Harry DuVal Emily Haymes Steve Messier	Ron Bos (ES) Jerry Brandon Maria Burgess (S) Kirk Cureton (N) Kevin Davy (S) Alan Rogol (MD) Jeff Rupp Amanda Timberlake Dianne Ward

	<u>Date/Place</u>	<u>Pres./PastPres./PresElect</u>	<u>Executive Board</u>
20th	Jan. 30-Feb. 1, 1992 Auburn, AL	Steve Messier Harry DuVal Gay Israel	Ron Bos (ES) Kevin Davy (S) Bill Duey (S) Ben Kibler (MD) Mindy Millard-Stafford Bob Moffatt Alan Rogol (MD) Jeff Rupp Phil Sparling (N) Amanda Timberlake
21st	Jan. 28-30, 1993 Norfolk, VA	Gay Israel Steve Messier J. Mark Davis	Vaughn Christian (ES) Barbara Ainsworth Michael Berry Jeff Chandler (CC) Shala Davis (S) Mindy Millard-Stafford Bob Moffatt Alan Rogol (MD) Phil Sparling (N) Kevin Tipton (S)
22nd	Jan. 20-22, 1994 Greensboro, NC	J. Mark Davis Gay Israel Janet Walberg Rankin	Vaughn Christian (ES) Barbara Ainsworth Michael Berry Jeff Chandler (CC) Shala Davis (S) Allan Goldfarb Victoria Schnyder (S) Phil Sparling (N) Beverly Warren
23rd	Feb. 2-4, 1995 Lexington, KY	Janet Walberg Rankin J. Mark Davis J. Larry Durstine	Vaughn Christian (ES) Carolyn Berry Jeff Chandler (CC) Allan Goldfarb Ed Howley (N) David Nieman Victoria Schnyder (S) Beverly Warren
24th	Feb. 1-3, 1996 Chattanooga, TN	J. Larry Durstine Janet Walberg Rankin Bruce Gladden	Vaughn Christian (ES) Carolyn Berry Ed Howley (N) Tim Lightfoot Patricia Mosher David Nieman Stewart Trost (S) George Wortley (MD)
25th	Jan. 23-25, 1997 Atlanta, GA	Bruce Gladden J. Larry Durstine Bob Moffatt	Vaughn Christian (ES) Dave Bassett Ed Howley (N) Tim Lightfoot Patricia Mosher Ann Swank Stewart Trost (S) George Wortley (MD)

	<u>Date/Place</u>	<u>Pres./PastPres./PresElect</u>	<u>Executive Board</u>
26th	Jan. 29-31, 1998 Destin, FL	Bob Moffatt Bruce Gladden Dianne Ward	Vaughn Christian (ES) Dave Bassett Mark Davis (N) Bonita Marks Mike Overton Ann Swank Melicia Whitt (S) George Wortley (MD)
27th	Feb. 4-6, 1999 Norfolk, VA	Dianne Ward Bob Moffatt Jeff Rupp	Vaughn Christian (ES) Mark Davis (N) Steve Dodd Bonita Marks Mike Overton Dixie Thompson Melicia Whitt (S) George Wortley (MD)
28th	Jan. 27-29, 2000 Charlotte, NC	Jeff Rupp Dianne Ward Mindy Millard-Stafford	Vaughn Christian (ES) Ted Angelopoulos Linda Chitwood Mark Davis (N) Keith DeRuisseau (S) Steve Dodd Dixie Thompson George Wortley (MD)
29th	Jan. 25-27, 2001 Columbia, SC	Mindy Millard-Stafford Jeff Rupp David Nieman	Vaughn Christian (ES) Ted Angelopoulos Linda Chitwood Bruce Gladden (N) Keith DeRuisseau (S) Craig Broeder Liz Dowling George Wortley (MD)
30 <sup>th</sup>	Jan 31-Feb.2, 2002 Atlanta, GA	David Nieman Mindy Millard-Stafford Michael Berry	Vaughn Christian (ED) Anne Allen (MD) Craig Broeder Bruce Gladden (N) Greg Hand Pat Nixon Ray Thompson (S) Liz Dowling Don Torok
31 <sup>st</sup>	Jan 30-Feb 1, 2003 Atlanta, GA	Michael Berry David Nieman Beverly Warren	Carolynn Berry (ED) Anne Allen (MD) Bruce Gladden (N) Greg Hand Pat Nixon David Pascoe Ray Thompson (S) Liz Dowling Don Torok Alan Utter



	Date/Place	Pres./PastPres./PresElect	Executive Board
32 <sup>nd</sup>	Jan.29-31, 2004 Atlanta, GA	Beverly Warren Michael Berry Allan Goldfarb	Carolynn Berry (ED) Stephen Bailey B. Sue Graves Ron Lee (MD) David Pascoe Janet Rankin Daniela Rubin (S) Alan Utter Liz Dowling Don Torok
33 <sup>rd</sup>	Jan. 27-29, 2005 Charlotte, NC	Allan Goldfarb Beverly Warren Tim Lightfoot	Carolynn Berry (ED) Stephen Bailey B. Sue Graves Judith Flohr Andrew Gregory (MD) Janet Rankin Daniela Rubin (S) Debra M. Vinci Liz Dowling Don Torok
34 <sup>th</sup>	Feb. 9-11, 2006 Charlotte, NC	Tim Lightfoot Allan Goldfarb Dixie Thompson	Carolynn Berry (ED) Paul Davis Judith Flohr Peter Grandjean Andrew Gregory (MD) Janet Rankin Abigail Turpyn (S) Debra M. Vinci Liz Dowling Don Torok

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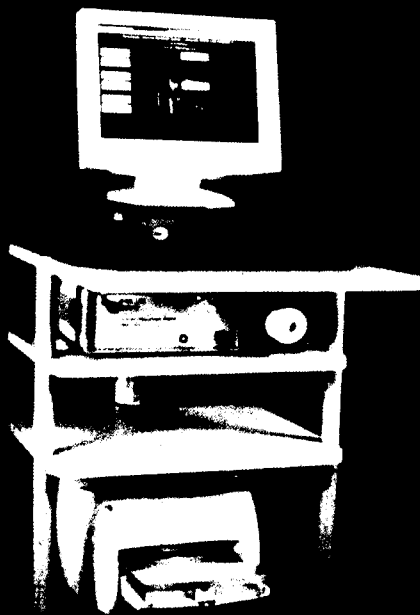
## SEACSM Award Winners

	<u>Scholar Award</u>
1989	Hugh Welch
1990	Russ Pate
1991	Wendell Stainsby
1992	Robert Armstrong
1993	Michael Pollock
1994	Kirk Cureton
1995	Scott Powers
1996	Mel Williams
1997	Henry Montoye
1998	Ed Howley
1999	Steve Messier
2000	Bruce Gladden
2001	Barbara Ainsworth
2002	J. Mark Davis
2003	Robert McMurray
2004	Rod Dishman
2005	Emily Haymes
2006	David Nieman

<u>Service Award</u>
Ron Bos
Harvey Murphy
Paul Ribisl
Phil Sparling
Dennis Wilson
Ed Howley
Gay Israel
Russ Pate
Emily Haymes
Kent Johnson
Vaughn Christian
J. Larry Durstine
Janet Walberg Rankin
Jeff Rupp
Don Torok
Mindy Millard-Stafford
George Wortley

<u>Student Award</u>
Paul Davis
Brian Hinson
Steve Bailey
David Criswell
Marian Kohut
Marvin Rainwater
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# SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE 2006 ANNUAL MEETING SCHEDULE

## THURSDAY, February 9, 2006

- 12:00 – 2:00      **BOARD MEETING (Boardroom)**
- 12:00 – 6:00      **REGISTRATION (Third Floor Registration Area)**
- 4:00 – 9:00      **EXHIBITS (Third Floor)**
- 4:00 – 6:00      **ACTIVE AGING INITIATIVE**  
Dr. Denise Gobert – Active Aging: Maintaining Balance for Life (Salon E)
- 4:00-5:30      **SYMPOSIUM (S1)**  
The Impact of Obesity on Strength and Function in Visually Impaired and Older Diabetic Adults (Salon F)
- 4:00 – 5:00      **TUTORIALS (T1-T2)**  
Time trends and international differences in physical activity and diet: Clues to the obesity epidemic (Salon A)  
Cancer treatment: Future trends in the administration of exercise and recreation (Salon B)
- 4:00 – 5:30      **ORAL FREE COMMUNICATIONS**  
Fitness/Testing/Assessment (O1-O6) (Salon G)  
Biomechanics/Gait/Balance (O7-O12) (Salon H)
- 4:00 – 6:00      **POSTER PRESENTATIONS I (P1-P14) Salon C** Authors present from 5:00-6:00  
Biomechanics/Gait/Balance      Metabolism – CHO, Lipid, Protein  
Cellular Regulatory Mechanisms      Body Composition/Energy Balance/Weight Control
- 5:15 – 6:15      **TUTORIALS (T3-T4)**  
Case study approach to teaching fitness testing and prescription (Salon A)  
Musculoskeletal modeling and computer simulation of human movement (Salon B)
- 7:30-9:00  
(CME1\*)      **BUSINESS MEETING AND KEYNOTE ADDRESS (Salons D & E)**  
Presiding: Tim Lightfoot  
“Is exercise the magic bullet for disease prevention and longevity?”  
Frank Hu, M.P.H, Ph.D., M.D., Director, Boston Obesity Nutrition Research Center  
Epidemiology Core  
School of Public Health, Harvard University
- 9:00-11:00      **SEACSM SOCIAL (Salons A, B, & C)**

## FRIDAY, February 10, 2006

- 6:30-7:45      **WOMEN'S BREAKFAST (Dilworth & Eastover)**  
(Registration required)
- 8:00-6:00      **REGISTRATION (Third Floor Registration Area)**
- 8:00-6:00      **EXHIBITS (Third Floor)**

- 8:00-9:00  
(CME1\*) **ACSM PRESIDENTIAL ADDRESS (Salons D & E)**  
**“Pacing strategy: The unexplored country in sports performance”**  
 Carl Foster, PhD, FACSM, ACSM President  
 Professor - University of Wisconsin-La Crosse
- 9:00-9:15 **BREAK**
- 9:00-11:00 **POSTER PRESENTATIONS II (P15-P26) Salon C**  
 Authors present from 10:00-11:00
- |                              |  |
|------------------------------|--|
| Chronic Disease & Disability | Connective Tissue/Bone/Skeletal Muscle |
| Endocrinology/Immunology     | Competitive Athletes                   |
| Environmental Physiology     | Epidemiology & Preventive Medicine     |
- 9:15-10:45 **SYMPOSIUM (S2)**  
 Debunking the myths: Experts address controversial questions related to exercise and health (Salon F & G)
- 9:30-10:30 **TUTORIALS (T5-T7)**  
 Thermoregulation in the child athlete: Are they at risk? (Salon A)  
 Compartmentation of lactate in the blood: Do you know what you are measuring? (Salon B)  
 Physical activity and genetics: The current research on a topic that impacts us all (Myers Park)
- 9:15-10:30 **ORAL FREE COMMUNICATIONS**  
 Hematology/Immunology (O13-O17) (Salon H)  
 Athletic Care/Trauma/Rehabilitation and Biomechanics (O18-O22) (Elizabeth)
- 10:45-11:00 **BREAK**
- 11:00-12:00  
(CME1\*) **BASIC SCIENCE LECTURE (Salons D & E)**  
**“The 0.1% Solution: Genetics and Exercise Training Adaptations”**  
 James Hagberg, PhD, FACSM, Dept. of Kinesiology, University of Maryland, College Park, MD
- 12:00-1:15 **PAST PRESIDENT’S LUNCH (Elizabeth)**
- 1:00-1:30 **CLINICAL TRACK (Dilworth/Eastover)**  
 Dr. John MacKnight – Medical Masqueraders in Sports Medicine
- 1:30-2:30  
(CME1\*) **CLINICAL EXCHANGE LECTURE (Salons D & E)**  
**“Sudden Death in Athletes”**  
 James Puffer, M.D.
- 2:30-4:15 **POSTER PRESENTATIONS III (P27-P43) Salon C**  
 Authors present 3:15-4:15
- |                              |                            |
|------------------------------|----------------------------|
| Exercise Evaluation/Clinical | Fitness/Testing/Assessment |
|------------------------------|----------------------------|
- 2:30 -3:30 **CLINICAL TRACK – (Dilworth/Eastover)**  
 Fellows Cases 1, 2, & 3 Followed by Discussion
- 2:45-4:15 **SYMPOSIUM (S3)**  
 Exertional compartment syndrome in athletes (Salon A)

- 2:45-3:45      **TUTORIALS (T8-T10)**  
 Nutritional strategies to counter stress to the immune system in athletes (Salon B)  
 ACSM's Guidelines for Exercise Testing and Prescription, 7th edition: Important changes (Salon F)  
 A broader view of exercise science: Non-traditional research lines (Myers Park)
- 2:45-4:00      **ORAL FREE COMMUNICATIONS**  
 Body Composition/Energy Balance/Weight Control (O23-O26) (Salon G)  
 Chronic Disease and Disability (O27-O31) (Salon H)
- 3:30 – 4:00      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Dr. John Baston – Obesity in young athletes
- 4:00 – 4:30      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Dr. Andrew Gregory – Abdominal trauma in sports and runners trots
- 4:30 – 4:45      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Discussion
- 4:15-5:30      **STUDENT SYMPOSIUM (Salon D)**  
**“NASA: It's not just for Engineers”**  
 Stuart Lee, Senior Scientist/Exercise Physiology, Wyle Laboratories
- 5:00 – 6:00      **CLINICAL TRACK – (Dilworth/Eastover)**  
**KEYNOTE SPEAKER**  
 Dr. Christine Lawless – Update: The new Bethesda guidelines
- 5:30–6:30      **SEACSM GRADUATE STUDENT FAIR (Salon E)**

**SATURDAY, February 11, 2006**

- 7:30-9:00      **REGISTRATION** (Third Floor Registration Area)
- 7:30 – 8:30      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Fellows Cases 4, 5, & 6 followed by discussion
- 8:00–12:00      **EXHIBITS** (Third Floor)
- 8:00-9:00  
 (CME1\*)      **HENRY J. MONTOYE SCHOLAR LECTURE (Salons D & E)**  
 Dr. David C. Nieman  
 “Exercise Immunology: A 20-Year Perspective”
- 9:00-9:15      **BREAK**
- 8:30 – 9:00      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Dr. Tracy Ray – Fatigue in athletes: Physiologic, psychologic or pathologic
- 9:00 – 9:30      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Dr. Kevin Guskiewicz, ATC – Postural testing in concussion management
- 9:30 – 9:45      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Discussion
- 9:30-11:30      **POSTER PRESENTATIONS IV (P44-P59) Salon C**  
 Authors present 10:30-11:30  
 Fitness/Testing/Assessment      Psychology/Psychiatry/Behavior  
 Nutrition and Exercise/Sports

- 9:15-10:45      **SYMPOSIUM (S4)**  
Arthrogenic muscle inhibition and ankle injuries (Salon A)
- 9:15-10:15      **TUTORIALS (T11-T12)**  
Physiology of obesity and lifestyle diseases: Present state of knowledge (Salon F)  
Excitation-contraction coupling and the role of ryanodine receptors in health and disease (Myers Park)
- 9:15-10:45      **ORAL FREE COMMUNICATIONS**  
Development & Aging / Cardiovascular Physiology / Cellular Regulatory Mechanisms /  
Connective Tissue/Bone/Skeletal Muscle (O32-O37) (Salon G)
- 9:45 – 10:45      **CLINICAL TRACK – (Dilworth/Eastover)**  
Fellows Cases 7, 8, & 9 followed by discussion
- 10:30-11:45      **ORAL FREE COMMUNICATIONS**  
Competitive Athletes / Nutrition and Exercise/Sports / Connective Tissue/Bone/Skeletal  
Muscle (O38-O42) (Salon H)
- 10:45 – 11:45      **CLINICAL TRACK – (Dilworth/Eastover)**  
**KEYNOTE SPEAKER**  
Dr. Frederick Reed – Update: The new PPE monograph
- 11:45 – 12:00      **CLINICAL TRACK – (Dilworth/Eastover)**  
Discussion – Best Fellow's Case Award
- 11:00-12:00      **TUTORIALS (T13-T16)**  
From research to practice: Principles of wellness coaching (Salon A)  
Does calcium really play a major role in enhancing weight loss? (Salon B)  
Stress: What is it and how can physical activity reduce its effects on health (Salon G)  
Interval training (Myers Park)
- Noon-2:00  
(CME1\*)      **SEACSM LUNCHEON AND LECTURE (Salon D & E)**  
**“How Do I Get 10,000 Steps If I Can't Even Cross the Darn Street?”**  
Mark Fenton, BS, MS  
Transportation and Public Health Consultant; Scituate, MA
- 2:00-4:00      **SEACSM EXECUTIVE BOARD MEETING (Boardroom)**
- 2:00-6:00      **LIFE FITNESS ACADEMY (Salons A & B)**  
Separate Registration Required

**SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE  
2006 ANNUAL MEETING SCHEDULE  
PROGRAM**

**THURSDAY, FEBRUARY 9, 2006**

12:00 – 2:00      **BOARD MEETING (Boardroom)**

12:00 – 6:00      **REGISTRATION (Third Floor Registration Area)**

4:00 – 9:00      **EXHIBITS (Third Floor)**

4:00 – 6:00      **ACTIVE AGING INITIATIVE**  
ACTIVE AGING – MAINTAINING BALANCE FOR LIFE  
Dr. Denise Gobert  
Chair: Dr. Beverly Warren (**Salon E**)

4:00-5:30      **SYMPOSIUM (S1)**

S1      THE IMPACT OF OBESITY ON STRENGTH AND FUNCTION IN VISUALLY IMPAIRED AND OLDER DIABETIC ADULTS. L. Jerome Brandon, Georgia State University and Christopher Ray, Rehab R & D Center, V.A. Medical Center, Decatur GA.  
Chair: Dr. Judith Flohr (**Salon F**)

4:00 – 5:00      **TUTORIAL (T1 – T2)**

T1      TIME TRENDS AND INTERNATIONAL DIFFERENCES IN PHYSICAL ACTIVITY AND DIET: CLUES TO THE OBESITY EPIDEMIC. D.R. Bassett, Jr., FACSM, Department of Exercise, Sport, and Leisure Studies, The University of Tennessee, Knoxville, TN.  
Chair: Dr. Gregory Hand (**Salon A**)

T2      CANCER TREATMENT: FUTURE TRENDS IN THE ADMINISTRATION OF EXERCISE AND RECREATION. Claudio Battaglini and Diane Groff; University of North Carolina at Chapel Hill.  
Chair: Dr. Paul Davis (**Salon B**)

4:00 – 5:30      **ORAL FREE COMMUNICATIONS**

**Fitness/Testing/Assessment** - Chair: Dr. Cathy Roy (**Salon G**)

- O1      COMPARISON OF ACCELEROMETER TIME SAMPLING INTERVALS FOR ASSESSMENT OF PHYSICAL ACTIVITY AMONG PRESCHOOL CHILDREN. K.A. Pfeiffer, K.L. McIver, M. Dowda, and R.R. Pate, FACSM. University of South Carolina, Columbia, SC.
- O2      VALIDATION OF THE LIFECORDER EX ACTIVITY MONITOR. C. Albright, S.A. Schmidt, and D.L. Thompson, FACSM. University of Tennessee, Knoxville, TN.
- O3      DIFFERENCES BETWEEN SUBJECTIVE AND OBJECTIVE OBSERVATIONS OF PHYSICAL ACTIVITY FOR COLLEGE FEMALES. Danielle Wadsworth, Auburn University & Jeffrey Hallam, The University of Mississippi.
- O4      ACCUMULATED OXYGEN DEFICIT & VO<sub>2</sub>MAX PLATEAU ON A CONTINUOUS TEST. Harris, JE, ML Goodwin, A Hernandez, \*HB Rossiter, and LB Gladden. Dept of Health & Human Perf, Auburn University and \*Inst of Membrane & Systems Biol, University of Leeds.



- 05 PHYSICAL ACTIVITY OF OLDER ADULTS RESIDING IN DIFFERENT LEVELS OF CARE. Randall J. Bergman, Kentucky Wesleyan College and Diane A. Klein, The University of Tennessee, Knoxville, TN.
- 06 ACSM/CDC PHYSICAL ACTIVITY RECOMMENDATION PROFILE OF OLDER ADULTS IN THE US: 1999-2002 NHANES. Eugene C. Fitzhugh, The University of Tennessee, Knoxville, TN.

**Biomechanics/Gait/Balance** Chair: Dr. Clare Milner (Salon H)

- 07 RELATIONSHIP BETWEEN MUSCLE COACTIVITY AND FORCE VARIABILITY IN YOUNG AND OLD ADULTS. J. Armada, M. Pullen, P. DeVita FACSM, T. Hortobágyi FACSM, Biomechanics Laboratory, Department of Exercise and Sport Science, East Carolina University, Greenville, NC.
- 08 A BIOMECHANICAL ANALYSIS OF THE SQUAT BETWEEN COMPETITIVE COLLEGIATE AND HIGH SCHOOL POWERLIFTERS. Miletello, W., Mahajan, N., Swaminathan, A., Ready, H., Cook, B., Emerson, C., Devadason, B., Dalrymple, B., Chilakala, S., Julien, D., Resendez, J. & Ruelas, B. Louisiana Tech University, Ruston, LA.
- 09 THE EFFECT OF BIOFEEDBACK ON TRUNK POSTURE DURING THE LOWERING PHASE OF LIFTING. J. T. Johnson, B. F. Johnson, G. Moore, L. Tis, FACSM, J. A. Doyle, and E. Higbie, University of West Georgia and Georgia State University.
- 010 SHOULDER EXTERNAL ROTATION FLEXIBILITY IN TENNIS PLAYERS. Jeff T. Wight, Guy B. Grover, John W. Chow, and Mark D. Tillman. Center for Exercise Science, University of Florida, Gainesville, FL.
- 011 CHANGES IN INTER-JOINT COORDINATION DURING GAIT WITH AGE. A. Gruber, P. Rider, J. Helseth, T. Hortobágyi FACSM & P. DeVita FACSM. Biomechanics Laboratory, Department of Exercise and Sport Science, East Carolina University, Greenville, NC.
- 012 AGE BUT NOT STRENGTH IS ASSOCIATED WITH MECHANICAL PLASTICITY IN GAIT. P. Rider, A Gruber, J. Helseth, T. Hortobágyi FACSM & P. DeVita FACSM. Biomechanics Laboratory, Department of Exercise and Sport Science, East Carolina University, Greenville, NC.

4:00 – 6:00 **POSTER PRESENTATIONS I (P1-P14).** Authors present from 5:00-6:00. (Salon C)

**Biomechanics/Gait/Balance**

- P1 THE RELATIONSHIP BETWEEN MUSCULAR STRENGTH, FLEXIBILITY, BALANCE AND 200 METER RUN SPEED IN COLLEGE AGED PARTICIPANTS. Sara Rakov and William Barfield, PhD. College of Charleston, Charleston SC.
- P2 EFFECT OF POWERED-ANKLE FOOT ORTHOSES (PAFOS) ON WALKING ECONOMY. E.M. Byrne, J.A. Norris, M.R. Mitros, A.P. Marsh, and K.P. Granata. Dept. of Health & Exercise Science, Wake Forest University and School of Biomedical Engineering & Sciences, Virginia Tech.
- P3 EFFECT OF EXTERNAL STIMULI ON SENIOR ADULTS DURING STAIR DESCENT. Sankara, Y., Miletello, W., Cronk, S., Kim, B.J., and Mahajan, N. Louisiana Tech University.

**Body Composition/Energy Balance/Weight Control**

- P4 EXAMINATION OF ESTIMATED, ACTUAL AND PERCEIVED CALORIC EXPENDITURE ON AN ELLIPTICAL TRAINER. Alicia R. Powell, Kate A. Fuchs, Anne E. Mishler and Judith A. Flohr. Department of Kinesiology, James Madison University.
- P5 EXCESS POSTEXERCISE OXYGEN CONSUMPTION AND INTERVAL TRAINING. S. Asano, T. J. Chandler, FACSM., C. E. Arnold, J. Mak, and T. Shepherd. Division of Exercise Science, Sports and Recreation, Exercise Physiology Laboratory, Marshall University, Huntington, WV.

- P6 LACK OF RELATIONSHIP BETWEEN WEIGHT AND PHYSICAL ACTIVITY IN MICE. M.J. Yost, S.E. Carter, A.M. Kleinhen, M.J. Turner, and J.T. Lightfoot, Dept. of Kinesiology, University of North Carolina at Charlotte, Charlotte, NC.
- P7 SELF-REPORTED AND MEASURED WEIGHT DISCREPANCY IN OVERWEIGHT/OBESE YOUNG WOMEN. S.D. Kirk, K.R. Hill, D.I. Melton, B.L. Swearingin, J.D. Waggoner, and P.G. Davis, FACSM. University of North Carolina at Greensboro and North Carolina A&T State University.
- P8 IMPROVEMENTS IN BLOOD LIPID PROFILE FOLLOWING A 6-MONTH MULTI-DISCIPLINARY ADOLESCENT HEALTHY WEIGHT MANAGEMENT PROGRAM. Herrick, JE, Evans, RK, Franco, RL, Stern, M, Bryan, DL, Larson, NY, Toderico, BJ, and Laver, JH. T.E.E.N.S. Healthy Weight Management Program, Virginia Commonwealth University, Richmond, VA.
- P9 THE T.E.E.N.S. HEALTHY WEIGHT MANAGEMENT PROGRAM: CHANGES IN PHYSICAL FITNESS CHARACTERISTICS OF OVERWEIGHT ADOLESCENTS AFTER 6 MONTHS OF PARTICIPATION. Toderico, BJ, Evans, RK, Franco, RL, Stern, M, Bryan, DL, Larson, NY, Herrick, JE, Laver, JH. T.E.E.N.S. Healthy Weight Management Program, Virginia Commonwealth University, Richmond, VA.

**Metabolism/Carbohydrate, Lipid, Protein**

- P10 EXAMINATION OF AN INNOVATIVE JUMPING DEVICE: OBSERVED RATES OF PERCEIVED EXERTION RESPONSES IN TRAINED SUBJECTS. Callahan, Z., Lyons, S., Bosak, A., Morehead, C., Faircloth, J., and Davis, J. Western Kentucky University, Bowling Green, KY.
- P11 ADOLESCENT OVERWEIGHT: PREVALENCE AND PREDICTORS. Garder, M., and Lyons, S. Western Kentucky University, Bowling Green, KY.
- P12 DIFFERENTIAL IMPACT OF HIGH-CARBOHYDRATE VS. LOW-CARBOHYDRATE DIETS ON ENDOTHELIAL FUNCTION IN ADULTS WITH THE METABOLIC SYNDROME. DW Brock, BA Irving, MK Davis, EJ Barrett, A Weltman, and GA Gaesser. University of Virginia, Charlottesville, VA.
- P13 THE EFFECT OF 10 DAYS OF EXERCISE TRAINING ON SKELETAL MUSCLE, OXIDATIVE CAPACITY, AND TOTAL FAT UTILIZATION. Sudip Bajpeyi. Human Performance Laboratory; East Carolina University.

**Cellular Regulatory Mechanisms**

- P14 FKBP12 DEFICIENCY DOES NOT EXACERBATE MUSCLE DAMAGE AFTER ECCENTRIC EXERCISE. C. Rouviere<sup>1</sup>, T. Nofal<sup>1</sup>, S.L. Hamilton<sup>2</sup>, and C.P. Ingalls<sup>1</sup>, FACSM. <sup>1</sup>Dept of Kinesiology & Health, Georgia State University and <sup>2</sup>Dept of Molecular Physiology & Biophysics, Baylor College of Medicine.

**5:15 – 6:15 TUTORIAL (T3 – T4)**

- T3 CASE STUDY APPROACH TO TEACHING FITNESS TESTING AND PRESCRIPTION. Edward T. Howley, Ph.D., FACSM. University of Tennessee, Knoxville, TN.

Chair: Dr. Jeff Rupp (Salon A)

- T4 MUSCULOSKELETAL MODELING AND COMPUTER SIMULATION OF HUMAN MOVEMENT. Brian R. Umberger. Biodynamics Laboratory, University of Kentucky, Lexington, KY.

Chair: Dr. Songning Zhang (Salon B)

**7:30-9:00 BUSINESS MEETING AND KEYNOTE ADDRESS (Salons D & E)**

(CME1\*) Presiding: Dr. Timothy Lightfoot IS EXERCISE THE MAGIC BULLET FOR DISEASE PREVENTION AND LONGEVITY?

Frank Hu, M.P.H., Ph.D., M.D., Director, Boston Obesity Nutrition Research Center  
Epidemiology Core  
School of Public Health, Harvard University

9:00-11:00 SEACSM SOCIAL (Salons A, B, & C)

**FRIDAY, FEBRUARY 10, 2006**

6:30-7:45 WOMEN'S BREAKFAST (Dilworth & Eastover)

8:00-6:00 REGISTRATION (Third Floor Registration Area)

8:00-6:00 EXHIBITS (Third Floor)

8:00-9:00 ACSM PRESIDENTIAL ADDRESS (Salons D & E)  
(CME1\*) PACING STRATEGY: THE UNEXPLORED COUNTRY IN SPORTS PERFORMANCE  
Carl Foster, PhD, FACSM, ACSM President  
Professor - University of Wisconsin-La Crosse  
Chair: Dr. Edward Howley

9:00-9:15 BREAK

9:00 - 11:00 POSTER PRESENTATIONS II (P15-P26). Authors present from 10:00-11:00. (Salon C)

**Chronic Disease and Disability**

P15 RELATIONSHIP BETWEEN WALKING TEST OUTCOMES & SELF-REPORTED PHYSICAL FUNCTION IN COPD PATIENTS. C.M. Woodard, W.J. Rejeski, N.E. Adair, K.J. Hanson, S.B. Kritchevsky, and M.J. Berry, FACSM. Wake Forest University, Winston-Salem, N.C.

**Connective Tissue/Bone/Skeletal Muscle**

P16 MEDIAL COLLATERAL LIGAMENT STIFFNESS IN MALES AND FEMALES. Patricia A. Aronson, Bruce Gansneder, Joe Gieck, Jay Hertel, Kathie L. Hullfish, Arie M. Rijke, and Christopher D. Ingersoll, FACSM. University of Virginia, Charlottesville, VA.

P17 EFFECTS OF HYALURONIC ACID ON PAIN, STIFFNESS, AND DISABILITY: A META-ANALYSIS. Medina JM, Thomas AC, and Denegar CR. The Pennsylvania State University.

**Competitive Athletes**

P18 LONG-TERM IMPACT OF ATHLETIC PARTICIPATION ON PHYSICAL CAPABILITIES. Kelly Brooks Friery, Phillip Bishop, Mark Richardson, Joe Smith, and John Higginbotham. Human Performance Laboratory, University of Alabama.

P19 PRE-SEASON PERFORMANCE RELATED VARIABLES IN MALE NCAA DIVISION III SOCCER PLAYERS. JJ. Dyer<sup>1</sup>, RT. Smith<sup>1</sup>, JR. Hoffman; FACSM<sup>2</sup>, & M. Magal<sup>1</sup>. <sup>1</sup>North Carolina Wesleyan College, Rocky Mount, NC, and <sup>2</sup>The College of New Jersey, Ewing, NJ.

**Endocrinology/Immunology**

P20 EFFECT OF EXERCISE INTENSITY ON CIRCULATING CORTISOL. E.E. Hill, E. Zack, C. Battaglini and A.C. Hackney FACSM. Dept of Exercise & Sport Science, University of North Carolina, Chapel Hill, NC.

P21 CARBOHYDRATE INGESTION DOES NOT ATTENUATE IL-6 DURING EXERCISE IN THE HEAT. K. Hitchcock, G. Warren, M. Millard-Stafford, and T. Snow. Applied Physiology, Georgia Tech, and Physical Therapy Dept, Georgia State University, Atlanta GA.

**Environmental Physiology**

P22 PROFILE OF WEIGHT GAINED AFTER EMPLOYMENT IN THE TELECOMMUNICATION INDUSTRY. Brian Cioci, Robert Boyce, Ed Boone, Albert Lee Josh Bolton and David Mills. University of North Carolina at Wilmington, Wilmington, NC.

- P23 ERGONOMIC PROFILE OF A TELECOMMUNICATION COMPANY AND EXERCISE SUGGESTIONS. Josh Bolton, Robert Boyce, FACSM, Edward Boone, Albert Lee, Brian Cioci, and David Mills. University of North Carolina at Wilmington, Wilmington, NC.

**Epidemiology & Preventive Medicine**

- P24 IF DISTANCE ISN'T A BARRIER, WHY DON'T KIDS WALK TO SCHOOL? Rachel Tabak, Amber Vaughn, Joanne Finkle, Brian Neelon, and Dianne S. Ward, FACSM. University of North Carolina at Chapel Hill.
- P25 INTERTESTER RELIABILITY OF BRACHIAL ARTERY FLOW-MEDIATED VASODILATATION USING UPPER AND LOWER ARM OCCLUSION IN HEALTHY SUBJECTS. L.M. Cosio-Lima<sup>1</sup>, P.D. Thompson<sup>2</sup>, M.A. Lagasse<sup>2</sup>, C.Bilbie<sup>2</sup>, R.Seip<sup>2</sup>. University of West Florida<sup>1</sup>, Pensacola, FL and Preventive Cardiology<sup>2</sup>, Hartford Hospital, Hartford, CT.
- P26 THE RELATIONSHIP AMONG COMMUTING, DIETARY, AND EXERCISE BEHAVIORS IN COLLEGE STUDENTS. Priscilla N. Goodwin, Michael Whitehurst, Jeffrey Stout, and Sue Graves. Florida Atlantic University, Davie, FL.

**9:15 – 10:45 SYMPOSIUM (S2)**

- S2 DEBUNKING THE MYTHS: EXPERTS ADDRESS CONTROVERSIAL QUESTIONS RELATED TO EXERCISE AND HEALTH. E.M. Jackson, Kennesaw State University; M.A. Collins, Kennesaw State University; E.T. Howley, University of Tennessee; P.J. O'Connor, University of Georgia, and M.H. Stone, East Tennessee State University.  
Chair: Dr. Michael Berry (Salon F & G)

**9:30 – 10:30 TUTORIALS (T5 – T7)**

- T5 THERMOREGULATION IN THE CHILD ATHLETE: ARE THEY AT RISK?. Mindy Millard-Stafford, Ph.D., FACSM. School of Applied Physiology, Georgia Tech, Atlanta, GA.  
Chair: Dr. Jody Clasey (Salon A)
- T6 COMPARTMENTATION OF LACTATE IN THE BLOOD: DO YOU KNOW WHAT YOU'RE MEASURING? L. Bruce Gladden, Ph.D., FACSM. Department of Health & Human Performance, Auburn University, Auburn, AL.  
Chair: Dr. David Bassett (Salon B)
- T7 PHYSICAL ACTIVITY AND GENETICS: THE CURRENT RESEARCH ON A TOPIC THAT IMPACTS US ALL. Michael J. Turner, Ph.D. Department of Kinesiology, University of North Carolina Charlotte, Charlotte, NC.  
Chair: Dr. Allan Goldfarb (Myers Park)

**9:15 – 10:30 ORAL FREE COMMUNICATIONS**

**Hematology/Immunology and Endocrinology/Immunology** Chair: Dr. Anthony Hackney (Salon H)

- O13 EFFECT OF ORALLY ADMINISTERED OAT BETA-GLUCAN ON THE MACROPHAGE RESPONSE TO IN VITRO HSV-1 INFECTION FOLLOWING EXERCISE STRESS. E. Angela Murphy, J. Mark Davis, Adrienne S. Brown, Martin D. Carmichael, Abdul Ghaffar and Eugene P. Mayer. University of South Carolina, Columbia, SC.
- O14 BLOOD LEUKOCYTE mRNA FOR IL-8, IL-10, AND IL-1RA IS INCREASED DURING PROLONGED AND INTENSIVE CYCLING. Pearce SA, Nieman DC, Henson DA, Davis JM, Dumke CL, Utter AC, Murphy EA, McAnulty SR, and McAnulty LS. Depts. HLES and Biology, Appalachian State University, Boone, NC.

- O15 INFLUENCE OF CARBOHYDRATE/PLACEBO ON IMMUNE CHANGES FOLLOWING 2-HOURS OF INTENSIVE CYCLING WITH OR WITHOUT REST INTERVALS. Gojanovich GS, Nieman DC, Henson DA, Davis JM, Dumke CL, Utter AC, Murphy EA, McAnulty SR, McAnulty LS, and Pearce SA. Depts. HLES and Biology, Appalachian State University, Boone, NC.
- O16 IBUPROFEN USE, MUSCLE DAMAGE AND SORENESS, INFLAMMATION, AND PLASMA CYTOKINES DURING ULTRAMARATHON COMPETITION. Oley K, Nieman DC, Henson DA, Dumke CL, McAnulty SR, Davis JM, Murphy RA, and Lind RH. Dept HLES and Biology, Appalachian State University, Boone, NC.
- O17 CARDIORESPIRATORY, STRESS HORMONE, AND HEMOSTATIC RESPONSES IN FIREFIGHTERS DURING PHYSICAL AND PSYCHOLOGICAL STRESS. Webb, H.E.<sup>1</sup>, McMinn, D.R.<sup>1</sup>, Garten, R.S.<sup>1</sup>, Beckman, J.L.<sup>1</sup>, Kamimori, G.H.<sup>2</sup>, FACSM, & Acevedo, E.O.<sup>1</sup>, FASCM. <sup>1</sup>The University of Mississippi, and <sup>2</sup>Walter Reed Army Institute of Research.  
**STUDENT AWARD WINNER**

**Athletic Care/Trauma/Rehabilitation and Biomechanics/Gait/Balance**

Chair: Dr. Jeffrey Johnson (**Elizabeth**)

- O18 INDIVIDUALS WITH ANKLE INSTABILITY HAVE DECREASED POSTURAL SWAY. Sarah J. de la Motte, MA, ATC, Brent L. Arnold, PhD, ATC. Virginia Commonwealth University, Richmond, VA.
- O19 CONTRIBUTING FACTORS TO CHRONIC ANKLE INSTABILITY. Hubbard TJ, Hertel J, Kramer LC, and Denegar CR. Athletic Training Research Laboratory, Pennsylvania State University, University Park, PA.
- O20 MODIFYING ANKLE KINEMATICS USING POWERED ANKLE-FOOT ORTHOSES (PAFOs). J.A. Norris\*, M.R. Mitros\*\*, E.M. Byrne\*\*, K.P. Granata\*, A.P. Marsh\*\*. \*School of Biomedical Engineering & Sciences, Virginia Tech and \*\*Wake Forest University, Winston-Salem, NC.
- O21 INFLUENCE OF POWERED ANKLE FOOT ORTHOSES (PAFOs) ON PREFERRED TREADMILL WALKING SPEED. M.R. Mitros\*, J.A. Norris\*\*, E.M. Byrne\*, A.P. Marsh\*, K.P. Granata\*\*. \*Dept. of Health & Exercise Science, Wake Forest University and \*\*School of Biomedical Engineering & Sciences, Virginia Tech.
- O22 THE EFFECT OF DIMINISHED PLANTAR CUTANEOUS SENSATION ON POSTURAL CONTROL. Patrick O. McKeon, MS, ATC, Jay Hertel, PhD, ATC, University of Virginia, Charlottesville, VA.

10:45-11:00 **BREAK**

11:00-12:00 **BASIC SCIENCE LECTURE (Salons D & E)**  
(CME1\*) THE 0.1% SOLUTION: GENETICS AND EXERCISE TRAINING ADAPTATIONS  
James Hagberg, PhD, FACSM, Dept. of Kinesiology, University of Maryland, College Park, MD  
Chair: Dr. Timothy Lightfoot

12:00-1:15 **PAST PRESIDENT'S LUNCH (Elizabeth)**

1:00-1:30 **CLINICAL TRACK (Dilworth/Eastover)**  
Dr. John MacKnight – Medical Masqueraders in Sports Medicine

1:30-2:30 **CLINICAL EXCHANGE LECTURE (Salons D & E)**  
(CME1\*) SUDDEN DEATH IN ATHLETES  
James Puffer, M.D.  
Chair: Dr. Sean Bryan

**Exercise Evaluation/Clinical**

- P27 BREAST CANCER: A STUDY OF STRENGTH AND FLEXIBILITY. E. Kolakowski, S.L. Mihalko, P.M. Ribisl, & E. Levine. Wake Forest University, Winston-Salem, NC.
- P28 RELATIONSHIPS BETWEEN PREFERENCE AND TOLERANCE OF EXERCISE INTENSITY AND EXERCISE PERFORMANCE. Amy S. Morse, Eric E. Hall, Elizabeth K. Bailey and Paul C. Miller. Department of Health and Human Performance, Elon University, Elon, NC.
- P29 EFFECTS OF VARIOUS STIMULI ON EXERCISE PERFORMANCE. Christine M. Kostura, Paul C. Miller, Eric E. Hall, Lindsay M. Gonzalez and Elizabeth K. Bailey. Department of Health and Human Performance, Elon University, Elon, NC.
- P30 THE INFLUENCE OF VARIOUS DISTRACTION STIMULI ON AFFECTIVE RESPONSES TO CYCLE ERGOMETRY. Rachel L. Blakeslee, Elizabeth K. Bailey, Paul C. Miller, Jacquelyn M. Delgiorno and Eric E. Hall. Department of Health and Human Performance, Elon University, Elon, NC.
- P31 EFFECTS OF CAFFEINE ON REPS TO FAILURE AND RPE DURING RESISTANCE TRAINING. Jason Wickwire, Matt Green, John McLester, and Robert Pritchett, University of Alabama, Tuscaloosa, AL and Kennesaw State University, Kennesaw, Georgia.
- P32 THE USE OF SESSION RPE FOR QUANTIFICATION OF RESISTANCE TRAINING BOUTS TO FAILURE AT 60% AND 90% OF 1RM. Robert C Pritchett, Matt Green, Kelly Kerr, and Jason Wickwire. University of Alabama, Tuscaloosa, AL.

**Fitness/Testing/Assessment**

- P33 LOW RELATIONSHIP BETWEEN BODY PART DISCOMFORT PROFILE AND END OF SHIFT FATIGUE. David Mills, Robert Boyce, FACSM, Ed Boone, Albert Lee, Brian Cioci, and Josh Bolton. University of North Carolina at Wilmington, Wilmington, NC.
- P34 A COMPARISON OF TWO WARM-UPS ON JOINT RANGE OF MOTION. Barry Beedle and Christie Mann. Elon University, Elon, NC.
- P35 TEST-RETEST RELIABILITY OF THE SENSORMEDICS VmaxST PORTABLE METABOLIC MEASUREMENT SYSTEM. JR Blessinger, BJ Sawyer, BA Irving, CK Davis, A Weltman, and GA Gaesser. University of Virginia, Charlottesville, VA.
- P36 WALKING AND RUNNING ECONOMY ARE WEAKLY INVERSELY CORRELATED TO MAXIMAL OXYGEN UPTAKE IN HEALTHY MALES AND FEMALES. BJ Sawyer, JR Blessinger, CK Davis, BA Irving, A Weltman, and GA Gaesser. University of Virginia, Charlottesville, VA.
- P37 CHANGES IN MAXIMAL OXYGEN CONSUMPTION AND VENTILATORY THRESHOLD IN PROFESSIONAL FIREFIGHTERS FOLLOWING 1-YR OF COMMUNITY CENTER BASED EXERCISE TRAINING. E.A. Sossamon, E.H. Washam, S.L. Hopkins, T.L. Schneider, T.S. Maynard, J.M. Hauser, J.E. Spruill, M.J. Webster FACSM, and J.T. Soukup. Appalachian State University, Boone, NC, Providence Hospital, Mobile, AL, Mobile Fire and Rescue Department, Mobile, AL, The University of Southern Mississippi, Hattiesburg, MS.
- P38 CHANGES IN SELECT CARDIOVASCULAR DISEASE RISK FACTORS IN MALE PROFESSIONAL FIREFIGHTERS FOLLOWING ONE YEAR OF COMMUNITY CENTER BASED EXERCISE TRAINING. E.H. Washam, E.A. Sossamon, S.L. Hopkins, T.L. Schneider, T.S. Maynard, J.M. Hauser, J.E. Spruill, M. J. Webster, FACSM and J.T. Soukup. Appalachian State University, Boone, NC, Providence Hospital, Mobile, AL, Mobile Fire and Rescue Department, Mobile, AL, The University of Southern Mississippi, Hattiesburg, MS.

- P39 EVALUATION OF CADENCE DIFFERENCES BETWEEN 100 AND 120 JUMPS PER MINUTE USING THE DIJI-JUMP MACHINE. A. Bosak, S. Lyons, Z. Callahan, C. Morehead, and J. Faircloth. Dept. of PE and Recreation, College of Health and Human Services, Western Kentucky University, Bowling Green, KY.
- P40 ACCURACY OF THE AMERICAN COLLEGE OF SPORTS MEDICINE METABOLIC EQUATION FOR PREDICTING OXYGEN COST DURING GRADED EXERCISE TESTING. K. Bundy & C. Eschbach, Ph.D. Department of Health, Exercise and Sports Science, Meredith College, Raleigh, NC.
- P41 THE ASSOCIATION BETWEEN STRETCHING AND INJURY IN RESISTANCE TRAINED MEN AND WOMEN. Pablo B. Costa. Florida Atlantic University, Davie, FL.
- P42 TASK-RELEVANT TESTS AND THE ARMY PHYSICAL FITNESS TEST: CRITERIA FOR EVALUATION OF COMBAT READINESS IN THE INFANTRY. Gregory S. Wimer, Ph.D., Richard A. Mohr, M.S., Kristen L. Gibson, M.S., Maryellen S. Cosgrove, Ph.D., and Jennifer D. Leong, M.S. Armstrong Atlantic State University Savannah, Georgia.
- P43 RELATIONSHIP BETWEEN MATERNAL AND CHILD PHYSICAL ACTIVITY AND BODY MASS INDEX. Brandi Eveland, M.S., Stephanie Otto, M.S., & Jennifer Caputo, Ph.D. Middle Tennessee State University, Murfreesboro, TN.

2:30 -3:30 **CLINICAL TRACK – (Dilworth/Eastover)**  
 Fellows Cases 1, 2, & 3 Followed by Discussion

2:45-4:15 **SYMPOSIUM (S3)**

- S3 EXERTIONAL COMPARTMENT SYNDROME IN ATHLETES. Robert P. Wilder, MD, FACSM, and Eric Magrum, PT. University of Virginia, Charlottesville, VA.  
 Chair: Dr. Kenneth Bielak (**Salon A**)

2:45-3:45 **TUTORIALS (T8-T10)**

- T8 NUTRITIONAL STRATEGIES TO COUNTER STRESS TO THE IMMUNE SYSTEM IN ATHLETES. David C. Nieman, DrPH, FACSM. Dept. HLES, Appalachian State Univ., Boone, NC.  
 Chair: Dr. Robert G. McMurray (**Salon B**)
- T9 ACSM'S GUIDELINES FOR EXERCISE TESTING AND PRESCRIPTION, 7TH EDITION: IMPORTANT CHANGES. Dr. Peter Brubaker. Wake Forest University, Winston-Salem, NC.  
 Chair: Dr. Craig Broeder (**Salon F**)
- T10 A BROADER VIEW OF EXERCISE SCIENCE: NON-TRADITIONAL RESEARCH LINES. Dr. Phillip Bishop and Dr. Matt Green, University of Alabama, Tuscaloosa, AL.  
 Chair: Dr. Karin Pfeiffer (**Myers Park**)

2:45-4:00 **ORAL FREE COMMUNICATIONS**

**Body Composition/Energy Balance/Weight Control** Chair: Dr. Laurie Wideman (**Salon G**)

- O23 EVALUATION OF LEG-TO-LEG BIA IN ASSESSING BODY COMPOSITION IN HIGH-SCHOOL AGED MALES AND FEMALES. Jessica L. Unick, Alan C. Utter, Sean Schumm, Tim C. McInnis. Dept. of Health, Leisure and Exercise Science, Appalachian State University, Boone, NC.
- O24 COMPARISON OF BODY COMPOSITION TECHNIQUES IN OLDER ADULTS. Cherilyn N. Hultquist, Rebekah A. Wilson, and Dixie L. Thompson. Center for Physical Activity and Health, University of Tennessee, Knoxville, TN.
- O25 RELATIONSHIP AMONG CARDIORESPIRATORY FITNESS, PHYSICAL ACTIVITY, ABDOMINAL VISCERAL FAT, ENDOTHELIAL FUNCTION AND ASSOCIATED RISK FACTORS IN WOMEN WITH THE METABOLIC SYNDROME. BA Irving, DW Brock, CK Davis, EJ Barrett, GA Gaesser, and A Weltman. University of Virginia, Charlottesville, VA.  
**STUDENT AWARD WINNER**

- O26 BMI AND CARDIORESPIRATORY FITNESS IN PRE-TEENAGE AFRICAN AMERICAN BOYS AND GIRLS. L. Jerome Brandon and Larry Proctor. Georgia State Univ., Atlanta, GA and Louisiana Tech Univ., Ruston, LA.

**Chronic Disease and Disability** Chair: Dr. Lynn Panton (Salon H)

- O27 OBSERVATIONS USING HOME-BASED RESISTANCE-TRAINING TARGETING TETRAPLEGICS WITH INCOMPLETE SPINAL CORD INJURIES: FEASIBILITY STUDY. Grogg, K.<sup>1</sup>, Hayes, D.M.<sup>2</sup>, & Cress, M.E., FACSM<sup>2,3</sup>. <sup>1</sup>Shepherd Center, Atlanta, GA, <sup>2</sup>University of Georgia, Department of Kinesiology, and <sup>3</sup>Institute of Gerontology, Athens, GA.
- O28 THE EFFECTS OF RESISTANCE TRAINING ON MUSCULAR STRENGTH AND FATIGUE LEVELS IN BREAST CANCER PATIENTS. Claudio Battaglini<sup>1</sup>, Martim Bottaro<sup>2</sup>, Carolyn Dennehy<sup>3</sup>, Dianne Barfoot<sup>1</sup>, Edgar Shields<sup>1</sup>, David Kirk<sup>4</sup>, and A.C. Hackney<sup>1</sup>. <sup>1</sup>University of North Carolina at Chapel Hill, Department of Exercise and Sport Science, Chapel Hill, NC; <sup>2</sup>Universidade de Brasilia, Faculdade de Educação Física, Brasilia, DF, Brazil; <sup>3</sup>Navitas Cancer Rehabilitation Centers of America, Inc., Westminster, CO; and <sup>4</sup>University of North Carolina at Chapel Hill, Department of Pulmonary Disease and Critical Care Medicine, Chapel Hill, NC.
- O29 THE USE OF PERCEIVED DYSPNEA TO PRESCRIBE EXERCISE INTENSITY IN COPD PATIENTS. Shruti K. Nagaria, and Michael J. Berry, Ph.D. Wake Forest University, Winston-Salem, NC.
- O30 INFLUENCE OF EXERCISE ON MENTAL HEALTH AND MOOD IN HIV-INFECTED PERSONS. Wesley D. Dudgeon<sup>1</sup>, Kenneth D. Phillips<sup>2</sup>, Stephanie E. Burgess<sup>2</sup>, J. Larry Durstine<sup>1</sup>, and Gregory A. Hand<sup>1</sup>. Arnold School of Public Health<sup>1</sup> and College of Nursing<sup>2</sup>, University of South Carolina, Columbia, SC.
- O31 NON-HDL CHOLESTEROL: A UNIQUE RISK FACTOR OR REDUNDANT INFORMATION IN THE SECONDARY PREVENTION OF CORONARY ARTERY DISEASE? Sylvia M. Holcombe and Peter H. Brubaker. Department of Health and Exercise Science, Wake Forest University, Winston-Salem, NC.

- 3:30 – 4:00 **CLINICAL TRACK – (Dilworth/Eastover)**  
Dr. John Baston – Obesity in young athletes
- 4:00 – 4:30 **CLINICAL TRACK – (Dilworth/Eastover)**  
Dr. Andrew Gregory – Abdominal trauma in sports and runners trots
- 4:30 – 4:45 **CLINICAL TRACK – (Dilworth/Eastover)**  
Discussion
- 4:15-5:30 **STUDENT SYMPOSIUM (Salon D)**  
NASA: IT'S NOT JUST FOR ENGINEERS  
Stuart Lee, Senior Scientist/Exercise Physiologist, Wyle Laboratories  
Chair: Abby Turpyn
- 5:00 – 6:00 **CLINICAL TRACK – (Dilworth/Eastover)**  
**KEYNOTE SPEAKER**  
Dr. Christine Lawless – Update: The new Bethesda guidelines
- 5:30–6:30 **SEACSM GRADUATE STUDENT FAIR (Salon E)**

**SATURDAY, FEBRUARY 11, 2006**

- 7:30-9:00 **REGISTRATION** (Third Floor Registration Area)
- 7:30 – 8:30 **CLINICAL TRACK – (Dilworth/Eastover)**  
Fellows Cases 4, 5, & 6 followed by discussion



- 8:00-12:00           **EXHIBITS (Third Floor)**
- 8:00-9:00           **HENRY J. MONTOYE SCHOLAR LECTURE (Salons D & E)**  
 (CME1\*)           Dr. David C. Nieman  
                       EXERCISE IMMUNOLOGY: A 20-YEAR PERSPECTIVE  
                       Chair: Dr. Mark Davis
- 9:00-9:15           **BREAK**
- 8:30 - 9:00           **CLINICAL TRACK - (Dilworth/Eastover)**  
                       Dr. Tracy Ray - Fatigue in athletes: Physiologic, psychological or pathologic
- 9:00 - 9:30           **CLINICAL TRACK - (Dilworth/Eastover)**  
                       Dr. Kevin Guskiewicz, ATC - Postural testing in concussion management
- 9:15-10:45           **SYMPOSIUM (S4)**  
 S4            ARTHROGENIC MUSCLE INHIBITION AND ANKLE INJURIES. Christopher D. Ingersoll  
                   University of Virginia; Mitchell L. Cordova, University of North Carolina at Charlotte; JoEllen Sefton,  
                   University of North Carolina at Charlotte; Eric D. McVey, University of Virginia; and Jay Hertel,  
                   University of Virginia.  
                   Chair: Dr. Teresa S. Stadler (**Salon A**)
- 9:15-10:15           **TUTORIALS (T11-T12)**  
 T11           Physiology of obesity and lifestyle diseases: Present state of knowledge. Robert G. McMurray Ph.D.,  
                   FACSM and Daniela Rubin, University of North Carolina at Chapel Hill.  
                   Chair: Dr. Eugene Fitzhugh (**Salon F**)
- T12           EXCITATION-CONTRACTION COUPLING AND THE ROLE OF RYANODINE RECEPTORS IN  
                   HEALTH AND DISEASE. Edward M. Balog, Ph.D. Georgia Institute of Technology, School of Applied  
                   Physiology, Atlanta, GA.  
                   Chair: Dr. Alan Utter (**Myers Park**)
- 9:15-10:45           **ORAL FREE COMMUNICATIONS**
- Development & Aging: Cardiovascular Physiology; Cellular Regulatory Mechanisms; Connective  
 Tissue/Bone/Skeletal Muscle Chair: Dr. Kevin McCully (**Salon G**)
- 032           EVALUATION OF PHYSICAL ACTIVITY PHENOTYPES IN SECOND GENERATION  
                   CROSSBRED MALE MICE. David G. Weih, Sean M. Courtney, Jenece E. Johnson, Alla El Masri, J.  
                   Timothy Lightfoot, and Michael J. Turner. Dept. of Kinesiology, University of North Carolina Charlotte,  
                   Charlotte, NC.
- 033           PHYSICAL ACTIVITY INCREASES WITH AGE IN FIRST GENERATION MICE FROM HIGH  
                   AND LOW ACTIVE PROGENITORS. Sean M. Courtney, David G. Weih, Jenece E. Johnson, Alla El  
                   Masri, J. Timothy Lightfoot, Michael J. Turner. Dept. of Kinesiology, University of North Carolina  
                   Charlotte, Charlotte, NC.
- 034           THE IMPACT OF AGING ON THE RESPONSIVENESS OF THE NEUROMUSCULAR JUNCTION  
                   TO MUSCLE OVERLOAD. K.A. Tenny, J.A. Wilson, and M.R. Deschenes, College of William &  
                   Mary, Williamsburg, VA.
- 035           FEMALE F2 MICE ARE MORE ACTIVE THAN MALE F2 MICE. S.E. Carter, A.M. Kleinhen, M.J.  
                   Yost, M.J. Turner, and J.T Lightfoot, Dept. of Kinesiology, University of North Carolina at Charlotte,  
                   Charlotte, NC.
- 036           MUSCLE WASTING AND THE ROLE OF IL-6 IN CACHECTIC APCMIN/+ MICE. K.A. Baltgalvis,  
                   T.A. Washington, J.M. Davis, F.G. Berger, and J.A. Carson. Integrative Muscle Biology Laboratory,  
                   Department of Exercise Science, University of South Carolina, Columbia, SC.
- STUDENT AWARD WINNER**

O37 IL-6 AND FUNCTIONAL OVERLOAD-INDUCED MUSCLE HYPERTROPHY. Tyrone A. Washington, Kristen A. Baltgalvis, and James A. Carson. Integrative Muscle Biology Laboratory, Exercise Science Department, University of South Carolina, Columbia, SC.

9:30 – 9:45 **CLINICAL TRACK – (Dilworth/Eastover)**  
Discussion

9:30-11:30 **POSTER PRESENTATIONS IV (P44-P59).**  
Authors present 10:30-11:30 (Salon C)

**Fitness/Testing/Assessment**

- P44 VALIDITY AND RELIABILITY OF AN ELECTRONIC PEDOMETER IN A LABORATORY SETTING. M.S. Green, B.T. Corona, A. Kimball, D.A. Dennison\*, and J.A. Doyle. Department of Kinesiology and Health, Georgia State University, Atlanta, GA and \*Center for Health Promotion, International Life Sciences Institute, Atlanta, GA.
- P45 RELATIONSHIP BETWEEN BODY MASS INDEX AND BLOOD PRESSURE RESPONSES DURING SUBMAXIMAL EXERCISE. Kelly Manning, Jeffrey C. Rupp, J. Andrew Doyle & L. Jerome Brandon, Georgia State University, Atlanta, GA.
- P46 ALLOMETRIC SCALING MODELS OF ISOMETRIC BICEPS STRENGTH AND THE EFFECTS OF RESISTANCE TRAINING IN ADULT FEMALES. Robert F. Zoeller<sup>1</sup>, E.D. Ryan<sup>2</sup>, H. Gordish-Dressman<sup>3</sup>, T.B. Price<sup>4</sup>, T.J. Angelopoulos<sup>5</sup>, N.M. Moyna<sup>6</sup>, P. Gordon<sup>7</sup>, D.J. Torok<sup>1</sup>, M. Whitehurst<sup>1</sup>, P.D. Thompson<sup>4</sup>, E.P. Hoffman<sup>3</sup>. <sup>1</sup>Florida Atlantic University, Davie FL, <sup>2</sup>University of Oklahoma, Norman OK, <sup>3</sup>Children's National Medical Center, Washington DC, <sup>4</sup>Hartford Hospital, Hartford CT, <sup>5</sup>University of Central Florida, Orlando FL, <sup>6</sup>Dublin City University, Dublin IR, and <sup>7</sup>University of West Virginia, Morgantown WV.
- P47 ACUTE EFFECTS OF HEAVY- AND LIGHT-LOAD SQUAT EXERCISES ON KINETIC FACTORS RELATED TO VERTICAL JUMP PERFORMANCE. E. Hanson, S. Leigh, and R. Mynark. Dept. of Exercise and Sport Science. University of North Carolina at Chapel Hill, Chapel Hill, NC.
- P48 STRETCHING NEGATIVELY AFFECTS REACTION TIME DURING REPETITIVE VERTICAL JUMP PERFORMANCE. Chavez, C.L. and J.R. McLester. Western Kentucky University, Bowling Green, KY and Kennesaw State University, Kennesaw, GA.

**Nutrition and Exercise/Sports**

- P49 A TEN-WEEK TEAM CHALLENGE IMPROVES FITNESS SCORES IN A CORPORATE SETTING. Katherine Heimburger and Victoria Thomas Scales. AFC Fitness Center, Atlanta, GA.
- P50 BEVERAGE CONSUMPTION OF MIDDLE AND HIGH SCHOOL STUDENTS WITH HIGH AND LOW ACTIVITY LEVELS. Kristin S. Ondrak, Robert G. McMurray, E H. Yun, and Leila D. Amorim. University of North Carolina at Chapel Hill, Chapel Hill, NC.
- P51 A PILOT STUDY COMPARING THE EFFECTS OF DIFFERENT TYPES OF EXERCISE ON BASAL METABOLIC RATE: IMPLICATIONS FOR WEIGHT CONTROL. Prawee Sirithienthad. Florida State University, Tallahassee, FL.
- P52 EFFECT OF ORAL ECHINACEA SUPPLEMENTATION ON RESTING IL-4 AND IL-10 RESPONSES. Scheett TP, Whitehead MT, Martin TD, and Webster MJ. College of Charleston, Charleston, SC, Northwestern State University of Louisiana, Natchitoches, LA, and The University of Southern Mississippi, Hattiesburg, MS.
- P53 EFFECT OF THE GO OUT FOR A RUN (GO FAR) FITNESS PROGRAM ON HEALTH IN CHILDREN. A.S. Bos<sup>1</sup>, R. Hale-Lindsay<sup>2</sup>, and M.C. Whitt-Glover<sup>1</sup>. <sup>1</sup>Wake Forest University Health Sciences and <sup>2</sup>High Point University, High Point, NC.

- P54 INFLUENCE OF CHRONIC THIAMIN DERIVATIVE SUPPLEMENTATION AND CARBOHYDRATE LOADING ON HIGH INTENSITY CYCLING EXERCISE. Boyd, J.C., M.J. Webster, T.M. Whitehead, and T.P. Scheett. Augusta State University, Augusta, GA.

**Psychology/Psychiatry/Behavior**

- P55 SELF- REFLECTION: MIRRORS AND RESISTANCE TRAINING. DO THEY INFLUENCE AFFECT AND STATE ANXIETY RESPONSES? Elizabeth Chmelo and Eric Hall. Elon University, Elon, NC. **STUDENT AWARD WINNER**
- P56 ARE THE CHANGES IN BRAIN ACTIVITY DURING EXERCISE DUE TO ACCUMULATION OR INTENSITY OF EXERCISE? Brooks Martin, Peter Bellezza, Stephen E. Folger, Stephen P. Bailey, Paul C. Miller, and Eric E. Hall. Departments of Health & Human Performance and Physical Therapy Education, Elon University, Elon, NC.
- P57 RESISTANCE TRAINING WITH MIRRORS: EFFECT ON HEART RATE AND RATE OF PERCEIVED EXERTION. Lauren E. Rappaport, Rachel E. Dewitt, Kristin K. McDonough, Paul C. Miller & Eric E. Hall. Department of Health and Human Performance, Elon University, Elon, NC.
- P58 DISORDERED EATING IN FEMALE ATHLETES AT SINGLE-SEX VERSUS CO-ED COLLEGES. Jennifer Gapin<sup>1</sup> and Kim Cassidy, Ph.D.<sup>2</sup> <sup>1</sup>University of North Carolina at Greensboro and <sup>2</sup>Bryn Mawr College, Greensboro, NC.
- P59 PRELIMINARY STUDY OF A GOAL-SETTING PROGRAM DURING ATHLETIC INJURY REHABILITATION. Melanie L. McGrath<sup>1</sup> and Diane L. Gill<sup>2</sup>. <sup>1</sup>University of North Carolina at Chapel Hill and <sup>2</sup>University of North Carolina at Greensboro.

9:45 – 10:45 **CLINICAL TRACK** – (Dilworth/Eastover)  
Fellows Cases 7, 8, & 9 followed by discussion

10:30-11:45 **ORAL FREE COMMUNICATIONS**

**Nutrition and Exercise/Sports / Competitive Athletes / Metabolism/Carbohydrate, Lipid, Protein / Connective Tissue/Bone/Skeletal Muscle** Chair: Dr. Mindy Millard-Stafford (**Salon H**)

- O38 EFFECT OF CARBOHYDRATE ON OXIDATIVE CHANGES FOLLOWING INTENSIVE CYCLING. Steven R. McAulty, Lisa S. McAulty, David C. Nieman, Jason D. Morrow, Charles L. Dumke, and Alan C. Utter. Dept. of Health, Leisure, and Exercise Science, Family and Consumer Sciences, Appalachian State University, Boone, NC and Dept. of Medicine and Pharmacology, Vanderbilt University School of Medicine, Nashville, TN.
- O39 EFFECTS OF SADDLE HEIGHT ON ANAEROBIC POWER PRODUCTION IN CYCLING. Will W. Peveler<sup>1</sup>, Josh Pounders<sup>1</sup>, and Phillip A. Bishop<sup>2</sup>. Mississippi University for Women<sup>1</sup> and University of Alabama<sup>2</sup>.
- O40 CIRCADIAN VARIATION IN SWIM PERFORMANCE. C.E. Kline, S.D. Youngstedt, T.M. Devlin, A.Y. Lee, and M.R. Zielinski. Department of Exercise Science, University of South Carolina, Columbia, SC.
- O41 EXERCISE-INDUCED MUSCLE INJURY RESULTS IN ELEVATIONS IN AEROBIC AND ANAEROBIC METABOLISM DURING SUBMAXIMAL TREADMILL RUNNING. B.T. Corona, M.S. Green, A. Doyle, J. Rupp, and C.P. Ingalls, FACSM. Dept of Kinesiology & Health, Georgia State University. **STUDENT AWARD WINNER**
- O42 MODERATE STATIC STRETCHING DOES NOT INFLUENCE TORQUE PRODUCTION OF THE KNEE FLEXORS. NB Jones, M Wilson, CG Berger and JW Yates, FACSM, Dept. of Kinesiology and Health Promotion, University of Kentucky, Lexington, KY.

- 10:45 – 11:45      **CLINICAL TRACK – (Dilworth/Eastover)**  
**KEYNOTE SPEAKER**  
 Dr. Frederick Reed – Update: The new PPE monograph
- 11:00-12:00      **TUTORIALS (T13-T16)**
- T13      **FROM RESEARCH TO PRACTICE: PRINCIPLES OF WELLNESS COACHING.**  
 Walter R. Thompson, Ph.D., FACSM, Department of Kinesiology and Health, Georgia State University,  
 Atlanta, GA.  
 Chair: Dr. L. Jerome Brandon (**Salon A**)
- T14      **DOES CALCIUM REALLY PLAY A MAJOR ROLE IN ENHANCING WEIGHT LOSS?**  
 Craig E. Broeder, Ph.D. FACSM. Benedictine University, Lisle, IL.  
 Chair: Dr. Arthur Weltman (**Salon B**)
- T15      **STRESS: WHAT IS IT AND HOW CAN PHYSICAL ACTIVITY REDUCE ITS EFFECTS ON  
 HEALTH.**  
 Gregory A. Hand, Ph.D. University of South Carolina, Columbia, SC.  
 Chair: Dr. Michael Turner (**Salon G**)
- T16      **INTERVAL TRAINING.**  
 JM Green, Ph.D. Dept of Kinesiology, The University of Alabama, Tuscaloosa, AL.  
 Chair: Dr. Peter Grandjean (**Myers Park**)
- 11:45 – 12:00      **CLINICAL TRACK – (Dilworth/Eastover)**  
 Discussion – Best Fellow's Case Award
- Noon-2:00      **SEACSM LUNCHEON AND LECTURE (Salon D & E)**  
 (CME1\*)      **"How Do I Get 10,000 Steps If I Can't Even Cross the Darn Street?"**  
 Mark Fenton, BS, MS  
 Transportation and Public Health Consultant; Scituate, MA
- 2:00-4:00      **SEACSM EXECUTIVE BOARD MEETING (Boardroom)**
- 2:00-6:00      **LIFE FITNESS ACADEMY (Salons A & B)**  
 Separate Registration Required

### **TIME TRENDS AND INTERNATIONAL DIFFERENCES IN PHYSICAL ACTIVITY AND DIET: CLUES TO THE OBESITY EPIDEMIC**

D.R. Bassett, Jr., FACSM, Department of Exercise, Sport, and Leisure Studies, The University of Tennessee, Knoxville, TN

T1

The prevalence of obesity in U.S. adults rose from about 13% in 1960 to 30.5% in 2000. During this same 40-year time span, the average body weight of US adults increased by 24 pounds. To what extent are these changes in body physique due to physical inactivity, diet or a combination of the two? The goal of this tutorial is to reflect on how changes in automobile usage, household chores, occupational patterns, and dietary intake have contributed to this epidemic. By examining data from U.S. national transportation surveys, time allocation studies, Department of Labor Statistics, and national dietary surveys, we can gain insights into this phenomenon. The emerging view is that the growing obesity epidemic is due to environmental factors and forms of electronic entertainment that discourage physical activity, as well as an abundance of cheap, calorie dense foods and beverages that encourage overconsumption. Although one could take the pessimistic view that obesity and inactivity are inevitable consequences of modernization, there are a few signs of optimism on the horizon. In Europe, obesity rates are far lower than in the U.S., and evidence will be presented that higher levels of active transportation (walking and bicycling) in Europe are one of the primary reasons. The possibility of international differences in energy intake will also be discussed, although no hard data exist. Another encouraging sign is that U.S. citizens engaged in regular leisure time physical activity (LTPA) are much more likely to have success in regulating their body weight. In summary, the obesity crisis poses enormous challenges for individuals who work in the fields of fitness, nutrition, and health care, but by using a multi-disciplinary approach it may be possible to design workable solutions to this problem.

### **CANCER TREATMENT: FUTURE TRENDS IN THE ADMINISTRATION OF EXERCISE AND RECREATION**

Claudio Battaglini and Diane Groff; Univ. of North Carolina at Chapel Hill

T2

Approximately 1.4 million people are diagnosed with cancer every year, and there are now more than 10 million survivors in the U.S. While significant progress has been made towards cancer prevention, diagnosis, and treatment, the development of physiological and psychological side effects commonly observed during the administration of cancer treatment are yet to be fully understood and managed. Over the past few years, cancer treatment-related symptoms have gained significant attention in the oncology arena. The ability to alter the course of therapy, via adjunct programs is of great importance and has gained significant attention by oncology physicians. Empirical evidence has shown that exercise can be used as a powerful adjunctive therapy with the attempt of mitigating some of the side effects developed with cancer treatment. However, many questions regarding exercise and other adjunct therapies remain unanswered. Although yet to be researched, one promising adjunctive therapy that may compliment the benefits of exercise is recreation therapy. The purpose of this tutorial is to present the latest information regarding the administration of exercise as an adjunctive therapy in the combat of cancer treatment-related symptoms, discuss how to ideally implement an exercise program for cancer patients, to discuss the possibilities of incorporating other adjunct therapies such as recreation therapy in combination with exercise for more efficient management of cancer treatment related symptoms, and to make recommendations for future research.

### **CASE STUDY APPROACH TO TEACHING FITNESS TESTING AND PRESCRIPTION**

Edward T. Howley, Ph.D., FACSM, University of Tennessee, Knoxville, TN

T3

The purpose of this symposium is to discuss the use of case studies in the teaching of an undergraduate fitness testing and prescription course. Following the presentation of a syllabus, I will walk attendees through the approach I use which includes some didactic instruction on each topic and the need for students to memorize some things like risk factors and formulas for estimating the oxygen cost of activities. Case study examples will be used in an interactive manner with the audience to move through the topics of risk factors, estimating the energy cost of activities, estimating VO<sub>2</sub>max, exercise prescription for cardiovascular fitness, body composition, medications, and the electrocardiogram. Time will be available for attendee input in terms of what works for them in similar or other courses.

### **MUSCULOSKELETAL MODELING AND COMPUTER SIMULATION OF HUMAN MOVEMENT**

Brian R. Umberger, Biodynamics Laboratory, University of Kentucky, Lexington, KY

T4

Much has been learned about the mechanics and control of human movement using traditional inverse dynamics analyses, wherein measurements of body motion, force, and muscle activity are used to infer function. However, the inverse approach does not account for the complex arrangement of bones, joints, and muscles in the human body, which ultimately limits its usefulness. The forward dynamics approach, based on models of musculoskeletal geometry and computer simulation techniques, offers an alternative that has the potential to yield greater insight as to how the nervous system produces coordinated movements of the body. The forward approach typically involves developing models of the skeletal-articular system, the neuromuscular system, environmental forces, and the goal of the motor task. Optimal control theory is then used to produce a simulation of musculoskeletal motion that meets the stated goal of the motor task. The greatest strengths of the forward approach are: 1) the ability to establish cause-and-effect relationships for how individual muscle forces accelerate the skeletal system, and 2) the ability to examine the effects of changes in the musculoskeletal system, such as increasing or decreasing the strength of a particular muscle. This latter approach offers strong possibilities for studying the effects of training or pathology. Neither of these two applications are possible using inverse dynamics techniques. Over the last 10-15 years, modeling and simulation studies have led to fundamental advances in our understanding of the mechanics and control of human movement. The continued development of more realistic models and access to faster computers should lead to even greater insights in the near future.

### **THERMOREGULATION IN THE CHILD ATHLETE: ARE THEY AT RISK?**

Mindy Millard-Stafford, Georgia Tech, School of Applied Physiology,  
Georgia Tech, Atlanta, GA

**T5**

Scientific reviews suggest pre-pubescent children and adolescents are less able to adapt to environmental extremes in temperature compared to adults. Sweat glands are less developed to produce sufficient sweating versus adults resulting in lower total body and sweat rate relative to body surface in children. Regional differences in skin blood flow (and vasodilatation) also appear maturation-related. Children have a greater surface area-to-body mass ratio compared to adults which is thought to contribute to greater heat gain in a hot environment and greater heat loss in a cold environment (particularly cold water). Reduced exercise economy in children also directly increases the energy cost (%VO<sub>2</sub>max) of exercise, a major determinant of core temperature. Recent data suggest that active children may be chronically dehydrated and drinking patterns during exercise differ between pre-pubescent boys and girls but what level of dehydration is "critical" in exercising youth is not known. In contrast to previous studies, recent evidence indicates rise in core temperature is not different in boys compared to men when accounting for higher baseline temperature. In fact, pre-pubertal boys are more efficient thermoregulators and sweaters (in terms of mass-dependent heat storage) than elderly and young adult males. However, data on pre-pubescent females is extremely limited. The new ACSM Position Stand, Exertional Heat Illness during Training and Competition: indicates rise in core temperature during exercise is similar for young boys and men, but that until additional scientific data is available, it is prudent to assume that children are "at risk".

### **COMPARTMENTATION OF LACTATE IN THE BLOOD: DO YOU KNOW WHAT YOU'RE MEASURING?**

L. Bruce Gladden, Ph.D., FACSM, Department of Health & Human Performance,  
Auburn University, Auburn, AL

**T6**

Blood lactate concentration is one of the most routinely measured metabolites in either basic or applied studies of exercise. Frequently, investigators fail to recognize that lactate is unevenly distributed between red blood cells and plasma, even when the two compartments are at equilibrium. In fact, lactate concentration is approximately twice as high in plasma as inside red blood cells, such that about one-third of blood lactate is found inside red blood cells and two-thirds within the plasma. One outcome of this unequal distribution is that if one analyzes the same blood sample for lactate in whole blood versus plasma, the whole blood value is approximately 70% of the plasma value. This has important implications throughout exercise physiology, and in medical practice as well. A further complication is that the ever more popular, portable lactate analyzers measure blood lactate in a variety of ways. Some indicate that plasma is being measured; others indicate that whole blood is being measured: some measure plasma and correct the value to whole blood; and some do not report which compartment is being measured. The purpose of this tutorial is to summarize research on lactate distribution in the blood, discuss the implications, and address the use of various rapid, portable lactate analyzers. It should be of interest to anyone who measures blood or plasma lactate concentration.

### **PHYSICAL ACTIVITY AND GENETICS: THE CURRENT RESEARCH ON A TOPIC THAT IMPACTS US ALL.**

Michael J. Turner. Department of Kinesiology, University of North Carolina Charlotte,  
Charlotte, NC

**T7**

Technological advances in genetic analysis have provided a unique opportunity for exercise physiologists to pursue answers involving the heritability of exercise-related phenotypes. Epidemiological research suggests an increasing number of individuals are performing less physical activity on a daily basis when compared to past decades. To address this important health issue, biological research is investigating how one's genetic composition may influence one's ability to regularly exercise. Recently, evidence from human and animal research has suggested one's genetic background does participate in influencing daily activity level. Research from our laboratory has found up to 85% of the daily activity being performed is inherited. Therefore, this symposium will present recent findings in the area of physical activity and genetics. Discussion will involve the heritability of one's inherent physical activity levels and the differing influence of genetic background on age-related changes in physical activity. Research will be provided regarding both human and animal research models. Lastly, future research questions will be provided for the new investigator interested in this developing area of study.

### **NUTRITIONAL STRATEGIES TO COUNTER STRESS TO THE IMMUNE SYSTEM IN ATHLETES**

David C. Nieman, DrPH, FACSM. Dept. HLES, Appalachian State Univ., Boone, NC

**T8**

Several key principles in nutritional immunology include: **PRINCIPLE #1:** Almost all nutrients in the diet play a crucial role in maintaining an "optimal" immune response. A balanced, healthy diet provides all the nutrients needed for good immune function in most healthy adults. **PRINCIPLE #2:** Deficient intakes of energy and nutrients can have negative consequences on immune status and susceptibility to pathogens. **PRINCIPLE #3:** Some nutrients (i.e., glutamine, arginine, fatty acids, vitamin E) provide additional benefits to immunocompromised persons (i.e., the frail elderly) or patients who suffer from various infections. **PRINCIPLE #4:** Advanced supplements may prove useful in countering immune suppression for healthy adults during unusual stress. Prolonged and intensive exertion causes numerous changes in immunity in multiple body compartments for 3-72 hours (depending on the immune measure). These exercise-induced immune changes occur at the same time the human body is experiencing physiologic and oxidative stress, inflammation, muscle microtrauma, and suppressed function against foreign pathogens. Carbohydrate ingestion during exercise attenuates exercise-induced increases in stress hormones, inflammatory cytokines, and neutrophil cell counts, but is ineffective in countering decreases in T and NK cell function and other aspects of immunity such as salivary IgA output. Vitamin C and E supplements do not counter increases in oxidative stress and alterations in immunity during extreme exertion. Advanced supplements including beta-glucan, tea extract, curcumin, and flavonoids such as quercetin are currently being studied to determine their usefulness in athletic populations.

**ACSM'S GUIDELINES FOR EXERCISE TESTING AND PRESCRIPTION, 7TH EDITION: IMPORTANT CHANGES**

Peter Brubaker, Wake Forest University, Winston-Salem, NC

In May 2005, the 7th edition of the ACSM's Guidelines for Exercise Testing and Prescription were released (Editors; Whaley, Brubaker, and Otto). There are numerous important changes presented in this edition related to clinical exercise testing and prescription that should be disseminated to the students and clinical exercise physiologists of SEACSM.

**T9**

**A BROADER VIEW OF EXERCISE SCIENCE: NON-TRADITIONAL RESEARCH LINES**

Phillip Bishop and Matt Green, University of Alabama

Interest in Exercise Science is often impelled by interest or background in sport. This personal interest in sport often serves as an obvious source of research questions. In this tutorial, we will introduce students and junior faculty to research possibilities outside the traditional lines of sport performance/enhancement and sports medicine. Among the topics to be discussed: research on Department of Defense issues (fatigue, ergogenics, hydration, thermophysiology), on NASA research questions (exercise countermeasures, functional physiology of egress), on potential industrial investigations (hydration, first responders, work physiology, suspension trauma, and biomechanical studies of work). These research areas will be illustrated with photos and sample data, many from our own investigations. Questions will be used to encourage attendees to consider their own potential non-traditional research and research funding opportunities and the associated physiological applications. Additionally, advantages and disadvantages of this approach will be elucidated some of which include: a) Decreased competition for funding, b) Increased variety of publication outlets, c) Fewer "experts" available for collaborative efforts, d) Study trials can be excessively time consuming/expensive. Our session will end with a group interactive discussion elucidating non-traditional lines of research using exercise science applications. Participants will be encouraged to take away ideas for potential new lines of investigation.

**T10**

**PHYSIOLOGY OF OBESITY AND LIFESTYLE DISEASES: PRESENT STATE OF KNOWLEDGE**

Robert G. McMurray, FACSM and Daniela Rubin, University of North Carolina at Chapel Hill

This presentation will focus on the etiology of obesity and the physiological consequences of obesity from childhood through adulthood. Initially, a short summary of the etiological of obesity will be presented, followed by information on tracking of obesity to show the likelihood of an overweight child becoming an overweight adult. This will be followed by a discussion of the relationship between obesity and adipokines, and the developing hypothesis that obesity is an inflammatory disease. The focus will be on leptin, adiponectin, resistin, tumor necrosis factor and interleukin-6. The remainder of the presentation will focus on the physiological consequences of obesity; the interrelationships between the inflammatory response, hormones and diseases related to obesity with particularly emphasis on diabetes, cardiovascular disease and multiple metabolic syndrome will be discussed. Finally, the role of exercise in modifying these health-related issues will be briefly presented.

**T11**

**Excitation-Contraction Coupling and the Role of Ryanodine Receptors in Health and Disease.**

Edward M. Balog, PhD. Georgia Institute of Technology, School of Applied Physiology, Atlanta, Ga.

Cells maintain a resting intracellular calcium concentration in the range of 50 nM to 100 nM in spite of millimolar concentration of calcium in the extracellular fluid and in the endo/sarcoplasmic reticulum. Such large concentration gradients make calcium an effective intracellular signaling molecule. However, elevated calcium concentrations are cytotoxic. Thus, the maintenance of intracellular calcium homeostasis is a matter of life and death for all cells. Indeed, an elevation of cytoplasmic calcium is one of the first cell signaling events to occur upon fertilization and one of the last cells signals as cells die via apoptosis or necrosis. Maintaining cellular calcium homeostasis is a particular challenge for cardiac and skeletal muscle cells as the excitation-contraction coupling process leads to the cyclic increases in cytoplasmic calcium required to activate contraction. The fine line between efficient cell signaling and aberrant calcium release has been illustrated by the pharmacogenetic skeletal muscle disease malignant hyperthermia and more recently by the identification of mutations in the cardiac sarcoplasmic reticulum calcium release channels that lead to potentially lethal cardiac arrhythmias. Thus this tutorial will provide an up to date overview of excitation-contraction coupling and the central role played by the ryanodine receptor calcium release channel of the sarcoplasmic reticulum and the many accessory proteins that modify its function. The mechanisms underlying excitation-contraction coupling in cardiac and skeletal muscle will be compared and contrasted and the effects of modifying excitation-contraction coupling in physiological and pathological conditions such as skeletal muscle fatigue, ageing, malignant hyperthermia and cardiac arrhythmia will be discussed.

**T12**

### FROM RESEARCH TO PRACTICE: PRINCIPLES OF WELLNESS COACHING

Walter R. Thompson, Ph.D., FACSM, Department of Kinesiology and Health,  
Georgia State University, Atlanta, Georgia State University

Personal training is now a \$2 billion business with more than a million people providing services to countless numbers of clients. In an industry that barely existed a decade ago, nearly every commercial, corporate, and community fitness center employs personal trainers. Even with this kind of success, health/fitness and even clinical exercise specialists continue to be frustrated by clients who do not sustain their programs. Behavioral scientists have demonstrated that the most effective approach to behavior change is one-on-one coaching, a technique that personal trainers and other health/fitness professionals can and should add to their skill sets in an attempt to help people change their bad habits and to maintain a better and more long-term healthy lifestyle. A fitness or wellness coach discovers values and motivators within clients. The coach helps the client create a vision for a healthy lifestyle and goals that are consistent with that vision. The coach helps the client decide what type of exercise behavior he or she will adopt that will be sustainable. A fitness or wellness coach also helps the client develop and commit to attainable goals. Coaching could be the next major force in health promotion/disease prevention, weight management, and fitness, adding to the enormous impact that personal training has had over the past decade. The purpose of this tutorial will be to introduce the research and historical background for personal fitness and wellness coaching and then to discuss its significance in both the health/fitness and healthcare industries.

T13

### DOES CALCIUM REALLY PLAY A MAJOR ROLE IN ENHANCING WEIGHT LOSS?

Craig E. Broeder, Ph.D. FACSM, Benedictine University, Lisle, IL

Researchers proposed several years ago from data in both animals and humans that calcium supplementation from dairy products enhanced weight loss during dieting. As a result of these studies, many diet food manufacturers are now including calcium supplementation in products or advertising the weight loss benefits of a dairy based diet. This tutorial's purpose will be to present the biochemical basis for the calcium hypothesis for enhancing weight loss during dieting. Because dieting results in a negative energy balance and consequently a reduction in resting metabolic rate, it was hypothesized due to calcium's roll in mitochondrial uncoupling protein activation and cell signaling that an increase in dietary calcium intake positively affected intracellular cell signaling of uncoupling proteins. Uncoupling proteins are found in mitochondrial cell membranes and play a major roll in promoting thermogenesis. Previous studies have shown there may be a significant difference in how uncoupling proteins respond to sympathetic nervous system stimuli between lean and obese individuals with obese individuals showing a blunted thermogenic response to feeding, exercise, and the combination of these stimuli. Thus, if an obese person could include foods rich in dietary calcium while dieting, researchers proposed that activation of mitochondrial uncoupling proteins may enhanced weight loss. Thus, this tutorial will also present an over-view of the most recent data in the calcium weight loss hypothesis and the validity of supplementing a person's diet with calcium for enhancing weight loss.

T14

### STRESS: WHAT IS IT AND HOW CAN PHYSICAL ACTIVITY REDUCE ITS EFFECTS ON HEALTH.

Gregory A. Hand, University of South Carolina, Columbia,  
South Carolina.

The purpose of this tutorial is to provide a state-of-the-art understanding of the field of stress physiology and the role of exercise/physical activity in reducing the impact of stress-associated chronic diseases. The tutorial is designed to present the current understanding of 1) what is emotional stress and why is the subject so confusing; 2) how is stress manifested physiologically in mammals; 3) what does chronic stress do in humans; and 4) how does exercise/physical activity affect the stress process both physically and psychologically. This presentation will encompass a wide range of topics that will be of interest to applied physiologists, psychologists, persons involved in health promotion, and clinical personnel. It is designed to provide an understanding of a public health problem that causes or exacerbates many diseases, and the tutorial will offer exercise practitioners insight into ways to integrate stress reduction into their clinical programs.

T15

### INTERVAL TRAINING

JM Green, The University of Alabama, Dept of Kinesiology, Tuscaloosa, AL

Interval training involves repeated bouts of intense exercise interspersed with recovery periods of a lower relative intensity. High intensity interval training sessions are often included as a constituent of endurance training programs. Such training has received increased attention in recent literature. This tutorial will begin by introducing the concept of interval training and reviewing the premise and rationale for inclusion of interval training within an endurance-based program, including the consideration of individual training state. The discussion will proceed with an overview of the acute physiological and perceptual responses to an interval training session including data from our lab. Based upon the literature, chronic responses to interval training include those associated with both enzymatic changes and buffering capacity. These adaptive responses will also be addressed. The dynamics of adaptation to interval training will be discussed with respect to both central and peripheral changes. Discourse will follow regarding the research examining performance enhancement associated with interval training. There are limitless combinations of durations and intensities for interval bouts and associated recovery periods. The multitude of possible combinations greatly compounds the difficulty in optimizing interval training protocols. The tutorial will conclude with considerations regarding program design including information on interval training frequency. The target audience for this presentation includes professionals and students having an interest in the science of training from a basic and applied physiological perspective.

T16



### THE IMPACT OF OBESITY ON STRENGTH AND FUNCTION IN VISUALLY IMPAIRED AND OLDER DIABETIC ADULTS

Christopher Ray and L. Jerome Brandon, Rehab R & D Center, VA Medical Center, Decatur, GA and Dept of Kinesiology and Health, Georgia State Univ., Atlanta, GA

Obesity is often present in visually impaired and older diabetic adults and has detrimental effects on function skills that are dependent on strength and necessary for independence. The relative decrease in function and strength in these populations is not clear. Therefore, the purpose of this symposium is to compare and discuss the relationships between biomechanical, strength and function status of obese visually impaired (VI) and older diabetic adults. The symposium will consist of two presentations. The first is a comparison of function, biomechanical and strength variables of VI and non-visually impaired (NVI) adults. The age and height of the VI (38.1 yrs; 171.3 cm) and NVI (38.1 yrs; 174.9 cm) were not different, but the BMI of the VI (30.7 kg/m<sup>2</sup>) was larger ( $p < 0.05$ ) than that of the NVI (26.1 kg/m<sup>2</sup>), suggesting that body fat may be partially responsible for differences observed for function, biomechanical and strength variables between the two groups. Results indicated that VI were more obese, had less strength, inferior mechanical variables, and less flexibility than the NVI. The second presentation will compare the impact of obesity and resistive training on function and strength in older diabetic (OD) and older non-diabetic (OND) adults. The OD (65.6 yrs) were younger than OND (72.1 yrs) were fatter (34.5 percent fat) than the OND (30.5 percent fat). Even though the ODs were fatter than the OND adults, baseline strength and function were not different ( $p < 0.05$ ) and resistive training resulted in similar patterns of responses as results did not differ ( $P < 0.05$ ). Finally, function values of the VI, NVI, OD, and NDO are compared to highlight the impact of disability and disease on function.

S1

### DEBUNKING THE MYTHS: EXPERTS ADDRESS CONTROVERSIAL QUESTIONS RELATED TO EXERCISE AND HEALTH

E.M. Jackson, Kennesaw State University, M.A. Collins, Kennesaw State University, E.T. Howley, University of Tennessee, P.J. O'Connor, University of Georgia, M.H. Stone, East Tennessee State University

Within Exercise Science, there are ongoing debates among health and fitness professionals over exercise related health questions. It can be difficult to discern myth from science when there are poorly designed research studies or limited evidence to unequivocally answer the question. Therefore, the purpose of this symposium is to have a panel of experts provide research-based evidence related to three controversial topics often posed to exercise science professionals. First, within the weight loss community there is frequent debate over the role of exercising in the fat burning zone for weight loss. Dr. Ed Howley will address the questions: what is the fat burning zone, and what is its significance for those trying to lose fat? Secondly, there has been an interest in the concept of a runner's high and some early research linked this phenomenon to brain endorphins. Dr. Pat O'Connor will address the questions: is there a physiological basis for euphoria associated with exercise and what role do endorphins play in this phenomenon? Lastly, the health related benefits of cardiovascular and resistance training are well documented, but the importance of stretching for health and sports performance is less clear. Dr. Mike Stone will address the questions: does research support the role of stretching in enhanced health and athletic performance and are there situations in which stretching might be considered contraindicated?

S2

### EXERTIONAL COMPARTMENT SYNDROME IN ATHLETES

Robert Wilder, MD, FACSM, University of Virginia, Charlottesville, VA

Exertional leg pain is a frequent complaint in athletes. Included in the differential diagnosis is the exertional compartment syndrome. This symposium will review epidemiology, pertinent lower leg anatomy as well as proposed etiologic factors. Diagnosis requires the ability to identify pertinent factors in the history including significant symptoms as well as a detailed training review and physical examination. Up to date recommendations for diagnostic testing options will be reviewed including illustration of the procedure of compartment pressure monitoring in addition to other available diagnostic options. Treatment will be detailed including conservative management and training guidelines as well as surgical indications and techniques. We will also present data profiling over 60 cases of exertional compartment syndrome seen at the Runner's Clinic at the University of Virginia.

S3

### ARTHROGENIC MUSCLE INHIBITION AND ANKLE INJURIES

CD Ingersoll, FACSM\*, ML Cordova, FACSM#, J Sefton#, ED McVey\*, J Hertel, FACSM\*  
\*University of Virginia, Charlottesville, VA #University of North Carolina at Charlotte, Charlotte, NC

Arthrogenic muscle inhibition (AMI) is present and recognized in acute injuries, particularly those with joint effusion. There is emerging science, however, identifying persistent AMI in certain chronic conditions such as osteoarthritis and chronic ankle instability (CAI). CAI is a common problem in sports medicine, where previous ankle injury appears to be the predominate factor in predicting this condition. Individuals who suffer from CAI experience multiple instances of ankle instability in which the clinical symptoms of CAI are poorly managed and may be dismissed as recalcitrant to treatment. Treatment of CAI has not considered interventions specifically designed to diminish or eliminate AMI. Further, the functional consequences of AMI in CAI have not been well studied. This symposium will: describe AMI and its effects on the tissues of the body; how to measure AMI; the effects of ankle support and perturbations on specific elements of AMI; and the presence and consequences of AMI in chronic ankle instability. Four speakers will address the following topics: What is AMI?, Overview of Quantifying Arthrogenic Muscle Inhibition, Functional Assessment of Presynaptic Muscle Inhibition, and Chronic Ankle Instability and Arthrogenic Muscle Inhibition. The presentations will present a balance of research and clinical applications. A question and answer period will be included after the final presentation.

S4

**THE RELATIONSHIP BETWEEN MUSCULAR STRENGTH, FLEXIBILITY, BALANCE AND 200 METER RUN SPEED IN COLLEGE AGED PARTICIPANTS**

Sara Rakov and William Barfield, PhD College of Charleston, Charleston SC

P1

**Background and Purpose:** Due to the nature of human gait, it has long been recognized that running requires a combination of muscular strength, flexibility, and balance. The relationship among these characteristics is however, still relatively unknown. The purpose of this study was to assess the relationship among muscular strength, flexibility and balance in comparison to a college student's 200 meter run speed and to further analyze any gender differences that may exist among these variables. **Subjects:** Following IRB approval participants for this study were undergraduate students at the College of Charleston (21 females/11 males). **Methods:** Balance testing was conducted with the subjects standing on one leg under varying visual conditions (eyes open and closed). Standardized sit and reach was used to assess hamstring and low back flexibility. A one repetition maximum effort on a 45 degree inclined leg press was used to assess leg strength. Speed was measured over 200 meters on an indoor track, for all participants. **Results:** A two-sample t-test indicated significant differences ( $p < 0.01$ ) between males and females in muscular strength, flexibility and speed. **Conclusion and Discussion:** Based on the results, it can be established that males have greater muscular leg strength, less flexibility and faster times for a 200-meter run, then their female counterparts with no significant difference in balance results between genders.

**EFFECT OF POWERED-ANKLE FOOT ORTHOSES (PAFOS) ON WALKING ECONOMY**

E.M. Byrne, J.A. Norris, M.R. Mitros, A.P. Marsh, K.P. Granata Dept. of Health & Exercise Science, Wake Forest University (WFU) and School of Biomedical Engineering & Sciences, Virginia Tech-WFU Winston-Salem, NC

P2

This study examined the effect of augmenting muscle power with PAFOs on aerobic demand while walking on a treadmill. Whole body submaximal  $VO_2$  was measured in healthy young adults (2 males, 8 females, ages 23.3 $\pm$ 1.5 yrs) using a PARVO Medics TrueOne 2400 Metabolic Measurement System. Subjects were tested at their predetermined preferred walking speeds (PWS) on a treadmill under four different conditions: no PAFOs, inactive PAFOs, active PAFOs, and inactive PAFOs at active walking speed.  $VO_2$  measurements were collected for 6-min at each condition and walking economy was calculated from a two minute steady state (3:30 to 5:30 min). Walking economy during the inactive PAFOs condition was significantly higher than the no PAFOs condition (13.0 $\pm$ 1.88 v. 11.7 $\pm$ 1.18 ml/kg/min;  $p=0.046$ ) likely due to the extra effort required to move the additional mass of the PAFOs. There was no significant difference in aerobic demand between the active PAFOs condition and the no PAFOs condition, indicating that the power supplied by the PAFOs during the gait cycle compensated for their additional mass. Walking economy during the active PAFOs condition was significantly lower than the inactive PAFOs at active speed condition (12.2 $\pm$ 2.18 v. 13.3 $\pm$ 2.14 ml/kg/min;  $p < 0.01$ ). The active PAFOs condition was more economical because the power supplied by the PAFOs during push-off was utilized to reduce metabolic cost. Therefore, adding muscle power at the ankle joint with PAFOs reduces the aerobic demand of walking in spite of the added mass of the devices.

**EFFECT OF EXTERNAL STIMULI ON SENIOR ADULTS DURING STAIR DESCENT.**

Sankara, Y., Miletello, W., Cronk, S., Kim, B.J., Mahajan, N., Louisiana Tech University.

P3

**Purpose:** The objective of this study was to determine the effect of external stimuli (light (400 Lux), sound (91dB), and a combination of light/sound) on kinematic and kinetic characteristics of the lower extremity during stair descent with step height (7" and 9") and ambient lighting (day and night) changes among seniors. **Methods:** Participants (N=18) ages 60+ signed an informed consent and had no physical limitations. The 2D analysis was conducted using a custom built staircase (10x8x4 ft) and motion detector with light and auditory output. Graphical procedures, descriptive statistics, and a two-tailed paired sampled t-test were used to describe the kinematic, kinetic, and temporal data with the statistical level for the analysis set at  $p < 0.05$ . Effect size was tested using Cohen's d statistic. **Results:** For the ankle motion, speed of descent increased with light vs. no light for the 9" step height, 2.47 $\pm$ 0.28 m/s and 2.31 $\pm$ 0.32 m/s. VGRF increased with sound vs. no sound during night with a step height change, 16.74 $\pm$ 1.76 N/Kg, 15.71 $\pm$ 1.37 N/Kg. Ankle motion was slowed with both light/sound vs. without light/sound regardless of ambient lighting/step height change, 2.50 $\pm$ 0.22 m/s and 2.67 $\pm$ 0.28 m/s. Effect size calculations revealed that light for day/night and sound for night had the greatest effect on foot motion, 1.30, 0.38, and 0.52. **Conclusion:** Interventions tested contributed to changes in lower extremity gait patterns for seniors during stair descent. An increased speed of descent and compensatory ankle/foot motion occurred in the presence of an intervention, which may indicate a more confident approach to the final step.

**EXAMINATION OF ESTIMATED, ACTUAL AND PERCEIVED CALORIC EXPENDITURE ON AN ELLIPTICAL TRAINER**

Alicia R. Powell, Kate A. Fuchs, Anne E. Mishler & Judith A. Flohr, Department of Kinesiology, James Madison University

P4

**PURPOSE:** The purpose of this study was to compare actual, estimated, and perceived caloric expenditure of activity on an elliptical trainer. In addition, the relationship between caloric expenditure, body fat (BF), sex, and exercise intensity were examined. **METHODS:** Twenty-four trained subjects (12 males:  $VO_{2max}$ , 51.34  $\pm$  9.65 ml/kg/min; 12 females:  $VO_{2max}$  = 43.13  $\pm$  4.23 ml/kg/min) performed two exercise bouts on an elliptical trainer at 50% and 65% of  $VO_{2max}$ .  $VO_2$  and RQ measurements were used to calculate actual caloric expenditure (ACE). The calories expended as estimated (EE) by the elliptical trainer and subject's perceptions of caloric expenditure (PCE) were recorded. **RESULTS:** There were significant differences ( $p < 0.05$ ) between ACE and EE at both intensities and in the EE between males and females, but only at the low intensity ( $p = 0.040$ ). There was a direct relationship ( $p = 0.047$ ) between BF and the difference between ACE and EE at the low intensity. There was no significant difference between ACE and PCE at either intensity. **CONCLUSIONS:** It is possible that individuals who are attempting to track their caloric expenditure during exercise are being provided with inaccurate feedback while using the elliptical trainer. In addition, at the low intensity, the higher the BF, the greater the discrepancy between EE and ACE. It is possible that the difference in accuracy between males and females at the low intensity was related to females having higher BF. It also appears that PCE was in close agreement with ACE; this may have been due to a combination of factors including the subject's knowledge and experience with exercise equipment including an elliptical trainer.

**EXCESS POSTEXERCISE OXYGEN CONSUMPTION AND INTERVAL TRAINING**

S. Asano, T. J. Chandler, FACSM., C. E. Arnold, J. Mak, T. Shepherd, Division of Exercise Science, Sports and Recreation, Exercise Physiology Laboratory Marshall University, Huntington, WV

**P5**

The purpose of the study was to investigate the effect of exercise intensity on excess postexercise oxygen consumption (EPOC) in college age apparently healthy individuals. Subjects (N = 8 M=5, F=3) randomly participated in 3 different exercise sessions that included aerobic exercise (AE), interval exercise (IE) and high intensity interval exercise (HIIE), on separate days. EPOC was measured one hour after each exercise session while subjects were in a supine position. Analysis of Variance (ANOVA) with repeated measurements was used to assess differences among exercise sessions. The mean values ( $\pm$  SEM) for EPOC of AE, IE, and HIIE were  $2.106 \pm 0.219$ ,  $2.846 \pm 0.309$  and  $4.969 \pm 0.522$  liters per hour, respectively. There was a significant difference ( $p < 0.05$ ) with effect size = 0.72 as determined by pairwise comparisons. There was no significant difference ( $p < 0.05$ ) between mean EPOC of AE and IE, however, a significant difference ( $p < 0.05$ ) was found in mean EPOC of HIIE when it was compared with both AE and IE. These data suggest that exercise intensity has a significant effect on EPOC.

**LACK OF RELATIONSHIP BETWEEN WEIGHT AND PHYSICAL ACTIVITY IN MICE**

M.J. Yost, S.E. Carter, A.M. Kleinthen, M.J. Turner, J.T. Lightfoot, Dept. of Kinesiology, University of North Carolina at Charlotte, Charlotte, NC.

**P6**

The association between weight and physical activity is unclear. We measured daily physical activity (average daily distance (DIST, km); average daily duration (DUR, mins); average daily velocity (VEL, m/min)) in 161 male and 149 female F<sup>2</sup> generation mice for 21 days starting at 9 weeks of age. There was no significant correlation between end weight and DIST ( $r=.28$ ,  $p=.12$ ), end weight and DUR ( $r=.31$ ,  $p=.08$ ), and end weight and VEL ( $r=.05$ ,  $p=.68$ ). There was also no significant correlation between change in weight and DIST ( $r=.04$ ,  $p=.92$ ), change in weight and DUR ( $r=.03$ ,  $p=.85$ ), and change in weight and VEL ( $r=.07$ ,  $p=.53$ ). Therefore, our data suggests that there is no association between weight and physical activity in mice, which supports other literature in this area.

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**SELF-REPORTED AND MEASURED WEIGHT DISCREPANCY IN OVERWEIGHT/OBESE YOUNG WOMEN**

S.D. Kirk, K.R. Hill, D.I. Melton, B.L. Swearingin, J.D. Wagganer, P.G. Davis-FACSM, Univ. of North Carolina at Greensboro, North Carolina A&T State Univ.

**P7**

Although obesity prevalence reports are often derived from self-reported data, women may underreport body weight. Previous research also suggests that White women may underreport their weight more than African American women due to a greater social pressure to be thin. PURPOSE: To examine differences between self-reported and measured weight and height in young overweight and obese women requesting information about an exercise training study. METHODS: After telephone screening respondents to advertisements for participation in an exercise research study, 14 African American and 7 White women (18-30 yr) reporting body mass indexes (BMI) of 25-35 kg/m<sup>2</sup> were invited to laboratory screening appointments. Weight and height were measured and comparisons were made between self-reported and measured data. RESULTS: Paired t-tests revealed lower self-reports of weight (self-report vs. measured:  $81.6 \pm 2.0$  vs.  $83.5 \pm 2.3$  kg,  $\text{mean} \pm \text{SE}$ ,  $p < 0.05$ ) and BMI ( $30.7 \pm 0.8$  vs.  $31.6 \pm 0.8$ ) with no difference in height ( $163.0 \pm 0.8$  vs.  $162.5 \pm 0.9$  cm). Significant inverse relationships existed between measured values and the magnitudes of reporting discrepancy in weight ( $r=-0.579$ ), height ( $r=-0.495$ ), and BMI ( $r=-0.458$ ) ( $p < 0.05$ ). ANOVA revealed no significant differences in reporting discrepancies between African American and White subjects. CONCLUSIONS: Young overweight and obese women are likely to underreport body weight. These preliminary results suggest that the extent of overweight/obesity, more than ethnicity, affects the underreporting of weight.

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**IMPROVEMENTS IN BLOOD LIPID PROFILE FOLLOWING A 6-MONTH MULTI-DISCIPLINARY ADOLESCENT HEALTHY WEIGHT MANAGEMENT PROGRAM.**

Herrick, JE, Evans, RK, Franco, RL, Stern, M, Bryan, DL, Larson, NY, Toderico, BJ, Laver, JH. T.E.E.N.S. Healthy Weight Management Program, Virginia Commonwealth University, Richmond, VA.

**P8**

Elevated blood lipids in adolescence may lead to hypertension and coronary artery disease (CAD) in adulthood. Moderate intensity exercise and nutritional intervention has been shown to reduce circulating lipid levels in adults. The purpose of this study was to evaluate blood lipid parameters in overweight adolescents prior to and following 6 months of participation in a healthy weight management program designed to positively alter dietary behaviors, increase physical activity (PA), and address additional maladaptive behaviors. 33 males and females ( $13.4 \pm 1.9$  yrs) with age-related BMI  $>95$ th percentile ( $39.7 \pm 9.9$  kg/m<sup>2</sup>) volunteered to participate. Fasting blood samples were obtained upon enrollment (PRE) in the program and after 6 months of participation (POST). The following blood markers were assessed: total cholesterol (TCHOL), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglyceride (TRIG). During the 6-month intervention, participants were required to attend nutritional and behavioral counseling twice per month and 60-minutes of structured PA once/week. Each participant was also encouraged to participate in PA for an additional 2 times/week. Data were analyzed with paired-samples t-tests at an  $\alpha$  level of 0.05. Results: Compared to PRE, there were significant reductions in TCHOL (mg/dl) (PRE-178.9+/-33.3 v. POST-168.4+/-29.3) and LDL (mg/dl) (PRE-113+/- 34.4 v. POST-104.5+/-28.2) values at POST. No significant changes were seen in HDL or TRIG values at POST. Conclusion: TCHOL and LDL values in overweight adolescents were significantly reduced following six months of participation in a healthy weight management program designed to modify unhealthy eating habits and increase PA. Limited evidence has shown a correlation of adolescent obesity to adulthood disease; however, control of blood lipid levels during adolescence may reduce the onset of CAD in adulthood.

**THE T.E.E.N.S. HEALTHY WEIGHT MANAGEMENT PROGRAM: CHANGES IN PHYSICAL FITNESS CHARACTERISTICS OF OVERWEIGHT ADOLESCENTS AFTER 6 MONTHS OF PARTICIPATION**

Toderico, BJ, Evans, RK, Franco, RL, Stern, M, Bryan, DL, Larson, NY, Herrick, JE, Laver, JH. T.E.E.N.S. Healthy Weight Management Program, Virginia Commonwealth University, Richmond, VA.

The purpose of this study was to evaluate physical fitness (PF) in overweight adolescents prior to and following 6 months of participation in a healthy weight management program designed to positively alter dietary behaviors, increase physical activity (PA), and address additional negative health behaviors. Methods: Twenty-nine males and females ( $13.3 \pm 1.8$  yrs) with age-related body mass index (BMI) values greater than the 95th percentile ( $38.3 \pm 7.9$  kg/m<sup>2</sup>) volunteered to participate. PF testing was performed prior to participating (PRE) and after 6 months of program participation (POST). The PF testing included a graded exercise test (VO<sub>2</sub>-170), a 1-mile distance for time (MILE), hand grip strength test (HG), static arm curl strength test (ARM), static leg lift strength test (LEG), and body fat assessment (%BF). During the 6 month intervention, participants were required to attend nutritional and behavioral counseling twice a month and one 60 minute structured PA session each week. Participants were also encouraged to participate in PA for an additional 2 times per week. Data were analyzed with paired-samples t-tests. The  $\alpha$  level was set at 0.05. Results: There was a significant reduction in %BF (PRE-42.1  $\pm$  2.2% vs. POST-40.3  $\pm$  2.2%) and MILE time (PRE-1036.1  $\pm$  40.6 sec vs. POST 934.3  $\pm$  42.3 sec) after 6 months. There were also significant increases in VO<sub>2</sub>-170 (PRE-18.5  $\pm$  0.9 ml/kg/min vs. POST-21.5  $\pm$  1.1 ml/kg/min) and ARM (PRE-57.3  $\pm$  2.8 lbs. vs. POST-62.3  $\pm$  3.7 lbs.) at 6 months. There were no significant differences in HG or LEG after 6 months. Conclusions: Participation in a multi-disciplinary weight management program designed to increase physical activity and promote other health behaviors was sufficient to improve several PF characteristics in overweight adolescents. Participation in a program of this type may be an effective first step toward developing appropriate exercise behaviors and other healthy habits that impact fitness, fat loss, and long-term weight control in our study population.

P9

**EXAMINATION OF AN INNOVATIVE JUMPING DEVICE: OBSERVED RATES OF PERCEIVED EXERTION RESPONSES IN TRAINED SUBJECTS.**

Callahan, Z., Lyons, S., Bosak, A., Morehead, C., Faircloth, J., and Davis, J., Western Kentucky University

The purpose of this study was to compare rates of perceived exertion (RPE) for two modalities on a prototype jumping machine unavailable to the public. Twelve trained subjects (age: 21.3 yrs  $\pm$  2.3; body fat: 13.1%  $\pm$  4.1) performed a 100 and 120 jumps per minute cadence protocol until subjects who were unable to complete the trial terminated due to cardiovascular stress, upper-leg muscle fatigue (quads. and hams.), lower- leg muscle fatigue (gastroc., soleus, and achilles), or a combination of these or for a period of 15 minutes. RPE was recorded for total body, lower leg, and upper leg. Seven of twelve subjects were able to jump for the full fifteen minute duration (time: 12.2 mins  $\pm$  3.7). Subjects were asked subjective questions following each of the trials to gain a more thorough understanding of the fatigue associated with repetitive jumping. Peak RPE was statistically significant for upper leg between 100 and 120 cadence ( $p < .05$ ). Anecdotal observations suggest the difference in RPE could be attributed to disruption of typical jump kinematics causing increased muscular contraction in lower cadence protocol. T-tests revealed statistical significance for mean total body, upper leg, and lower leg RPE's at both 100 and 120 jump per minute cadence. This data demonstrates that controlled jumping cadence will cause stress responses at varying cadences and should be investigated more thoroughly.

P10

**ADOLESCENT OVERWEIGHT: PREVALENCE AND PREDICTORS**

Garder, M., Lyons, S., Western Kentucky University

Much attention has been focused in recent years on the growing problem of childhood overweight and obesity. As overweight persists into adolescence, the likelihood of remaining overweight or obese as an adult increases dramatically. To better understand the factors associated with adolescent overweight, a study was undertaken on a cohort of students attending a public city high school in southern Kentucky. Height and weight measurements were abstracted from school health physical forms in the students' academic records and BMI percentile was computed for two points in time: school entry at kindergarten and sixth grade. Additionally, students were weighed and measured during their current school year to assess current BMI percentile. Data were analyzed to determine prevalence of overweight and to develop a trend within a single cohort over time. For this cohort of students, the data revealed that while in kindergarten ( $n=823$ ) 30.6% were at the 85th percentile or above (17.7 "at risk," 12.9 overweight); while in 6th grade ( $n=1135$ ) 44.6% were at the 85th percentile or above (20.0 at risk, 24.6 overweight); and while in high school ( $n=886$ ) 39.5% were at the 85th percentile or above (17.4 at risk, 22.4 overweight). These data reveal that the problem of being at risk or overweight begins as early as kindergarten and likely continues throughout adolescence, thus increasing the likelihood of being overweight or obese as an adult.

P11

**DIFFERENTIAL IMPACT OF HIGH-CARBOHYDRATE VS. LOW-CARBOHYDRATE DIETS ON ENDOTHELIAL FUNCTION IN ADULTS WITH THE METABOLIC SYNDROME**

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Endothelial dysfunction has been linked to the pathogenesis of atherosclerotic vascular disease and predicts future cardiovascular events in patients with or without CVD. We evaluated the impact of two distinctly different diets on brachial artery reactivity in subjects with elevated risk for CVD and T2D. METHODS: 9 subjects (3 males and 6 females, age 44.5  $\pm$  8.4 years, BMI 34.5  $\pm$  5.0 kg/m<sup>2</sup>, mean  $\pm$  SD) who meet the NCEP ATP III criteria for the metabolic syndrome participated. In a single-blinded, crossover design, each participant received 150% of their caloric needs on both diets and were instructed to eat only until no longer full. The low-carbohydrate (LC) diet contained 15-20% carbohydrate (10g/day of fiber), 55-60% fat, and 25-30% protein, and the high-carbohydrate (HC) diet contained 55-60% carbohydrate (45g/day of fiber), 20-25% fat, and 15-20% protein. Diet order was randomized, followed by a 4-week washout period. Brachial artery flow-mediated dilation (FMD) and response to sublingual glyceryltrinitrate (GTN) were assessed using high-resolution ultrasound and edge-detection software. Subjects were imaged in a fasted state at baseline and after 4 weeks of each diet. Changes in vascular reactivity are reported as the mean % change over baseline. A 2 x 2 repeated-measures ANOVA revealed a significant decrease in FMD as a result of the LC diet (7.79  $\pm$  2.5 %; 5.48  $\pm$  4.26 %,  $P = 0.039$ ); whereas, a non-significant increase was observed after the HC diet (8.47  $\pm$  4.67%; 9.72  $\pm$  4.72 %,  $P = 0.24$ ). Baseline FMD and the response to GTN did not differ between baseline measurements (FMD: 7.79  $\pm$  2.5 % vs. 8.47  $\pm$  4.67%,  $P > 0.52$ ; GTN 16.13  $\pm$  4.1 % vs. 18.35  $\pm$  3.51%,  $P > 0.28$ ). Endothelium-dependent vasodilation of the brachial artery was markedly impaired following the LC diet in adults with the metabolic syndrome. In as much as both endothelial dysfunction and the metabolic syndrome are markers for increased cardiovascular disease risk, the low carbohydrate diet may adversely affect clinical outcomes in metabolic syndrome subjects.

P12

### THE EFFECT OF 10 DAYS OF EXERCISE TRAINING ON SKELETAL MUSCLE, OXIDATIVE CAPACITY, AND TOTAL FAT UTILIZATION

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P13

The purpose of this study was to determine whether 10 days of endurance exercise training can improve skeletal muscle oxidative capacity and/or whole body fat utilization in sedentary lean and obese subjects. 7 lean (age, 30.3 + 3.8 years; BMI, 22.9 + 1.0 kg/m<sup>2</sup>; 2 men; 5 women) and 12 obese (Age, 34.5 + 1.9 years; BMI, 37.8 + 1.6 kg/m<sup>2</sup>; 1 men; 11 women) sedentary men (lean, 2; obese, 1) and women (lean, 1; obese, 11) exercised on a cycle ergometer at 70% VO<sub>2</sub>max, for one hour each day for 10 consecutive days. Muscle biopsies from vastus lateralis muscle were taken before and after the exercise intervention. Skeletal muscle oxidative capacity was quantified from image analysis of NADH tetrazolium reductase staining. Total amount of fat utilization was determined from pre and post exercise respiratory exchange ratio (RER) at 15 watt work load. At baseline, lean subjects showed 15% higher muscle oxidative capacity compared to obese subjects (p=0.06). Fat utilization at 15W workload was similar between lean and obese subjects, at baseline. After 10 days of exercise training, no significant training effect in muscle oxidative capacity was observed. However, a significant increase in fat utilization occurred in the obese subjects after 10 days of exercise training whereas lean subjects showed no significant change in fat utilization. This study suggests that skeletal muscle oxidative capacity measured from NADH tetrazolium reductase staining may not reflect the similar result when total fat utilization is measured from RER.

### FKBP12 DEFICIENCY DOES NOT EXACERBATE MUSCLE DAMAGE AFTER ECCENTRIC EXERCISE.

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P14

Central core disease (CCD) is a hereditary disease that stems from mutations in the ryanodine receptor (RYR1), and is characterized by muscle weakness and abnormal myofiber morphology. PURPOSE: To test the hypothesis that removal of FKBP12, a 12-kD binding protein known to bind to RYR1 sites near the locus of some CCD mutations, would exacerbate myofiber damage in tibialis anterior (TA) and extensor digitorum longus (EDL) muscles after eccentric exercise. METHODS: Skeletal muscle specific FKBP12 deficient mice were created using the CreLoxP gene recombination technique with Cre transgene expression under muscle creatine kinase promoter regulation. TA muscles were obtained from FKBP12 deficient (n=13) and control (n=16) mice at 3, 7, and 14 days after performance of 150 eccentric contractions in vivo. EDL muscles from FKBP12 knockout (n=4) and control (n=4) mice were dissected at 3 days post-exercise. Muscle sections (12 μm) were stained with hematoxylin and eosin to assess cellular damage and regeneration. RESULTS: FKBP12 deficiency reduced body weight (-14%), TA (-10%) and EDL (-21%) muscle wet weights, and TA (-23%) estimated total number of fibers compared with controls. There was no difference in peak eccentric strength deficit between FKBP12 (-46%) and control (-46%). The extent of myofibers undergoing active degeneration (4-12%) and regeneration (1-8%) was not different between groups after injury induction in either muscle. CONCLUSION: Skeletal muscle FKBP12 deficiency results in a smaller phenotype but does not exacerbate cellular markers of muscle damage after eccentric exercise in mouse anterior crural muscle.

### RELATIONSHIP BETWEEN WALKING TEST OUTCOMES & SELF-REPORTED PHYSICAL FUNCTION IN COPD PATIENTS.

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P15

The six minute walk test (6 MWT) is a common assessment used to evaluate functional status in chronic obstructive pulmonary disease (COPD) patients. However, the use of the 6 MWT to predict physical function in this population may be problematic because some COPD patients are unable to walk continuously for 6 minutes. The four meter walk test (4m) has been proposed as an alternative test for severely disabled populations, although its relationship to function in COPD patients is unknown. Therefore, the purpose of this study was to determine the ability of the 4m walk test and 6 MWT to predict self-reported physical function in COPD patients. One-hundred fifty-nine COPD patients (age = 65.1 ± 10.1; FEV<sub>1</sub>/FVC = 51.9 ± 12.6; FEV<sub>1</sub> % of predicted = 52.2 ± 19.1) completed a standardized function questionnaire, a 4m walk for time, and a 6 MWT for distance. Stepwise multiple regression analysis was used to predict function, with 4m walk time (secs) and 6 MWT distance (feet) as predictor variables. For the entire sample, both time and distance entered the regression equation as significant predictors: function = 1.8769 - .0004(feet) + .1102(secs), r squared = .239. For patients who walked continuously during the 6 MWT (n=111), distance was the only significant predictor: function = 2.3569 - .0005(feet), r squared = .102. Conversely, for patients who walked intermittently or terminated the 6 MWT prior to completion (n=48), time was the only significant predictor: function = .8986 + .2517(secs), r squared = .297. These results suggest that, for COPD patients who are unable to walk continuously during 6 minute walk testing, the 4m walk test is a better predictor of self-reported physical function. Supported by NIH grants HL53755 and AG021332

### MEDIAL COLLATERAL LIGAMENT STIFFNESS IN MALES AND FEMALES

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P16

Ligament stiffness is a material property of collagen tissue. Measuring ligament stiffness in males and females at three different ages may determine if ligament stiffness changes across the lifespan. Purpose: The purpose of this study was to compare the stiffness of the medial knee and the MCL at different distinct ages and between the genders in those age groups. Methods: One-hundred and eight healthy and physically active subjects (54 males, 54 females, age range = 35.0 + 20.6 years old, mass = 67.1 + 23.3 kg, height = 161.9 + 17.8 cm) with no previous knee surgery, were measured with an arthrometer in 0° and 20° of knee flexion with a valgus force of 120N. The slope-values of the force-strain line were obtained. Statistical analysis on three groups by age was compared with a one-way ANOVA to determine if differences existed between the groups and for males and females within each group to determine gender differences at different ages. Results: Differences exist in ligament stiffness between the three different age groups at full extension (F 2, 105 = 105.3, P < .001) and 20° knee flexion (F 2, 105 = 51.06, P < .001). Males and females in the 8-10 year old age group were not statistically different from each other in extension (F1,25 = .05, P = .85) or in flexion (F1,25 = .001, P = .97). Males and females in the 18-40 year old age group were statistically different from each other in extension (F1,42 = 6.7, P = .013) and in flexion (F1,42 = 7.8, P = .008). Conclusions: Knee stiffness is lower in pre-pubescent children than in adults, but there is no difference in adults 18-40 and 50-75 years old. After puberty, knee stiffness is greater for males than females.

#### EFFECTS OF HYALURONIC ACID ON PAIN, STIFFNESS, AND DISABILITY: A META-ANALYSIS

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**P17**

Objective: To systematically review the literature assessing the efficacy of hyaluronic acid (HA) injections for management of osteoarthritis (OA) at the knee. Methods: A computerized search of PubMed(1950-2004), CINAHL (1982-2004), and Medline(1966-2004) was performed. Studies included were written in English, utilized HA injection for the purpose of management of knee OA, and used the Western Ontario McMaster University Index (WOMAC) or the Lequesne functional index as outcomes assessment tools. Data Abstraction: Two reviewers abstracted the data using a standardized meta-analysis format. Results: Seven studies met the inclusion criteria. Study results were homogeneous. Separate meta-analyses were performed for each outcomes index. Active treatment resulted in a greater decrease in stiffness when compared to placebo (95% CI for percent difference between HA and control=[2.18, 8.80]), but not in pain [-.60, 5.48] or disability [-.83, 4.86] as evaluated on WOMAC. Functionality, as evaluated by the Lequesne index, improved following HA injections up to 6 months post-treatment (95% CI=[1.23, 2.63], however this difference was not observed after 6 months [-.85, .48]. Conclusions: HA injection may reduce symptoms related to OA at the knee. The response was relatively small and transient in the population included in our analysis. There is insufficient evidence for use of HA in the management of OA at the knee. Decisions to treat with HA should be examined from a cost-benefit perspective and attention should be given to the relatively large effect of saline injection.

#### LONG-TERM IMPACT OF ATHLETIC PARTICIPATION ON PHYSICAL CAPABILITIES

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**P18**

Collegiate athletes undergo training regimens that place them under chronic stress, and increase susceptibility to injuries and overtraining. The purpose of this study was to investigate the effects of prior participation in collegiate athletics on limitations in daily life and during exercise. Former Division I college athletes, and a demographically similar group of alumni (controls), were surveyed via e-mail (n=15,000). The survey included questions about athletic participation, current health and activity status, and limitations in physical capabilities. Subjects were asked whether an injury during physical activity in their college years limited current daily life or physical activity. Former athletes returned 375 surveys, and controls returned 2980. The rate of reported major and repetitive injuries was greater for the athletes compared to controls (p<0.01). Of the alumni controls, 3% reported limitations in daily life, and 5% reported limitations during exercise. In the athlete group, 21% reported limitations in daily living, and 36% reported limitations during exercise due to injuries suffered as a collegiate athlete. Former athletes reported a significantly greater rate of daily life and physical activity related limitations compared to controls (p<0.01). Athletes reported significantly more osteoarthritis. The data suggests that prior collegiate athletics participation may result in a greater rate of limitations during daily life and exercise later in life. These data are a first step in determining the potential long-term risks associated with participation in

#### PRE-SEASON PERFORMANCE RELATED VARIABLES IN MALE NCAA DIVISION III SOCCER PLAYERS

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**P19**

In recent years, several studies have examined the physiological profile of elite soccer players. However, normative data for NCAA division III male soccer players are limited. Therefore, the purpose of this study was to examine performance related variables in this subject population. Thirteen Members of a NCAA Division III men's soccer team (mean +/- SD): age 20 +/- 1 yrs; body weight 73.3 +/- 10.2 kg; body fat 11.9 +/- 8.8% volunteered to participate in the study. Performance testing included aerobic capacity (VO2max test performed on a treadmill), Wingate anaerobic power test, vertical jump, and a 20 yard shuttle run. All performance testing occurred prior to the start of the regular season. The results of this study suggest that male athletes participating in NCAA Division III soccer perform at a lower level in aerobic capacity (53.7 +/- 4.7 ml/kg/min), peak power (9.2 +/- 1.2 W/kg-1), mean power (6.9 +/- 0.8 W/kg-1), vertical jump height (59.4 +/- 6.4 cm), and the 20 yard shuttle run (5.0 +/- 0.2 s) than elite soccer players. In conclusion, this study provides normative data for NCAA Division III male soccer players. In comparison to published descriptive data in the literature, the athletic ability of the athletes observed in this study appears to be lower than the more elite soccer player.

#### EFFECT OF EXERCISE INTENSITY ON CIRCULATING CORTISOL

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**P20**

This study examined the influence of exercise intensity on the circulating cortisol response in men. Ten highly trained (VO2max = 67.1 +/- 2.9 ml/kg/min [X +/- SE]) men performed three 30-min submaximal steady-state cycling exercise bouts (40%, 60%, 80% VO2max). Exercise bouts occurred on separate days and the order of intensity administration was randomized. Blood specimens were obtained pre-exercise (post-prandial state, following a 30-min supine rest period) and immediately upon completion of the exercise bouts (i.e., post-exercise). Specimens were placed on ice, later centrifuged, and separated plasma was stored at -80°C until analyzed. The time of day for exercise bouts was controlled and standardized. Bloods specimens were examined for hematocrit and cortisol levels, the latter by RIA analysis. A repeated measures ANOVA was used to test for significant differences. Results indicates that all resting, pre-exercise cortisol levels were normal and within accepted clinical ranges (13.0 +/- 1.0 ug/dl). Significant post-exercise increases (p<0.05) in cortisol were observed at 60% (+40.4 +/- 11.7% [% > pre-exercise]) and 80% (+83.9 +/- 18.6%), but not 40% (+1.9 +/- 9.8%) VO2max. When post-exercise hormonal levels were adjusted for hemoconcentration effects (plasma volume changes) the 60% and 80% VO2max increases remained significant (p<0.05), while at 40% there was a tendency for hormone levels to be reduced (p=N.S.). These findings confirm earlier work (Davies & Few 1973) indicating that increasing exercise intensity provokes greater increases in the cortisol response to an exercise bout once a certain threshold intensity is reached.

### CARBOHYDRATE INGESTION DOES NOT ATTENUATE IL-6 DURING EXERCISE IN THE HEAT

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Interleukin (IL)-6 is a cytokine that increases significantly during prolonged, intensive exercise. Recent studies suggest carbohydrate (CHO) ingestion attenuates this increase in thermoneutral conditions. The purpose of this study was to verify if CHO attenuates plasma IL-6 and enhances performance during prolonged cycling in the heat. Eight trained male cyclists volunteered to participate in a double-blind, cross-over study while ingesting either: placebo (PLA) or a 6% carbohydrate drink (CHO). Subjects cycled in the heat (28°C, 55% RH) for 2 hr with variable intensity (alternating between 60% and 75%VO<sub>2</sub>max every 15 min) followed by a 15 min time trial (TT). For both PLA and CHO, plasma IL-6 was elevated significantly ( $p < 0.05$ ) at 60 min (as core temperature reached 38.5°C), remained elevated throughout cycling, but was not different between treatments. Blood glucose was significantly higher for CHO compared to PLA. For PLA, blood glucose and IL-6 showed a significant inverse relationship ( $r = -0.50$ ,  $p < 0.05$ ), but there was no significant relation ( $r = 0.22$ ,  $p > 0.05$ ) between IL-6 and glucose for CHO. IL-6 was also significantly correlated to serum triglyceride, heart rate, ratings of perceived exertion, and rectal temperature ( $r = 0.49 - 0.69$ ,  $p < 0.05$ ). Work completed during TT was not different ( $p > 0.05$ ) between CHO (224.0 + 36.6) and PLA (200.5 + 36.6 kJ). During prolonged variable-intensity cycling in the heat, CHO does not attenuate plasma IL-6 or enhance performance.

Funded by The Coca-Cola Company

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### PROFILE OF WEIGHT GAINED AFTER EMPLOYMENT IN THE TELECOMMUNICATION INDUSTRY

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There is a tendency for employees to gain weight after entering sedentary occupations. It is critical for organizations to understand the situations, which promote weight gain. Purpose: To compare demographic and organizational characteristics of those that gained weight and did not gain weight after employment in a telecommunication organization. Methods: An anonymous ergonomic and exercise questionnaire was administered to 393 volunteers in a communication company, 71% female and mean age of 33.6+9.78 years. The survey included body part discomfort, fatigue, exercise, and ergonomic assessments. The discomfort scale was 0-5 with 0 = no discomfort to 5 = very uncomfortable. Fatigue was measured at the 8th shift hour on a similar scale of 0-5. The International Physical Activity Questionnaire was used to establish the MET- minutes used per week. A principal components analysis combined multiple body part discomfort scores into one discomfort index. T- tests, F-tests and ANCOVA procedures were used to analysis those that gained weight and did not gain weight for the following variables: Age, gender, pain index, fatigue after 8 hours, fitness club membership, previous employment type, days it took to become accustomed to the job, total MET-minutes/week. Results: No significant differences were found for any of the variables and the amount of weight gained showed similar results. Conclusions: Little differences were found between those that gained weight and did not gain weight in this organization.

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### ERGONOMIC PROFILE OF A TELECOMMUNICATION COMPANY AND EXERCISE SUGGESTIONS

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Ergonomic discomfort and fatigue profiles are useful tools in selecting exercise and nutrition programs to improve employee health and productivity. Profiles vary according to industry and job characteristics. Purpose: To report questionnaire findings in an industry requiring sitting and answering telephones and discuss the implications for exercise programming. Methods: An anonymous ergonomic and exercise questionnaire was administered to 393 volunteers in a communication company. Questionnaire included body part discomfort, fatigue, and injury assessments. Discomfort scale was 0-5 with 0 = no discomfort to 5 = very uncomfortable. Fatigue was measured at time intervals during shift on similar scale of 0-5. Results: Most distressed body parts (% reporting a 3-5 level of discomfort): lower back, 41%; neck 35%; upper back 30%; eyes 27%; right shoulder 24%; left shoulder 21%; and right wrist 20%. Mean number of days since discomfort began: 176 days. 70.9% indicated discomfort gradually over time. The mean fatigue level increased from .5 to 2.5 over the 8 hours with a significant slope increase (1.18+1.39 to 2.46+1.50,  $p < .05$ ) between hours 6 and 8 of the shift. Injured employees required 33-54 days to become accustomed to job; non-injured 15-31 days. Conclusions: Develop programs addressing body area discomfort profile and shift fatigue curves. Use computers to prompt exercise stretch breaks supported by booklet targeting top five discomfort areas. The main target is low back in resistance exercise. Exercise during shift breaks and nutritional support to reduce the 6-8 hour fatigue slope.

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### IF DISTANCE ISN'T A BARRIER, WHY DON'T KIDS WALK TO SCHOOL?

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One component of physical activity (PA) that has experienced a dramatic decline over the past 40 years is walking for transportation, in particular walking or biking to school. Although distance has often been cited as a primary reason kids don't use active travel, even when children live close to school, many do not walk. Purpose: To compare perceived barriers and benefits of active school travel in children who live close enough to school to walk or bike. Methods: 1679 4th and 5th grade children from 19 elementary schools from across the US were asked to complete a survey on school travel. Children were included in the analysis only if they reported that they lived close enough to walk or bike to school. Frequency of walking and biking to school (always, sometimes, never) was obtained by questionnaire. Children were asked to indicate which barriers and benefits (from a list) were associated with walking and bicycling to school in their opinion. Chi-square comparisons were made between groups of AT and NAT children. Results: 1060 (63%) 4th and 5th graders from the schools indicated they lived close enough to walk or bike to school. Of these, 32% always walked/biked to school; while 23% said they never used active travel. In this group of children, the barriers which appeared to significantly influence walking or biking to school included: "it's too hot, too cold, or always raining," "no time in the morning," "no safe way to cross the street," and especially "parents won't let me." Children credited: "I can spend time with friends as I walk or bike to/from school" and "I can get exercise" as benefits of walking or biking to school. Conclusions: Spending time with friends and getting exercise are powerful motivators for active school travel. Even when distance is not a barrier, parental restrictions, time in the morning, street crossings, and weather appear to be barriers. Maximizing the perceived benefit of exercise and time with friends, as well as overcoming parental concerns and improving time management could be useful targets for interventions to promote walking and biking to school.

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**INTERTESTER RELIABILITY OF BRACHIAL ARTERY FLOW-MEDIATED VASODILATATION USING UPPER AND LOWER ARM OCCLUSION IN HEALTHY SUBJECTS.**

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P25

The assessment of endothelial function as brachial artery flow-mediated vasodilatation is widely used to determine the effect of risk factor intervention and may predict the clinical benefit of antiatherogenic therapy. Previous studies suggest that flow-mediated dilation is greater using the upper arm occlusion technique, but no data are available to compare interreliability within technicians. This study was undertaken (1) to compare the amount of hyperemia between upper and lower occlusion techniques (5 min blood pressure cuff occlusion) and (2) to determine reproducibility of measurements between testers. Methods: 14 healthy adults ages 18 to 50 underwent 4 measurements by two technicians. Brachial artery vasodilatation was measured 1, and 3 min post cuff deflation, compared with baseline, and expressed as a percent change. Results: Upper arm occlusion resulted in significantly greater ( $P < 0.05$ ) percent change dilation regardless of tester at 1 min post occlusion (9.52 and 9.32 vs 6.7 and 4.3 %) and at 3 min post occlusion (7.5 and 8.3 vs. 4.9 and 1.9 %). There was a tester effect in percent change diameter across all measurements. Tester 2 recorded significantly ( $P < 0.05$ ) higher percent changes in diameter in the upper vs lower occlusion (6.7 vs. 4.3%). Conclusion: Upper arm occlusion produces significantly greater vasodilatation than does lower arm occlusion. Also, results vary by technician suggesting that the same technician should perform all measurements in a study.

**THE RELATIONSHIP AMONG COMMUTING, DIETARY, AND EXERCISE BEHAVIORS IN COLLEGE STUDENTS**

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Objective: This study examined the association between commuting time and/or distance and body mass index (BMI), and dietary and exercise behaviors in college students. Methods: Behaviors were assessed using self-report, dietary screeners, and an exercise questionnaire in 400 college students ages 18-35 taking classes on a commuter campus. BMI was determined through measurement of height and weight. Results: Pearson correlations revealed no relationship between commuting time and/or distance and BMI, and dietary and exercise behaviors. However, total meals eaten out the week prior and number of meals obtained from any away-from-home food vendors was related to total, saturated, and percent fat in the diet, as well as cholesterol. Conclusion: Commuting distance nor time were related to BMI, dietary or exercise behaviors. Regardless of commuting behaviors, better dietary behaviors should be recommended among college students.

**BREAST CANCER: A STUDY OF STRENGTH AND FLEXIBILITY**

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The American Cancer Society estimates in 2005 that 211,240 women will join the 2 million women currently living with breast cancer in the United States. Subjective measures have been used to describe deficits in self-reported physical function after breast cancer surgery. Few studies have used objective measures of physical function in breast cancer survivors and strength and flexibility before surgery remains unknown. The purpose of the present study was to describe strength and flexibility among women prior to breast cancer surgery. Pre-surgery data was collected on 40 women (M age=55+12.7 years) receiving treatment from a Comprehensive Cancer Center. Objective measures were used to assess static grip strength, dynamic muscular strength via bicep curl, and range of motion via flexion and abduction of the shoulder. An average of two trials performed on the affected and non-affected side was calculated per measure. The affected side was significantly weaker when compared to the non-affected side in grip strength and bicep curl ( $p < .01$ ). Flexibility was not significantly different between sides. On the affected side, grip strength measured  $M=22$  kg, the bicep curl was completed between 6 and 10 repetitions with an average of  $M=11$  lbs, and degrees of flexion and abduction were  $M=173.5$  and  $M=171.1$ , respectively. Findings from this study are informative for the development of appropriate exercise interventions for women diagnosed with breast cancer.

**RELATIONSHIPS BETWEEN PREFERENCE AND TOLERANCE OF EXERCISE INTENSITY AND EXERCISE PERFORMANCE**

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The Preference for and Tolerance of Intensity of Exercise Questionnaire (PRETIE-Q) can assess an individual's innate willingness to participate in various types of exercise. This information may be particularly useful in the development of exercise prescriptions & the enhancement of adherence & compliance to exercise programs. Little research has examined the individual differences in preference for and tolerance of exercise intensity and its interaction with the exercise environment. PURPOSE: To examine the relationship between the PRETIE-Q and exercise performance with differing distraction stimuli. METHODS: 20 Individuals participated in this investigation. They were asked to complete the PRETIE-Q to determine preference (PREF) for & tolerance (TOL) of high intensity exercise. The study included 3 thirty min exercise bouts on a cycle ergometer. The 3 conditions included a no stimulus, a video, and a music condition. The video & music conditions were selected by the participants and were randomly administered. Each participant was given a 2-3 day rest between test sessions. During the first 5 minutes of exercise, the participants were allowed to manipulate the ergometer resistance as needed. Following this acclimation period, the participants were limited to changing the resistance only at the completion of each 5 min stage. Power, distance, calories burned (CAL), & pedalling rate (PR) were recorded every five minutes during exercise from the ergometer display. Heart rate (HR) & ratings of perceived exertion (RPE) were also measured and recorded using a Polar heart rate monitor & the Borg 20-point scale. RESULTS: Correlational analyses revealed significant relationships for PREF & PR and distance. TOL was also significantly related to power, HR, resistance, CAL & distance. CONCLUSIONS: These data indicate that there is a relationship between PREF & TOL and exercise performance. These qualities may vary widely from person to person. The importance of elucidating these characteristics may reside in the development of fitness programs especially with regard to exercise adherence and compliance.



#### EFFECTS OF VARIOUS STIMULI ON EXERCISE PERFORMANCE

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Music has been shown to have beneficial effects during exercise. Distraction stimuli have been used during exercise to promote arousal and divert the performer from feelings of fatigue. This phenomenon may be assessed by measuring power, distance, calories burned (CAL), pedalling rate (PR), ratings of perceived exertion (RPE) and heart rate (HR). While several studies have examined the effect of music during exercise few have considered the effects of visual stimuli. **PURPOSE:** To identify the differences in exercise performance with music, video, and without stimuli. **METHODS:** College-aged individuals (20.5±1.4 years) volunteered to participate in this investigation. This study included 3 thirty min cycle ergometry exercise conditions; a control condition with no stimuli and 2 test conditions; a video and a music treatment. The test conditions were selected by the participant and administered randomly. There was a 2 day rest between test conditions. The participants were allowed to change the ergometer resistance during the initial 5 minutes of exercise. Following the initial 5 min, they were restricted to changing the resistance following each of the subsequent 5 min stages. HR, RPE, power, CAL, distance, and PR were measured every 5 min during exercise. HR and RPE were measured using a Polar heart rate monitor and the Borg 20-point scale. The remaining variables were recorded off the ergometer interface. The hypothesis for this study was that while HR may actually vary according to exercise intensity, RPE would be lower and power, cal, distance, and PR would be higher during the video and music conditions. **RESULTS:** Investigation of these data revealed no significant differences for any of the performance variables between the treatments. **CONCLUSIONS:** These findings may indicate that distraction stimuli may have little effect on exercise performance when the intensity is self-selected. Also, when exercise duration is more moderate, the influence of distraction may be reduced. These findings may prove to be important for the design of exercise programs especially when duration and intensity are prescribed rather than self-selected.

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#### THE INFLUENCE OF VARIOUS DISTRACTION STIMULI ON AFFECTIVE RESPONSES TO CYCLE ERGOMETRY

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Acute bouts of exercise have been associated with significant affective changes. Exercise supplemented with distraction stimuli may divert attention from feelings of fatigue and discomfort that are common during bouts of exercise to more pleasant feelings. However, many studies focus on auditory stimuli rather than visual stimuli. **PURPOSE:** The purpose of this study was to compare individuals' affective responses to exercise with visual, auditory and no distraction. **METHODS:** 20 individuals (20.5±1.4 years) volunteered for this investigation. This study included three 30 min cycle ergometry exercise conditions, a control condition with no stimuli and 2 test conditions; one supplemented with a video and a second involving music. Both stimuli were self-selected and administered in a random order. The Activation Deactivation Adjective Check List (ADACL), the Feeling Scale (FS), and the Felt-Arousal Scale (FAS) were given to the participants prior to, immediately following, 10 min post and 60 min post an acute bout of cycle ergometry. The ADACL assesses affect in the following dimensions: energetic arousal (EA; energy to tiredness) and tense arousal (TA; calm to tension). The FS assesses affective valences ranging from 'very good' to 'very bad'. The FAS assesses activation ranging from "low arousal" to "high arousal". It was hypothesized that immediately after the acute bouts of exercise; positive affective responses will be highest after the video condition, followed by the music condition and lastly, the control condition. **RESULTS:** The data seems to indicate a time effect for the FS, FAS, TA and EA. There was no condition effect or interaction for FS or FAS. For EA there was no effect for condition or a time by condition interaction. There was a condition effect for TA and a trend towards a time by condition interaction. The music condition had lower TA than the other 2 conditions. **CONCLUSIONS:** It may be too preliminary to draw any definitive conclusions at this time. However, the music condition may be a desirable technique to employ for those participating in exercise as a means of relaxation.

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#### EFFECTS OF CAFFEINE ON REPS TO FAILURE AND RPE DURING RESISTANCE TRAINING

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Research suggests caffeine enhances aerobic performance. Since caffeine is a CNS stimulant and blunts pain perception it may positively effect anaerobic performance, however this is not well-understood. This study examined the effects of caffeine (Ca) on resistance training {repetitions (reps), RPE, HR}. Apparently healthy, recreationally trained males (n=6) and females (n=2) were tested for their ~10 rep max on bench press (BP) and leg press (LP). In sessions 2 and 3, Ca (~6mg/kg) or placebo (PI) was ingested 1 hr prior to arrival in a double blind manner and in a counterbalanced order. With verbal encouragement provided, subjects performed 3 sets to failure (BP and LP). Successful reps, peak HR (PHR), and Omni RPE were recorded each set. Subjects rested 3min between sets and 5min between exercises. Data were analyzed using 2 x 3 repeated measures ANOVA for Ca vs. PI (p < 0.05). During set 3 for LP, reps were significantly higher for Ca (11.9+3.3) vs. PI (10.1+3.3) which contributed to a significantly greater PHR for Ca (156.5+11.9) compared to PI (146.9+7.3). However, no difference was found between Ca and PI for RPE during LP for any set. Similar RPE with higher reps suggests caffeine may have blunted pain response during set 3 possibly delaying subjective fatigue. No differences were observed for reps, RPE or PHR for BP. Ca seems to have an effect on latter sets of a training bout. Further research is warranted utilizing complete training sessions including more exercises and sets to more fully explore the benefits of caffeine during resistance training exercise.

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#### THE USE OF SESSION RPE FOR QUANTIFICATION OF RESISTANCE TRAINING BOUTS TO FAILURE AT 60% AND 90% OF 1RM.

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Session RPE provides a subjective evaluation of the perceived overall difficulty of an exercise session after its completion. Previous research on this method of globally quantifying exercise intensity is limited for resistance training and for exercise bouts to failure. Using a within-subjects design, this study compared acute RPE, session RPE and heart rate (HR) between resistance training workouts using repeated high-intensity (HI) and low-intensity (LI) exercise bouts to failure. Recreationally resistance trained men (n=7), were assessed for exercise-specific 1 repetition maximum (1RM) for 6 exercises (leg press, bench press, lat pull-down, shoulder press, triceps press, and biceps curls). Then, in a counterbalanced order on separate days, subjects performed 3 sets to failure for each exercise at 60% (LI) and 90% (HI) of 1RM (2min rest between sets and exercises). After each set subjects rated their exertion for that bout using a 10 point Borg RPE scale. Successful reps and HR were recorded for each set. Thirty minutes after the end of the exercise session subjects rated their overall RPE for the entire session using the session RPE scale (0-10). HR, total work (sets x reps), and acute RPE were compared between HI and LI using repeated measures ANOVA (p<0.05). Session RPE for LI and HI were compared using a paired samples t-test (p<0.05). LI was significantly higher for session RPE (LI=8.6+/-1.0, HI=6.1+/-1.5) and total work (LI=17196+/-4254, HI=5143+/-1256). Total work was significantly greater per exercise for leg press, bench press, lat pull and triceps press; however, there were no significant differences (LI vs. HI) for acute RPE responses. HR was significantly higher for leg press, bench press and lat pull during LI. However, there was no overall difference between LI and HI. Results suggest, in resistance exercise to failure, session RPE was influenced by total work with a potential auxiliary role for acute physiological responses. However, RPE during acute bouts seems to reflect level of fatigue more so than total work

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### LOW RELATIONSHIP BETWEEN BODY PART DISCOMFORT PROFILE AND END OF SHIFT FATIGUE

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The relationship between body part discomfort, a typical ergonomic assessment tool, and shift fatigue experienced by workers is critical for recommending exercise and health programs that target increased productivity and lower insurance costs. Purpose: To examine the relationship between a body part discomfort profile and eventual end of shift fatigue. Methods: An anonymous ergonomic and exercise questionnaire was administered to 393 volunteers in a communication company, 71% female and mean age of 33.6±9.78 years. The survey included body part discomfort, fatigue, and exercise assessments. The discomfort scale was 0-5 with 0 = no discomfort to 5 = very uncomfortable. Fatigue was measured at the 8th shift hour on a similar scale of 0-5. The International Physical Activity Questionnaire was used to establish the MET- minutes used per week. A principle components analysis combined multiple body part discomfort scores into one discomfort index. A regression analysis established a relationship between the discomfort index and fatigue. Regression and ANCOVA procedures analyzed the effects of age, gender, fitness club membership, shift and total MET-minutes/week on the discomfort index and fatigue relationship. Results: The discomfort index and fatigue relationship was low, but significant ( $R^2=0.0866$ ,  $SEE = +0.04568$ ,  $p<0.0001$ ). The non-club member variable was significant, yet low ( $R^2 = 0.1675$ ,  $SEE = 0.05992$ ,  $p<0.0001$ ). Other variables showed no significant differences. Conclusion: The self reported factors provided insufficient information to establish a close relationship between body part discomfort and shift fatigue.

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### A COMPARISON OF TWO WARM-UPS ON JOINT RANGE OF MOTION.

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More research needs to be done on ballistic stretching compared to other stretching techniques (1). Gillette et al. (6) note that the optimum intensity and duration of the CRF activity of the warm-up have not yet been determined. Therefore, purpose of this study was to compare a 5-minute treadmill activity at 70% maximum heart rate (MHR) and 5 - 6 minutes of ballistic stretching to a 5-minute treadmill activity at 60% MHR and 5 - 6 minutes of static stretching. Thirty healthy male and female college students, 7 males and 23 females, volunteered. Four of the participants were highly active, 14 were moderately active, and 12 were physically inactive. This study was approved by the Institutional Review Board and all participants signed an informed consent. Participants received the aforementioned warm-ups in random order with 48 - 72 hours between warm-ups. The stretches were the same for both warm-ups. They were a back stretch, a quadriceps stretch, and a hamstring stretch. Three trials for 30-s each were given. After each warm-up the participants performed the Modified-Modified Schober Test for low back flexibility, the Active Knee Extension Test for hamstring flexibility, and plantar flexion for ankle flexibility. Three trials were given for each test. There were no significant differences on any of the three range of motion tests although the ankle range of motion test was greater following static stretching (68.8 degrees) as compared to ballistic stretching (65.9 degrees). Therefore, a ballistic-type warm-up did not prove to be any better than a static-one for improving range of motion.

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### TEST-RETEST RELIABILITY OF THE SENSORMEDICS VMAXST PORTABLE METABOLIC MEASUREMENT SYSTEM.

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The Sensormedics VmaxST portable metabolic measurement system has been reported to provide acceptable measures of oxygen uptake during exercise. Test-retest reliability of this system during various physical activities has not been reported. PURPOSE: To assess the test-retest reliability of the VmaxST portable metabolic measurement system during walking and running. METHODS: 19 healthy males (age 26.9 ± 6.4 yr.; ht: 179.7 ± 7.2 cm; wt: 79.5 ± 10.4 kg; % fat: 16.0 ± 7.4) and 26 healthy females (age 24.8 ± 4.8 yr.; ht: 166.1 ± 5.2 cm; wt: 62.2 ± 8.9 kg; % fat: 25.9 ± 11.4) underwent two separate exercise sessions on different days that consisted of treadmill walking on a level grade at 2.0 mph (54 m/min), 3.0 mph (80 m/min), and 4.0 mph (107 m/min), and running at 6.0 mph (161 m/min). Subjects exercised for 5 min at each velocity, with 3 min rest in between each exercise bout. Pulmonary ventilation (VE) and gas exchange were measured breath-to-breath each minute of the test. Data collected during minutes 3, 4 and 5 of each test were averaged. RESULTS: Analysis of variance revealed no significant differences between the two trials for VE [range 18.9 to 56.4 l/min; differences between trials = 0.1-0.6 l/min; < 3%; coefficients of variation (CV) 5.3 ± 7.0 %; Intraclass correlation coefficients (ICC) 0.81 ± 0.92], oxygen uptake [VO<sub>2</sub>; range 0.73 to 2.22 l/min; differences between trials = 0.00 ± 0.03 l/min; < 3%; CVs 5.70 ± 7.96 %; ICCs 0.77 ± 0.90] or carbon dioxide production (VCO<sub>2</sub>; range 0.59 to 2.07 l/min; differences between trials = 0.02 ± 0.10 l/min; < 5%; CVs 12.8 ± 14.5 %; ICCs 0.68 ± 0.80). Additional exercise trials involving simulated activities of daily living yielded similar results. CONCLUSION: The Sensormedics VmaxST portable metabolic measurement system yielded good test-retest reliability for measurement of VE, VO<sub>2</sub> and VCO<sub>2</sub> during walking and running exercise in young men and women

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### WALKING AND RUNNING ECONOMY ARE WEAKLY INVERSELY CORRELATED TO MAXIMAL OXYGEN UPTAKE IN HEALTHY MALES AND FEMALES

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An inverse relationship has been shown between maximal oxygen uptake (VO<sub>2</sub>max) and running and cycling economy. Furthermore, it has recently been reported that among sedentary premenopausal women VO<sub>2</sub>max correlated inversely with walking economy at 3.0 mph (Hunter et al., Eur J Appl Physiol, 2005). PURPOSE: To examine the relationship between VO<sub>2</sub>max and walking and running economy in healthy men and women. We selected a range of typical walking speeds (2.0 ± 4.0 mph), and one running speed (6.0 mph). METHODS: 19 healthy males (age 26.9 ± 6.4 yr.; ht: 179.7 ± 7.2 cm; wt: 79.5 ± 10.4 kg; % fat: 16.0 ± 7.4) and 26 healthy females (age 24.8 ± 4.8 yr.; ht: 166.1 ± 5.2 cm; wt: 62.2 ± 8.9 kg; % fat: 25.9 ± 11.4) underwent two separate exercise sessions on different days that consisted of treadmill walking on a level grade at 2.0 mph (54 m/min), 3.0 mph (80 m/min), and 4.0 mph (107 m/min), and running at 6.0 mph (161 m/min). Subjects exercised for 5 min at each velocity, with 3 min rest in between each exercise bout. Pulmonary ventilation (VE) and gas exchange were measured breath-to-breath each minute of the test. The average of VO<sub>2</sub> values obtained during the last two minutes of exercise for both exercise sessions was used for determination of exercise economy (corrected for resting VO<sub>2</sub>; RMR). VO<sub>2</sub>max was assessed during an inclined walking treadmill test to volitional fatigue. Linear regression was performed between 1/VO<sub>2</sub> obtained during the submaximal tests and VO<sub>2</sub>max (in l/min, with and without correction for RMR; ml/kg/min; and ml/kg fat free mass/min). RESULTS: For both women and men linear regression generally revealed inverse relationships between walking/running economy and VO<sub>2</sub>max (regardless of how it was expressed). However, r<sup>2</sup> values were routinely quite low: for walking: R<sup>2</sup>=0.01 ± 0.13; for running: r<sup>2</sup> = 0.03 ± 0.24. CONCLUSION: Walking and running economy tend to vary inversely with VO<sub>2</sub>max; however, regression analysis suggests that very little of the variation in walking/running economy can be explained by maximal oxygen uptake.

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CHANGES IN MAXIMAL OXYGEN CONSUMPTION AND VENTILATORY THRESHOLD IN PROFESSIONAL FIREFIGHTERS FOLLOWING 1-YR OF COMMUNITY CENTER BASED EXERCISE TRAINING

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Purpose: The present study was undertaken as part of a national Fire Act Grant award to determine the effectiveness of a 1-yr community center based exercise program toward improving the cardiorespiratory endurance and ventilatory threshold (VT) in professional firefighters. Methods: Three hundred and eight professional firefighters (males n=301, females n=7) completed both pre and post program maximal graded exercise testing in which maximal oxygen consumption (VO<sub>2</sub>max) and VT were assessed through indirect spirometry. Results: Values are reported as mean +/- SEM. No significant changes were noted in VO<sub>2</sub>max in either male or female firefighters (males, VO<sub>2</sub>max pre= 38.05 +/- 0.43 ml/kg/min vs. VO<sub>2</sub>max post=37.71 +/- 0.45 ml/kg/min; females VO<sub>2</sub>max pre=40.67 +/- 0.14 ml/kg/min vs. VO<sub>2</sub>max post=39.69 +/- 0.43 ml/kg/min). However, there was a significant increase (p<0.05) in VT for male firefighters (males, VTpre=54.73 +/- 0.47% vs. VTpost=56.46 +/- 0.57%) but not female firefighters (VTpre=53.43 +/- 3.95% vs. VTpost=60.29 +/- 2.69%). Conclusion: One yr of community center based exercise training did not improve VO<sub>2</sub>max in professional male and female firefighters, however, improvements were seen in the VT of male firefighters.

Supported by the Department of Homeland Security: Assistance to Fire Fighters Grant Program - MFRD Firefighter Health & Wellness Program

CHANGES IN SELECT CARDIOVASCULAR DISEASE RISK FACTORS IN MALE PROFESSIONAL FIREFIGHTERS FOLLOWING ONE YEAR OF COMMUNITY CENTER BASED EXERCISE TRAINING

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Purpose: The present study was undertaken as part of a national Fire Act Grant award to determine the effect of a 1-yr community center based exercise program on select cardiovascular disease (CVD) risk factors. Methods: Two hundred thirty-three male firefighters completed all phases of a pre and post exercise program evaluation of body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), total cholesterol (TC), high density lipoprotein cholesterol (HDL) and low density lipoprotein cholesterol (LDL). Results: Values are reported as mean +/- SEM. There were no significant changes noted in BMI (pre=29.11 +/- 0.26 kg/m squared vs. post=29.32 +/- 0.33 kg/m squared), TC (pre=194.67 +/- 2.89 mg/dL vs. post=192.82 +/- 2.76 mg/dL), LDL (pre=128.31 +/- 2.62 mg/dL vs. post=126.00 +/- 2.58 mg/dL) or HDL (pre=38.86 +/- 0.77 mg/dL vs. post=39.11 +/- 1.41 mg/dL). However, a significant increase in both SBP (pre=124.67 +/- 0.96 mmHg vs. post=128.86 +/- 0.90 mmHg), and DBP (pre=74.74 +/- 0.67 vs. 78.79 +/- 0.71 mmHg) was observed. Conclusion: One yr of community center based exercise training did not favorably alter any of the select CVD risk factors assessed in this study. Furthermore, an increase in both SBP and DBP was seen at 1-yr follow-up.

Supported by the Department of Homeland Security: Assistance to Fire Fighters Grant Program - MFRD Firefighter Health & Wellness Program

EVALUATION OF CADENCE DIFFERENCES BETWEEN 100 AND 120 JUMPS PER MINUTE USING THE DIJI-JUMP MACHINE

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Jumping rope can often be an arduous task to endure. Constantly having to restart the jumping process after catching the rope on your foot or feet can be rather frustrating and may reduce the duration of continuous jumping activity. The recent design of an innovative jump rope simulation machine (The Diji-Jump Machine) could potentially make repetitive jumping a little more structured and potentially less troublesome. However, despite the likely positive effects of this new jumping machine, little is known regarding the aerobic benefits of repetitive jumping exercise. Also, there seems to be a void in the literature regarding the recommendation of the most apropos jumping cadence which may elicit the greatest stimulus for aerobic improvement. PURPOSE: To compare aerobic performance during "jumping activity" between different cadences of 100 jumps per minute (jpm) and 120 jpm using the Diji-Jump machine. METHODS: Using a counterbalanced design, 12 moderately fit subjects (7 males & 5 females) completed two continuous Diji-Jump protocols at a cadence of 100 jpm (OHJ) and 120 jpm (OTJ). The two continuous jumping trials were completed within a seven day period. Average (VO<sub>2</sub>ave) and peak (VO<sub>2</sub>peak) aerobic capacity (ml/kg/min) values were compared between OHJ and OTJ using a Multivariate ANOVA. Differences were considered significant at p<0.05. RESULTS: There were no significant differences (p = 0.32) between OHJ (37.0 ± 6.3 ml/kg/min) and OTJ (37.9 ± 5.2 ml/kg/min) regarding VO<sub>2</sub>ave. VO<sub>2</sub>peak differences between OHJ (41.9 ± 7.9 ml/kg/min) and OTJ (42.7 ± 6.3 ml/kg/min) were also not significant (p = 0.37). CONCLUSIONS: Results suggest that oxygen consumption demands appear to be similar between cadences of 100 jpm and 120 jpm when using the Diji-Jump machine as a form of aerobic activity. Future studies may be required to determine how fitness level, sport specificity, age, or other variables might determine the appropriate jumping cadence which may yield the most superlative aerobic benefits.

ACCURACY OF THE AMERICAN COLLEGE OF SPORTS MEDICINE METABOLIC EQUATION FOR PREDICTING OXYGEN COST DURING GRADED EXERCISE TESTING.

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The purpose of this study was to investigate the accuracy of the American College of Sports Medicine (ACSM) metabolic equation for running when compared to actual oxygen measures obtained during graded exercise testing (GXT) on a treadmill. Oxygen cost of running was obtained for forty-five trained, healthy subjects (29 men, 16 women; range, mean ±SD; ages 19-62, 39.1 ±9.3 yrs; body mass 46.8-103.9, 74.5 ±14.5 kg; height 1.52-1.96, 1.75 ±0.10 m; percent body fat 7.3-25.9, 15.1 ±5.4%) during a maximal GXT to exhaustion. Participants performed one of three GXT protocols depending on their most recent 5-km race performance. Each GXT utilized a discontinuous protocol that increased in speed every 3-min. During the GXT oxygen consumption was measured utilizing a calibrated metabolic cart and average during the last 30-sec of each stage. Utilizing the ACSM's running equation, VO<sub>2</sub> (ml/kg/min) = [0.2 X speed (m/min)] + [0.9 X speed (m/min) X grade (%)] + 3.5, an estimation for the oxygen cost of each workload was calculated. Accuracy of the ACSM equation was determined by descriptive statistics comparing means between the ACSM metabolic equation for running and actual measures. Examination of actual oxygen cost at each workload revealed an average overestimation of 4.76ml/kg/min. Further examination revealed greater overestimation at every increase in speed. Based upon these findings the ACSM metabolic equation for running overestimates fitness and/or calorie utilization in trained runners with accuracy dissipating as speed increases.

#### THE ASSOCIATION BETWEEN STRETCHING AND INJURY IN RESISTANCE TRAINED MEN AND WOMEN

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**P41**

**INTRODUCTION:** Few studies have examined the association between stretching and injury prevalence. In addition, no study has investigated the association between stretching in experienced resistance-trained men and women. **OBJECTIVE:** The purpose of this study was to compare the prevalence of injuries in resistance-trained men and women who follow or do not follow a stretching program. Furthermore, this study also compared injury prevalence between genders, the type of injury, and region of the body injured most. **METHODS:** One hundred subjects equally divided by gender, between the ages of 20 to 30 years, voluntarily responded to a questionnaire on their training, stretching habits, and injury history. Chi-Square analysis was performed between injury prevalence, gender, and stretching program. **RESULTS:** The results revealed that the difference in the prevalence of injury between groups that stretch and do not stretch was not significantly different ( $p > 0.05$ ). The male subjects sustained more injuries than the female subjects ( $p < 0.05$ ). The knee joint for the female subjects and the shoulder joint for the male subjects were the most common injury reported. **CONCLUSION:** Whether the subjects participated in a stretching program or not did not appear to be associated with the prevalence of injury. Based on these findings, a future well-controlled training study should be conducted to examine the relationship between stretching and injury prevalence.

#### TASK-RELEVANT TESTS AND THE ARMY PHYSICAL FITNESS TEST: CRITERIA FOR EVALUATION OF COMBAT READINESS IN THE INFANTRY

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The purpose of this study was to determine if infantry soldier performances on task-relevant tests (TRT) or the Army Physical Fitness Test (APFT) predict combat readiness. **METHODS:** Twenty-three U.S. Army Rangers completed a standard APFT consisting of push-ups, sit-ups, and a two-mile run. Seven days later, the subjects began executing a series of task-relevant events consisting of a four-mile loaded march, 300-yard modified shuttle run, 100-meter low-crawl, pull-ups, dips, hanging knee-raises, and a modified anaerobic step test. Several weeks later, combat readiness was assessed utilizing a tactical field test (FT) of infantry-specific tasks at the end of a field exercise. **RESULTS:** There were no significant correlations between performance of any individual TRT event and the FT. In contrast, the results indicated a highly significant correlation between the overall performances of the TRT and the FT ( $r = 0.86/p < 0.001$ ) while performances on the APFT and FT were moderately significantly correlated ( $r = 0.61/p < 0.01$ ). **CONCLUSION:** When compared to the APFT, the TRT improves prediction of combat readiness. The enhanced predictive value of the TRT events may be explained by the inclusion of a greater number of events which more closely replicate the physical demands of infantry tasks.

#### Relationship Between Maternal and Child Physical Activity and Body Mass Index

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**P43**

To help increase the success of public health programs aimed at decreasing childhood obesity, it is important to understand behavioral influences on childhood physical activity. Subjective measures of physical activity have been used to show a relationship between a mother and child's physical activity level. Currently, this relationship is less well known when activity level is assessed using activity monitors which provide an objective measure of physical activity. **PURPOSE:** The purpose of this study was to examine the relationship between a mother's physical activity and her child's physical activity using step count output. A secondary purpose was to look at the relationship between body mass index (BMI) and activity level between mother's and children. **METHODS:** Data were collected on 26 sets of mother's and their elementary school age children. Height and weight were recorded to determine BMI. Each mother and child wore and NL-2000 activity monitor for a 7-day period and average step count was determined. **RESULTS:** There was no significant relationship between a mother and her child's activity levels. An inverse relationship was found between mother's PA and her BMI ( $r = -.59, p < .01$ ). Furthermore, no significant relationship between BMI and activity level was found for children. **CONCLUSION:** Mother's PA was not predictive of her child's. This finding may be due to the fact that children spend a majority of their time during the week in school; therefore, reducing the influence of maternal activity. Mother's PA was not related to her child's BMI but was negatively related to her own BMI, supporting a predicted health benefit of PA. For successful public health programs, behavioral influences on childhood physical activity need to be further understood.

#### VALIDITY AND RELIABILITY OF AN ELECTRONIC PEDOMETER IN A LABORATORY SETTING

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The purpose of this study was to determine the validity and reliability of step counting by the Omron HJ-700IT pedometer. A total of 20 subjects (10 males, 10 females) completed 2 trials of treadmill walking (age =  $35.0 \pm 10.8$  y, height =  $1.72 \pm 0.10$  m, weight =  $68.5 \pm 13.9$  kg, body fat =  $20.7 \pm 9.8\%$ , BMI =  $23.1 \pm 3.5$  kg/m<sup>2</sup>). For each trial, subjects walked for 30 minutes, 15 minutes at 67 m/min and 15 minutes at 93.8 m/min. Steps were counted manually as the criterion measure. Three Omron HJ-700IT pedometers were carried in random order (shirt pocket, belt clip at the hip, and pants pocket). A Yamax Digi-Walker SW-200 was carried on the belt at the right hip. A two-way ANOVA with repeated measures on Trial indicated no significant difference in total steps counted by the HJ-700IT pedometers from the manually counted steps between trials or at any of the three carrying locations. There was a significant difference in steps counted by the Yamax pedometer ( $P < 0.001$ ) compared to counted steps. Pearson's correlation and linear regression of pooled data from Trial 1 and 2 revealed correlations and SEE to the criterion variable (counted steps) for the Omron HJ-700IT of: Shirt (0.991, 27.1), Belt (0.988, 30.5), Pants (0.958, 57.9), and Yamax (0.725, 139.9). Percent error for pedometer-counted steps for the Omron HJ-700IT in the Shirt, Belt, and Pants location were 0.04, 0.15, and 0.67% respectively compared to -4.21% for the Yamax SW-200 over an average of  $3305.8 \pm 198.7$  steps walked. In conclusion, the Omron HJ-700IT is a highly accurate and reliable pedometer for counting steps during 30 minutes of walking and is accurate when carried in a shirt pocket, on a belt clip at the hip, and in a pants pocket.

**RELATIONSHIP BETWEEN BODY MASS INDEX AND BLOOD PRESSURE RESPONSES DURING SUBMAXIMAL EXERCISE**

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The response pattern and relationship between BMI and blood pressure during exercise has not been clearly elucidated. Therefore, the purpose of this study was to determine the relationship between BMI, blood pressure, and heart rate (HR) during submaximal exercise. Twenty-nine healthy young females between 18 and 40 years of age signed university approved informed consent forms and volunteered to participate in this study. The participants were grouped using BMI into average weight (18-24.9 kg/m<sup>2</sup>), overweight (25-29.9 kg/m<sup>2</sup>), and obese ( $\geq$  30 kg/m<sup>2</sup>) categories and completed three-minute cycle ergometer exercise stages, one each at 25 watts (W), 50 W, 75 W and 85% of their maximal HR. Blood pressure and HR were collected during minutes two and three of each exercise stage and at two minute intervals for eight minutes after the final stage. The data were evaluated with descriptive statistics, ANOVA and correlations. These data indicate that individuals with higher BMI values do not elicit higher BP or HR responses when exercising at 25 W, 50 W, or 75 W or at 85% of HR max. There was a negative relationship ( $r = -0.46$ ;  $p < 0.05$ ) between BMI and 85% HR max. However, the negative was probably due to the fact that the obese group was older than the other two groups and had lower 85% HR values. These data suggest that when individuals of different levels of body mass perform the same amount of absolute and relative submaximal work, circulatory responses will be similar in healthy young women.

**ALLOMETRIC SCALING MODELS OF ISOMETRIC BICEPS STRENGTH AND THE EFFECTS OF RESISTANCE TRAINING IN ADULT FEMALES**

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The purpose of this study was to 1) derive allometric scaling models of isometric biceps strength using pre-training muscle cross-sectional area (CSA) and body mass (BM) as scaling variables, 2) test model appropriateness using regression diagnostics, and 3) cross-validate the models before and after training. A subset of FAMuSS\* study data ( $n = 183$ , age = 24.4  $\pm$  6.0 yrs) was randomly split into two groups (A & B). Group A pre-training data for BM and CSA models produced scaling exponents of 1.08 and 0.44 respectively. The allometric scaling model using CSA, but not BM, met all statistical criteria. To further investigate the relation between BM and isometric strength, Group A was subdivided into 2 groups based on BMI ( $< 25$  vs.  $\geq 25$ ), yielding a scaling coefficient of 1.48 for the BMI  $< 25$  group that met statistical criteria. No significant relation between BM and strength was found for the BMI  $\geq 25$  group. These data suggest that the relation between BM and strength in females may be influenced by adiposity. Cross-validation to Group B pre-training data revealed that the CSA model and BM model (for BMI  $< 25$  group) were appropriate. Twelve weeks of resistance training did not alter the relation between BM, CSA, and isometric biceps strength as assessed by allometric scaling.

\*Functional SNP's (single nucleotide polymorphisms) Associated with Muscle Size and Strength

**ACUTE EFFECTS OF HEAVY- AND LIGHT-LOAD SQUAT EXERCISES ON KINETIC FACTORS RELATED TO VERTICAL JUMP PERFORMANCE**

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**PURPOSE:** To examine the acute performance enhancing effects of a single heavy- load (HL) or light-load (LL) squat intervention set (SIS) on vertical jumping. **METHODS:** Twenty nine resistance trained subjects attended 3 independent sessions, 3 to 7 days apart. The first session served for practice and familiarization and squatting capacity (1-RM) was also determined. In the two testing sessions, subjects performed 2 pre-test countermovement jump (CMJ) sets and 1 post-test CMJ set after a single SIS of either 40% or 80% of 1-RM, which were counterbalanced within subjects. A set consisted of 3 CMJ with 30 seconds of rest between jumps. Impulse, peak vertical ground reaction forces (VGRF), minimum VGRF, and time of contact were measured during each CMJ. **RESULTS:** Only minimum VGRF values significantly decreased from pre- to post-test in the LL condition. There were no other statistically significant pre- to post-test changes. **CONCLUSIONS:** Neither the LL nor HL SIS significantly affected kinetic variables related to vertical jump performance. Reasons for the lack of change may be attributed to insufficient movement pattern specificity when comparing the SIS and CMJ, a sub-maximal squat workload of only 50%, or rest intervals of excess duration. Since LL produced similar results to HL, and given the previous success of HL interventions on improving jump height, the current data suggests that optimum LL workloads may also improve CMJ performance

**STRETCHING NEGATIVELY AFFECTS REACTION TIME DURING REPETITIVE VERTICAL JUMP PERFORMANCE.**

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Stretching is a common staple of exercise programs. Some recent research has shown that stretching may hinder performance. **PURPOSE:** The purpose of this study was to examine whether stretching affects repeated vertical jump performance. **METHODS:** Twenty subjects (21.8 $\pm$ 1.8 years, 67.3 $\pm$ 12.9kg, and 16.1 $\pm$ 5.1% fat) reported to the laboratory for three separate trials. During each trial, subjects performed two bouts of four consecutive vertical jumps. In randomized order, the subjects performed the two bouts under the following conditions: A) a non-stretching trial, B) a pre-first bout only stretching trial (7 min passive rest between bouts), and C) a between- bout only stretching trial (7 min stretching protocol between bouts). The stretching protocol included static stretching of the gluteus maximus, hamstrings, quadriceps, and triceps surae. Reaction time between jumps (rt), jump height, and explosive leg power factor (elpf = air time/ground time) were measured by a Power Mat (Probotics, Inc.) for each bout. **RESULTS:** The results indicated that stretching immediately prior to the first bout significantly impaired reaction time (rt1 = 0.469 $\pm$ 0.21 versus rt2 = 0.439 $\pm$ 0.19 seconds;  $p = 0.035$ ) and decreased leg power factor (elpf1 = 1.31 $\pm$ 0.41 versus elpf2 = 1.38 $\pm$ 0.37;  $p = 0.053$ ) on the first bout. There were no significant differences ( $p > 0.05$ ) found for the non-stretching or stretching only between bouts conditions. **CONCLUSION:** These findings suggest that stretching immediately prior to repeated vertical jump performance hinders reaction time and leg power on the first bout. After seven minutes, these negative effects were no longer evident.

#### A TEN-WEEK TEAM CHALLENGE IMPROVES FITNESS SCORES IN A CORPORATE SETTING

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**P49** The purpose of this study was to evaluate the effectiveness of a team fitness challenge program in increasing the fitness of middle-aged adults in the corporate world. Seventy-six volunteers began the team program, but complete data was gathered on only 37 (34 females; 3 male) who had an average age of  $43.0 \pm 11.1$  years. The volunteers were divided into teams of 4 to 6 and agreed to take the challenge to win the fitness competition. The competition was based on team points related to exercise, motivation, and diet. Members were encouraged to assist each other since the top three teams and top ten individuals were announced in the facility newsletter and received prizes. Teams received points based on self-reported activities completed each week during the intervention. The teams were evaluated for fitness (cardiovascular- step test-; strength push-ups-; endurance sit-ups-; flexibility sit & reach-; and body composition sum of four skinfolds-) prior to the 10 weeks of competition and at the conclusion of the intervention. The results were evaluated using paired t-tests. The overall results of the program were a significant ( $p < 0.05$ ) reduction of 3% body weight, a decrease of 7.5% for the sum of four skinfolds, a reduction in recovery heart rate of 16% for the three- minute step test, 37.1% increase in strength (push-ups), a 21.4% increase in muscle endurance (sit-ups) and a 6.6% improvement in flexibility (sit & reach). These results indicate that a team approach to fitness is effective in improving fitness in middle-aged adults.

#### BEVERAGE CONSUMPTION OF MIDDLE AND HIGH SCHOOL STUDENTS WITH HIGH AND LOW ACTIVITY LEVELS

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**P50** Recent studies have addressed the increasing consumption of soda in adolescents; however, research exploring the types and quantities of beverages consumed by active and inactive adolescents is deficient. Thus, the purpose of this study was to determine if physical activity levels dictate trends in beverage choices of adolescents. Participants were divided into four groups of 60: low activity middle school, high activity middle school, low activity high school, and high activity high school, with equal gender representation in all groups. The frequency and type of beverages consumed were quantified using a 10-item self-report questionnaire. Water was the most consumed beverage, with the 78% of the high activity groups reporting daily consumption compared to 60% for the low activity groups ( $p = 0.03$ ). Regardless of grade, daily regular soda intake was reported more frequently in the high activity group compared to their less active counterparts (43% vs. 33%). A greater percentage of adolescents with high activity reported daily intake of fruit punch (50% vs. 29%;  $p < 0.005$ ), coffee and tea (41% vs. 27%) and fruit flavored soda (40% vs. 26%;  $p < 0.002$ ), compared to the less active groups. Middle school students drank more milk than high school students, and whole milk was consumed more than either low-fat or skim. Milk consumption also varied with grade and activity level, as high activity high school students reported the lowest proportion of low-fat (7%) and skim milk (3%) consumption, compared to all other groups. Our findings suggest that activity level influenced the choices of liquid intake in middle and high school students. Further, milk consumption declined during the high school years. Thus, when evaluating fluid balance in youth, activity levels should be considered.

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#### A PILOT STUDY COMPARING THE EFFECTS OF DIFFERENT TYPES OF EXERCISE ON BASAL METABOLIC RATE: IMPLICATIONS FOR WEIGHT CONTROL

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**P51** There has been some controversy among researchers about the most appropriate form of exercise to increase basal metabolic rate (BMR). Therefore the purpose of this pilot study was to compare the effects of three bouts of exercise resistance (RE), continuous aerobic (CA), and intermittent aerobic (IA), matched for energy expenditure (kcal) and rate of oxygen consumption ( $VO_2$ ), on basal metabolic rate (BMR). Three healthy men (age  $29 \pm 2$  years, height  $169.3 \pm 5.0$  cm, weight  $66.7 \pm 6.1$  kg) were recruited to participate in the pilot study. BMR was measured after spending the night in the laboratory on four different occasions over a four week period: control, 21 hours post RE, CA, and IA. For the RE subjects performed one circuit of five exercises vertical butterflys, squats, toe raises, lateral pulldowns, and triceps press downs at approximately 60% of their maximal lifts. Each set was performed until failure, and followed by 60 s of rest. The circuit was repeated for a total of 45 minutes of exercise.  $VO_2$  was measured continuously and used for calculating the total amount of energy expenditure ( $210 \pm 11$  kcal) and average rate of  $VO_2$  ( $13.6 \pm 2.0$  ml/kg/min). For CA, subjects cycled at the work load that produced the same average rate of  $VO_2$  at each subject's average rate of  $VO_2$  during the RE. For IA, subjects cycled at high intensity interval between 90%-100% of  $VO_{2max}$  for 30 seconds and a low intensity interval at 20-30% of  $VO_{2max}$ . For the low intensity interval, subjects cycled until the average rate of  $VO_2$  in that interval matched the average rate of  $VO_2$  during the RE. For both CA and IA, subjects cycled until spending the same amount of kcal measured during RE (exercise duration; CA:  $44 \pm 2$ ; IA:  $45 \pm 2$  min). Result showed that RE significantly ( $P < 0.05$ ) increased BMR compared to CA (Control:  $3.59 \pm 0.26$ ; RE:  $4.19 \pm 0.21$ ; CA:  $3.48 \pm 0.33$ ; IA:  $3.86 \pm 0.16$  ml/kg/min). RE was significantly different from the control BMR at  $P = 0.07$ . These preliminary results suggest that RE may have greater effects on BMR compared to CA and IA, indicating the importance of further research to examine a possible role for RE in controlling body weight.

#### EFFECT OF ORAL ECHINACEA SUPPLEMENTATION ON RESTING IL-4 AND IL-10 RESPONSES.

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**P52** Echinacea (*Echinacea purpurea*) is an herbal supplement derived from a North American perennial plant (Purple Coneflower) that is primarily used as a non-specific immunostimulant. Anecdotal evidence suggests that supplementation with Echinacea can shorten the duration and/or severity of the common cold. However, the prospective mechanisms related to the possible immune-enhancing effects of Echinacea remain to be identified. The purpose of this investigation was to determine whether four weeks of oral Echinacea supplementation altered resting interleukin (IL)-4 or IL-10 responses. Twenty-four apparently healthy and recreationally active males age  $24.9 \pm 4.2$  yrs, height  $178.9 \pm 7.9$  cm, weight  $87.9 \pm 14.6$  kg and  $19.3 \pm 6.5$  % body fat were randomly assigned to either an Echinacea (ECH;  $n = 12$ ) or a placebo (PLA) group. Subjects were required to be free of any symptoms of upper respiratory tract infections (URTI) for 7 days prior to starting the study. Participants were supplemented with 8 grams/day-1 of ECH or PLA (wheat flour) for 28 consecutive days. Fasting, morning blood and saliva samples were collected prior to and at weekly intervals for four weeks and were analyzed for serum IL-4 and IL-10. Subjects were queried during each visit regarding symptoms of URTI or other changes in health status. Frequency, severity, and duration of events were recorded. ANOVA was used to determine if significant differences existed between or within the groups during the four weeks of supplementation. Significance was set at  $\alpha = 0.05$ . There were no significant ( $p > 0.05$ ) alterations in either IL-4 or IL-10 within or between ECH and PLA at any time. No subjects in either ECH or PLA reported any symptoms of URTI or other changes in health status during their four-week study period. These data suggest that oral supplementation of 8 grams/day-1 of *Echinacea purpurea* for 28 days did not produce significant alterations in these anti-inflammatory markers at rest.

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#### EFFECT OF THE GO OUT FOR A RUN (GO FAR) FITNESS PROGRAM ON HEALTH IN CHILDREN

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**P53** **PURPOSE:** GO FAR evaluated the effect of a 10-week fitness program on flexibility (FLEX [in]), endurance (FIT [min]), body mass index (BMI [kg/m<sup>2</sup>]), resting pulse (PULSE) and systolic and diastolic blood pressure (SBP/DBP [mmHg]) among 9 – 12 year old children. **METHODS:** Students (n = 34) participated in twice weekly classes (n = 20 class total), led by volunteer coaches, which included a discussion period, stretching, and a healthy snack, as well as 45 – 60 minutes of walking or jogging in preparation for a 5K race at the end of the program. Pre-program data were collected during week 2. Post-program data were collected during week 9. All data were collected by the same trained investigator. **RESULTS:** Thirteen students had complete data and were included in analyses (mean + SD: age 10 + 0.8 years, FLEX 17.1 + 2.3 in, FIT 4.9 + 0.5 min, BMI 20.2 + 3.3 kg/m<sup>2</sup>, PULSE 82 + 10.9, and SBP/DBP 107.3 + 8.6/61.2 + 7.9 mmHg). Those with complete data attended more classes than those with incomplete data (17 vs. 12 classes; p < 0.01). There were no significant baseline differences between completers and non-completers. After 10 weeks, there were significant increases in FLEX (1.2 + 1.9 in; p < 0.05). Other changes were not statistically significant (FIT: 0.1 + 0.9 min, BMI: - 0.4 + 1.1 kg/m<sup>2</sup>, PULSE: 3.5 + 11.9, SBP/DBP: 2.8 + 9.7/2.2 + 10.2 mmHg; all p > 0.05). **CONCLUSIONS:** These data suggest that the GO FAR program may improve flexibility and BMI in children. Further testing in larger samples is needed to confirm these findings.

#### INFLUENCE OF CHRONIC THIAMIN DERIVATIVE SUPPLEMENTATION AND CARBOHYDRATE LOADING ON HIGH INTENSITY CYCLING EXERCISE.

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**P54** The purpose of the study was two fold: 1) to investigate the physiological and performance responses to chronic supplementation with thiamin tetrahydrofurfuryl disulfide (TTFD), also known as allithiamin, and 2) to investigate the physiological and performance responses to chronic supplementation with TTFD in conjunction with carbohydrate loading. **Methods:** Utilizing a randomized, double blind, matched-pair design, 20 recreationally trained endurance athletes ingested either 300 mg·day<sup>-1</sup> of TTFD (n=10) or a placebo (PL) (n=10) for 28 days. On day 0 and 23, participants performed a progressive cycling test to volitional exhaustion for the determination of VO<sub>2</sub>max and lactate threshold. Day 24, participants were measured for resting metabolic rate (RMR) and then performed a 60-min ride at ~80% of VO<sub>2</sub>max followed by a 5-km time-trial. During days 24-27, a carbohydrate loading regimen was followed. Day 28, subjects were again measured for RMR and then performed a final 60-min ride and TT. Serial measures of respiratory gases, heart rate, rating of perceived exertion, and [La<sup>-</sup>] were made during each test for the determination of VO<sub>2</sub>max, 60-min ride and 5-km TT. **Results:** 1) Chronic 24-d TTFD supplementation revealed no significant between or within group differences (p<0.05) for any physiological or performance measures. 2) Chronic 28-d TTFD supplementation in conjunction with a 3-d carbohydrate loading regimen likewise revealed no significant differences (p<0.05) in any physiological or performance parameters. **Conclusion:** The results of this study suggest that neither chronic TTFD supplementation, nor chronic TTFD supplementation in conjunction with carbohydrate loading, provides any physiological or performance benefits to trained recreational cyclists performing high-intensity exercise.

#### SELF- REFLECTION MIRRORS AND RESISTANCE TRAINING, DO THEY INFLUENCE AFFECT AND STATE ANXIETY RESPONSES?

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**P55** Recent studies have shown that the environment, specifically, exercising in front of mirrors may have an influence on affective responses to exercise. These studies have shown women tend to feel worse when exercising in front of mirrors compared to non-mirrored conditions. The purpose of this study was to examine the affective and state anxiety responses exercisers experience following resistance training in front of mirrors. Thirty college-aged female participants (mean Age = 21.0 ± 1.4 years, mean BMI = 22.1 ± 2.1) completed 3 sessions with 48-72 hours of rest between sessions. The first session determined 10 repetition max (RM) load for 8 different resistance exercises including chest press, rows, lateral raises, bicep curls, triceps extensions, squats, and Romanian dead lifts and abdominal crunches on the Life Fitness cable machine. During the next 2 sessions participants performed 2 sets (60% and 100% 10-RM) on the 8 resistance exercises. One session occurred in front of mirrors and the other session without mirrors. Activation Deactivation Adjective Check List (ADACL; Thayer, 1989) and State Anxiety Inventory (SAI; Spielberger, et al., 1970) were given to the participants prior to, during, immediately following, 15 min and 60 min post resistance training sessions. A 2 (conditions) x 5 (time points) repeated measures ANOVA for Energetic Arousal (EA) and Tense Arousal (TA) showed a significant main effect for time, Wilks λ = .12, F(8, 17) = 16.1, p < .001, but not a condition or a condition by time interaction. The effect for time was attributable to both EA (F(4, 96) = 19.1, p < .001) and TA (F(4, 96) = 15.1, p < .001). A 2 (conditions) x 5 (time points) repeated measures ANOVA for State Anxiety (SA) showed a significant main effect for time, Wilks λ = .59, F(4, 21) = 3.7, p = .02, but not a condition or a condition by time interaction. The inability to find a difference in the mirrored condition may be a result of the participants using the mirrors for technique and not negative self-evaluation.

#### ARE THE CHANGES IN BRAIN ACTIVITY DURING EXERCISE DUE TO ACCUMULATION OR INTENSITY OF EXERCISE?

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**P56** Few studies have systematically examined changes in brain electrical activity during an acute bout of exercise. Those that have studied changes during exercise have often found an increase in alpha and beta activity. **PURPOSE:** To investigate whether the increases in brain activity occur because of an increase in exercise intensity or an accumulation due to the duration of the exercise. **METHODS:** 24 males (Age = 22.8 ± 3.7 years, Height = 180.1 ± 7.1 cm; Weight = 85.0 ± 14.8 kg) participated in the study. Participants cycled on a recumbent cycle ergometer for 5, 5 min stages. The first stage was 50 W; the next 4 stages were randomly assigned at 50W, 100W, 150W or 200W. Brain activity was recorded via EEG (24 lead, PSYLAB EEG System, Contact Precision Instruments, Cambridge, MA) pre-exercise, at the end of each stage of exercise, immediate post exercise (IPE), and 10 min post-exercise. EEG signals were visually inspected for artifact and underwent a Fast Fourier Transform to determine power at the alpha 1 (8.00 to 10.49 Hz), alpha 2 (10.50-12.99), beta 1 (13.00-17.99 Hz), and beta 2 (18.00-30.00) frequency bands. **RESULTS:** When examining the changes in EEG from pre-exercise, alpha 1 and alpha 2 power progressively increased whether examined by exercise stage or by intensity. Alpha 1 and alpha 2 power returned to pre-exercise levels at IPE and 10 min post-exercise. Beta 1 and beta 2 power progressively increased as exercise intensity increased; however, when examining by stages it increased through the first 3 stages and then reached a plateau for the last 2 stages before returning to pre-exercise levels IPE and 10 min-post exercise. **CONCLUSIONS:** It appears that the increase in alpha power during exercise may be due to both an accumulation effect as well as an intensity effect. However, when examining changes in beta power, it appears that the intensity effect is stronger than the accumulation effect. Future studies should continue to examine the influence of intensity and accumulation on changes in brain activity.

#### RESISTANCE TRAINING WITH MIRRORS: EFFECT ON HEART RATE AND RATE OF PERCEIVED EXERTION

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Heart Rate (HR) and Ratings of Perceived Exertion (RPE) are often used to evaluate the intensity at which a person is working during exercise. RPE during exercise is functionally related to physiological variables (e.g., ventilation); however, the environment may also influence RPE during exercise. Previous research has found exercisers to feel worse during aerobic exercise in a mirrored environment; however, perceptual responses, such as RPE, have not been investigated. The purpose of this study was to examine the differences in RPE and HR during resistance training in the presence and absence of mirrors. Thirty college-aged female participants (mean Age = 20.97 ± 1.4 years; mean BMI = 22.1 ± 2.1) completed 3 visits with 48-72 hours of rest between sessions. The first session determined 10 repetition max (RM) load for 8 different resistance exercises including chest press, rows, lateral raises, bicep curls, triceps extensions, squats, Romanian dead lifts and abs on the Life Fitness cable machine. During the next 2 sessions participants performed 2 sets (60% and 100% 10-RM) of the 8 resistance exercises. Participants were randomized to either the mirror or non-mirror condition. RPE (Borg's CR-10, Borg, 1998) and HR were assessed immediately following each resistance exercise. It was hypothesized that the mirrored condition will elicit a greater RPE than the non-mirrored condition, which could potentially affect HR in a similar manner. A 2 (conditions) x 8 (lifts) repeated measures ANOVA for RPE showed a significant main effect for lifts, [Wilks  $\lambda$  = .45, F (7, 23) = 3.9, p = .006], but not a condition or a condition by lifts interaction. A 2 (conditions) x 8 (lifts) repeated measures ANOVA for HR showed a significant main effect for lifts, [Wilks  $\lambda$  = .15, F (7, 23) = 18.7, p < .001], but not a condition or a condition by lifts interaction. These findings demonstrate that the mirrored condition did not have an influence on either RPE or HR response to resistance training.

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#### DISORDERED EATING IN FEMALE ATHLETES AT SINGLE-SEX VERSUS CO-ED COLLEGES

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Microsystems such as sororities and female dormitories within college settings have been documented as breeding grounds for eating disorders. Thus, the gender composition of the college may operate at the same subcultural level to influence disordered eating attitudes and behaviors. Previous research also indicates that all-female environments might be more intensely competitive and thus be predictive of greater prevalence of eating pathology. There is a lack of research comparing disordered eating in the athletic populations at all-women's and co-ed colleges. PURPOSE: To determine whether the gender composition of the collegiate environment impacts disordered eating among female athletes. METHODS: 75 Division III female collegiate athletes (39 co-ed, 36 single sex) in non-body leanness sports completed a web based survey that included: Eating Disorder Inventory (EDI); Survey of Eating Disorders Among Athletes (SEDA); Body Rating Scale-17 (BRS-17). RESULTS: While 25% of athletes reported an eating disorder, there were no significant differences between single sex and co-ed athletes,  $X^2(2) = 3.50$ , p > .05. Also there were no significant differences on the EDI scales Body Dissatisfaction (t(66) = -.366, p > .05) and Bulimia (t(66) = .26, p > .05). There was a significant difference between the single sex and co-ed athletes on BRS-17 scores with the single sex group displaying greater body dissatisfaction, i.e. nominating an ideal body figure farther away from their actual body figure, t(67) = -2.51, p < .05. Additionally, the single sex athletes expressed greater preoccupation with being thinner (as measured by the EDI). CONCLUSION: Female athletes at single-sex schools did not report a higher incidence of eating disorders, but they scored higher on variables indicative of subclinical eating disorders. Therefore, future research should continue to examine specific factors in the single sex and co-ed collegiate environments that may contribute to disordered eating.

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#### PRELIMINARY STUDY OF A GOAL-SETTING PROGRAM DURING ATHLETIC INJURY REHABILITATION.

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The present study investigated the effects of a goal-setting program on NCAA student-athletes who had sustained a major athletic injury and were in structured, supervised rehabilitation programs. A single-subject design, with 3-5 week baselines followed by 2-6 week interventions, was used with six student-athlete volunteers. The primary investigator administered the goal-setting intervention once a week for the duration of the intervention. Confidence and adherence (rehabilitation attendance and score on the Sport Injury Rehabilitation Compliance Scale- SIRAS) measures were completed weekly, and athlete and athletic trainer (or physical therapist) satisfaction measures were completed post-baseline and post-intervention. A post-intervention debriefing was held to evaluate the intervention.

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It was hypothesized that the intervention would increase confidence, adherence, and satisfaction among participants. Results varied across participants, with positive trends for both confidence and SIRAS scores. Group analysis did not reveal statistically significant results, but participants found the intervention useful and would recommend it to other injured athletes. Although this study does not provide strong support for the use of a goal-setting program in injury rehabilitation, it provides preliminary evidence and guidance for future research on psychological interventions during recovery from athletic injury. Recommendations for future studies include: validating confidence and adherence measures in athletic rehabilitation populations, beginning data collection as soon as possible after injury, following athletes until unrestricted return-to-play, and establishing stable baselines prior to the onset of the intervention.




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#### COMPARISON OF ACCELEROMETER TIME SAMPLING INTERVALS FOR ASSESSMENT OF PHYSICAL ACTIVITY AMONG PRESCHOOL CHILDREN

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**01** **PURPOSE:** To investigate the effect of three different time sampling intervals (epoch settings) on time spent in different intensity levels for assessment of physical activity (PA) via accelerometer among preschool children. **METHODS:** Preschool children (N=36, 50% African American, age=3.9 +/- 0.6 years, 39% male, BMI=16.4 +/-1.5 kg/m<sup>2</sup>) from two centers were evaluated over a range of days (4-11) for at least 5 hours per day. Demographic variables, height, and weight were measured. PA was assessed using the Actigraph accelerometer (MTI, model 7164; Fort Walton Beach, FL) with epochs set at 15 seconds. Activity counts were reconfigured (summed) to form 30-second and 60-second epochs. Time spent (minutes per hour) at different PA intensities was calculated using age-specific count cutpoints. Repeated measures ANOVA (controlling for gender and BMI) was used to assess differences in time spent at different PA intensities (sedentary, light, moderate, and vigorous) for different epochs. **RESULTS:** A significant difference was found between epochs. The data showed that children spent more time in sedentary activities and vigorous PA and less time in light and moderate PA when using 15-second epochs than when using 30- and 60-second epochs. **CONCLUSION:** Results of this study suggest that different expressions of accelerometer epochs yield different estimates of PA. More research regarding the treatment of accelerometer data in youth is necessary.

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#### VALIDATION OF THE LIFECORDER EX ACTIVITY MONITOR

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**02** The accuracy of physical activity monitors must be determined before use as objective measuring tools in research. **Purpose:** To examine the accuracy of the Lifecorder EX activity monitor as a step counter, method of calculating resting metabolic rate (RMR), and in measuring energy expenditure (EE) during activity. **Methods:** Ten males and 10 females had their RMR measured using indirect calorimetry (IC). Subjects then performed a 9-stage treadmill test at increasing speeds from 2 to 6 mph. Speeds were increased 0.5 mph at the end of each 4-min walking stage or 6-min running stage. A 2-min rest period was taken between each stage. Steps were hand tallied (HT) and EE was measured by IC during activity. Subjects wore 2 Lifecorders, one of each side of the waistband. **Results:** There were no measurement differences between Lifecorders for any stage ( $P < 0.05$ ). A difference in step counts between the Lifecorder and HT was found only at speeds of 2.0 mph ( $P = 0.006$ ; mean difference =  $32.3 \pm 8.66$  steps) and 2.5 mph ( $P = 0.002$ ; mean difference =  $7.35 \pm 2.95$  steps). These step differences reflect an undercounting of 8.4 and 1.7 percent for those speeds, respectively. The Lifecorder underestimated net and gross EE compared to IC at all treadmill speeds ( $P < 0.05$ ) for both genders. The average difference in EE for all stages was 4.41 and 5.52 kcal for net and gross EE, respectively. The Lifecorder significantly underestimated RMR compared to IC for both genders ( $P < 0.001$ ; mean difference =  $194.22 \pm 145.48$  kcal/day). **Conclusion:** The Lifecorder EX underestimated RMR for males and females and consistently underestimated EE for both genders during treadmill walking and running. Step counts were only inaccurate at slow walking speeds, but the level of undercounting steps was small in comparison to many previously investigated pedometers.

#### DIFFERENCES BETWEEN SUBJECTIVE AND OBJECTIVE OBSERVATIONS OF PHYSICAL ACTIVITY FOR COLLEGE FEMALES.

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**03** The purpose of this study was to examine differences between subjective & objective measures of moderate (MPA) & vigorous physical activity (VPA) of inactive college females. Subjects consisted of 91 college-aged females who were not engaging in a regular schedule of exercise within the past 30 days. Objective physical activity was measured with the BodyMedia SenseWear Pro2 Armband (BSPA) for 7 consecutive days. The BSPA is a continuous body monitoring device that measures physical activity & energy expenditure. Subjective physical activity was measured with the International Physical Activity Recall Questionnaire (IPAQ). The IPAQ was completed as an online questionnaire & concurred with the 7 days of objective monitoring. Physical activity was measured as days, minutes & MET\*min/week of MPA & VPA for both the IPAQ and BSPA. Frequency of physical activity was defined as accumulating a minimum of 30 minutes of MPA or 20 minutes of VPA per day. Bouts of physical activity (minimum of 10 minutes) were summed for the week from the BSPA (MPA =  $3.0-5.99$  METs and VPA  $> 6.0$  METs). Weekly minutes were calculated from the IPAQ by multiplying the days per week spent in MPA or VPA times the minutes per day spent in MPA or VPA. MET\*min/week were calculated by multiplying the median IPAQ MET levels (MPA 4.0 METs & VPA 8.0 METs) by the number of minutes per week in MPA and VPA. Paired t-tests examined differences between the two measures. An alpha level of .05 was adjusted with the Bonferroni correction factor a priori. Pearson-Product moment correlations assessed the relationship between the two measures. Alpha level was set at .05 a priori. Data were analyzed only on subjects who wore the BSPA for seven consecutive days. 18 subjects were removed from analysis due to incomplete BSPA data (N=73). The results showed significant differences between the IPAQ and the BSPA for days, minutes and MET\*min/week of MPA and VPA ( $p=.000-.001$ ). All correlations between the IPAQ and the BSPA for days, minutes and MET\*min/week of MPA and VPA were not significant ( $p>.005$ ). Self-report data underestimated MPA and overestimated VPA when compared to an objective measure.

#### ACCUMULATED OXYGEN DEFICIT & VO<sub>2</sub>MAX PLATEAU ON A CONTINUOUS TEST.

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**04** The classical criterion for determining maximal oxygen uptake (VO<sub>2</sub>max) is a plateau in oxygen uptake (VO<sub>2</sub>) despite an increase in work rate (WR), but the plateau criterion is frequently not met during continuous incremental tests (CIT). Few data have been published regarding why plateaus are elusive. **PURPOSE:** We investigated possible factors influencing the ability to manifest a plateau at VO<sub>2</sub>max; specifically whether endurance-trained subjects reach maximal accumulated oxygen deficit (MAOD) on a CIT. **METHODS:** On a motorized treadmill, nine male endurance-trained runners (age  $21.2 \pm 1.0$  yrs, VO<sub>2</sub>max  $75.2 \pm 3.0$  mL\*kg<sup>-1</sup>\*min<sup>-1</sup>) each completed; a) tests to establish the WR- VO<sub>2</sub> relationship, b) a CIT, c) a constant WR test (CWT) to confirm VO<sub>2</sub>max, and d) a CWT that induced exhaustion in two to three minutes, to determine MAOD. A plateau was defined as less than half the expected increase in VO<sub>2</sub> between the last two complete stages. Accumulated oxygen deficit (AOD) was calculated as the difference between the extrapolated oxygen demand and the measured VO<sub>2</sub>. Data were analyzed by repeated measures ANOVA. **RESULTS:** No subjects achieved a plateau on the CIT, despite each reaching blood [lactate]  $> 8.0$  mM and RER  $> 1.10$ . The AOD on the CIT ( $57.6 \pm 17.0$  mL\*kg<sup>-1</sup>) was not significantly different ( $p = 0.37$ ) from MAOD ( $60.4 \pm 12.6$  mL\*kg<sup>-1</sup>), and they were significantly correlated ( $p < 0.01$ ,  $r = 0.88$ ). **CONCLUSIONS:** Subjects reached volitional exhaustion on the CIT at an AOD which was not significantly different from MAOD. Achievement of MAOD may represent a limit that prevents the completion of an additional stage, thereby precluding a plateau at VO<sub>2</sub>max.

#### PHYSICAL ACTIVITY OF OLDER ADULTS RESIDING IN DIFFERENT LEVELS OF CARE

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**05** This study compared the physical activity and functional levels of older adults residing in retirement (RH), assisted-living (AL) and nursing homes (NH). The StepWatch Step Activity Monitor<sup>3</sup> (SW) pedometer was used to collect the number of steps taken during one day of activity. Activities of daily living (ADL) and instrumental activities of daily living (IADL) surveys were completed to measure functional status in terms of ADL problems and impairments. The sample consisted of thirty-seven older adults (17 RH, 8 AL, 12 NH, 71 – 94 years old) who wore the SW on the right ankle during a full day of routine activity. ADL and IADL surveys were completed the day prior to the collection of physical activity data. Participants wore the pedometers an average of  $13.66 \pm 1.26$  hours ( $12.63 \pm 1.43$  RH,  $13.82 \pm 1.26$  AL,  $14.13 \pm .84$  NH) and took  $6134.11 \pm 5205.60$  steps ( $8518.47 \pm 4707.78$  RH,  $2592.75 \pm 1961.69$  AL,  $5117.17 \pm 5913.01$  NH). The average score for ADL problems was  $2.32 \pm 1.31$  ( $3.42 \pm .67$  RH,  $2.88 \pm .99$  AL,  $1.29 \pm .99$  NH) and  $4.35 \pm 1.30$  for impairments ( $5.42 \pm .67$  RH,  $5.00 \pm .77$  AL,  $3.29 \pm .99$  NH). Data indicates that as level of skilled care increases number of steps taken and functional levels of older adults decrease.

#### ACSM/CDC Physical Activity Recommendation Profile of Older Adults in the US: 1999-2002 NHANES

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**06** To date, national estimates of the physical activity (PA) behaviors among older adults in the US have only assessed leisure-time activities. This limitation was addressed in the 1999-2002 National Health and Nutrition Examination Survey (NHANES) by comprehensively assessing three domains of PA: leisure-time, destination, and domestic. The purpose of this study is to provide an estimate of the prevalence of older adults in the US achieving the ACSM/CDC PA recommendations through leisure-time, destination, and domestic PA. Methods: For this study, NHANES contains 3706 persons 60 years of age and above who were interviewed regarding frequency, duration, and intensity of PA within leisure-time, destination, and domestic domains. These components of PA, within each domain, were integrated and accumulated into one global measure that corresponded to the ACSM/CDC PA public health recommendation. Subjects were classified as meeting the recommendation, getting some PA, but at insufficient levels, or being physically inactive in all domains. Findings: 37.9% of older adults in the US meet the ACSM/CDC recommendation when PA from all domains are considered simultaneously. By domain, 6.0% met the recommendation via destination PA, 8.7% through domestic PA, and 20.9% in leisure-time PA. Also, older adults through all domains achieved a median of 944.7 MET-minutes per week through 6.3 bouts of PA per week and 79.9 minutes of PA per day. Discussion: The discussion will focus on the contribution of each domain towards meeting a global measure of the ACSM/CDC recommendation with special emphasis on demographic variations.

#### RELATIONSHIP BETWEEN MUSCLE COACTIVITY AND FORCE VARIABILITY IN YOUNG AND OLD ADULTS

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**07** When comparing young to old adults, there is increased coactivity of the agonist and antagonist muscles during leg extension exercises (2). There is also an increase in force variability with aging (1). This led us to ask, do old adults increase coactivity of the antagonist muscles to decrease force variability? The purpose of this study was to determine the relationship between muscle coactivity and force variability with increasing age. Twelve young and 12 old subjects performed eccentric leg extensions as steadily as possible at 20 and 40% of maximal voluntary eccentric contraction. The EMG analyses showed the young ( $141 + 60 \mu V$ ) had 34% more EMG activity of the quadriceps when compared to old adults ( $93 + 33 \mu V$ ) ( $P < 0.05$ ). The EMG activity of the antagonist hamstrings was similar in young ( $26 + 16 \mu V$ ) and old ( $18 + 5 \mu V$ ) ( $P = 0.14$ ). Force variability (coefficient of variation, %) was less in young ( $15 + 4$ ) than in old subjects ( $21 + 0.06$ ) ( $P < 0.05$ ). Hamstring- to-quadriceps coactivity ratios were similar in young ( $19 + 1.9$ ) and old adults ( $22 + 2.2$ ) ( $P = 0.762$ ). Regression analyses of coactivity ratios and force variability revealed a weak relationship between the two ( $P = 0.1$ ). The results suggest that antagonist muscle coactivity is similar in young and old adults and does not contribute to the age-related increase in force variability.

(1) Laidlaw et al. Muscle Nerve 23, 600-612, 2000.

(2) Macaluso et al. Muscle Nerve 25, 858-863, 2002.

#### A BIOMECHANICAL ANALYSIS OF THE SQUAT BETWEEN COMPETITIVE COLLEGIATE AND HIGH SCHOOL POWERLIFTERS.

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**08** Purpose: The study was conducted to determine the difference in squatting techniques between competitive college powerlifters (Co) and high school (Hs) powerlifting teams to determine the effect of skill level on performance. Methodology: Competitive powerlifters (N=12) were considered for this study and were required to be free from injury and to have competed in powerlifting meets in 2005. These athletes lifted at 80% of their 1- RM. A 2D-video and analog motion capture system was used. Results: Variables analyzed included the magnitude and timing of vertical ground reaction force, knee angular displacement, velocity, and accelerations. Statistical analysis using Paired Samples t-test ( $p < 0.05$ ) was performed. Statistically significant differences were found among Hs and Co groups for the mean peak knee angle ( $92.16 \pm 7.79$  and  $78.77 \pm 4.29$  (deg)), angular acceleration ( $-932.6 \pm 108.4$  and  $-564.3 \pm 148.1$  (deg/s/s)), angular velocity ( $164.3 \pm 10.47$  and  $105.9 \pm 21.72$  (deg/s)) and time-to-peak in angular velocity ( $2.47 \pm .31$  and  $2.14 \pm .37$  (s)). All statistically significant differences were found to exist in the ascending phase. Conclusions: In power lifting to avoid injury and to achieve optimum results technique must be optimized. Differences were observed in the descending strategy across the groups; however, most differences occurred in the ascending phase. The Hs athletes had a slower ascent rate and a faster descent rate. Less efficient patterns of performance in the ascent phase may result in less power and lower overall weight lifted. A 3D analysis is warranted based on these findings.

#### THE EFFECT OF BIOFEEDBACK ON TRUNK POSTURE DURING THE LOWERING PHASE OF LIFTING

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09

The purpose of this study was to determine whether the BackBuddy™ biofeedback device, specifically designed to monitor trunk posture, effected a postural change in individuals lowering a box from a table to the ground. 40 subjects (38 male, 2 female) were recruited from an Atlanta company where lifting was an integral part of the job. The device both vibrates and beeps to alert the individual to a potentially injurious posture when tilted to a predetermined angle (45 to 50 degrees for this study). An external on/off switch allowed the researcher to control the audible/vibration mechanism. A series of five trials with five lifts per trial (25 lifts) was employed to test the effectiveness of the device. The subjects were informed more about the purpose of the device throughout the testing protocol. The trunk angle with the box on the ground and the number of violations (a violation is a potentially injurious posture) were dependent variables, while the five trials was the independent variable. Two (one for each dependent variable) one-within (Trials) repeated-measures ANOVAs, at an alpha of 0.025 (0.05/2), were used to analyze the data. The results revealed that trials one and two were significantly different from trials three, four, and five for each dependent variable. The conclusion was that the BackBuddy™ did help the subjects reduce the number of infractions and the ending trunk angle during the lowering phase of a lifting task. The overall means for violations and trunk angle were 4.42, 3.77, 2.3, 2.78, & 2.75, and 67.5, 62.9, 47.2, 48.9, & 48.4 degrees respectively.

#### SHOULDER EXTERNAL ROTATION FLEXIBILITY IN TENNIS PLAYERS

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010

INTRODUCTION: Novotny et al., (J Orthop Res. 2000 Mar;18(2):190-4) showed it is possible to develop a device and protocols to quantify shoulder internal/external rotation range of motion (ROM) and resistance to the associated motion. The purpose of this project was to develop a device to measure shoulder external rotation flexibility in an orientation relevant to overhand athletics. A secondary purpose was to determine if relationships exist among flexibility measures in advanced tennis players. METHODS: Twenty-seven advanced (NTPR rating > 5.0) male tennis players (age = 22.4 ± 7.3 yrs) participated in the study. The device was built to measure both external rotation range of motion and the associated resistance in an overhand orientation (upper arm abducted at 90° and in the scapular plane). A load cell measured resistance to ER (torque) and a potentiometer was mounted to the device to measure external rotation ROM (degrees). Flexibility measures included the resistance onset angle (ER angle at 1 Nim of resistance), ER ROM (end ROM), and ER stiffness (slope of torque vs. angle best fit line). Pearson product moment correlations were used to determine if significant relationships existed among flexibility measures. RESULTS: All flexibility measures were highly variable. The resistance onset angle ranged from 80-124° (mean = 100 ± 13°), ER ROM ranged from 87-162° (122 ± 17°), and stiffness ranged from 1.6-4.0 °/Nim (2.4 ± 0.7 °/Nim). No relationship was found between the resistance onset angle and ER stiffness (r = 0.14, p = 0.43), however, a significant positive correlation was found between the resistance onset angle and ER ROM (r = 0.83, p < 0.01). No relationship was found between ER ROM and ER stiffness (r = 0.11, p = 0.60). DISCUSSION: To our knowledge, this is the first study to objectively quantify resistance to shoulder external rotation in overhand athletes. In this study, tennis players with early resistance onset angles tended to cease ER ROM sooner. Interestingly, the resistance onset angle and ER stiffness appear to be independent.

#### CHANGES IN INTER-JOINT COORDINATION DURING GAIT WITH AGE

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011

Young adults exhibit a stereotypical and strong inverse relationship between hip and knee joint torques during gait. Healthy aging alters joint torques towards greater hip extensor and less knee extensor torque. This mechanical plasticity led us to ask, do older adults, after changing their gait strategy to emphasize proximal hip muscles, retain the inter-joint coordination in hip and knee torques? The purpose of the study was to determine the relationship between hip and knee torques in old and young adults as they walk on level and inclined surfaces. Ground forces and kinematics were obtained from 20 old (75 yrs) and 20 young (21 yrs) adults as they walked on level and up a 10 degree inclined walkways. Peak hip and knee joint torques were assessed with correlations that were tested for sig. differences with a z-transform. Young adults had a strong inverse relationship between hip and knee torques in level (r=-0.76) and inclined gaits (r=-0.65). Old vs young adults had 71% more hip and 33% less knee torque in both gaits (t-tests, both p<.05). They also had a strong inverse relationship in level (r=-0.78) but not inclined walking (r=- 0.33, sig. < level walking, p<.05). We conclude that inter-joint coordination is maintained with age in the less difficult task of level walking but is disrupted in the more difficult task of inclined walking. These data show the novel result of the interaction between age and task difficulty on inter-joint coordination in human movement.

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#### AGE BUT NOT STRENGTH IS ASSOCIATED WITH MECHANICAL PLASTICITY IN GAIT

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012

Mechanical plasticity in gait is associated with age such that old vs young adults use more hip extensor torque and less knee extensor torque while walking. Old adults however are weaker than young and this systematic difference led us to pose the alternative hypothesis that a lack of strength and not age causes mechanical plasticity in gait. The purpose of the study was to determine the effects of age & strength on lower limb joint torques during walking. Ten old (71 yrs) and 10 young (21 yrs) adults were tested isokinetically for lower limb strength and with gait analysis for joint torques while walking at 1.5 m/s. Subjects were grouped by age & strength (5 strongest and 5 weakest per age group). Angular impulses from the joint torques were analyzed with two-factor ANOVAs and direct comparisons between specific cells using alpha <.05. Old vs young adults walked with 54% more hip torque and 42% less knee torque (both p<.05). Strong and weak adults walked with statistically identical torques. Strong adults were 33% stronger than weak adults (p<.05). However, strong-old and weak-young adults were statistically equal in strength. Despite this equality, strong-old vs weak-young adults had 82% more hip extensor torque and 35% less knee extensor torque (both p<.05). The data refute the alternative hypothesis and suggest that age but not lower extremity strength is associated with the mechanical plasticity in locomotion exhibited by old adults.

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#### EFFECT OF ORALLY ADMINISTERED OAT ,BETA-GLUCAN ON THE MACROPHAGE RESPONSE TO IN VITRO HSV-1 INFECTION FOLLOWING EXERCISE STRESS

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Oat ,beta-glucan (O,G), a soluble fiber with mild immunostimulant activity, can offset the increased risk of infection associated with exercise stress (Davis et. al., Med Sci Sports Exerc 36(8):1321-7, 2004). Macrophages (M+s) play an important role in this mechanism: we have shown that depletion of M+s negates the beneficial effect of O,G on preventing the exercise induced increase in susceptibility to infection. Specifically, we have found that O,G can offset the decrease in intrinsic anti-viral resistance of M+s associated with stressful exercise, however it is likely that extrinsic functions of M+s are also involved. This study examined the effect of oral feedings of O,G on M+ cytokine release following exercise stress and in vitro HSV-1 infection in mice. Exercise mice were run to fatigue on a treadmill for 3 consecutive days. O,G was fed to the mice in their drinking water for 10 consecutive days. Mice (Ex-H2O, Ex-O,G, Con-H2O, Con-O,G) were sacrificed 15 minutes following the final exercise bout or rest. Lung and peritoneal M+s were harvested, and allowed to adhere on a 96 well microplate at a concentration of  $1 \times 10^6$ . A standardized dose of HSV-1 was incubated with the M+s for a period of 24h after which time supernatants were collected. M+ supernatants were analyzed for IL-1, IL-6 and TNF- via ELISA. Both exercise and O,G increased IL-6 and TNF- release from peritoneal and lung M+s following HSV-1 infection. O,G increased IL-1, release from peritoneal M+s following infection. Results indicate that both exercise and oral feedings of O,G can increase the M+ cytokine response to HSV-1 in vitro. The benefits of O,G on preventing the exercise induced increase in susceptibility to infection may be mediated at least in part by certain extrinsic functions of M+s.

013

#### BLOOD LEUKOCYTE mRNA FOR IL-8, IL-10, AND IL-1RA IS INCREASED DURING PROLONGED AND INTENSIVE CYCLING

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The primary purpose of this project was to determine if leukocyte mRNA is increased during 2 h intensive cycling with or without rest intervals under carbohydrate or placebo conditions. Trained cyclists (N=12) functioned as their own controls during four test sessions that were separated by 1-2 weeks and randomized to control for an order effect. Subjects cycled for 2.0 h at ~60% Wattmax continuously (C) or with 3-min rest intervals (R) interspersed every 10 min (2.6 h total time) while receiving 4 mL.kg<sup>-1</sup>.15 min<sup>-1</sup> carbohydrate (6%) (Cho) or placebo (Pla) beverages (thus CCho, CPla, RCho, RPla). Blood samples were collected 30 min pre-exercise, and immediately and 1-h post-exercise. Immune measures included plasma levels and blood leukocyte relative gene expression for IL-6, IL-10, IL-1ra, IL-8, with mRNA content determined using real-time quantitative RT-PCR. Cho compared to Pla ingestion attenuated exercise-induced changes in plasma IL-6 (interaction effect, P<0.001), IL-10 (P<0.001), and IL-1ra (P=0.008), but not IL-8 (P=0.595). Plasma cytokine levels were not significantly different when comparing C and R trials. Significant time effects were measured for leukocyte IL-10 (increase, P=0.007), IL-1ra (increase, P=0.011), and IL-6 (decrease, P=0.027) mRNA content with no significant differences measured when comparing C or R exercise modes or Cho and Pla test conditions. The pattern of change in leukocyte IL-8 mRNA did not differ between Cho and Pla, but increased during C and decreased during R exercise trials (P<0.001). In conclusion, plasma levels for IL-6, IL-8, IL-10, and IL-1ra, and blood leukocyte mRNA content for IL-10 and IL-1ra, increased following intensive cycling. Cho compared to Pla beverage ingestion had no attenuating influence on leukocyte mRNA content but did decrease plasma levels for IL-6, IL-10, and IL-1ra. Inserting 3-min rest intervals during intensive cycling had no influence on any measured parameter except for a reduction in leukocyte IL-8 mRNA content.

Supported by a grant from the Gatorade Sports Science Institute

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#### INFLUENCE OF CARBOHYDRATE/PLACEBO ON IMMUNE CHANGES FOLLOWING 2-HOURS OF INTENSIVE CYCLING WITH OR WITHOUT REST INTERVALS

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The purpose of this project was to study the effect of carbohydrate compared to placebo ingestion on immune changes following 2 hours of intensive cycling with or without rest intervals. Trained cyclists (N=12) functioned as their own controls during four test sessions that were separated by 1-2 weeks and randomized to control for an order effect. Subjects cycled for 2.0 h at ~60% Wattmax continuously (C) or with 3-min rest intervals (R) interspersed every 10 min (2.6 h total time) while receiving 4 mL.kg<sup>-1</sup>.15 min<sup>-1</sup> carbohydrate (6%) (Cho) or placebo (Pla) beverages (thus CCho, CPla, RCho, RPla). Blood samples were collected 30 min pre-exercise, and immediately and 1-h post-exercise. Immune and hormonal measures included determination of leukocyte and lymphocyte subset counts, cortisol, glucose, and insulin, PHA-induced lymphocyte proliferation, and natural killer cell activity (NKCA). Exercise-induced immune and hormonal changes did not differ between C and R trials. Cho compared to Pla ingestion attenuated exercise-induced changes in blood neutrophil, monocyte, T cell, and NK cell counts, plasma cortisol and insulin, and PHA-induced lymphocyte proliferation, but not NKCA (interaction effect, P=0.134). In summary, most measured immune and hormonal changes induced by intense and prolonged exercise were attenuated when cyclists ingested Cho compared to Pla beverages, but were largely unaffected when athletes were allowed to rest 3 min every 10 min of exercise.

Supported by a grant from the Gatorade Sports Science Institute

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#### IBUPROFEN USE, MUSCLE DAMAGE AND SORENESS, INFLAMMATION, AND PLASMA CYTOKINES DURING ULTRAMARATHON COMPETITION

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The purpose of this study was to measure the influence of ibuprofen use during the 160-km Western States Endurance Run to inflammation, muscle damage and soreness, and changes in serum diagnostic chemistries and plasma cytokines. Subjects included 29 ultramarathoners who consumed 600 and 1,200 mg ibuprofen the day before and on race day, and 25 controls who competed in the race but avoided ibuprofen and all other medications. Blood samples were collected the morning prior to and immediately following the race, and subjects recorded muscle soreness during the week following the race using a 10-point Likert scale (DOMS). Age, body composition, training distances, prior race experience, and race time did not differ significantly between ibuprofen users and nonusers (25.8±0.6 and 25.6±0.8 h, respectively). Ibuprofen use compared to nonuse was linked to significantly greater increases (pre-to-post race) in blood neutrophil counts, C-reactive protein (CRP), serum glutamic pyruvic transaminase (SGPT) and glutamic oxaloacetic transaminase (SGOT), blood urea nitrogen (BUN), plasma cytokine levels for interleukin (IL)-6, IL-10, IL-8, IL-1ra, granulocyte colony-stimulating factor (G-CSF), monocyte chemotactic protein 1 (MCP-1), and macrophage inflammatory protein 1 beta (MIP-1&#946;), but not tumor necrosis factor alpha (TNF-&#945;). Post-race DOMS and plasma creatine phosphokinase (CPK) levels did not differ significantly between ibuprofen users and nonusers (20,621±3,565 and 13,886±3,068, respectively, P=0.163). In conclusion, ibuprofen use compared to nonuse by athletes competing in a 160-km race did not alter muscle damage or soreness, and was related to elevated indicators of inflammation and liver damage including plasma cytokines, CRP, BUN, SGOT, and SGPT. Funded by a grant from the Gatorade Sports Science Institute

016

#### CARDIORESPIRATORY, STRESS HORMONE, AND HEMOSTATIC RESPONSES IN FIREFIGHTERS DURING PHYSICAL AND PSYCHOLOGICAL STRESS

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**O17** Firefighters are often subjected to the combination of physical & psychological stress. A number of studies have found that firefighters have an increased rate of ischemic heart disease. The purpose of this study was to examine the effects of a combination of acute mental challenge and physical stress on cardiovascular (heart rate [HR], respiration rate [RR], ventilation [VE], and ventilatory efficiency [VE/VO<sub>2</sub>]), neuroendocrine (epinephrine [EPI], norepinephrine [NE], adrenocorticotrophic hormone [ACTH], and cortisol [CORT]), and hemostatic function (interleukin-6 [IL-6], endothelin-1 [ET-1], and thromboxane B<sub>2</sub> [TXB<sub>2</sub>]) in firefighters. 12 professional firefighters, averaging 11.5 years of firefighting experience participated in two experimental conditions; one in which the firefighter was challenged to make decisions on a computerized fire strategies and tactics drill while exercising on a cycle ergometer at 60% of VO<sub>2</sub>max (FSC) and the other in which the firefighter exercised at the same intensity without the mental challenge (EAC). There were no differences in the work performed between the 2 conditions. No differences in self-report measures of anxiety or perceived exertion were revealed, although the FSC did result in greater perceptions of overall workload. Participants had elevated cardiorespiratory (HR, RR, VE, and VE/VO<sub>2</sub>) and stress hormone (EPI, NE, CORT) responses during the FSC. There were no significant changes in hemostatic function (IL-6, ET-1, or TXB<sub>2</sub>), positive correlations were found in the FSC among CORT and IL-6 ( $r = 0.57$ ), ET-1 and TXB<sub>2</sub> ( $r = 0.55$ ), and a negative correlation between IL-6 and TXB<sub>2</sub> ( $r = -0.54$ ). The additional response of the sympathoadrenal and hypothalamic-pituitary-adrenal axes in response to the combined mental challenge and physical stress along with the significant relationships among these variables may provide evidence in support of a mechanism that explains the elevated incidence of cardiovascular deaths among firefighters.

#### INDIVIDUALS WITH ANKLE INSTABILITY HAVE DECREASED POSTURAL SWAY.

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**O18** The purpose of this study was to correlate reported episodes of ankle giving-way (GW) and functional performance (FP) with measures of postural sway (PS). Thirty subjects (175.84±7.59cm, 81.57±18.1kg, 27.97±11.26 yrs) with varying degrees of ankle instability volunteered for the study. Each subject reported previous history of ankle pathology including self-reported incidence of GW, and GW during selected tasks of daily living (i.e. FP). Sixteen subjects (53%) reported one or more incidents of ankle GW per year, and seventeen (57%) reported problems with FP. The AccuSway PLUS (AMTI, Watertown, MA) force platform system was used to assess PS during three 30-second single-limb static balance trials. PS measurements of medial-lateral sway (x-average, x-max), anterior-posterior sway (y-average, y-max), path length, velocity (v), and area of the 95% confidence ellipse were calculated based on the center of pressure measurements of the foot (in cm) and averaged across three trials. Pearson Correlations were calculated for reported GW and FP with measures of PS. We found no significant relationship ( $p > .05$ ) between reported GW and PS measures. Significant relationships were found between reported FP and the following PS measures: x-max average ( $r = -.379$ ,  $p = .039$ ), path length ( $r = -.366$ ,  $p = .047$ ), and v average ( $r = -.366$ ,  $p = .047$ ). The negative relationship between FP and PS indicates that those with greater ankle instability had decreased PS. Whether this negative relationship is the result of a motor compensation for the existing ankle instability, of increased concentration by the injured subjects, or of a predisposing condition is unclear.

#### CONTRIBUTING FACTORS TO CHRONIC ANKLE INSTABILITY.

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**O19** Repetitive ankle sprains and persistent symptoms after initial ankle sprain have been termed chronic ankle instability (CAI). Several measures of mechanical and functional insufficiencies associated with CAI have been reported in the literature; however, there is not a clear indication of which measures best discriminate between individuals with and without CAI. Therefore, our purpose was to examine subjects with and without unilateral CAI for side-to-side differences in various measures of ankle laxity and hypomobility, static and dynamic balance, ankle and hip strength, and selected lower extremity malalignment and flexibility patterns. Thirty subjects with unilateral CAI and 30 healthy controls were tested. Symmetry indices comparing the side-to-side differences of each measure were calculated for each dependent variable and compared between groups using independent t-tests. Eight variables were identified as being significantly different between groups and were entered into a discriminant analysis. These 8 measures explained 46.5% of variance in group membership. The measures significantly predictive of CAI group membership were decreased anterior reach direction of the Star Excursion Balance Test (SEBT), ( $r^2$  change = .185), diminished plantar flexion peak torque ( $r^2$  change = .099), decreased posterior medial reach direction of the SEBT ( $r^2$  change = .094), and greater inversion laxity ( $r^2$  change = .041). These four variables correctly predicted group membership in 80.0% of CAI subjects and 73.3% of healthy subjects. The results of this study elucidate the specific measures that best discriminate between subjects with and without CAI. Measures of both mechanical and functional insufficiencies appear to significantly contribute to the etiology of CAI.

#### MODIFYING ANKLE KINEMATICS USING POWERED ANKLE-FOOT ORTHOSES (PAFOS)

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**O20** The aims of this study were to demonstrate (I) that PAFOs could be used to provide plantar flexion (PF) power and (II) that providing PF power modifies ankle kinematics during treadmill gait. We constructed a pair of ankle-foot orthoses with pneumatic muscle actuators (PMAs) - similar to designs by Ferris, et al. (J. Appl. Biomech. 21, 189-197, 2005) - to provide external PF forces. PMAs produce contractile forces when supplied with compressed air. To time PMA contraction with PF push-off, the PAFOs were instrumented with electrical gyroscopes to measure shank and foot angular velocities. Compressed air at 60 psi was supplied to the PMAs during PF push-off such that the PMAs only operated in a concentric manner, i.e. adding positive power at the ankle joint. Nine young healthy adults (23.3 ± 1.5 yrs) completed 6-min trials of treadmill walking for two conditions: wearing the PAFOs with the PMAs (1) inactive and (2) active. The treadmill was set at each participant's preferred walking speed for wearing the PAFOs with PMAs active (determined in earlier experimental sessions). Ankle kinematics and PMA forces were recorded for 1-min using the electrical gyroscopes and load cells inline with the PMAs, respectively. Across subjects, the active PMAs provided a peak power of 40 ± 5 W to the ankle joint during PF push-off. Within subject changes between active and inactive conditions were calculated. When PMAs were active, PF push-off started 1.3 ± 1.1% ( $p = 0.01$ ) earlier in the gait cycle, and peak PF velocity occurred 2.9 ± 1.2% ( $p < 0.001$ ) earlier and decreased by 38 ± 25 deg/s ( $p = 0.002$ ). In summary, we've used a pair of PAFOs to provide PF push-off power during treadmill walking. Ankle kinematics were significantly changed when power was supplied by active PMAs.

#### INFLUENCE OF POWERED ANKLE FOOT ORTHOSES (PAFOs) ON PREFERRED TREADMILL WALKING SPEED

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021

Ankle muscle power has been identified as an important contributor to physical function in older adults. The purpose of this study was to determine if directly augmenting ankle power using PAFOs on both left and right lower extremities would increase preferred walking speed (PWS) during treadmill walking. Male (n=2) and female (n=7) young adults (YA, 23.3±1.6 years) and male (n=6) and female (n=1) older adults (OA, 74.6±6.6 years) walked under three randomly assigned conditions: no PAFOs, pneumatic muscles of PAFOs inactive (InPAFOs), and pneumatic muscles of PAFOs active (ActPAFOs). YA PWS for the three conditions were no PAFOs (1.20±0.14 m/s), InPAFOs (1.18±0.16 m/s), and ActPAFOs (1.25±0.16 m/s). YA PWS was not significantly different between no PAFOs and InPAFOs. For YA PWS, a significant difference was found between no PAFOs and Act PAFOs (p=0.029) and InPAFOs and ActPAFOs (p=0.031). OA PWS for the three conditions were no PAFOs (1.08±0.20 m/s), InPAFOs (1.03±0.16 m/s), and ActPAFOs (1.05±0.17 m/s). No significant differences were found between any of the three conditions for OA PWS. Since the additional power generated by the PAFOs was approximately the same for YA and OA, the significantly greater body mass (BM) and BM index (BMI) of OA may have reduced the effect of the PAFOs on the OA PWS. We examined correlations between BM/BMI and change in PWS from InPAFOs to ActPAFOs. No significant correlations were found. OA may also require a longer acclimation period to take advantage of the additional power provided by the ActPAFOs. In summary, PAFOs were effective at increasing PWS in young adults, and a similar trend, although not significant, was observed in OA.

#### THE EFFECT OF DIMINISHED PLANTAR CUTANEOUS SENSATION ON POSTURAL CONTROL.

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022

Our purpose was to identify the effect of diminished plantar cutaneous sensation on postural control during double-limb quiet standing. Thirty-two young adults without history of balance disorders, peripheral neuropathy, or lower extremity injury within the past year participated. Subjects were tested on an intervention day and control day. The intervention consisted of 10 minutes of ice immersion of the plantar aspect of the feet, while the control consisted of no intervention. On each day, subjects performed three trials of barefoot double-limb quiet standing on a force plate with eyes open and closed. Dependent measures consisted of center of pressure (COP) velocity and area. Analysis included separate 2x2 ANOVAs with repeated measures on both factors to examine the influence of sensation (control, after cooling) and vision (eyes open, eyes closed) on COP velocity and area. Significant interactions were found between sensation and vision for double limb COP area (p=0.046). There was no significant difference between control (.81±.45 cm<sup>2</sup>) and intervention (.75±.43 cm<sup>2</sup>), trials with eyes open (p>0.05). When eyes were closed under the control condition, COP excursion area increased significantly (1.01±.74 cm<sup>2</sup>), however, under the iced condition, when eyes were closed, there was minimal change (.74±.38 cm<sup>2</sup>). Using a dynamical systems framework, we hypothesize that in the absence of vision, the reduction in COP excursions accompanying diminished plantar sensation in double-limb stance was due to increased organismic constraints. When vision was eliminated in the presence of plantar hypoesthesia, postural control could not be maintained with the previous amount of COP excursion, and thus the area of COP excursions was reduced in an effort to diminish postural variability.

#### EVALUATION OF LEG-TO-LEG BIA IN ASSESSING BODY COMPOSITION IN HIGH-SCHOOL AGED MALES AND FEMALES.

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023

**BACKGROUND:** Accurately assessing body composition at an early age could serve as a valuable instrument in decreasing the prevalence of childhood obesity and reducing the risks of life threatening diseases later on in life. **OBJECTIVE:** The purpose of the present investigation was to evaluate the accuracy of the Tanita 300WA leg-to-leg bioelectrical impedance analysis (BIA) for measuring body composition when compared to hydrostatic weighing (HW) in an American high school (HS) aged population. **DESIGN:** Body composition was determined in 40 HS aged males (mean ± SD, age: 14.9 ± 1.7 years, height: 1.72 ± 0.09 m, body mass: 62.4 ± 13.0 kg) and 37 HS females (mean ± SD, age: 15.5 ± 1.9 years, height: 1.61 ± 0.06 m, body mass 57.1 ± 6.9 kg) comparing skinfold (SK) and BIA measurements to the reference method HW. For all methods, body density (Db) was used to calculate percent body fat (%BF) using age and gender specific equations. **RESULTS:** Among the males, there were no significant differences in %BF between BIA (14.1 ± 7.8) and HW (14.9 ± 9.1). A significant correlation in fat-free mass (FFM) was found between these two methods (r = 0.96, P<0.001) and the standard error of estimate (SEE) for FFM was 3.28 kg. In females, a significant difference (p<0.001) in %BF was found between BIA (26.4 ± 5.7) and HW (23.6 ± 5.9). The correlation in FFM between these two methods was lower (r=0.78, p<0.001) and the SEE for FFM was 2.93 kg. **CONCLUSIONS:** The results of this study indicate that leg-to-leg BIA is a simple and accurate tool for schools to use in assessing body composition in male adolescents. However, caution should be taken when using leg-to-leg BIA to predict %BF in high school aged females. Other field-based body composition methods, such as skinfolds, should be considered for this population.

#### COMPARISON OF BODY COMPOSITION TECHNIQUES IN OLDER ADULTS

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024

Body composition is an important measurement for health assessments for all ages, including older adults. The purpose of this study was to evaluate percent body fat (%BF) estimations in older adults by foot-to-foot bioelectrical impedance analysis (BIA), a two-compartment model (Siri 2-C) and dual energy x-ray absorptiometry (DXA) compared to a three-compartment model (Lohman 3-C). Fifty-two females and fifty males between the ages of 54 and 75y volunteered for the study. The Bod Pod was used to determine body density (Db) for the 2-C and 3-C models. DXA was used to obtain an estimate of %BF, and determine BMC for use in the 3-C model. Compared to the 3-C estimate of % BF (26.1 ± 1.0%), %BF in males was significantly underestimated by foot-to-foot BIA (22.1 ± 0.8%), and overestimated by 2-C (27.6 ± 0.9%) and DXA (28.6 ± 0.9%) (P < 0.001). The bias and limits of agreement for all methods in males were: Foot-to-foot BIA, -3.93 ± 10.3 %BF; 2-C, 1.53 ± 3.38 %BF; and DXA, 2.51 ± 6.36 %BF. Compared to the 3-C estimate of %BF (39.2 ± 1.2%), %BF in females was significantly underestimated by foot-to-foot BIA (36.4 ± 1.2%; P < 0.001) and overestimated by DXA (40.5 ± 1.2%; P = 0.013). There was no significant difference in females between the 3-C and 2-C estimates of %BF (39.2 ± 1.2% vs. 39.3 ± 1.2%, respectively, P > 0.05). The bias and limits of agreement for all methods in females were: Foot-to-foot BIA, -2.85 ± 8.66 %BF; 2-C, 0.05 ± 3.24 %BF; and DXA 1.27 ± 5.64 %BF. This study suggests that, in general, the techniques used in this investigation are not interchangeable when estimating %BF in older adults.

**RELATIONSHIP AMONG CARDIORESPIRATORY FITNESS (CRF), PHYSICAL ACTIVITY (PA), ABDOMINAL VISCERAL FAT (AVF), ENDOTHELIAL FUNCTION AND ASSOCIATED RISK FACTORS IN WOMEN WITH THE METABOLIC SYNDROME (MS)**

BA IRVING, MS, DW BROCK, MS, CK DAVIS, MD, EJ BARRETT, MD, PhD, GA GAESSER, PhD, and A WELTMAN, PhD. University of Virginia.

025

Although increased CRF and PA have been shown to attenuate mortality and morbidity in individuals with the MS, the independent impact of CRF and PA on the associated constellation of metabolic abnormalities has yet to be fully elucidated. **PURPOSE:** To examine the relationships among CRF, PA, AVF, endothelial function and associated risk factors in abdominally obese women with the MS. **METHODS:** 22 females [(mean (SD); age 44.6 (12.2) y, ht 165.8 (5.9) cm, wt 95.0 (16.2) kg, AVF 155 (57.5) cm<sup>2</sup>, VO<sub>2</sub>peak 21.3 (3.9) ml/kg/min, MET-h/wk 130.7 (59.8), and % fat 44.1 (3.7)] who met the International Diabetes Federation criteria for the MS participated. Each subject completed a VO<sub>2</sub> peak treadmill test, Physical Activity Questionnaire, Computed Tomography (CT), air displacement plethysmography, seated blood pressure, standard biochemistry exams [fasting blood glucose (FBG), hemoglobin A1C (HbA1c), lipids and lipoproteins], and Brachial Artery Flow Mediated Dilation (FMD). FMD was assessed using high-resolution ultrasound and edge-detection software. **RESULTS:** Correlations with VO<sub>2</sub>peak were AVF -0.50, FMD 0.38, HbA1c -0.53\*, FBG -0.25, Total Chol .01, LDL-C 0.02, HDL-C -0.27, TG 0.24, SBP -0.37, DBP -0.17, WC -0.28 and with MET-h/wk were AVF -0.44, FMD 0.23, HbA1c -0.08, FBG -0.15, Total Chol 0.11, LDL-C 0.13, HDL-C 0.22, TG -0.24, SBP -0.16, DBP -0.45\*, WC -0.32 (\*p < 0.05) and the correlation between VO<sub>2</sub>peak and MET-h/wk was -0.28. Regression analysis further revealed that VO<sub>2</sub>peak was more strongly associated with HbA1c, FBG, SBP and MET-h/wk was more strongly associated with HDL-C and DBP.

**BMI AND CARDIORESPIRATORY FITNESS IN PRE-TEENAGE AFRICAN AMERICAN BOYS AND GIRLS**

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026

The purpose of this study was to compare the cardiorespiratory fitness levels of African American (AA) children based on BMI and gender. A comparative, descriptive research design was employed as 134 children (65 boys and 69 girls) between 10 and 12 years of age volunteered to participate in this study. The children were divided by gender into three groups based on BMI classifications (average weight BMI 18-24.9 kg/m<sup>2</sup>; overweight BMI 25-29.9 kg/m<sup>2</sup>; and extremely overweight - BMI > 30 kg/m<sup>2</sup>) and evaluated for the difference in cardiorespiratory fitness. They were evaluated for resting heart rate (RHR), vital capacity (VC), forced expired volume in one second (FEV1), blood pressure (DBP & SBP) and heart rate responses during a three minute step test (EHR). The data were evaluated using descriptive statistics and ANOVA. The results show that the girls were not different for FEV1, VC, or RHR, but were different on EHR, SBP and DBP based on BMI classifications. The boys were not different on any of the cardiorespiratory variables based on BMI. The extremely overweight girls had higher EHR values than any of the other groups. The average and overweight girls had lower DBP values than the all groups of boys. Increases in weight per unit of height has more impact on pre-teenage girls than boys. However, all cardiorespiratory variables, except for SBP of the extremely overweight girls were within acceptable ranges. In summary, these data indicate that although differences exist for some of the cardiorespiratory variables based on BMI, higher BMI values were not associated with unfit conditions in pre-teenage African American boys and girls.

**OBSERVATIONS USING HOME-BASED RESISTANCE-TRAINING TARGETING TETRAPLEGICS WITH INCOMPLETE SPINAL CORD INJURIES: FEASIBILITY STUDY**

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027

**Background:** Studies have demonstrated consistent adherence to an exercise program attenuates incidences of chronic disease. Individuals living with an incomplete spinal cord injury (ISCI) possess similar health needs as the general population but face substantial barriers when traveling outside the home. This study evaluated the effects of "home-based" resistance-training (therabands) on upper body muscular strength and endurance and daily physical functionality. **Methods:** Using a sequential longitudinal design, a 3-month no exercise control period was followed by a 3-month intervention period (resistance-training 2x/week); 6 male volunteers with ISCI were evaluated at 0, 3 and 6 months. Outcome variables included muscular strength (estimated 1-RM), physical function (Wheelchair Physical Functional Performance (WC-PFP) test), and self-reported function (Sickness Impact Profile (SIP)). Inter-rater and test-retest reliability of the WC-PFP and strength measures were evaluated 1-week apart. **Analyses:** Statistical analyses included: 1) Intra-class correlation (ICC) for inter-rater and test-retest reliability; 2) Within subjects repeated measures analysis to evaluate resistance-training effect on dependent variables. **Results:** Significant inter-rater reliability (ICC= 0.96- 1.0, p<.01). Significant test-retest reliability for 2 of the 5 strength measures (ICC= 0.93-0.96, p<.05) and WC-PFP domain and total scores (ICC= 0.97- 0.99, p<.01). Significant main effects change (p<.05, partial eta squared = 0.53-0.63) in latissimus dorsi strength (0=111.58±39.9 to 0=127.16±37.6), WC-PFP total score (0=23.13±19.4 to 0=24.97±21.9), and WC-PFP endurance (0=19.34±19.5 to 0=22.24±22.6). Only the WC-PFP endurance increased due to the intervention (paired contrast significance of p=0.025). **Implications:** WC-PFP has good reliability. Home-based resistance training using therabands is feasible in this population with promising results for improving upper body strength and endurance while enhancing daily functionality. Further investigation is warranted.

**THE EFFECTS OF RESISTANCE TRAINING ON MUSCULAR STRENGTH AND FATIGUE LEVELS IN BREAST CANCER PATIENTS**

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028

The effects of generalized exercise programs to combat the cancer and cancer treatment-related side effects have been extensively reported in the literature. The purpose of this study was to examine the effects of a specifically designed individualized exercise regimen, emphasizing resistance exercise, on changes in muscular strength and fatigue in breast cancer patients receiving treatment. Twenty subjects were randomized into an exercise (57.5 ± 23.0 years) or control (56.6 ± 16.0 years) group. A twenty-one week intervention involving pre and post functional assessments, prescriptive exercise, and three moments of fatigue measures was utilized. The experimental group exercised at a low to moderate-intensity for sixty minutes two days a week beginning post-surgery. **Results:** Significant differences in overall muscular strength were observed between groups post-intervention (p = 0.025). Fatigue was also significantly different between groups at treatment one (p = 0.001), treatment two (p = 0.005) and post-intervention (p = 0.001). **Conclusion:** The results of this study suggest that an emphasis on resistance training should be utilized to the combat fatigue and to increase muscular strength in breast cancer patients undergoing treatment.

#### THE USE OF PERCEIVED DYSPNEA TO PRESCRIBE EXERCISE INTENSITY IN COPD PATIENTS.

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**029** Current recommendations regarding exercise prescription for individuals with chronic obstructive pulmonary disease (COPD) lack consensus as to the optimal intensity. Two major approaches that have been evaluated are to exercise at 50% of peak oxygen consumption (VO<sub>2</sub>) or at maximal limits. Additionally, using a rating of perceived dyspnea (RPD) between 3 and 5 to target exercise training intensity has been recommended. The purpose of this study was to determine the exercise intensity, as a percentage of maximal VO<sub>2</sub> (%VO<sub>2</sub>max), among COPD patients when exercising at RPD between 3 and 5. Participants (N = 29; age = 68.8 ± 5.5 years) underwent a graded exercise test to determine VO<sub>2</sub>max (18.41 ± 3.71 ml/kg/min). On a separate day, participants walked in a field setting for 30 minutes at a target RPD between 3 and 5. After 10 minutes of walking at the prescribed intensity, a portable gas analyzer was used to measure the participants' VO<sub>2</sub> for three minutes (13.96 ± 2.64 ml/kg/min). Results show that when exercise was prescribed based on RPD, participants walked at 77 % (+ 16.3%) of their VO<sub>2</sub>max, which is equivalent to "hard or vigorous" physical activity based on ASCM's classification of physical activity intensity. Participants were also found to be able to maintain their oxygen saturation above 88% (94 ± 2.57 %) while walking at the higher intensity. The results of this study indicate that patients with COPD are able to safely exercise at a much higher percentage of their maximal capacity than what is currently recommended for healthy older adults.

#### INFLUENCE OF EXERCISE ON MENTAL HEALTH AND MOOD IN HIV-INFECTED PERSONS.

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**030** Background: Frequently, persons infected with HIV suffer from mental health/ mood disorders. Pharmacological therapies exist to treat many of these abnormalities; however this population already has a high medication burden. A possible non-pharmacological method of countering these conditions is exercise training, which has been shown to be effective in other clinical populations. Methods: Forty-three HIV-infected individuals were randomized to an exercise group (EX) who completed 6 weeks (twice per week) of moderate- intensity resistance and aerobic exercise training, or to a control group (CON) that received only the standard of care. Prior to and following the 6- week training period each subject was assisted in completing the Profile of Mood States (POMS) and the Perceived Stress Scale (PSS). Results: Those individuals in the EX group (N=21) had significant improvements in the Tension/ Anxiety (p=.04), Depression/Dejection (p=.04), and Vigor (p=.02) subscales of the POMS, while also improving Total Mood (p=.04). There was a trend towards an improvement in the Anger/ Hostility (p=.08) subscale in the EX group. The CON group (N=22) showed only an improvement in Depression/ Dejection (p=.04), however this change (30%) was less than the improvement observed in the EX group (50%). Conclusions: These data indicate that short-term, moderate-intensity resistance and aerobic exercise training can improve mental health/ mood in persons infected with HIV. The results suggest that exercise training can play an important role in the holistic treatment of HIV- infected individuals. This work was supported by the National Institutes of Health (NINR) and the Arnold School of Public Health.

#### NON-HDL CHOLESTEROL: A UNIQUE RISK FACTOR OR REDUNDANT INFORMATION IN THE SECONDARY PREVENTION OF CORONARY ARTERY DISEASE?

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**031** Recent studies have shown that non-HDL cholesterol is a strong and independent predictor of cardiovascular events as this measure is thought to reflect a composite of the all the atherogenic lipids/lipoproteins. However, the impact of lifestyle changes (exercise, diet, weight loss) made through participation in cardiac rehabilitation (CR) on non-HDL has not been evaluated. Methods: We retrospectively studied 48 (40 male & 8 female) with a mean age of 59±11 years before and after 3 months of comprehensive Phase II CR. The CR consisted of 1 hour of exercise therapy 3 times per week supplemented with dietary and weight loss interventions. Fasting blood samples were obtained at entry and again after the 12 week intervention. Body weight and exercise capacity (METS) from symptom-limited treadmill exercise test were also measured pre & post intervention in standard fashion. Patients used were on stable medical therapy (including lipid lowering drugs); however, any patients with change in lipid lowering therapy were excluded from further analysis. Results: Overall compliance to the exercise program was high (81.5±13.2%) during the 3 months of study. There were significant (p<.05) changes in METS (7.0±2.0 vs. 7.7±2.3), total cholesterol/HDL ratio (4.7±1.4 vs. 4.2±1.3), as well as a trend (p=.08) for decreasing non-HDL (136.4±32.5 vs. 127.4 ± 33.6) over the 3 months. Weight, body mass index, total cholesterol, LDL, HDL, triglycerides, and glucose did not change significantly over time. Furthermore, there was a significant correlation between change in non-HDL and change in total cholesterol/HDL ratio (r=.97) but there were non-significant correlations between the change in non-HDL and METS (r=.17) and non-HDL and weight (r=-0.4). Conclusions: Patients used in this study had excellent control of lipids with 56% (27/48) on lipid lowering therapy at baseline and at follow-up which minimized the potential impact from lifestyle changes. However, we still observed a trend for improving non-HDL during CR as well as a significant reduction in total cholesterol/HDL ratio. Surprisingly, change in METs and bodyweight did not correlated significantly with change in non-HDL. The unique contribution of non-HDL is not yet apparent and warrants further investigation.

#### EVALUATION OF PHYSICAL ACTIVITY PHENOTYPES IN SECOND GENERATION CROSSBRED MALE MICE.

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**032** Previously, our laboratory identified a strong genetic contribution to the age-related change in daily physical activity (PA) with mice. To further investigate this genetic influence, we performed reciprocal crossbreeding with our high (SWR/J) and low active (DBA/2J) mice to generate second generation progeny (F<sub>2</sub>). The daily PA patterns of the second generation progeny (SDSD F<sub>2</sub>, n=29, SDDS F<sub>2</sub>, N=18, DSSD F<sub>2</sub>, N=5, DSDS F<sub>2</sub>, N=13 ) were compared amongst each other throughout a 6 week period (8-13 wks of age). All mice were housed in separate cages, each with a running wheel and magnetic sensor, and were monitored daily. Daily duration, distance, and average velocity were analyzed by ANOVA with repeated measures (p<0.05). The age-related changes in daily duration (p<0.0001) and distance (p<0.0003) were different between the SDDS vs. the SDSD and DSDS male mice. The SDSD F<sub>2</sub> and DSDS F<sub>2</sub> mice exhibited a lesser PA level than the SDDS mice, which was similar to the difference between the progenitor strains (DBA/2J and SWR/J). There was no significant difference in regards to velocity between the four groups or across the 6-week period. Therefore, evaluation of PA phenotypes throughout weeks 8-13 of life in second generation crossbred male mice suggests a genetic influence previously observed in female crossbred F<sub>2</sub> mice. Supported by an NIH AG022417 (Turner, Weih, Courtney, Johnson, and El Masri). AR050085 (Lightfoot) and DK61635 (Lightfoot).



**PHYSICAL ACTIVITY INCREASES WITH AGE IN FIRST GENERATION MICE FROM HIGH AND LOW ACTIVE PROGENITORS.**

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Exercise patterns are commonly believed to decline as a result of the aging process. Research from our laboratory has observed a significant genetic impact on physical activity patterns with increasing age. To further investigate these influences highly active SWR/J mice and low active DBA/2J mice were crossbred resulting in the production of 16 D2SW F1 (9 male and 7 female) and 19 SWD2 F1 (11 male and 8 female) mice. Daily running wheel patterns were compared between F1 mice throughout ages 12-33 weeks. Each mouse was housed in an individual cage and provided with a running wheel, sensor and a clock. Daily readings of duration, distance and average velocity were recorded. Daily duration, distance, and average velocity were found to be similar between the SWD2 and D2SW F1 groups. No differences were noted between genders for daily duration, distance and average velocity. Daily distance and duration were found to significantly increase from age 17 to 33 weeks. Velocity was not different across time. Therefore, first generation mice from high and low progenitors were found to not differ between F1 groups or gender for physical activity patterns. However, daily distance and duration significantly increased from 17 to 33 weeks of age.

Supported by AG022417 (Turner, Courtney, Weih, Johnson, and El Masri), AR050085 (Lightfoot), and DK61635 (Lightfoot).

**THE IMPACT OF AGING ON THE RESPONSIVENESS OF THE NEUROMUSCULAR JUNCTION TO MUSCLE OVERLOAD**

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The purpose of this investigation was to examine whether neuromuscular junctions (NMJs) demonstrate age-specific sensitivity to the stimulus of muscle overload. Eight young adult (8 mo old) and eight aged (22 mo old) male Fischer 344 rats served as subjects. Each animal underwent unilateral synergist ablation, thereby creating a state of chronic overload on the remaining ankle extensors. Muscles from the sham operated contralateral hindlimb served as controls. After four weeks of this intervention, rats were euthanized and soleus muscles from overloaded and control limbs were quickly frozen at resting length. Using a cryostat set at -20 degrees, 50  $\mu$ m thick longitudinal sections were obtained from muscles. Cytofluorescent procedures were used to stain pre-synaptic nerve terminals and post-synaptic endplate regions. Confocal microscopy was employed to collect and digitize images of NMJs. Several morphological features of NMJs were quantified including pre-synaptic nerve terminal branch number, branch length and branching complexity, along with post-synaptic endplate perimeter length, endplate area, and pre- to post-synaptic coupling. Our analysis revealed that the four experimental groups examined (young controls, young overloaded, aged controls, aged overloaded) failed to display significant differences in any variable assessed. Thus, when examining the primarily slow-twitch, weight bearing soleus, we conclude that: 1) alone, aging does not affect NMJ structure, and 2) aged NMJs are no more susceptible to overload induced remodeling than young NMJs.

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**FEMALE F2 MICE ARE MORE ACTIVE THAN MALE F2 MICE**

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Previous screening studies have suggested that female mice exhibit higher daily activity levels than male mice. The purpose of this study was to determine if female mice from a large interbred population were more active than males. Based on previous studies C57L/J's (high active) and C3H/HEJ's (low active) were crossbred and the resulting F1's were bred in a 4-way breeding protocol, resulting in four F2 substrains (n=310). The average daily exercise duration (mins), distance (km), and velocity (m/min) were measured in the F2 females (149) and males (161) for 21 days, starting at 63 days of age. Using one way ANOVA females weighed less ( $p < 0.0001$ ) than the males and ran significantly further ( $p < 0.0001$ ), longer ( $p < 0.0001$ ), faster ( $p = 0.0001$ ). There were no differences between the four substrains in daily activity as demonstrated in exercise distance ( $p = 0.31$ ). In conclusion our data showed female F2 mice were more active than male F2 mice, and that this is not a maternally or paternally propagated trait.

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**MUSCLE WASTING AND THE ROLE OF IL-6 IN CACHECTIC APCMIN/+ MICE**

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Cancer cachexia is characterized by skeletal muscle and adipose tissue mass loss, anemia, and chronic inflammation. Although regulation of cachexia is not well understood, the cytokine interleukin-6 (IL-6) is an excellent candidate for inducing skeletal muscle wasting. Our laboratory has published that the ApcMin/+ mouse, which develops intestinal tumors, undergoes cachexia. This mouse also has elevated levels of circulating IL-6. The purpose of this study was to determine the role of IL-6 during ApcMin/+ mouse skeletal muscle wasting. ApcMin/+ mice were crossed with IL-6 null mice, creating ApcMin/+ x IL-6-/- mice. This cross produced mice that had a similar tumor burden compared to ApcMin/+ mice. Wild-type (n=5), ApcMin/+ (n=7), and ApcMin/+ x IL-6-/- (n=7) mice were compared at 6 months of age. ApcMin/+ gastrocnemius muscle wet weight ( $93 \pm 11$  mg) decreased 26% compared to wild-type ( $126 \pm 3$  mg) mice. ApcMin/+ x IL-6-/- ( $125 \pm 5$  mg) gastrocnemius muscle weight was not different from wild-type mice. Gastrocnemius mean fiber cross-sectional area also decreased in ApcMin/+ mice ( $1031 \pm 122$   $\mu$ m<sup>2</sup>) compared to wild-type mice ( $1456 \pm 115$   $\mu$ m<sup>2</sup>), but this decrement was not seen in ApcMin/+ x IL-6-/- mice ( $1529 \pm 152$   $\mu$ m<sup>2</sup>). It appears that inflammatory cytokine IL-6 is necessary for the induction of muscle wasting in the ApcMin/+ mouse.

**IL-6 AND FUNCTIONAL OVERLOAD-INDUCED MUSCLE HYPERTROPHY**

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Functional overload is a hypertrophic stimulus in skeletal muscle. Interleukin-6 (IL-6) is an inflammatory cytokine that is induced in skeletal muscle during hypertrophy. However, the functional significance of increased IL-6 expression in response to functional overload has not been determined. The purpose of this study was to determine the effect of IL-6 deficiency on muscle morphology and gene expression related to growth. Male C57/BL6 (WT, n=10) or IL-6 knockout (IL-6KO, n=10) mice were assigned to either control or functional overload group. The functional overload group was subjected to 21 days of synergist ablation and the control group was subjected to a sham surgery. Functional overload increased plantaris muscle mass to body mass ratio 25% ( $p < 0.05$ ) and 51% ( $p < 0.05$ ) in WT and IL-6KO mice, respectively. The induction of muscle mass was larger in IL-6KO mice compared to WT mice. Functional overload induced a 31% ( $p < 0.05$ ) and 74% ( $p < 0.05$ ) increase in extracellular matrix (ECM) in WT and IL-6KO mice, respectively. There was a larger induction of the extracellular matrix in the IL-6KO mice compared to WT mice. Functional overload induced a 4-fold ( $p < 0.05$ ) and 16-fold ( $p < 0.05$ ) increase in IGF-1 mRNA expression in WT and IL-6KO mice, respectively. The IGF-1 overload induction was greater in the IL-6KO mice than in the WT mice. In summary, IL-6 loss increased noncontractile tissue and IGF-1 expression during functional overload. This study suggests that IL-6 is critical for the regulation of ECM remodeling during functional overload induced hypertrophy.

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**EFFECT OF CARBOHYDRATE ON OXIDATIVE CHANGES FOLLOWING INTENSIVE CYCLING**

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Carbohydrate administration during cycling exercise diminishes stress hormones, which appear to mediate oxidative stress, but the effect of rest intervals on the hormonal response and oxidative stress has not been examined. The study purpose was to examine carbohydrate (CHO) compared to placebo (PLA) treatment during 2 hours of cycling with and without rest intervals on stress hormones and oxidative stress. Subjects functioned as their own controls and performed four exercise bouts (CHO or PLA treatment, with and without rest intervals for each treatment) in a randomized design. Subjects received CHO or PLA beverages 15-30 min pre-exercise (12 ml/kg) and during the 2.5-h cycling bout (75%  $VO_{2max}$ ) (4 ml/kg/15 min). Blood samples were collected pre-exercise, immediately post-exercise, and 12-h post-exercise and analyzed for F2-isoprostanes, ferric reducing ability of plasma (FRAP), glucose, insulin, and cortisol. Statistical design was a 2 (treatment) x 2 (condition) x 3 (time) repeated measures ANOVA. Group differences were significant for glucose, insulin, and cortisol. The group effect for F2-isoprostanes was  $P=0.018$  with consistently lower percentage changes in CHO versus PLA across all conditions. FRAP did not exhibit group or condition effects but was significantly elevated over time ( $P=0.000$ ). During cycling, oxidative stress but not FRAP is influenced by carbohydrate and increased stress hormones.

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**EFFECTS OF SADDLE HEIGHT ON ANAEROBIC POWER PRODUCTION IN CYCLING**

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In competitive cycling, setting the proper saddle height is important for both performance and injury prevention. Using a 25°-35° knee angle to set saddle height is recommended for injury prevention and using 109% of inseam is recommended for optimal performance. Prior research has demonstrated that these two methods do not produce similar saddle heights. The purpose of this study was to assess the difference in performance between these two methods. Trained cyclists (n=9) as well as non-cyclists (n=18) were compared for anaerobic power using a 30s Wingate protocol at a saddle height of 25°, 35° and 109% of inseam. Saddle height set using 109% of inseam fell outside the recommended 25°-35° knee angle 62% of the time. There was no significant difference ( $p > .05$ ) found between saddle heights when examining peak power (PP) and mean power (MP) in all groups. The data was then divided into those that fell within the recommended 25°-35° knee angle and those that fell outside the recommended knee angle, when using 109% to set saddle height. A 25° knee angle produced a significantly higher ( $p < .05$ ) MP when compared to 109% in those that fell outside the recommended knee angle. An increase in sustainable power, at a 25° angle, can be translated into increased performance. There was no difference in power output detected in those individuals who fell within the recommended knee angles. For this reason it is recommended that saddle height be set using a 25°-35° knee angle for both injury prevention and increased performance.

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**CIRCADIAN VARIATION IN SWIM PERFORMANCE**

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Although several studies have suggested that there are time-of-day differences in athletic performance, no study has demonstrated an internally generated circadian performance rhythm independent of environmental and behavioral "masking" factors which could moderate time-of-day differences (e.g., sleep, ambient temperature, caloric intake). METHODS: Twenty-five experienced swimmers were assessed for 50 consecutive hours in the laboratory. The swimmers adhered to a 3-hr "ultra-short" sleep-wake cycle, involving 2 hr of wakefulness in dim light followed by 1 hr of sleep in darkness, repeated throughout the 50-hr period. The protocol distributes sleep/activity, posture, caloric intake, etc., equally across the 24-hr period. The swimmers performed 6 maximal-effort 200-m swim trials. The trials began at one of eight randomly assigned times of day, and were each separated by 9 hrs. Tympanic membrane temperature was recorded three times each wake period. A cosine fit was used to establish the body temperature minimum (BTmin). Swim performances were z-transformed. RESULTS: ANOVA revealed a significant ( $p < 0.001$ ) circadian pattern in swim performance. Performance peaked between 7.5 and 4.5 hours before the BTmin (corresponding to approximately 2300 hrs) and was worst between 1.5 hrs before to 1.5 hrs after the BTmin (corresponding to approximately 0500 hrs). The variation from peak to worst performance was approximately 4 sec. CONCLUSION: To our knowledge, these data provide the first evidence for a circadian rhythm in athletic performance, independent of environmental and behavioral "masking" effects. These results could have implications for influencing performance following rapid transmeridian travel.

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**EXERCISE-INDUCED MUSCLE INJURY RESULTS IN ELEVATIONS IN AEROBIC AND ANAEROBIC METABOLISM DURING SUBMAXIMAL TREADMILL RUNNING.**

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Exercise-induced muscle injury results in strength reductions, which may require individuals to work at 300% higher relative intensity to perform a given submaximal exercise. Manifestations of such increased work intensity could include increased  $\dot{V}O_2$ , blood lactate concentrations, VE, and  $\dot{V}CO_2$ . **PURPOSE:** To test the hypothesis that exercise-induced muscle injury will result in elevations in both aerobic and anaerobic metabolism during submaximal level treadmill running and to correlate the magnitude of functional reductions with any observed metabolic alterations. **METHODS:** Male recreational athletes aged 26 +/- 5 yrs participated in this study. Subjects performed identical submaximal treadmill protocols 1 d before (STR1) and 2 d after (STR2) a 30-min downhill run. The submaximal running protocol consisted of two 15-min runs (at 60% or 75%  $\dot{V}O_{2peak}$ ) separated by a 10-min. rest. **RESULTS:** The downhill run reduced the quadriceps muscles strength immediately (16%) and at 2 d (9%).  $\dot{V}O_2$ , VE, and  $\dot{V}CO_2$  were elevated by 4, 11, and 3% respectively through the first 3 min of 60% - STR2 compared to 60% - STR1. Mean VE was 7% greater during 60% - STR2 compared to STR1 values. Relative lactate change for 60% - STR2 was 32% greater than for 60% - STR1. The magnitude of strength deficit is strongly correlated with the magnitude of change in lactate accumulation at the 60%  $\dot{V}O_{2peak}$  intensity ( $r = .83$ ). **CONCLUSION:** Exercise-induced muscle injury results in a transitory increase in aerobic metabolism and a greater reliance on anaerobic metabolism during submaximal running at 60%  $\dot{V}O_{2peak}$  intensity. The magnitude of strength deficits may be indicative of the degree of elevation of anaerobic metabolism.

**MODERATE STATIC STRETCHING DOES NOT INFLUENCE TORQUE PRODUCTION OF THE KNEE FLEXORS**

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Several recent studies have suggested that acute static stretching decreases muscular strength and performance, particularly of the knee extensors. **Purpose:** The purpose of this study was to investigate the effect of static stretching on peak concentric and eccentric torque production in the knee flexors. **Methods:** Subjects (15 females, 14 males) were tested for isokinetic concentric (CON) and eccentric (ECC) peak torque at two velocities (60° and 210°/sec) before and after a 3-minute knee flexor static stretching protocol. Subjects also underwent a control day in which the isokinetic pre- and posttests were separated by 15 minutes of sitting rather than stretching. A sit-and-reach test was administered prior to the pre- and post-isokinetic tests on both days to assess changes in flexibility that occurred as a result of stretching or control protocols. Data were analyzed using a two-way repeated-measures ANOVA. **Results:** The change in flexibility was significantly greater ( $p < 0.05$ ) following stretching than sitting (2.3 vs 0.6 cm). Pretest to posttest changes in peak torque were not significantly different between the stretching (mean decrease = 10.2 Nm) and control (mean decrease = 6.3 Nm) conditions for either velocity or contraction type. There was a non-significant trend ( $p = 0.059$ ) toward diminished peak torque following stretching only in the ECC 210°/sec condition (14.2 vs 6.6 Nm). **Conclusions:** When compared to the control condition, static stretching of the knee flexors prior to maximal isokinetic testing does not lead to diminished concentric or eccentric torque output at slow (60°/sec) or fast (210°/sec) contraction velocities.



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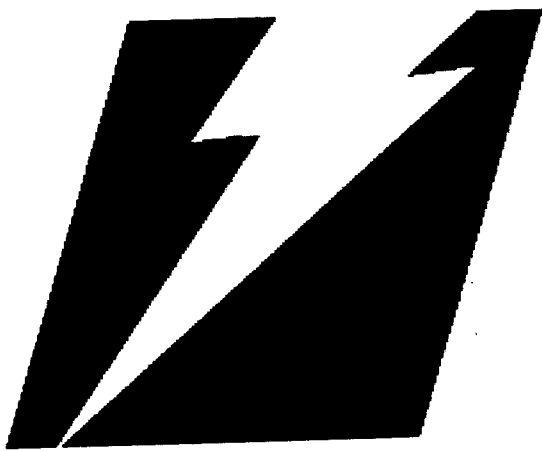
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