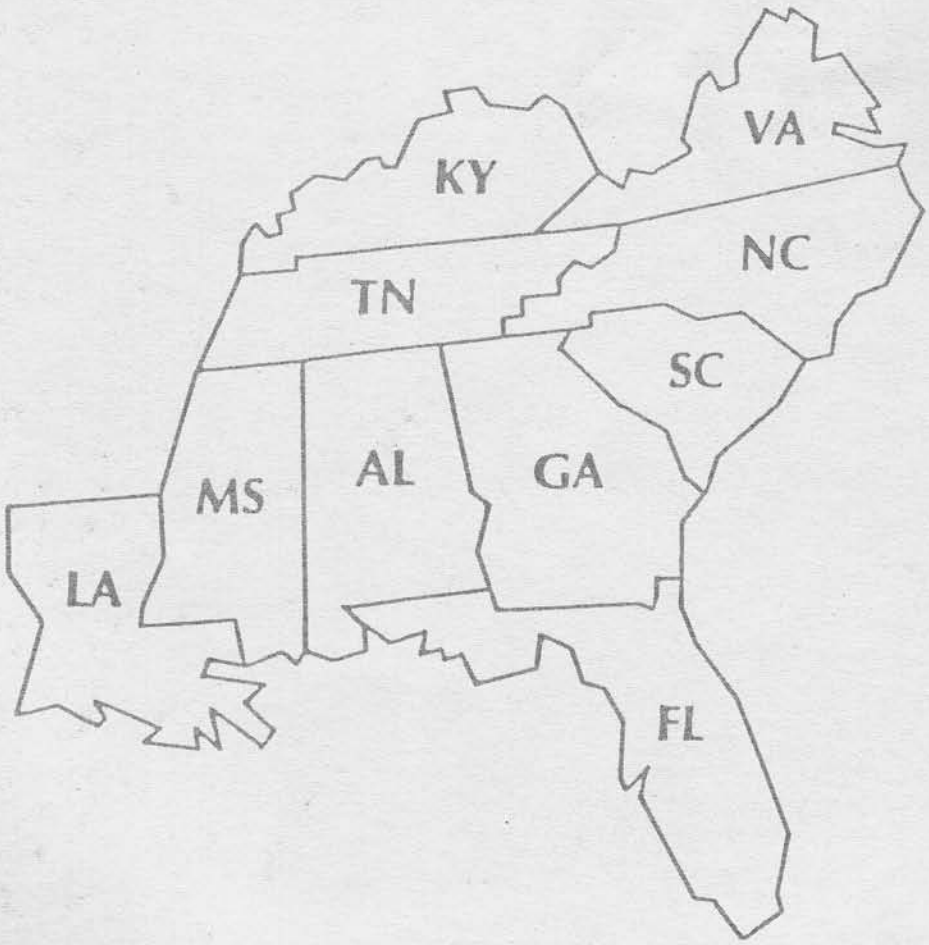
AMERICAN COLLEGE of SPORTS MEDICINE

Southeast Regional Chapter

DENVER COLORADO

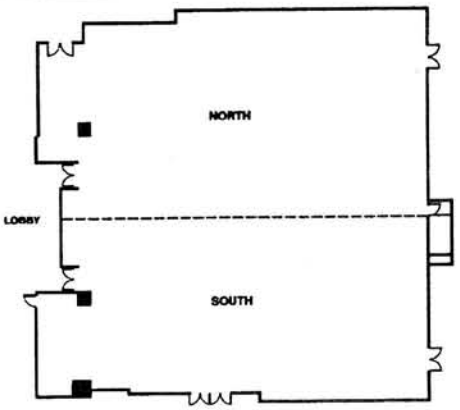
January 23-25, 1997
25th Annual Meeting
The Hyatt Regency on Peachtree
Atlanta, Georgia

ABSTRACTS

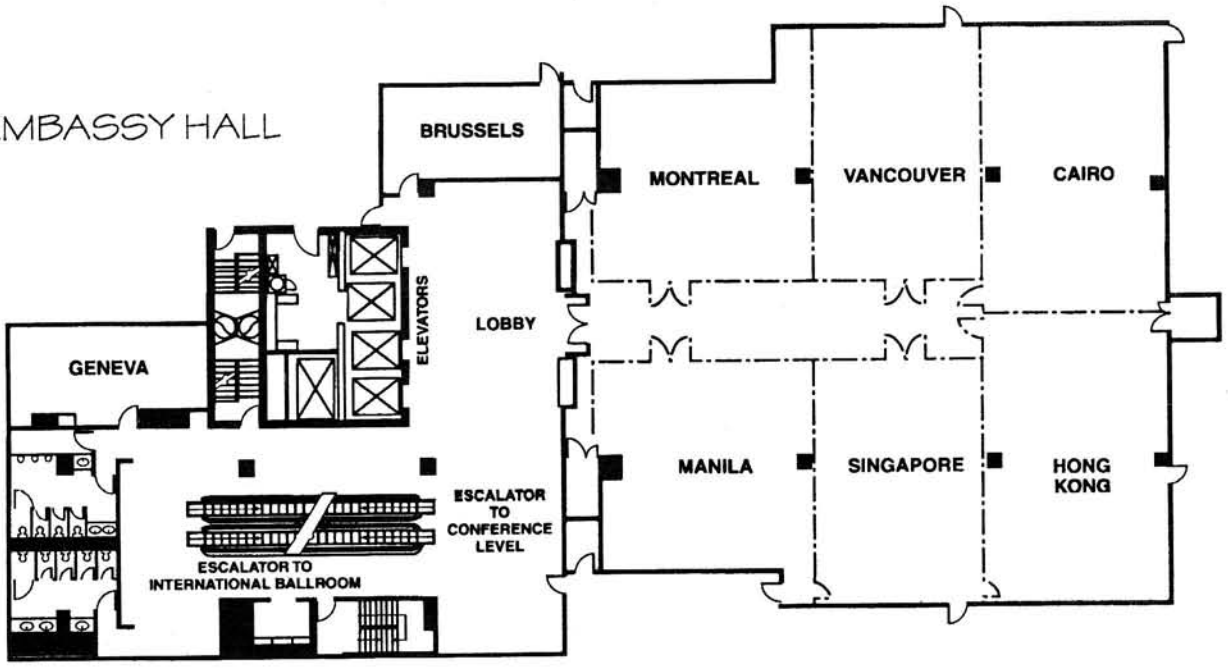


HYATT REGENCY ATLANTA

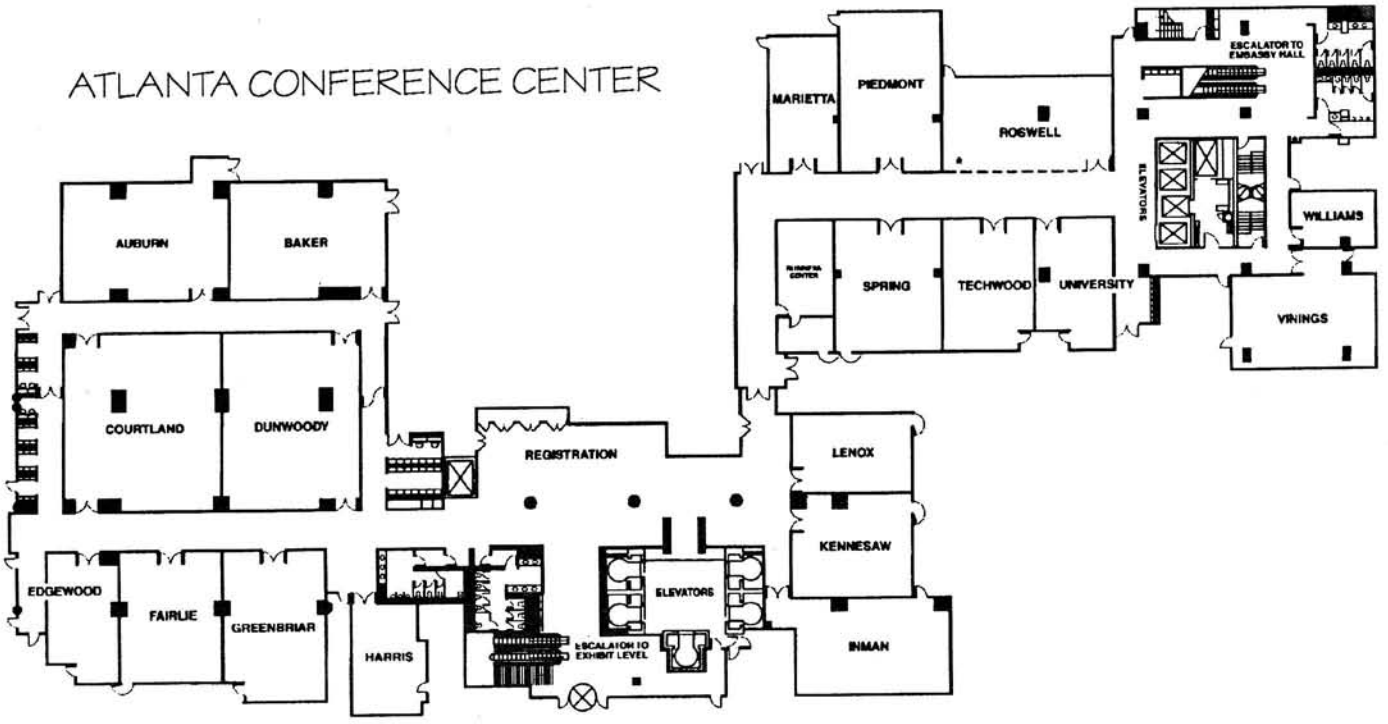
INTERNATIONAL BALLROOM



EMBASSY HALL



ATLANTA CONFERENCE CENTER



Meeting Objective

The objectives of this annual meeting are to provide students, scientists, educators and sports medicine practitioners with new research findings, a synthesis of current theories and applications, and contemporary approaches in clinical practice. These objectives will be accomplished with featured addresses, poster presentations, tutorials, symposium and free communications.

Planning Committee

Bob Moffatt, Program Chair
Jeff Rupp, Host
Bruce Gladden
J. Larry Durstine
Dave Bassett
Edward Howley
J. Timothy Lightfoot
Patricia Mosher
Ann Swank
Stewart Trost
George Wortley
Vaughn Christian

List of Reviewers

Kent Adams
Stan Brown
Linda F. Chitwood
Emily M. Haymes
J. Michael Overton
Neal W. Pollock
Bryant A. Stamford
Art Weltman
Bonnie Marks

Chronology of SEACSM Meetings & Officers

	Date/Place	Pres./PastPres/PresElect	Executive Board
1st	Fall 1973 Gattlinburg, 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	

	Date/Place	Pres./PastPres/PresElect	Executive Board
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 Chronan Kirk Cureton
10th	Feb 5-6, 1982 Blacksburg, VA	Bill Herbert Paul Ribisl Russ Pate	Harvey Murphy (ES) Kirk Cureton Joe Chandler Harvey Murphy Tom Cronan Jon MacBeth (ES)
11th	Feb 4-5, 1983 Gainesville, FL	Russ Pate Bill Herbert Kirk Cureton	David Cundiff Scott Powers Earl Allen Jon MacBeth (ES)
12th	Feb 3-4, 1984 Auburn University	Kirk Cureton Russ Pate Chris Zauner	Emily Haymes Phil Sparling Mike Stone Ron Bos (ES)
13th	Jan 31- Feb 2, 1985 Boone, NC	Chris Zauner Kirk Cureton Robert McMurray	Harry DuVal J.W. Yates John Billings Diane Spitler Ron Bos (ES)
14th	Jan 23-25, 1986 Athens, GA	Robert McMurray Scott Powers Chris Zauner	Diane Spitler John Billings Terry Bazzarre J. Larry Durstine Russ Pate (N) Ron Bos (ES)
15th	Jan 29-31, 1987 Charleston, SC	Scott Powers Robert McMurray Diane Spitler	Terry Bazzarre J. Larry Durstine Janet Walberg Steve Messier Allen Moore (S) Russ Pate (N) Ron Bos (ES)
16th	Jan. 28-30, 1988 Winston-Salem, NC	Diane Spitler Scott Powers Phil Sparling	Janet Walberg Rankin Steve Messier Gay Israel Dalynn Badenhop Mark Senn (S) Russ Pate (N) Ron Bos (ES)

	Date/Place	Pres./PastPres/PresElect	Executive Board
17th	Jan 19-20, 1989 Atlanta, GA	Phil Sparling Diane Spitler Emily Haymes	Dalynn Badenhop Mark Davis Gay Israel David Peltzer (S) Art Weltman Kirk Cureton (N) Ben Kibler (MD) Ron Bos (ES)
18th	Feb. 1-3, 1990 Columbia, SC	Emily Haymes Phil Sparling Harry DuVal	Jerry Brandon Mark Davis Diane Ward Art Weltman Maria Burgess (S) Ben Kibler (MD) Kirk Cureton (N) Ron Bos (ES)
19th	Jan. 31-Feb. 2, 1991 Louisville, KY	Harry DuVal Emily Haymes Steve Messier	Jerry Brandon Jeff Rupp Amanda Timberlake Dianne Ward Maria Burgess (S) Kevin Davy (S) Alan Rogol (MD) Kirk Cureton (N) Ron Bos (ES)
20th	Jan. 30-Feb.1, 1992 Auburn University	Steve Messier Harry DuVal Gay Israel	Mindy Millard-Stafford Bob Moffatt Amanda Timberlake Jeff Rupp Kevin Davy (S) Bill Deuy (S) Alan Rogol (MD) Ben Kibler (MD) Phil Sparling (N) Ron Bos (ES)
21st	Jan. 28-30, 1993 Norfolk, VA	Gay Israel Steve Messier J. Mark Davis	Bob Moffatt Michael Berry Barbara Ainsworth Mindy Millard-Stafford Kevin Tipton (S) Shala Davis (S) Vaughn Christian (ES) Jeff Chandler (CC) Alan Rogol (MD) Phil Sparling (N)
22nd	Jan. 20-22, 1994 Greensboro, NC	J. Mark Davis Gay Israel Janet Walberg Rankin	Barbara Ainsworth Michael Berry Allan Goldfarb Beverly Warren Shala Davis (S) Victoria Schnyder(S) Vaughn Christian(ES) Jeff Chandler (CC) Phil Sparling (N)

	Date/Place	Pres./PastPres/PresElect	Executive Board
23rd	Feb. 2-4, 1995 Lexington, KY	Janet Walberg Rankin J. Mark Davis J. Larry Durstine	Carolyn Berry Allan Goldfarb David Nieman Beverly Warren Victoria Schnyder (S) Jeff Chandler (CC) Vaughn Christian (ES) Ed Howley (N)
24th	Feb. 1-3, 1996	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	Bruce Gladden J Larry Durstine Bob Moffatt	Vaughn Christian (ES) Dave Bassett Edward Howley (N) J. Timothy Lightfoot Patricia Mosher Jeff Rupp Ann Swank Stewart Trost (S) George Wortley (MD)

ES = Executive Secretary S = Student Representative CC = Clinical Consultant
N = National Representative MD = Physician Representative

Chronology of SEACSM Award Winners

	Scholar Award	Service Award	Student Award
1989	Hugh Welch	Ron Bos	
1990	Russell Pate	Harvey Murphy	
1991	Wendell Stainsby	Paul Ribisl	Paul Davis
1992	Robert Armstrong	Phil Sparling	Brian Hinson
1993	Michael Pollock	Dennis Wilson	Steve Bailey
1994	Kirk Cureton	Edward Howley	David Criswell
1995	Scott Powers	Gay Israel	Marian Kohut
1996	Henry Montoye		Cathryne Gracey

SEACSM APPRECIATES THE SUPPORT OF OUR SPONSORS:

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Georgia State University Department of Kinesiology & Health

Emory University Department of Health and Physical Education

Georgia Tech Department of Health & Performance Sciences

THURSDAY, JANUARY 23

	12:00 - 6:00 PM	**REGISTRATION**
(PIEDMONT)	**4:00 - 6:00**	**POSTERS:** Body Composition and Energy Balance
	4:00 - 4:45	**FREE COMMUNICATIONS**
(MONTREAL/VANCOUVER)		Nutrition and Sports
(MANILA)		Biomechanics
(HONG KONG/CAIRO)		Competitive Athletics
	5:00 - 6:00	**TUTORIALS:**
(HONG KONG/CAIRO)		The Zen and the Art of Metabolic Cart Maintenance
(INTERNATIONAL BALLROOM SOUTH)		Achievement and Maintenance of Peak Bone Mass
(MANILA)		Alternative Models for Cardiac Rehabilitation: Home Based Programs
(SINGAPORE)		Herbs - Recognition and Regulation
(VANCOUVER/MONTREAL)		The Use of Heart Rate Variability to Assess Resting Autonomic Function
(INTERNATIONAL BALLROOM NORTH)		Weight Loss Practices and Consequences in Athletics
(INTERNATIONAL BALLROOM)	**7:45 - 9:00**	**KEYNOTE ADDRESS:** Carl Casperson, PHD, MPH **"The Role of Physical Activity in Public Health"**
(EMBASSY HALL)	**9:00 - 11:00**	**SEACSM SOCIAL**

FRIDAY, JANUARY 24

(PIEDMONT)	**8:00 - 10:00**	**POSTERS:** Hematology and Immunology
(TECHWOOD)	**8:00 - 9:00**	**PUBLIC INFORMATION/COMMUNICATION SESSION:**
		Snapshot: ACSM Public Information Department
	8:00 - 9:00	**FREE COMMUNICATIONS**
(CAIRO)		Cardiovascular Physiology
(HONG KONG)		Exercise Evaluation
(INTERNATIONAL BALLROOM)	**9:15 - 10:15**	**SEACSM SPECIAL TOPICS LECTURE: Biomechanics** Steve Messier, Ph.D.
		"Overuse Injuries in Runners: Clinical and Research Perspectives"
	10:30 - 11:30	**TUTORIALS:**
(INTERNATIONAL BALLROOM NORTH)		Obesity a Disease? A Closer Scrutiny of the Evidence
(SINGAPORE/ MANILA)		Developing a Sports Nutrition Performance Enhancement Program
(MONTREAL/ VANCOUVER)		Physiology of Deep Water Running
	10:30 - 12:00 PM	**SYMPOSIA:**
(HONG KONG)		Acute Responses and Chronic Adaptations to Exercise in Heart Failure and Following Heart Transplantation
(UNIVERSITY)		The Surgeon General's Report on Physical Activity and Health-Activity Plans for the Future

(TECHWOOD)		Exercise Programming for the Chronically Diseased and Disabled
(INTERNATIONAL BALLROOM SOUTH)		Exercise Regulation of the Obesity Gene (ob) and the Obesity Gene Product Leptin
(CAIRO)		ACL Knee Injuries in Female Athletes: Epidemiology and Prevention
(INTERNATIONAL BALLROOM)	**1:00 - 2:00**	**SEACSM SPECIAL TOPIC LECTURE:** Doug Seals, Ph.D. **"The Emerging Role of Physical Activity in Preventive Gerontology"**
	2:00 - 2:45	**FREE COMMUNICATIONS**
(VANCOUVER/ MONTREAL)		Occupational and Environmental Physiology
(SINGAPORE/ MANILA)		Epidemiology
(INTERNATIONAL BALLROOM NORTH)		Psychological Aspects of Activity
(PIEDMONT)	**2:00 - 4:00**	**POSTERS:** Skeletal Muscle
	2:30 - 4:00	**SYMPOSIA**
(HONG KONG)		Exercise Considerations and Chronic Obstructive Pulmonary Disease
(TECHWOOD)		Determinants of Physical Activity in Children and Youth
(INTERNATIONAL BALLROOM SOUTH)		The Application of Physical Activity Monitors to Estimation of Physical Activity/Energy Expenditure
(CAIRO)		Influence of Exercise Training and Weight Loss on Blood Pressure in Hypertensive Populations

(UNIVERSITY)		Biomechanics Student Symposium
	3:00 - 4:00	**TUTORIALS:**
(VANCOUVER/ MONTREAL)		Guidelines for Developing Healthy and Medically Sound Weight Loss Programs
(INTERNATIONAL BALLROOM NORTH)		Obesity Assessment and Management in African-American and Caucasian Children
(MANILA/ SINGAPORE)		Nutritional Strategies to Enhance Lean Tissue Accretion During Resistance Training
(INTERNATIONAL BALLROOM)	**4:15 - 5:15**	**SEACSM BASIC SCIENCE LECTURE:** Steve Segal, Ph.D. **"Intercellular Integration of Blood Flow Control in Resistance Networks"**
	5:15 - 6:15	**TUTORIAL:**
(TECHWOOD)		The State of Research Funding and the Year 2000 in Exercise Science and Sports Medicine Research
(UNIVERSITY)		Personal and Professional Performance in the Workplace
(MONTREAL/ VANCOUVER)		Athletic Injury: A Psychological Viewpoint
(MANILA/ SINGAPORE)	**5:15 - 6:15**	**SEACSM STUDENT SYMPOSIUM** **"The Road to Success - Training for Careers in Clinica and Commercial Health and Fitness Settings"**
(CAIRO & HONG KONG)	**6:15 - 7:15**	**GRADUATE SCHOOL FAIR**

SATURDAY, JANUARY 25

(SPRING)	**6:45 - 7:45 AM**	**The Breakfast of the Past Presidents of SEACSM**
(INTERNATIONAL BALLROOM)	**8:00 - 9:00**	**STUDENT SEMINAR:** Barbara Campaigne, National ACSM Office **"Learning to Swim With the Sharks: The Development of a Competitive Research Grant Application"**
	8:00 - 9:00	**FREE COMMUNICATIONS**
(CAIRO)		Carbohydrate and Lipoprotein Metabolism
(MONTREAL/ VANCOUVER)		Athletic Trauma/Biomechanics
(HONG KONG)		Physical Activity and Training
(PIEDMONT)	**8:00 - 9:30**	**POSTERS:** Exercise Evaluation
	8:00 - 9:15	**SYMPOSIA**
(SINGAPORE/ MANILA)		Fitness, Fatness and Cardiovascular Health in Children: Experiences at the Georgia Prevention Institute
(TECHWOOD)		Effects of Strength Training on Functional Skills and Strength in Older Adults
(UNIVERSITY)		Sports Medicine: Implications for Athletes with a Disability
(INTERNATIONAL BALLROOM)	**9:30 - 10:30**	**THE HENRY J. MONTOYE SEACSM SCHOLAR LECTURE:** Henry J. Montoye, Ph.D., Professor Emeritus, University of Wisconsin **"The Measurement of Energy Expenditure: An Historical Perspective"**

(TECHWOOD)	**10:30 - 11:30**	**SYMPOSIUM**
		Sport-Specific Conditioning Using the Open and Closed Chain Concept
	10:30 - 11:30	**TUTORIALS:**
(SINGAPORE/ MANILA)		Quality of Life: An Outcome Measure Whose Time Has Come
(HONG KONG)		The Evolution of a Moderate Intensity Physical Activity Campaign
(UNIVERSITY)		Developing an Effective Health and Fitness Website
(MONTREAL & VANCOUVER)	**10:45 - 11:30**	**SEACSM GRADUATE STUDENT RESEARCH AWARD HONOREES**
(INTERNATIONAL BALLROOM)	**11:30 - 1:30**	**SEACSM LUNCHEON LECTURE:** Martin Collis, Ph.D.
		"Great Expectations"

SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE
25TH ANNUAL MEETING

Thursday, January 23

- indicates that this abstract was selected as one of the TOP 30.

12:00 - 2:00	EXECUTIVE BOARD MEETING **(Techwood)**
12:00 - 6:00	REGISTRATION **(International Lobby)**
12:00 - 6:00	Voting Open for the SEACSM elections **(Embassy Lobby)**
12:00 - 6:00	EXHIBITS **(Embassy Lobby)**
12:00 - 7:00	SPEAKER READY ROOM **(Brussels)**

Thursday, January 23

4:00 - 6:00 p.m. POSTER PRESENTATIONS: Body Composition and Energy Balance
Authors present from 5:00 - 6:00 p.m.
Chair: Lisa Colvin; ERGOWELL - Valdosta, GA.
(Piedmont)

1 • Relationship Between Obesity Status and Measures Of Physical Activity In Children. M.T. Mahar, C.R. Parker, D.A. Rowe. East Carolina University - Greenville, NC; Middle Tennessee State University - Murfreesboro, TN.

2 Long-Term Effects Of Physical Activity On Bone Mineral Density In The Elderly. D.L. Herring, M.L. Pollock, S. Powers, J. Meuleman, L. Garazella, P. Arbuch, D.L. Lowenthal. The University of Florida - Gainesville, FL.

Thursday, January 23

3 Influence of Diet, Exercise, Or Both on Body Composition And Cardiorespiratory Fitness In Obese Women. E.M. Shannonhouse, D.C. Nieman, B.J. Warren, A. Utter, D.E. Butterworth, A. Ward, A. Koch. Appalachian State University - Boone, NC.

4 Use Of The Bioelectrical Impedance Method In Assessing Body Composition Changes In Obese Women. A. Ward, D.C. Nieman, B.J. Warren, A. Utter, D.E. Butterworth, E. M. Shannonhouse, A. Koch. Appalachian State University - Boone, NC.

5 • Effects of Age, Body Composition, Dietary Intake and Fitness Level On Bone Mineral Density In Middle-Aged African-American and Caucassian Females. G. P. Granata, L.J. Brandon, D.Benardot. Georgia State University - Atlanta, GA.

6 • Body Composition, Blood Pressure and Food Frequency In 4 Year Old African-American Children. M.D. Broussard, J.C. Merritt, L.J. Brandon. Morehouse - Atlanta, GA; Georgia State University - Atlanta, GA.

7 Energy Expenditure of Strength Training. D.E. Holmes, J.A. Doyle, J.C. Rupp, J. Brandon, W.R. Thompson, FACSM, D. Benardot. Georgia State University - Atlanta, GA.

8 Effects Of Acute Exercise On Systemic Leptin Levels. D.M. Dorsey, P.J. Geiselman, G.E. Truett, J.J. Zachwieja. Pennington Biomedical Research Center - Baton Rouge, LA.

9 Cardiovascular (CV) Fitness And Percent Bodyfat (%Fat) Are Associated With Total Bone Density in 7-13 yr. Olds. B. Gutin, S. Owens, F. Treiber, S. Islam, S. Riggs, G. Slavens. Medical College of Georgia - Augusta, GA.

10 The Physiological And Anthropometric Effects Of Eight Weeks Of Strength Training On Older Females. B. Glass, J. Johnson, G. McLaughlin, D. Bunt. Austin Peay State University - Clarksville, TN.

11 Evaluation of Nutritional Knowledge In Athletes and Coaches. S. Vann, M. Skelton. Stetson University - Deland, FL.

Thursday, January 23

4:00 - 4:45 p.m. FREE COMMUNICATIONS: Nutrition and Sport
Chair: Janet Walberg-Rankin; Virginia Tech - Blacksburg, VA
(Montreal/Vancouver)

12 (4:00 - 4:15) The Effects of Intense Exercise Training on Serum Folate Levels In The Rat. J. Coombes, T. Dorian, L. Bailey, S.K. Powers, FACSM. University of Florida - Gainesville, FL.

13 • (4:15 - 4:30) Anabolic And Lipolytic Effects Of Chromium Supplementation In Resistance Training Females. M.C. Washam, L.E. Thomas, T.L. Landrum. Northeast Louisiana University - Monroe, LA.

14 (4:30 - 4:45) Resting Estradiol Levels and Fat Metabolism During Prolonged Exercise. C. Ashley, P. Bishop, J. Smith, P. Reneau, P. Emplaincourt. The University of Alabama - Tuscaloosa, AL.

4:00 - 4:45 p.m. FREE COMMUNICATIONS: Biomechanics
Chair: Paul DeVita; East Carolina University - Greenville, NC
(Manila)

15 (4:00 - 4:15) Biomechanics of Successful Front Handspring Front Tucked Vaults in Women's Gymnastics. R.W. McCoy, L.A. Dameron-Wolfe. The College of William and Mary -Williamsburg, VA.

16 (4:15-4:30) The Effect of A Shortening Of the Golf Backswing On Club Head Velocity At Ball Impact. G.T. Neighbors, R. Witchey. Human Performance Evaluation - Charleston, SC; California State University - Fullerton, CA.

17 • (4:30-4:45) The Effects of Knee Positioning On Parallel Barbell Squat Hip and Knee Torques. E.L. Gossick, A.C. Fry, L.T. Ramsey, M. Scruggs, D. Bullen, G. Calhoun, L.E. Wood. The University of Memphis - Memphis, TN.

Thursday, January 23

4:00 - 4:45 p.m. FREE COMMUNICATIONS: Competitive Athletics
Chair: Art Weltman; University of Virginia - Charlottesville, VA
(Hong Kong/Cairo)

18 (4:00 - 4:15) Whole Body And Regional Bone Mass Changes in Collegiate Female Athletes. T.L. Robinson, D. R. Taaffe, C.M. Snow, FACSM, R. Marcus. University of South Alabama - Mobile, AL; Stanford University - Stanford, CA; Oregon State - Corvallis, OR.

19 (4:15-4:30) Predictors Of Rowing Performance In Collegiate Female Rowers. A.J. Fletcher, D.L. Thompson, D.R. Bassett, E. T. Howley. The University of Tennessee - Knoxville, TN.

20 (4:30 - 4:45) Acute Weight Gain, Body Composition, And Performance In Collegiate Wrestlers Throughout The Competitive Season. A.C. Utter, J. Kang. Appalachian State University - Boone, NC.

5:00 - 6:00 p.m. TUTORIALS:

The Use Of Heart Rate Variability to Assess Resting Autonomic Function.
Bonita Marks; University of North Carolina - Chapel Hill, NC.
Chair: Mike Overton; Florida State University - Tallahassee, FL
(Vancouver/Montreal)

Herbs - Recognition and Regulation.
Amanda Timberlake; Life College - Marietta, GA.
Chair: Emily Haymes; Florida State University - Tallahassee, FL
(Singapore)

Alternative Models For Cardiac Rehabilitation: Home-Based Programs.
Peter Brubaker; Wake Forest University - Winston-Salem, NC.
Chair: Neal Pollock; East Carolina University - Greenville, NC
(Manila)

Achievement and Maintenance of Peak Bone Mass.
Steve Downs; Middle Tennessee State University - Murfreesboro, TN.
Chair: Tracey Robinson; University of South Alabama - Mobile, AL
(International Ballroom South)

The Zen and the Art of Metabolic Cart Maintenance.
Hugh Welch; Appalachian State University - Boone, NC.
Chair: Paul Ribisl; Wake Forest University - Winston -Salem, NC
(Hong Kong/Cairo)

Weight loss practices and consequences in athletes. Janet Walberg-Rankin; Virginia Tech - Blacksburg, VA.
Chair: Craig Broeder; East Tennessee State University - Johnson City, TN
(International Ballroom North)

6:00 - 7:45 p.m. DINNER

7:45 - 9:00 p.m. KEYNOTE ADDRESS

Introduction: Bruce Gladden; Auburn University - Auburn, AL.
(International Ballroom)

Carl Casperson, PhD, MPH
Division of Nutrition and Physical Acitivity
National Center for Chronic Disease Prevention and Health Promotion.
Atlanta, GA.

The Role of Physical Activity in Public Health.

BUSINESS MEETING

L. Bruce Gladden
President, SEACSM

9:00 - 11:00 p.m. SEACSM SOCIAL
(EMBASSY HALL)

Friday, January 24

Note: Please remember to vote by 5:00 p.m. today

7:00 - 7:00 SPEAKER READY ROOM
(Brussels)

8:00 - 3:00 REGISTRATION
(International Lobby)

8:00 - 5:00 EXHIBITS
(Embassy Lobby)

8:00 - 10:00 a.m. POSTER PRESENTATIONS: Hematology and Immunology
Chair: Lisa Colvin; ERGOWELL - Valdosta, GA
(Piedmont)

21 • Effects Of A 3-Week Taper Period Following 22-Weeks Of Swim Training On Immunological Responses To Exercise. M. Ferreira, R. Kreider, M. Wilson, Ratzlaff, E. Bertun, J. Bozarth, V. Muriel, S. Tulis, L. Ramsey, H. Yamashita, T. Taylor. University of Memphis - Memphis, TN; Old Dominion University - Norfolk, VA.

22 Influence Of Obesity And Weight Loss On Lymphocyte Proliferation. A.J. Koch, D.C. Nieman, D.A. Henson, D.E. Butterworth, B.J. Warren, A. Utter. Appalachian State University - Boone, NC.

23 Carbohydrate Affects NK Cell Trafficking After 2.5H Of Running. E.B. Garner, D.C. Nieman, D.A. Henson, D.E. Butterworth, B.J. Warren, A. Utter, J.M. Davis. Appalachian State University - Boone, NC.

24 • Effects Of Creatine Monohydrate Supplementation On Hematological Responses To Resistance Training. R. Kreider, M. Ferreira, M. Wilson, P. Grindstaff, S. Plisk, J. Reinhardy, E. Cantler, A. Almada. The University of Memphis - Memphis, TN; Experimental & Applied Sciences - Golden, CO.

25 Carbohydrate And The Cytokine Response To 2.5H Of Running. D.C. Nieman, D.A. Henson, D.E. Butterworth, B.J. Warren, A. Utter, J.M. Davis. Appalachian State University - Boone, NC.

Friday, January 24

26

- Influence Of Obesity And Its Treatment On Innate Immunity. M. Ekkens, D.C. Nieman, D.A. Henson, D.E. Butterworth, B.J. Warren, A. Utter. Appalachian State University - Boone, NC.

27

- The Effect Of Physical Activity On The Production Of Specific Antibody In Response To Influenza Vaccine In College Students. P.B. Schuler, B.R. Abadie, R. K. Collins, L.K. Lloyd, P.A. LeBlanc. Mississippi State University, MS; The University of Alabama - Tuscaloosa, AL.

8:00 - 9:00 a.m. ACSM Public Information Communication Session.
(Techwood)

Snapshot: ACSM Public Information Department
Susan Nelson - ACSM National Center, Indianapolis, IN

8:00 - 9:00 a.m. FREE COMMUNICATIONS: Cardiovascular Physiology
Chair: Phil Sparling; Georgia Tech - Atlanta, GA
(Cairo)

28

- (8:00-8:15) Effect Of Physical Training On Heart Period Variability In Obese Children. S. Owens, B. Gutin, G. Slavens, S. Riggs, F. Treiber. Medical College of Georgia - Augusta, GA.

29

- (8:15-8:30) Resting Heart Rate Variability Profiles in Overweight Women. B.L. Marks, FACSM, D. Groo. University of North Carolina - Chapel Hill, NC; Florida Atlantic University - Boca Raton, FL.

30

(8:30-8:45) Influence of Dietary Sodium And Physical Activity On The Blood Pressure Of The Spontaneously Hypertensive Rat. K.M. Hayes, J.M. Overton. The Florida State University - Tallahassee, FL.

31

- (8:45-9:00) Forearm Vascular Resistance Is Augmented During Isometric Knee Extension Following Muscle Damage. E.T. Mahoney, K.M. Hume, K.H. Gracey, C.A. Ray. University of Georgia - Athens, GA.

Friday, January 24

8:00 - 9:00 a.m. FREE COMMUNICATIONS: Exercise Evaluation
Chair: Matt Hickey; East Carolina University - Greenville, NC
(Hong Kong)

32 (8:00-8:15) The Effects of 300 mg/kg of Sodium Bicarbonate on Power Production, Blood Lactate, and Heart Rate During Three Minute Interval Rowing. B.A. Clark, J.A. Flohr, D.L. Wenos, N.J. Dalton, M.S. Goldberger, R.J. Domangue, G.W. Marrah. James Madison University - Harrisburg, VA.

33 (8:15-8:30) Effects of Detraining On Cardiorespiratory and Metabolic Responses After Six Weeks High-Intensity Cycling. L. Bullock, S Davis, W. Herbert, D. Sebolt, J. Ocel. Virginia Tech University - Blacksburg, VA.

34 (8:30-8:45) Expert Ranking Of Exercise Determinants For Older Adults. L.W. Boyette, J.E. Boyette, B.F. Sharon, L. J. Brandon. Virginia Medical Center -Richmond, VA; Georgia State University - Atlanta, GA.

35 (8:45-9:00) The YMCA Submaximal Cycle Protocol Does Not Accurately Predict VO_2 max. M.R. McCammon, A.M. Dence, M.R. Moreland, C.D. Baggett, R.A. Ahne, M.J. Mahar. East Carolina University - Greenville, NC.

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

9:15 - 10:15 a.m. SEACSM SPECIAL TOPICS LECTURE: BIOMECHANICS
Introduction: Tibor Hortobagyi; East Carolina University - Greenville, NC
(International Ballroom)

Steve Messer, PhD
Professor
J.B. Snow Biomechanics Lab
Department of Health and Sport Science
Wake Forest - Winston - Salem, NC.

Overuse Injuries in Runners: Clinical and Research Perspectives.

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

Friday, January 24

10:30 - 11:30 a.m. TUTORIALS:

Physiology of Deep Water Running.
Stanley Brown, Linda Chitwood, John G. Alvarez; University of Mississippi - University, MS.
Chair: Jerry Brandon; Georgia State University - Atlanta, GA
(Montreal/Vancouver)

Obesity a disease? A closer scrutiny of the evidence.
Glenn A. Gaesser; University of Virginia - Charlottesville, VA.
Chair: Bonita Marks; University of North Carolina - Chapel Hill, NC
(International Ballroom North)

Developing a Sport Nutrition Performance Enhancement Program.
Maria Ferreir, Richard B. Kreider; University of Memphis - Memphis, TN.
Chair: David Nieman; Appalachian State University - Boone, NC
(Singapore/Manila)

10:30 - 12:00 p.m. SYMPOSIA:

Exercise Regulation of the Obesity Gene (ob) and the Obesity Gene Product Leptin.
Jeffrey J. Zachwieja, Ruth Harris, Matt Hickey; Pennington Biomedical Research Center - Bation Rouge, LA; East Carolina University - Greenville, NC.
Chair: Mark Davis; University of South Carolina - Columbia, SC.
(International Ballroom South)

The Surgeon General's Report on Physical Activity and Health-Activity Plans for the Future.
Barbara Ainsworth, Elizabeth Howze, Michael Pratt; University of South Carolina - Columbia, SC; Centers for Disease Control - Atlanta, GA.
Chair: Diane Ward; University of South Carolina - Columbia, SC
(University)

Exercise Programming for the Chronically Diseased and Disabled.
J. Larry Durstine, Don Morgan; University of South Carolina Columbia, SC; The University of Greensboro - Greensboro, NC.
Chair: Bob McMurray; University of North Carolina - Chapel Hill, NC
(Techwood)

CLINICAL TRACK

ACL knee injuries in Female Athletes: Epidemiology and Prevention.
W. Ben Kibler; Lexington Clinic Sports Medicine Center - Lexington, KY
Letha Griffin; Peachtree Orthopedic Clinic - Atlanta, GA
Chair: George Wortley; Lynchburg Family Practice Residency - Lynchburg, VA.
(Cairo)

Acute Responses And Chronic Adaptations to Exercise in Heart Failure and Following Heart Transplantation.
Randy Braith, Mike Welsch, Matthew Feigenbaum; University of Florida - Gainesville, FL; Louisiana State University; Furman University.
Chair: Peter Brubaker; Wake Forest University - Winston-Salem, NC
(Hong Kong)

12:00 - 1:00 p.m. LUNCH

1:00 - 2:00 p.m. SEACSM SPECIAL TOPIC LECTURE: GERONTOLOGY
Introduction: Mike Overton; Florida State University - Tallahassee, FL.
(International Ballroom)

Doug Seals, Ph.D.
Associate Professor
Department of Kinesiology
University of Colorado
Boulder, CO

The Emerging Role of Physical Activity in Preventive Gerontology

Friday, January 24

2:00 - 2:45 p.m. FREE COMMUNICATIONS: Occupational Physiology
Chair: Kent Adams; University of Louisville - Louisville, KY.
(Montreal/Vancouver)

36 • (2:00-2:15) The Effect of Prior Submaximal Exercise Upon Supramaximal Arm Ergometer Performance. P. McDonough, K.D. Biggerstaff, J. Santana, C. Peterson, A. Dunham, R.J. Moffatt. Florida State University - Tallahassee, FL.

37 (2:15-2:30) Effects Of a New Ice-Cooling Technique On Work In Protective Clothing at 28C, 23C and 18C WBGT's. I.H. Muir, P.A. Bishop, P. Ray. University of Alabama - Tuscaloosa, AL.

38 • (2:30-2:45) The Acute Effect Of Short-Term, Intense Exercise Upon Mechanical Pulmonary Function. R. Godsen, B. Barfield, T. Waggener, C. Godsen. College of Charleston - Charleston, SC.

2:00 - 2:45 p.m. FREE COMMUNICATIONS: Epidemiology
Chair: Scott Owens; Medical College of Georgia - Augusta, GA
(Singapore/Manila)

39 • (2:00-2:15) The Effects of a Video Presentation on Children's Definition of Physical Activity. S.G. Trost, A.M. Morgan, J.L. Durstine, G. Felton, M. Parsons, R.R. Pate. University of South Carolina - Columbia, SC.

40 (2:15-2:30) Exercise Patterns And Perceptions Of Female African-American College Students. J. Rodean. Clark Atlanta University - Atlanta, GA.

41 • (2:30-2:45) The Long-Term Impact of a Required Physical Education Program on College Alumni. C.R. Darracott, S.H. Darracott. Oxford College of Emory University - Oxford, GA.

2:00 - 2:45 p.m. FREE COMMUNICATIONS: Psychological Aspects of Exercise
Chair: David Pargman; Florida State University - Tallahassee, FL
(International Ballroom North)

42 • (2:00-2:15) Known Groups Validity Evidence For the Body Self-Image Questionnaire. D. Rowe. Middle Tennessee State University - Murfreesboro, TN.

Friday, January 24

43 (2:15-2:30) Obesity Modifies Perceptions of Barriers And Benefits of Exercise. R.G. McMurray, J.S. Harrell, T.G. Griggs. University of North Carolina - Chapel Hill, NC.

44 (2:30-2:45) Effects of a Five Week Running Program On The Emotional Self-Control of Elementary School Children. D. Abry, D. Pargman. Florida State University - Tallahassee, FL.

2:00 - 4:00 p.m. POSTER PRESENTATIONS: Skeletal Muscle
Chair: Lisa Colvin; ERGOWELL - Valdosta, GA
(Piedmont)

45 Ultrasonagraphy of Detection of Damage In Delayed Onset Muscle Soreness. A.J. Clapp, P.A. Bishop. University of Alabama - Tuscaloosa, AL.

46 • Velocity-Specific Training Effects, The Importance of Neural Adaptations. A.G. Nelson, M. Prevost. Louisiana State University - Baton Rouge, LA.

47 Uniform Titin Cytoskeletal Protein Expression In Elite Olympic-Style Weighlifters. A.C. Fry, R.S. Staron, C.B.L. James, F.C. Hagerman. The University of Memphis - Memphis, TN; Ohio University - Athens, OH.

48 The Effects of Acute Eccentric And Concentric Training on Neuromuscular Efficiency. J.L. Mooney, W.L. Dempsey, J. Barrier, P. DeVita, J. Hortobagyi. East Carolina University - Greenville, NC.

49 • Human Skeletal Muscle Myosin Heavy Chain (MHC) mRNA Levels Before and After Concentric and Eccentric Exercise Training. T. Hortoagyi, J. Hill, D. Zheng, J. Houmard, D. Fraser, L. Dohm. East Carolina University - Greenville, NC; Eastern M. Carolina Internal Medicine - Pollocksville, NC.

50 • Insulin Signaling In Human Insulin Resistance; Minimal Model vs. Euglycemic Clamp. C.J. Tanner, D.S. O'Neill, L. Morgan, G.L. Dohm, J. A. Houmard, M.S. Hickey. East Carolina University - Greenville, NC.

Friday, January 24

51

Activation of Phosphatidylinositol 3-Kinase In Vivo: Relation to Insulin Action, Fiber Type, and Body Fat. C.D. Shaw, C.J. Tanner, L.J. Morgan, J. Houmard, M.S. Hickey. East Carolina University - Greenville, NC.

52

Exercise Induced Plasma Lactate Responses, But Not Plasma Volume Shifts, Demonstrate Chronological Sensitivity. M.R. Deschenes, K. Ramsey, D. Kim, K. Mullen, T. Doughtry. The College of William and Mary, Williamsburg, VA.

2:30 - 4:00 p.m. SYMPOSIA:

Influence of exercise training and weight loss on blood pressure in hypertensive populations.
Mike Casto, Mark Van Ness, Mike Overton; Florida State University - Tallahassee, FL.
Chair: Ted Agelopoulos; University of Southern Mississippi - Hattiesburg, MS
(Cairo)

Exercise Considerations and Chronic Obstructive Pulmonary Disease.
Michael Berry, Tim Stewart, Scott Walschlager, Dave Edwards; Wake Forest University - Winston-Salem, NC.
Chair: Larry Durstine; University of South Carolina - Columbia, SC **(Hong Kong)**

Determinants of Physical Activity in Children and Youth. Dianne Ward, Russell R. Pate, Ruth Saunders, Stewart Trost; University of South Carolina - Columbia, SC.
Chair: Arlette Perry; University of Miami - Miami, FL.
(Techwood)

The Application of Physical Activity Monitors to Estimation of Physical Activity/Energy Expenditure.
Michael Duffey, Michele Pitbladdo, Gina Maggiano, Paul Ribisl; Wake Forest University - Winston-Salem, NC.
Chair: Stan Brown; University of Mississippi - Oxford, MS
(International Ballroom South)

Biomechanics Student Symposium
Chair: Paul DeVita; East Carolina University - Greenville, NC
(University)

Friday, January 24

3:00 - 4:00 p.m. TUTORIALS

Obesity Assessment and Management in African-American and Caucasian Children.
Mark Loftin, L. Jerome Brandon; University of New Orleans - New Orleans, LA; Georgia State University - Atlanta, GA.
Chair: Linda Chitwood; University of Mississippi - Oxford, MS
(International Ballroom North)

Guidelines For Developing Healthy and Medically Sound Weight Loss Programs.
Craig Broeder; East Tennessee State University - Johnson City, TN.
Chair: Jeff Zachwieja; Louisiana State University - Baton Rouge, LA
(Vancouver/Montreal)

Nutritional Strategies to Enhance Lean Tissue Accretion During Resistance Training.
Richard Kreider; The University of Memphis - Memphis, TN.
Chair: Glenn Gaesser; University of Virginia - Charlottesville, VA.
(Manila/Singapore)

4:00 - 4:15 p.m. BREAK

4:15 - 5:15 p.m. SEACSM BASIC SCIENCE LECTURE
Introduction: Glenn Gaesser; University of Virginia - Charlottesville, VA
(International Ballroom)

Steven Segal, PhD
Associate Professor
John B. Pierce Lab
School of Medicine
Yale University
New Haven, Connecticut

Intercellular Integration of Blood Flow Control in Resistance Networks

Friday, January 24

5:15 - 6:15 p.m. TUTORIALS:

Athletic Injury: A Psychological Viewpoint.
David Pargman; Florida State University - Tallahassee, FL.
Chair: Jeff Chandler; Lexington Clinic Sports Medicine Center - Lexington, KY
(Montreal/Vancouver)

Personal and Professional Performance in the Workplace.
Martin Collis; University of Victoria - Victoria, B.C.
Chair: Jeff Rupp; Georgia State University - Atlanta, GA
(University)

The State of Research Funding and the Year 2000 in Exercise Science and Sports Medicine Research.
Barbara Campaigne, ACSM National Office
Chair: Bruce Gladden; Auburn University - Auburn, AL
(Techwood)

5:15 - 6:15 p.m. SYMPOSIUM: SEACSM STUDENT

The Road to Success - Training for careers in the clinical and commercial health and fitness settings.
Allan Lewis, Memorial Hospital - Chattanooga, TN;
Carrie Kelly; Bradley Wellness Center - Dalton, GA.
Chair: Stewart Trost; University of South Carolina - Columbia, SC
(Manila/Singapore)

6:15 - 7:15 p.m. GRADUATE SCHOOL FAIR
Chair: David Bassett; University of Tennessee - Knoxville, TN
(Cairo/Hong Kong)

7:30 p.m. DINNER WITH FRIENDS, COLLEAGUES AND ALUMNI

Saturday, January 25

6:45 - 7:45 a.m. Breakfast of PAST PRESIDENTS (by Invitation)
Chair: Larry Durstine; University of South Carolina - Columbia, SC
(Spring)

7:00 - 11:30 a.m. SPEAKER READY ROOM
(Brussels)

7:30 - 9:00 a.m. REGISTRATION
(International Lobby)

8:00 - 9:00 a.m. FREE COMMUNICATIONS: Physical Activity and Training
Chair: David Bassett; University of Tennessee - Knoxville, TN.
(Hong Kong)

53 (8:00-8:15) A Comparison Of the One, Three, and Ten-Repetition Maximum Strength Tests. P. Stewart, M. Skelton; Stetson University - Deland, FL.

54 • (8:15-8:30) Changes In Physical Activity of 3rd through 9th Graders. C.B. Bradley, R.G. McMurray, S. Deng, J. Harrell. University of North Carolina - Chapel Hill, NC.

55 • (8:30-8:45) Resistance Exercise Prevents Glucocorticoid- Induced Myopathy In Heart Transplant Recipients. R.W. Braith, M.A. Welsch, R.M. Mills, J.W. Keller, M.L. Pollock. University of Florida - Gainesville, FL.

56 (8:45-9:00) Cardiorespiratory Fitness Adaptations In Parkinson's Disease Patients: A Pilot Training Study. S. Kallish, J.L. Juncos, T. Millard, B. Jenson. Georgia State University - Atlanta, GA; Emory University - Atlanta, GA.

8:00 - 9:00 a.m. FREE COMMUNICATIONS: Carbohydrate and Lipoprotein Metabolism
Chair: Bob Moffatt; Florida State University - Tallahassee, FL
(Cairo)

57 • (8:00-8:15) Effects of Short-Term Exercise On Glucose Tolerance in Young Obese Males. M.R. Lewis, J.C. Denton, A.Z. Jamurtas, A.H. Goldfarb, R.T. Carter, W. Forsythe, III, T.J. Angelopoulos. The University of South Carolina - Columbia, SC

Saturday, January 25.

58

- (8:15-8:30) Relationship of Immunoreactive Glucagon and Hepatic Norepinephrine Spillover t o Hepatic Glucose Production During Heavy Exercise. R.H. Coker, M.G. Krishna, D.B. Lacy, D.H. Wasserman. Vanderbilt - Nashville, TN.

59

- (8:30-8:45) Effects Of A Single Bout of Exercise on the Susceptibility of Low Density Lipoprotein to in vitro oxidation. R Shern-Brewer, C. Weitzstein, J. White-Welkley, S. Parthasarathy. Emory University - Atlanta, GA.

60

- (8:45-9:00) Effects of a Session of Long-Duration Exercise on Lipoprotein (a). P.G. Davis, M.A. Ferguson, N.L. Anderson, S.G. Trost, J.L. Durstine. University of South Carolina - Columbia, SC.

8:00 - 9:00 a.m. FREE COMMUNICATIONS: Athletic Trauma and Biomechanics
CLINICAL TRACK
Chair: Jeff Chandler; Lexington Clinic Sports Medicine Center - Lexington, KY
(Montreal/Vancouver)

61

(8:00-8:15) Relationship Between Foot Structure and Knee Joint Laxity In Matched Subjects With and Without Anterior Cruciate Reconstructed Knees. K.M. Marcina, E.J. Higbie, L.F. Taylor. Georgia State University - Atlanta, GA.

62

(8:15-8:30) Incidence Of Injury In Male and Female Collegiate Athletes. L. Hogen, J. Greco, J. Ornelas, H. Niemas, L. Burdick, M. Skelton. Stetson University - Deland, FL.

63

(8:30-8:45) The Effect of Ankle Posture on Sit-and-Reach Test Performance In Children. K.R. Johnson, W.P. Liemohn, J. Thompson, G. Pariser. The University of Tennessee - Knoxville, TN.

8:00 - 9:00 a.m. STUDENT SEMINAR
(International Ballroom)

Learning to Swim with the Sharks: The Development of a Competitive Research Grant Application.
Barbara Campaigne, PhD - ACSM National Office.

Saturday, January 25

8:00 - 9:30 a.m. POSTER PRESENTATIONS: Exercise Evaluation
Chair: Lisa Colvin; ERGOWELL - Valdosta, GA
(Piedmont)

64 Energy Expenditure Comparison: Fastrak 2 - Ski Simulator Versus Treadmill Walking. W. Guion, B. Joyner, T. Fritz, L. Willis, J. Jones-Guion. Georgia Southern University - Statesboro, GA.

65 The Metabolic Cost of Chair Dancing Exercise For Individuals With Multiple Sclerosis. M. Brunson, J. Wygand, R. M. Otto, FACSM, M. Bichsel, J. Brindisi, T. McLoughlin, E. Rossman. Adelphi University - Garden City, NJ.

66 Effects of 16 Weeks of Brisk Walking On Lipid Profile and Body Composition In Postmenopausal Women. B. Prabakharan, E.A. Dowling, H. Jewett, A. Caulderon. Old Dominion - Norfolk, VA.

67 Effects of Motivation on Aerobic Exercise In Older Adults. B.F. Sharon, W. Del'Aune, S.M. Sprague, L.W. Boyette, L.J. Brandon. Virginia Medical Center - Richmond, VA; Georgia State University - Atlanta, GA.

68 Lower Extremity Strength Training And Mobility In Older Adults. L.J. Brandon, L.W. Boyette, B.F. Sharon; Virginia MedicalCenter-Richmond, VA; Georgia State University - Atlanta, GA.

69 Effect of Gender On Ratings Of Perceived Exertion. J.A. Bodie, C.M. DeWitt; University of South Carolina - Aiken, SC.

70 An Evaluation of the Micro Medical Microspirometer. T. Waggener, B. Barfield, R. Godsen, C. Godsen; College of Charleston - Charleston, SC.

71 The Use of Ratings Perceived Exertion For Self-Monitoring Swimming Intensity. J.M. Green, T.J. Michael, A.H. Solomon; Middle Tennessee State University - Murfreesboro, TN.

72 Use of RPE In Cardiac Rehabilitation Patients. C. Lucas, M. Skelton; Stetson University - Deland, FL.

73 Does Glucose - 6- Phosphate Dehydrogenase Deficiency Affect the Creatine Kinase Concentration In Response to Two Modes of Exercise? A Case Study. A.Z. Jamurtas, A.H. Goldfarb, S.C. Chung, B.T. Boyer, University of North Carolina - Greensboro, NC.

74 Personnel Qualifications and Programming In Fitness/Wellness Centers. J.L. Phillips, J.F. Smith, L. O'Brien, M.A. Collins, P.A. Bishop. University of Alabama - Tuscaloosa, AL; Kennesaw State University - Marietta, GA.

75 A Review of the Demand for Licensure of Clinical Exercise Physiologists within the State of Georgia. B.L. Carter, C. Bentley. John D. Archibold Memorial Hospital - Thomasville, GA.

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

Sports Medicine: Implications for Athletes with a Disability.
Walter R. Thompson, Howard Bailey; Georgia State University - Atlanta, GA.
Chair: Mark Kasper; Valdosta State University - Valdosta, GA.
(University)

Effects of Strength Training on Functional Skills and Strength in Older Adults.
L. Jerome Brandon, Lisa Boyette, Catherine Hennessy; Georgia State University - Atlanta, GA; Centers for Disease Control - Atlanta, GA.
Chair: Barbara Ainsworth; University of South Carolina - Columbia, SC.
(Techwood)

Fitness, Fatness and Cardiovascular Health in Children: Experiences at the Georgia Prevention Institute.
Scott Owens, Bernard Gutin, Michael Ferguson, Susan Morehead, Shay Riggs; Medical College of Georgia - Augusta, GA.
Chair: Linda Chitwood; University of Mississippi - Oxford, MS.
(Singapore/Manila)

9:15 - 9:30 a.m. BREAK

Saturday, January 25

9:30 - 10:30 a.m.

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THE HENRY J. MONTOYE SCHOLAR LECTURE
Introduction: Ed Howley; University of Tennessee - Knoxville, TN.
(International Ballroom)

Henry J. Montoye, PhD
Professor-Emeritus
University of Wisconsin

The Measurement of Energy Expenditure: An Historical Perspective.

10:30 - 11:30 a.m.

SYMPOSIUM
CLINICAL TRACK

Sport-Specific Conditioning using the Opened and Closed Chain Concept.
W. Ben Kibler, Jeff Chandler; Lexington Clinic Sports Medicine Center - Lexington, KY.

Chair: George Wortley; Lynchburg Family Practice Residency - Lynchburg, VA
(Techwood)

10:30 - 11:30 a.m.

TUTORIALS:

Developing an Effective Health and Fitness Website.
Don Torok; Florida Atlantic University - Davie, FL.
Chair: Tim Lightfoot; University of North Carolina at Charlotte - Charlotte, NC.
(University)

Quality of Life - An Outcome Measure Whose Time Has Come.
Carl King; N.C. Heart Institute - Moses Cone Memorial Hospital - Greensboro, NC.
Chair: Lisa Colvin; ERGOWELL - Valdosta, GA
(Singapore/Manila)

The Evolution of a Moderate Intensity Physical Activity Campaign.
Sarah Levin, Barbara Ainsworth; University of South Carolina - Columbia, SC.
Chair: Diane Spitler; Roanoke- Chorvan Hospital - Shoski, NC
(Hong Kong)

10:45 - 11:30 a.m. FREE COMMUNICATIONS: STUDENT RESEARCH AWARD HONOREES
Chair: Larry Durstine, University of South Carolina - Columbia, SC.
(Montreal/Vancouver)

76 • (10:45-11:00)Measurements of Skeletal Muscle Maximal Oxidative Capacity and Maximal Oxygen Consumption in Sedentary Women. D.E. Larson, G.R. Hunter, B. R. Newcomer, H. P. Hetherington, R.L. Weinsier. University of Alabama - Birmingham, AL.

77 • (11:00-11:15)Effect of Weight Loss and Subsequent Exercise Training on Serum Leptin Levels in Obese Humans. K Cory, C.J. Tanner, L.J. Morgan, B.L. Tripp, G. Dohm, W.J. Pories, H.A Barakat, R.V. Considine, J.A. Houmard, J.F. Caro, M.S. Hickey. East Carolina University - Greenville, NC; Thomas Jefferson University - Philadelphia, PA.

78 • (11:15-11:30) Heat Sensitizes Skeletal Muscle Afferents During Ischemic Exercise in Humans. K.H. Gracey, C.A. Ray. University of Georgia - Athens, GA.

11:30 - 1:30 p.m. SEACSM LUNCHEON LECTURE

Introduction: Bob Moffatt; Florida State University - Tallahassee, FL.
(International Ballroom)

Martin Collis, Ph.D.
Professor
Department of Physical Education
University of Victoria
Victoria, BC
Great Expectations

Saturday, January 25

1:45 - 3:45 p.m.	SEACSM EXECUTIVE BOARD MEETING **(Techwood)**
1:45 p.m.	HAVE A SAFE TRIP HOME. SEE YOU NEXT YEAR AT THE BEACH.

EXHIBITORS

Diatek, INC. Mobile Diagnostics

EMPI, INC.

Fitness Instrument Technologies

Noraxon, USA

Quinton Instruments

SensorMedics

Body Composition and Energy Balance

1

RELATIONSHIP BETWEEN OBESITY STATUS AND MEASURES OF PHYSICAL ACTIVITY IN CHILDREN

M. T. Mahar, C. R. Parker, and D. A. Rowe, East Carolina University, Greenville, NC and Middle Tennessee State University, Murfreesboro, TN

Pediatric obesity is an important health concern; however, the correlates of obesity in youth are unclear. Research on whether obese and non-obese youth differ on variables such as physical activity and television viewing is equivocal. Therefore, the purpose of this study was to examine whether physical activity and television viewing habits differed between obese and non-obese children (mean age = 10.2 ± 0.8 yr.). All fourth and fifth grade students in one public school had their body composition assessed via triceps and calf skinfolds. Subjects were classified as obese (n = 54) or non-obese (n = 146) based on standards from the Fitnessgram® youth fitness program. Questionnaires to assess physical activity and television viewing habits were administered to small groups (≤ 3 students) by a research assistant. Physical activity was assessed with the Godin-Shephard scale and two other questionnaire measures. Physical activity scores from the Godin-Shephard scale were divided into quintiles. Logistic regression was used to estimate the relative risks (*RR*) of obesity among the physical activity quintiles. With the *RR* for the most physically active quintile set at 1.0, the *RRs* (95% confidence limits) of being obese for the least to the more physically active quintiles were: 1.21 (0.41, 3.60), 1.42 (0.50, 4.09), 1.90 (0.67, 5.34), and 1.17 (0.39, 3.47). Thus, since all confidence intervals included a value of 1.0, no significant association was found between obesity and this measure of physical activity. Also, no relationship was observed between obesity status and the other two measures of physical activity used in this study ($p > .05$). Additionally, no significant association was found between television viewing habits and obesity (*Gamma* = -.05, $p > .05$). In conclusion, obesity status was not related to measures of physical activity or inactivity in this sample of children.

2

LONG-TERM EFFECTS OF PHYSICAL ACTIVITY ON BONE MINERAL DENSITY IN THE ELDERLY

D. L. Herring, M. L. Pollock, S. Powers, J. Meuleman, L. Garzarella, P. Arbuch, D. L. Lowenthal, Dept. of Exercise and Sport Sciences, The University of Florida, Gainesville, FL, 32611

The purpose of this study was to examine the effects of physical activity on changes in bone mineral density (BMD) in twenty-three subjects over the age of 60 (10 males and 13 females). Subjects were initially sedentary and were recruited to participate in a 6 month exercise training program (3x/wk, walking and/or stair stepping 30-45 min/day). After the formal program was completed, subjects were provided information on continuing their regimen at home. After a 5 year follow-up, subjects were evaluated and categorized into two groups for comparison (active vs. sedentary). Dual energy X-ray absorptiometry (DXA) was used to measure BMD and calcium content of the total body, neck of the trochanter and vertebra 2,3. When controlling for initial total BMD and initial bone calcium content, activity over time attenuated the percentage loss in total BMD (0% and 5.5%, respectively; $p<0.01$) and bone calcium content (5.2% and 10.1%, respectively, $p<0.03$) in the active individuals compared to the sedentary elderly. No differences were noted in the other BMD measurements between groups. In conclusion, elderly individuals who started and maintained an active lifestyle after age 60 were found to have higher levels of total BMD and bone calcium content compared to those who had led a more sedentary lifestyle over a period of 5 years.

3

INFLUENCE OF DIET, EXERCISE, OR BOTH ON BODY COMPOSITION AND CARDIORESPIRATORY FITNESS IN OBESE WOMEN

E.M. Shannonhouse, D.C. Nieman, B.J. Warren, A. Utter, D.E. Butterworth, A. Ward, A. Koch. Dept. Health & Exercise Science, Appalachian State University, Boone, NC 28608

This study was designed to measure the influence of exercise, diet, or both on body composition and cardiorespiratory fitness in obese women. Subjects included 53 moderately obese women (44.5±0.7 % fat, 47.3±1.3 yrs of age). The subjects were randomly divided into 1 of 4 groups, with measurements made pre- and post-12 weeks of intervention: diet (D) alone (1,200 kilocalories/day), exercise (E) alone (five 45 minute sessions per week at 78.4±0.6 % maximum heart rate), diet and exercise (DE), and controls (C) (no exercise or diet). Forty-six subjects complied with all study requirements. Significance was accepted at $p<0.05$. Using a 4x2 repeated measures ANOVA weight loss was found to be significantly greater in D (N=13, 7.7±0.9 kg) and DE (N=11, 9.1±0.7 kg), but not E (N=11, 1.4±0.8 kg), relative to C (N=11, 2.0±0.8 kg). Body fat was measured using underwater weighing. Loss of body fat % was significantly greater in DE (4.6±0.5%) and D (3.7±0.6%), but not E (0.8±0.5%), relative to C (1.9±0.6%). The MedGraphics CPX Express system and the Bruce protocol were used to measure cardiorespiratory fitness. Peak oxygen uptake was significantly increased in E (169±34 ml/min) and DE (161±31), but not D (-41±56 ml/min), relative to C (46±34 ml/min). We conclude that exercise alone has no discernable effect on body composition, but does increase cardiorespiratory fitness in moderately obese women. A combination of diet and exercise has a favorable effect on body composition and cardiorespiratory fitness.

Supported by the Cybex Research Grant from the ACSM Foundation

4

USE OF THE BIOELECTRICAL IMPEDANCE METHOD IN ASSESSING BODY COMPOSITION CHANGES IN OBESE WOMEN

A. Ward, D.C. Nieman, B.J. Warren, A. Utter, D.E. Butterworth, E.M. Shannonhouse, A. Koch. Dept. Health & Exercise Science, Appalachian State University, Boone, NC 28608

The purpose of this study was to determine the validity of bioelectrical impedance (BIA) as a method of estimating body composition (BC) when compared to hydrostatic weighing (HW) in an obese population. Fifty-three obese women (43±0.7% fat, 47.3±1.3 yrs) and 15 age matched controls (26.1±1.7% fat, 47.1±2.9 yrs) were studied. The obese subjects were randomly divided into 1 of 4 groups, with BC measurements made pre- and post-12 week intervention: Diet (D) alone (1,200 kcal/day), exercise (E) alone (five 45 min sessions/wk at 78.4±0.6 max HR), both diet and exercise (DE) and controls (C) (no diet or exercise). Lean body mass (LBM), fat mass (FM) and body fat (BF) were estimated from BIA and HW. For all subjects combined, estimation of BF by BIA and HW was highly correlated ($r=0.90$, $p<0.001$). Mean values for BF were significantly different between HW and BIA (43.9±0.7% and 48.6±1.2%, $p<0.05$), respectively. Using a 4 by 2 repeated measure ANOVA, weight loss was found to be significantly greater ($p<0.05$) in D (N=13, 7.7±0.9 kg) and DE (N=11, 9.1±0.7 kg), but not E (N=11, 1.4±0.8 kg), relative to C (N=11, 2.0±0.8kg). Changes in BF, FM, and LBM (pre- to post-study) for all 3 methods were analyzed with a four (group) by three (method) repeated measures ANOVA. For the three methods, a significant ($p<0.001$) main effect was found for BF, FM, and LBM. When comparing DE and C, the change in BF over time was significantly higher when using BIA (8.2±0.9%) compared to HW (4.6±0.5%). In summary, cross sectionally, a high correlation was found between BIA and HW in estimating BF; however, BIA tended to overestimate BF in obese women by 4.7±1.3%. In addition, BIA tended to overestimate changes in BF across time in a dieting obese population.

Supported by the Cybex Research Grant from the ACSM Foundation

5

EFFECTS OF AGE, BODY COMPOSITION, DIETARY INTAKE AND FITNESS LEVEL ON BONE MINERAL DENSITY IN MIDDLE-AGED AFRICAN-AMERICAN AND CAUCASIAN FEMALES

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This study was designed to evaluate the relative importance of age, body composition, dietary variables and fitness level on bone mineral density (BMD), expressed as g/cm^2, in middle aged African-American (AAF) and Caucasian females (CF). Twenty-eight middle-aged females (13 AAF, age 37.5 $\pm$ 5.5 yrs; 15 CF, age 40.2 $\pm$ 4.6 yrs) were evaluated for BMD, lean body mass (LBM) and %body fat (%BF) via Lunar Dual Energy X-ray Absorptiometry. Subjects maintained a 3-day dietary record that was analyzed via Nourish-Check software to determine macro- and micronutrient intake. The subjects completed a submaximal bicycle ergometer test to assess fitness level. Pearson product-moment correlations were performed to evaluate relationships among measured variables while one-way ANOVAs were performed to evaluate each variable by race. BMD was significantly greater ($p<.01$) in the AAF ($1.24\pm.04$g/cm^2) than in the CF ($1.15\pm.04$g/cm^2). The two groups did not differ significantly for age or height. However, AAF values were significantly greater than CF values for weight (AAF=67.8 ± 7.7kg, CF=60.2 ± 4.3kg; p=.014), %BF (AAF=37.5 ± 7.9%, CF=29.5 ± 4.7%; p=.017), and body mass index (AAF=25 ± 2.3 kg/m^2, CF=21.9 ± 1.4 kg/m^2; $p<.01$). CF values were significantly higher than AAF values for predicted VO_2max (CF=40.3 ± 11.06 ml/kg/min, AAF=32 ± 5.1 ml/kg/min; p=.03) and average daily calcium intake (CF=1015 ± 577mg, AAF=597 ± 168mg; p=.048). Data from all subjects indicate that BMD is positively correlated with body weight (p=.017) and BMI (p=.02), and negatively correlated with age (p=.043). These results suggest that the greater BMD observed in the AAF may be the result of their greater body weight and BMI. These results also suggest that body weight, BMI and age are important variable in bone mineral density in moderately fit middle-aged AAF and CF.

6

BODY COMPOSITION, BLOOD PRESSURE AND FOOD FREQUENCY IN 4 YEAR OLD AFRICAN-AMERICAN CHILDREN

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Major health issues in adult African-Americans are obesity and hypertension. Whether or not the etiology of these health problems are present during early childhood has not been definitively determined. Therefore, the purpose of this study was to evaluate body composition, food frequency and blood pressure (BP) responses in 4 year old African-American children. The subjects were 52 children (weight 18.3, S_d 2.7 kg) from an innercity Headstart program. Body composition variables included height, weight, BMI, subscapula and triceps skinfolds. Percent body fat (%fat) was calculated employing skinfold equations designed for young African-American children by Slaughter et al. (1988). Blood pressure was measured with a sphygmomanometer and stethoscope. Weekly food frequencies for eight food groups were completed by a staff member during an interview with the child's parent or guardian. The results indicate that the children were within acceptable health and fitness ranges for all body composition variables. The subjects has slightly larger peripheral fat deposits as the triceps value was larger than the subscapular value. Mean BP value of 84/50 was within the normotensive range and the MABP was 61.5. The consumption frequency of the foods ranged from 4.6 to 7.0 times a week. Cakes, sodas and candy were consumed the least and milk products were consumed the most. A comparison of the %fat/BMI ratio indicate that the children were fatter per given BMI unit than 9 year old children, but not middle aged adults previously measured in our lab. These 4 year old African-American children had a reasonably balanced consumption of different food groups and did not show signs or symptoms of hypertension or obesity. These results suggest that lifestyle choices adapted later in life maybe responsible for the high prevalence of obesity and hypertension observed in African-American adults.

7

ENERGY EXPENDITURE OF STRENGTH TRAINING

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Strength training has been formally recommended by ACSM since 1991, and has become an increasingly popular component of the basic adult fitness program. The caloric expenditure of a basic strength training session that meets ACSM recommendations was determined for 19 subjects (10 males and 9 females). Each subject performed one exercise session consisting of 2 minutes rest, 3 minutes of warmup on a cycle ergometer, 2 minutes of stretching, nine strength training exercises, and 5 minutes of passive recovery. The nine strength training exercises performed were (in order): bench press, lat pull, overhead press, bicep curl, tricep press, leg press, leg extension, prone leg curl, and calf raises. One set of 10 repetitions of each exercise was performed with a resistance equal to each subject's 10 repetition maximum. No more than 1 minute rest was allowed between each exercise. Oxygen consumption for the experimental session was determined continuously with a MedGraphics CPX breath-by-breath metabolic cart. Indirect calorimetry was used to calculate energy expenditure. The mean absolute oxygen consumption of the exercise and recovery period was 16.17 ± 5.08 Liters and 2.84 ± 1.43 Liters, respectively. Converted to caloric expenditure, the average energy expenditure was approximately 95.99 kcals ± 29.30 kcals, including the strength training exercises and postexercise recovery period. Therefore, while a strength training session of 1 set of 10 reps of 9 exercises may have many health and fitness benefits, it does not result in significant caloric expenditure.

8

EFFECTS OF ACUTE EXERCISE ON SYSTEMIC LEPTIN LEVELS

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We have previously shown that 6 wks of exercise training in male osborne-mendel and S5B/Pl rats reduces both adipose tissue expression and circulating leptin levels. Data published in abstract form in a recent issue of Obesity Research, vol. 4 suppl. 1:41s, 1996, suggested that an acute bout of short duration (20 min), low intensity (60% age predicted max HR) exercise did not effect serum leptin levels in normal weight adults. The purpose of this study was to determine whether an acute bout of longer duration and higher intensity exercise would reduce circulating leptin levels. A second purpose was to follow serum leptin levels during recovery from such exercise. Two males and 4 females (24±5.8 yrs, mean ± SD) with an average BMI of 24.7 ± 2.9 (body fat range = 12.8 - 34.3%) rode a stationary cycle ergometer (LODE; Groningen, Holland) for 60 minutes at 63.2 ± 7.8 % of VO_2 max and expended approximately 400 kcals. Blood samples were taken 30 minutes before exercise, every 15 minutes during exercise, and at 10, 30, and 60 minutes of recovery. A control trial was also performed by having subjects sit on, but not pedal the stationary ergometer. Exercise and control trials were randomized and separated by 4 weeks. All females were tested in the follicular phase of their menstrual cycle and the experimental trials were performed in the mid-morning (10 am) following a light breakfast (≈ 300 kcal) served at 8am. Leptin levels were determined on serum samples using a commercially available RIA kit (Linco, St. Charles, MO). We found no evidence of a reduced systemic leptin level either during or following acute bicycle ergometer exercise. Further, there was no relationship between the amount of fat oxidized during exercise and change in circulating leptin. Considerable variation in leptin levels were noted both between trials (exercise fasting = 6.58 ± 4.4 ng/ml vs. control fasting = 8.78 ± 5.86 ng/ml) and among individuals (fasting range = 1.21 to 19.12 ng/ml). It appears that future studies attempting to assess the effect of acute exercise on systemic leptin levels will need to test a large number and a homogeneous (in terms of gender and body type) group of subjects.

9

CARDIOVASCULAR (CV) FITNESS AND PERCENT BODYFAT (%FAT) ARE ASSOCIATED WITH TOTAL BODY BONE DENSITY IN 7-13 YR OLDS

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The associations of gender, ethnicity, CV fitness, and %fat with total body bone density (BD) and bone mineral content (BMC) were determined in 72 black and white 7-13 yr old children. Fitness and fatness were made independent of eachother by expressing fitness as submaximal heart rate while cycling at 49 W (a lower submaxHR indicated better fitness). Dual x-ray absorptiometry was used to measure %fat, BD and BMC. Analyses of covariance, using age as the covariate, revealed that BD and BMC were significantly higher in boys and in blacks, in comparison to girls and whites. Multiple regression equations, that also included age, gender and ethnicity, showed that better CV fitness and higher %fat were independently associated with higher levels of BD and BMC. Thus, this study confirms that the determinants of total body BD in 7-13 yr olds are similar to those previously shown in older subjects and in studies that used only regional measures of BD.

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10

THE PHYSIOLOGICAL AND ANTHROPOMETRIC EFFECTS OF EIGHT WEEKS OF STRENGTH TRAINING ON OLDER FEMALES

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The purpose of this study was to determine the effects of eight weeks of strength training on the upper body strength of older females. Thirty-six females, age 55-74 (mean age=65$\pm$3.78), volunteered to participate in the study. A pre-test was administered to each subject which consisted of body weight, fat % (3 site skinfolds), grip strength, biceps circumference, and isokinetic shoulder flexion/extension strength using Cybex instrumentation. Subjects were then given instructions on proper weightlifting exercises that involved only upper body lifts. The training protocol consisted of eight weeks of five different exercises (bench press, bicep curls, tricep pressdowns, seated lat rows, & abdominal crunches), three days a week with an increase in weight and a decrease in repetitions made every two weeks. A posttest was administered at the end of the training period. Dependent T-tests between pre and posttest means indicated a significant difference ($p \leq .05$) in isokinetic shoulder extension at $90°\cdot s^{-1}$ (36.0 Nm vs 42.3 Nm peak torque), body fat percent (31.7% vs 30.4%), bicep circumference (31.5 cm vs 32.0 cm) and grip strength (33.7 kg vs 35.2 kg). It was concluded that resistance training for the older female is beneficial for both increased strength and positive body composition changes.

EVALUATION OF NUTRITIONAL KNOWLEDGE IN ATHLETES AND COACHES

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The purpose of this study was to evaluate the nutritional knowledge, practices, and beliefs of NCAA Division I athletes and coaches. Athletes (N = 126) and coaches (N=15), representing 7 different sports, completed a questionnaire which included current nutritional practices and 38 questions related to general nutrition and nutritional supplements. Coaches scored significantly higher ($p < 0.05$) than the athletes by responding correctly to 55.8% (21.2 ± 5.1) of the knowledge questions. The athletes responded correctly to 45.3% (17.2 ± 6.4) of the knowledge questions. Female athletes (18.6 ± 5.8; N = 68) scored significantly higher than the male athletes (15.5 ± 6.8; N = 58). Forty percent of athletes cited peers/friends as their primary source for nutritional information while 36% indicated media and magazines as their primary source of nutritional information. Only 6% of the athletes considered coaches as their primary source of nutritional information. Misconceptions about vitamins and minerals may have contributed to the high percent of athletes (68%) reporting use of vitamin and mineral supplements. Only 38% of the athletes understood that vitamin and mineral supplements do not provide energy while 77% believed that B-vitamins provide an energy boost. Misinformation about protein and amino acid supplements was also apparent. Only 36% understood that protein and amino acid supplements do not increase muscle strength. Sixty-five percent of athletes believed that carbohydrate loading would enhance performance in events lasting one hour or less. Coaches and athletes demonstrated a unsatisfactory level of nutritional knowledge with much of their knowledge based on misconceptions and misinformation suggesting a strong need for nutritional education in intercollegiate athletics.

12

THE EFFECTS OF INTENSE EXERCISE TRAINING ON SERUM FOLATE LEVELS IN THE RAT

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There has been speculation for many years that individuals involved in aerobic exercise training have an increased requirement for vitamins. Folate is a B group vitamin that plays a major role in many metabolic pathways, and therefore may be required in greater amounts in individuals that exercise. Most studies that have examined the effects of training on vitamin status usually show that if there is an increased need for a vitamin then an individual will normally meet this requirement from their diet. Although low serum folate levels is a serious clinical problem no study has systematically looked at the effects of exercise training on the status of folate in the blood. Therefore the purpose of this study was to study the effects of an intensive endurance exercise training program on folate status. To ensure that the training program was consistent the rat was used as the subject. We hypothesized that the extra demand on metabolism caused by the training program would not effect serum folate status in the rat due to a compensatory increase in folate intake from the diet. The animals were trained on a motorized treadmill, and at the completion of the 10 weeks were running at 30 meters/min. up an 18% incline for 90 mins. Animals were fed ad-libitum a normal rat chow that contained 200 mg of folate per kg diet. At the end of the 10 week training period animals had a blood sample taken for serum folate analysis via the microbial procedure and were then euthanized for the removal of the plantaris muscle. The plantaris was analyzed for the oxidative enzyme citrate synthase to determine the effectiveness of the training program. Trained animals had significantly higher citrate synthase levels (45 μM/g/min) than untrained animals (31 μM/g/min), ($p<0.05$). Analysis of serum folate at the completion of the training revealed no significant differences in the serum folate levels between trained (46.5 ng/ml) and untrained (42.0 ng/ml) animals ($p<0.05$). These data suggest that exercise training does not effect serum folate status in the rat when the animals are fed ad-libitum.

13

ANABOLIC AND LIPOLYTIC EFFECTS OF CHROMIUM SUPPLEMENTATION IN RESISTANCE TRAINING FEMALES

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This study investigated pharmacological augmentation of exercise regimens designed to increase muscle mass and/or decrease body fat with the trace mineral chromium in the form of chromium picolinate. There were three groups involved in the double blind study: (1) beginning female weight training students who were given a daily 200 mcg. chromium supplement (n=5); (2) beginning female weight training students who were given a placebo indistinguishable from the supplement (n = 5), and (3) a control group which was not involved in the weight training class (n = 5). Baseline plasma chromium levels were measured in all three groups prior to beginning the training segment of the study; body composition and muscular strength baseline values were collected in the two training groups. Subjects in the two training groups were then subjected to a rigorous resistance training program of 84 days duration. At the conclusion of the training program, the subjects in the training groups were tested for plasma chromium levels, body composition changes, and muscular strength changes. There were no significant differences between any of the three groups in plasma chromium levels from pre- to post-test. There were no significant differences in body fat mass or lean body mass between the groups. There was a significant increase ($p < .0001$) in upper body muscular strength in both the treatment and placebo group when compared to the control group. These results suggest that chromium supplementation has no significant effect on body composition and strength changes in females participating in resistance training programs.

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RESTING ESTRADIOL LEVELS AND FAT METABOLISM DURING PROLONGED EXERCISE

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The relationship between resting estradiol levels and fat metabolism via respiratory quotient (RQ) was examined in 15 physically active females who performed two 60-min submaximal runs once each in the follicular phase (FP) and luteal phase (LP) of the menstrual cycle. Resting estradiol levels were assessed prior to exercise. Four day food diaries were analyzed for macronutrients. Estradiol was significantly greater in the LP ($p>.05$). There was no significant difference in RQ between the FP and LP runs and no significant correlation between estradiol and RQ. Total energy expenditure and carbohydrate (CHO) oxidation and utilization were moderately correlated with protein intake during the LP run ($r=.57$ to .77, $p<.05$). The FP RQ was significantly correlated with fat, CHO, and protein intake ($r=-.64$, .56 and .60, respectively, $p<.05$). Further inspection of the data revealed two groups based on the relationship between resting estradiol and fat metabolism. Ten subjects (D) exhibited a direct relationship between estradiol and fat metabolism and five subjects evidenced an inverse relationship between estradiol and fat metabolism. Results are as follows:

	D		I	
	FP	LP	FP	LP
Estradiol (pg/ml)	32.00+	60.60	40.00	50.80
	(8.93)	(37.80)	(6.93)	(11.03)
RQ	.90 + *	.87	.85	.88
	(.03)	(.03)	(.05)	(.05)

(+ -Significant difference between phases, $p<.05$; * -Significant difference between groups, $p<.05$)

Interrelationships between estradiol, dietary intake, and substrate metabolism differed between the groups. The effects of estradiol on substrate response appear to be multifactorial as nutritional status along with other potential physiological correlates relate strongly to substrate utilization.

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15

BIOMECHANICS OF SUCCESSFUL FRONT HANDSPRING FRONT TUCKED VAULTS IN WOMEN'S GYMNASTICS

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The mechanics of the front handspring front tucked vault were examined in two groups of college gymnasts. Group 1 consisted of 4 gymnasts who successfully completed the vault (11 vaults analyzed). Group 2 consisted of 3 gymnasts who unsuccessfully completed the vault (12 vaults analyzed). A successful vault was considered when the gymnast landed on her feet. A video camera was positioned perpendicular to the movement of the gymnast at a distance of 15 m and was shuttered at 1/500 s. Each vault was subsequently analyzed using the PEAK Performance two-dimensional video analysis system at a rate of 60 pictures per second. Group 1 had a significantly ($P<0.05$) shorter time in hurdle (0.117 s vs. 0.120 s), preflight (0.172 s vs. 0.199 s), and horse contact (0.176 s vs. 0.199 s) as compared to group 2. However, the time from horse off to obtaining the tuck position was similar for both groups (group 1: 0.292 s vs. group 2: 0.298 s). These data relate to the significantly faster running speed for group 1 (7.92 m/s) as compared to 7.54 m/s for group 2. At horse contact, group 1 had a more extended shoulder angle (119.0°) and hip angle (222.3°) than group 2 (112.9° and 215.6°, respectively). Due partially to the shorter time on the horse, group 1 had a more vertical body position at the time of horse takeoff than group 2. Interestingly, group 1 had less of a tuck position (hip angle: 67.3°) during postflight than group 2 (56.6°). These data illustrate proper mechanics to successfully complete this often performed vault in women's gymnastics.

16

THE EFFECT OF A SHORTENING OF THE FULL GOLF BACKSWING ON CLUB HEAD VELOCITY AT BALL IMPACT

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Twenty four golfers with long backswings were video taped before and after instruction from PGA Master professional Don Trahan. Data was processed using the Ariel Performance Analysis System. Dependent t-tests were run on pre and post instruction paired values of club head velocity (CHV) and standard deviation of CHV at ball impact, and club shaft angle and position at the end of the backswing. The subjects significantly shortened travel and changed the planar orientation of the club shaft at the end of the backswing. After instruction the club shaft had a more vertical orientation at the end of the backswing. There was no significant difference in CHV at ball impact and a significant decrease in the standard deviation of CHV at ball impact. The results indicated the backswing could be shortened approximately 20% without a significant loss in CHV while significantly increasing the consistency of CHV at ball impact.

THE EFFECT OF KNEE POSITIONING ON PARALLEL BARBELL SQUAT HIP AND KNEE TORQUES

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The parallel barbell squat is a popular resistance training exercise for the development of lower body strength and power. To avoid excessive forces at the knees, commonly used guidelines for the performance of the parallel barbell squat exercise suggest that the shank should remain as vertical as possible during the exercise, or that the anterior displacement of the knees should not go past the toes. Previous research indicates that knee torque increases as the knees move past the toes during a squat. It has also been shown that different body positions during the parallel squat exercise may affect the forces at the involved joints. Therefore, the purpose of this study was to determine the effect of restricting knee movement during the squat on the resulting forces at the hips. Seven weight trained males ($\bar{X}\pm SD$; 27.9±5.2 yrs) were video taped in the sagittal plane while performing three repetitions of two variations of parallel barbell squats using a shoulder width stance. During the unrestricted squat, normal squat form was used, thus allowing the knees to move anteriorly past the toes. During restricted squats, the knees were prevented from moving anteriorly past the toes by use of a wooden barrier. The load on the barbell for all repetitions was equal to each subjects' body weight. Static knee and hip torques were calculated for the bottom position of the squat using the methods of J.G. Hay (1985). For the unrestricted squat, knee torque (Nm) = 150.1±50.8, and hip torque = 282.2±65.0. For the restricted squat, knee torque = 117.3±34.2, and hip torque = 302.7±71.2. When comparing both squat variations, knee torque for the restricted squat was significantly ($p<.05$) less than for the unrestricted squat, and hip torque for the restricted squat was significantly greater than for the unrestricted squat. These data indicate that the squat technique used can have a significant impact on the distribution of forces between the knees and hips. If the knees are intentionally restricted from moving past the toes during a squat in an effort to minimize knee torque, it must be realized that this will produce increased torque at the hips. Further research is necessary to determine if the greater hip torque during restricted squats produces an unnecessary risk of injury to the lower back region when using maximal loads. These data may also help coaches and athletes determine which type of squat is most beneficial for them based on the functional demands of their sport.

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18

WHOLE BODY AND REGIONAL BONE MASS CHANGES IN COLLEGIATE FEMALE ATHLETES

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Regular physical activity may help prevent osteoporosis by maximizing peak bone mass and reducing the loss of bone mineral with age. To examine the role of exercise training on bone mineral density (BMD) accretion, longitudinal changes in whole body and regional BMD were monitored in female collegiate athletes whose skeletons were exposed to differential loading patterns. Two cohorts were studied. Cohort I included 26 gymnasts (19.7±1.2 yr), 36 runners (21.1±2.7 yr) and 14 non-athletic control women (19.3±1.7 yr), and was followed for 8 months. Cohort II included 8 gymnasts (18.9±1.1 yr), 11 swimmers (20.0±2.3 yr) and 11 non-athletic women (19.0±1.2 yr), followed for 12 months. BMD of the whole body (WB), left and right arms and legs, and pelvis were assessed by dual-energy x-ray absorptiometry (Hologic QDR 1000/W). For Cohort I, the percent change in WB BMD was not significantly different among groups, although the 1.3±1.0% increase in gymnasts and 1.2±1.4% increase in runners was significantly different compared to zero ($p<0.05$). In Cohort II, the % change WB BMD was also not significantly different among groups, nor significantly different from zero. In Cohort I, the % change in left and right arm BMD were not different among groups or from zero; similar findings were seen in Cohort II. In Cohort I, the % change in pelvis BMD was not significantly different among groups, but the 1.6±2.4% increase in the gymnasts was different when compared to zero. In Cohort II, the % change in pelvis BMD did not differ among groups or from zero. In Cohort I, the % change in left leg BMD was not significantly different among groups, although the gymnasts' 2.5±2.0% and the runners' 2.0±2.3% increase were significantly different compared to zero. The % change in right leg BMD was significantly different among groups, with the gymnasts (3.2±2.2%) differing from the runners (1.2±1.5%) and controls (1.0±2.0%). These changes were significantly different from zero for gymnasts and runners. In Cohort II, group differences were observed for % change of both right and left leg BMD, with swimmers (increase in BMD) differing from controls (decrease in BMD). The swimmers' 1.3±1.8% change in left leg BMD and 1.7±2.5% change in right leg BMD were significantly different from zero. These results indicate that bone mass at certain sites responds differently in collegiate women depending on the mechanical loading characteristics of their training.

19

PREDICTORS OF ROWING PERFORMANCE IN COLLEGIATE FEMALE ROWERS

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The purpose of this investigation was to examine the relationship between physiological variables and 2000 m ergometer performance in collegiate female rowers. Nineteen rowers (age: 19.89 ± 1.34 years, height: 167.11 ± 6.6 cm, weight: 67.11 ± 0.82 kg, body fat: 20.95 ± 4.62%, VO_2peak: 2.87 ± 0.31 L/min) with at least 3 months rowing experience served as subjects. A discontinuous incremental rowing ergometer test was completed to determine oxygen consumption at the lactate threshold (VO_2@LT), VO_2 at 2.5 mM lactate (VO_2@2.5), VO_2@4.0 and VO_2peak. Subjects performed one maximal repetition (1-RM) lifts on the hip sled and seated rows to determine strength. Hydrostatic weighing was performed to determine percentage body fat and fat-free mass (FFM). Pearson correlation coefficients revealed that 2000 m ergometer time was significantly correlated with seated rows ($r = -0.573$), hip sled ($r = -0.468$), VO_2peak ($r = -0.489$), fat-free mass ($r = -0.774$), height ($r = -0.522$), weight ($r = -0.589$) and VO_2@4.0 mM ($r = -0.494$). VO_2@LT and VO_2@2.5 were not significantly correlated with 2000 m time. Although there was a high correlation between performance and VO_2@4.0 mM lactate, the relationship between VO_2peak and VO_2@4.0 ($r = 0.888$) suggests that the high correlation may be a reflection of the significance of VO_2peak. Multiple regression analysis revealed significant R values from the combinations of VO_2peak and FFM ($p = 0.001$), FFM and hip sled ($p < 0.001$), FFM and rows ($p = 0.001$), FFM, rows and hip sled ($p = 0.001$), VO_2peak and rows ($p = 0.020$), VO_2peak and hip sled ($p = 0.025$) and VO_2peak, rows and hip sled ($p = 0.045$). It appears that training methods which target increasing VO_2max and muscular strength (upper and lower body) would be advantageous to competitive female rowers.

ACUTE WEIGHT GAIN, BODY COMPOSITION, AND PERFORMANCE IN COLLEGIATE WRESTLERS THROUGHOUT THE COMPETITIVE SEASON

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Objective: The purpose of this investigation was to characterize the magnitude of acute weight gain and its relation to success in collegiate wrestlers throughout the competitive season.

Experimental Design: This prospective study investigated 11 varsity, intercollegiate, NCAA Division #1, wrestlers between the ages of 17-25 yr. throughout the entire season.

Measures: Acute weight gain (i.e. defined as the amount of weight gained between the official weigh-in and match time) was determined at 15 different competitive dates throughout the season. Success was defined by season record and qualifying for the NCAA Division #1 Championships. Each subjects height, body weight (BW), and double thickness subcutaneous adipose measures were also recorded three times throughout the competitive season.

Results: The results showed that on average (SEM), wrestlers gained 3.7 ± 0.03 Kg (8.2 ± 0.3 Lb) of body weight before competing throughout the entire season. Acute weight gain was not found to be significantly different between the successful (4.2 ± 0.09 Kg) versus the less successful wrestler (3.3 ± 0.3 Kg). A non-significant correlation was found between percent weight gain and season record ($r = 0.45$, $p>0.05$). Significant changes ($p<0.05$) were also reported in BW, percent body fat (% fat), lean body weight (LBW), and fat weight (FW) throughout the season.

Conclusions: Collegiate wrestlers, excluding heavyweights, undergo significant acute weight gain (5.2% average) 6-24 h prior to competition. However, acute weight gain throughout the competitive season does not appear to be related to success in collegiate wrestling.

Hematology and Immunology

21

EFFECTS OF A 3-WEEK TAPER PERIOD FOLLOWING 22-WEEKS OF SWIM TRAINING ON IMMUNOLOGICAL RESPONSES TO EXERCISE

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Intense training has been reported to suppress immune status. This study examined the effects of a 3-week taper period on exercise-induced changes in immune status. Following 22-weeks of training in which training volume & intensity were systematically altered, 17 male and female college swimmers had fasting and post-exercise blood samples obtained to assess immune status prior to and following a 3-week taper period in which swim training volume was decreased by approximately 50%. The exercise stimulus consisted of a standardized 90-min swim workout performed at the end of the intense training and taper periods. Blood samples were analyzed for the percentage of lymphocytes in peripheral blood mononuclear cells determined by flow cytometry; lymphocyte proliferation induced by pokeweed (PWM) and phytohemagglutinin (PHA) mitogens measured by incorporation of [^{3}H-methyl]-thymidine into the DNA of 5×10^4 peripheral blood mononuclear cells; and plasma immunoglobulins (IgA, IgM, IgG) determined by radial diffusion assay. Data were expressed as percent changes from pre-exercise values and analyzed by repeated measures ANOVA. Results revealed significant changes ($p<0.05$) in exercise-induced response to pre- and post-taper periods, respectively, in CD19 total B-cells (-32±19, -7±28 %), CD4 T-helper/inducer cells (-34±24, -14±23 %), the CD4/CD8 T-helper/inducer:T-cytotoxic/ suppressor ratio (-38±29, -56±20 %), lymphocytic response to PWM mitogen stimulation (-19±51, 2±47 %), and plasma IgM levels (-9±27, 30±52 %). No significant differences were observed in total T-cells (CD2), T-cytotoxic/suppressor cells (CD8), lymphocytic response to PHA stimulation, plasma IgA, or plasma IgG levels. Results indicate that the reduction in training volume and/or normal immunological adaptations to environmental conditions may affect exercise-induced changes to swimming and that this response has a relatively large degree of variability.

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22

INFLUENCE OF OBESITY AND WEIGHT LOSS ON LYMPHOCYTE PROLIFERATION

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This study was designed to measure the influence of obesity and weight loss on mitogen-induced lymphocyte proliferation (a measure of T and B cell function). Subjects included 53 obese females (44.5±0.7% fat, 47.3±1.3 yrs of age) and 15 age-matched nonobese controls (26.1±1.7% fat, 47.1±2.9 yrs). Subjects were randomized into 4 groups, with measurements made pre- and post-12 wks of intervention: diet (D) alone (1200 kcal/d), exercise (E) alone (five 45-min sessions/wk at 78.4±0.6% max HR), both diet and exercise (DE), and controls (C). At baseline, lymphocyte subsets and proliferative responsiveness to the mitogens concanavalin A (Con A), phytohemagglutinin (PHA), and pokeweed mitogen (PWM) at optimal and suboptimal concentrations were compared between obese and nonobese subjects. Blood T (1.51±0.06, 1.25±0.08 10^9/l) but not B cell counts were significantly higher in obese versus nonobese. When adjusted for the difference between groups in T cells, both Con A- and PHA-induced proliferation responses were significantly lower in the obese (17% to 30%). Forty-six obese subjects complied with all study requirements during the 12-wk study. Relative to C, (N=11, 2.0±0.8 kg), weight loss was significantly greater in D (N=13, 7.7±0.9 kg) and DE (N=11, 9.1±0.7 kg), but not E (N=11, 1.4±0.8 kg). Peak oxygen uptake was significantly increased in E (169±38 ml/min) and DE (161±31 ml/min), but not D (-41±56 ml/min), relative to C (46±34 ml/min). Four by two repeated measures ANOVA revealed significant group x time effects for adjusted and unadjusted Con A- and PHA-induced lymphocyte proliferation (optimal but not suboptimal). Post-hoc analysis revealed that pre-to-post treatment changes in the 2 diet groups were significantly different from the control group. A significant correlation was found between weight loss and decrements in Con A (r=0.34, P=0.008) and PHA (r=0.35, P=0.006). These results indicate that obesity is associated with a 17% to 30% impairment in T cell function, and that weight loss may impair function further.

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CARBOHYDRATE AFFECTS NK CELL TRAFFICKING AFTER 2.5 H OF RUNNING

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23

This randomized, double-blind, placebo-controlled study was designed to determine the influence of carbohydrate (C) ingestion on the natural killer (NK) cell response to 2.5 h of running (76.7±0.4% VO_{2max}). Thirty marathon runners (VO_{2max} 53.4±1.0 $ml \cdot kg^{-1} \cdot min^{-1}$, age 41.5±1.4 yrs) were randomized into C (N=17) and placebo (P) (N=13) groups. Subjects rested for 10-15 min prior to a blood sample at 0715, and then ingested 0.75 l of C (Gatorade) or P. At 0730, subjects began running at 75-80% VO_{2max} for 2.5 h, and drank 0.25 l of C or P fluid every 15 min. Immediately after the run (1000), another blood sample was taken, followed by 1.5 h, 3 h, and 6-h recovery samples. For NK cells, a difference in the pattern of change between groups was found, highlighted by a greater increase in P immediate post-run and a greater decrease 3 h post-run [$F(4,25)=3.79$, $P=0.015$]. For all subjects combined, a significant time effect was found, with the blood NK cell count dropping 58%, 49%, and 34% at 1.5-h, 3-h, and 6-h post-run, respectively. The pattern of change over time between groups was not significantly different for NK cell activity (NKCA) [$F(4,112)=0.80$, $P=0.530$]. For all subjects combined, a significant time effect was observed, with NKCA dropping 52%, 35%, and 39% at 1.5-h, 3-h, and 6-h post-run, respectively. These changes were similar to those noted for blood NK cell counts, and when NKCA was adjusted for this, the time effect was erased. The patterns of change over time between groups for plasma cortisol and glucose were significantly different, with cortisol levels higher and glucose lower in P following the run. The immediate post-run plasma glucose concentration correlated negatively with plasma cortisol ($r=-0.67$, $P<0.001$), epinephrine ($r=-0.38$, $P=0.038$), and the NK cell count ($r=-0.57$, $P=0.001$) . In summary, the data support an interactive effect of C on post-2.5-h run plasma glucose, stress hormones, and NK cell trafficking, but not NKCA.

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EFFECTS OF CREATINE MONOHYDRATE SUPPLEMENTATION ON HEMATOLOGICAL RESPONSES TO RESISTANCE TRAINING

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24

Creatine monohydrate (CrH_2O) has become a popular nutritional supplement for strength/power athletes. While reports suggest an improved anaerobic capacity and possible enhancement in lean body mass, less is known regarding the medical safety of CrH_2O supplementation. This study evaluated the effects of 28 days of CrH_2O supplementation on hematological responses to resistance/agility training. In a double-blind and randomized manner, 25 NCAA Division IA football players were matched by total body weight and assigned to supplement their diet with either 84 $g \cdot d^{-1}$ of a glucose placebo (P) or a supplement containing 84 $g \cdot d^{-1}$ of glucose with 15.75 $g \cdot d^{-1}$ of HPCE pure CrH_2O (Cr) during an intense phase of resistance training (~5 hrs/wk) and agility/sprint training (~3 hrs/wk). Fasting blood samples were obtained prior to and following the supplementation period. Comprehensive clinical blood profiles and blood cell counts were performed on plasma and whole blood samples. Data were analyzed by repeated measures ANOVA with Tukey post-hoc analysis and are presented as percent change from baseline for the P and Cr groups, respectively. Results revealed that plasma creatinine levels were increased in the Cr group (4±9; 22±10%, p=0.001). However, the ratio of urea nitrogen/creatinine was unchanged in the Cr group while increasing in the P group (24±35; 4±31%, p=0.04). Plasma globulin (1±10; 11±11%, p=0.04), LDH (10±8; 25±17%, p=0.01) & ALT levels (-9±20; 15±32%, p=0.04) increased while CK (71±60; 168±114%, p=0.09) & AST levels (-5±26; 17±28%, p=0.06) tended to increase to a greater degree in the Cr group. Finally, HDL levels (3±8; 10±11%, p=0.07) tended to increase while the ratio of total cholesterol/HDL tended to decrease (1±12; -7±12%, p=0.07) in the Cr group. No differences were observed in remaining hematological or blood cell count values. Moreover, all values remained within normal limits for active individuals. Results indicate that while significant alterations were observed in some hematological markers analyzed, CrH_2O ingestion during intense training does not appear to result in clinically significant alterations in plasma blood profiles or blood cell counts.

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25

CARBOHYDRATE AND THE CYTOKINE RESPONSE TO 2.5 H OF RUNNING

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This randomized, double-blind, placebo-controlled study was designed to determine the influence of carbohydrate (C) supplementation on the cytokine response to 2.5 h of high-intensity running (76.7±0.4% VO_{2max}). Thirty experienced marathon runners (VO_{2max} 53.4±1.0 ml·kg^{-1}·min^{-1}, age 41.5±1.4 yrs) were randomized into C (N=17) and placebo (P) (N=13) groups. Subjects rested for 10-15 min prior to a blood sample at 0715, and then ingested 0.75 l of C (Gatorade) or P. At 0730, subjects began running at 75-80% VO_{2max} for 2.5 h, and drank 0.25 l of C or P fluid every 15 min. Immediately after the run (1000), another blood sample was taken, followed by 1.5 h, 3 h, and 6-h recovery samples. For interleukin-6 (IL-6) (a major inducer of the acute phase response), a difference in the pattern of change between groups was found, highlighted by a greater increase in P versus C immediate post- (753% versus 421%) and 1.5-h post-run (193% versus 86%) [$F(4,112)=3.77$, $P=0.006$]. For interleukin-1 receptor antagonist (IL-1ra) (synthesized in response to inflammatory stimuli to limit the deleterious effects of interleukin-1), a difference in the pattern of change between groups was found, highlighted by a greater increase in P versus C 1.5-h post-run (231% versus 72%) [$F(2,50)=6.38$, $P=0.003$]. No significant interaction effects were seen for interleukin-2 or interleukin-1β. The patterns of change over time between groups for plasma cortisol and glucose were significantly different, with cortisol levels higher and glucose lower in P following the run. The immediate post-run plasma glucose concentration correlated negatively with plasma cortisol ($r=-0.67$, $P<0.001$); post-run cortisol levels ($r=0.70$, $P<0.001$) and IL-6 ($r=0.54$, $P=0.003$) correlated positively with IL-1ra. Taken together, the data indicate that carbohydrate ingestion attenuates the inflammatory cytokine response to heavy exertion.

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26

INFLUENCE OF OBESITY AND ITS TREATMENT ON INNATE IMMUNITY

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This study was designed to measure the influence of obesity and its treatment on innate immune function. Subjects included 53 moderately obese females (44.5±0.7% fat, 47.3±1.3 yrs of age) and 15 age-matched non-obese female controls (26.1±1.7% fat, 47.1±2.9 yrs). Following cross-sectional comparisons of innate immunity at baseline, the obese subjects were randomly divided into 1 of 4 groups, with measurements made pre- and post-12 weeks of intervention: diet (D) alone (1,200 kilocalories/day), exercise (E) alone (five 45 minute sessions per week at 78.4±0.6% maximum heart rate), both diet and exercise (DE), and controls (C) (no exercise or diet). At baseline, innate immunity was not significantly different between obese and non-obese groups: natural killer cell activity (NKCA), 164±12 and 195±28 lytic units, respectively; granulocyte oxidative burst activity, 463±16 and 448±34 mean fluorescence channel (MFC), respectively; granulocyte phagocytosis, 1697±44 and 1680±86 MFC, respectively. Forty-six obese subjects complied with all requirements during the 12 week study. Relative to C (N=11, 2.0±0.8 kg), weight loss was significantly greater in D (N=13, 7.7±0.9 kg) and DE (N=11, 9.1±0.7 kg), but not E (N=11, 1.4±0.8 kg). Peak oxygen uptake was significantly increased in E (169±38 ml/min) and DE (161±31 ml/min), but not D (-41±56 ml/min), relative to C (46±34 ml/min). Four by two repeated measures ANOVA revealed a significant group by time interaction effect for NKCA [$F(3,42)=4.05$, $P=0.013$] but not granulocyte oxidative burst activity or phagocytosis. NKCA was significantly decreased in DE relative to C, and for all subjects combined, change in NKCA was correlated with change in weight ($r=0.41$, $P=0.004$). We conclude that obesity has no discernable effect on innate immune function, while weight loss through dieting and exercise may lower NKCA.

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THE EFFECT OF PHYSICAL ACTIVITY ON THE PRODUCTION OF SPECIFIC ANTIBODY IN RESPONSE TO INFLUENZA VACCINE IN COLLEGE STUDENTS

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The purpose of this study was to determine the effect of physical activity on the anti-hemagglutinin response to the H1 (A/Texas/36/91) and H3 (A/Johannisburg/33/94) components of the 1995-96 Influenza virus vaccine. Eighty-five volunteers 18-30 years of age (mean 21.1±2.3) participated in the study. Physical activity was assessed using the Standford 7-Day Recall Questionnaire. Participants were divided into inactive (<36), moderately active (>36<44) and active (>44) based on Blair et.al (1985). Fifty microliters of blood were collected via fingerprick of the index finger prior to, one, two, four, and six weeks post vaccination. Samples were diluted (1:10) in 450 microliters of saline/heprin solution (1gr/ml), centrifuged immediately, and plasma was frozen at -20°C until analyzed. Participants were encouraged to maintain previously reported activity levels throughout the entire study period. Anti-hemagglutinin titers were determined by using chicken erythrocytes and reference antigen obtained from the Center of Disease Control. Titers were normalized by comparison to a standard sera run with each assay. As expected, two repeated measures ANOVA (H1/H3)) revealed significant main effects for time ($F=5.18, p=0.002$; $F=10.93, p=0.001$) with the highest titers found on week four (H1) and week six (H3), respectively. However, for both antigens, there was no significant difference between groups and no significant interaction. The results of this study showed no significant effect of physical activity on the production of specific antibody in the present group of college students.

28

EFFECT OF PHYSICAL TRAINING ON HEART PERIOD VARIABILITY IN OBESE CHILDREN

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This study examined the effect of physical training (PT) on heart period variability (HPV) in 35 obese (bodyfat > 30%) children aged 7-11 years. HPV, the beat-to-beat variability in R-R ECG intervals, provides information concerning autonomic traffic and predicts dysrhythmias and mortality. Children were randomly assigned to PT and control groups. The PT group underwent 4 months of PT, 5 days/week, for 40 minutes/day. Aerobic fitness was measured with submaximal heart rate (HR) during supine cycling, percent body fat (%BF) was measured with dual energy absorptiometry, and resting HPV parameters were measured in a supine position. Compared to the control group, the PT group: (1) reduced submaximal HR and %BF ($p<0.01$); (2) increased in the root mean square of successive differences, a time domain parameter reflective of vagal tone ($p<0.05$); (3) decreased in low frequency power expressed as a percentage of total power, a frequency domain index of combined sympathetic and vagal activity ($p<0.03$); and (4) decreased in the ratio of low to high frequency power, an index of sympathetic-parasympathetic balance ($p<0.01$). In obese children, PT alters cardiac autonomic function favorably by reducing the ratio of sympathetic to parasympathetic activity.

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29

RESTING HEART RATE VARIABILITY PROFILES IN OVERWEIGHT WOMEN.

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Time domain and spectral analyses of resting heart rate variability (HRV) may be a useful noninvasive method to assess autonomic dysfunction of the cardiovascular system and its relationship to obesity. Decreased vagal tone has been associated with aging, cardiovascular disease, and rapid weight gain. Decreased sympathetic activity may also contribute to weight gain due to a slowed metabolism. The purpose of this study was to gather baseline data to characterize resting HRV in overweight, deconditioned women (n=8) and also pilot the effect of a moderate diet and/or exercise plan on resting HRV in a small subsample (n=4). Subject characteristics: age = 35.5 years (±8); height = 162.5 cm (±5), weight = 75 kg (±13), body fat = 36.6%.(±4.9); $\dot{V}O_2max$ = 24.3 ml·kg·min^{-1} (±6); resting HR = 70.6 bpm (±16). HRV analyses were performed in the morning with subjects in a fasted, resting state. ECG data was collected for 15 min after a 5-min resting baseline with the subject in a supine position. The subsample participated in 6 wks of brisk walking (3 d/wk, 30 min) and/or dietary counseling (-300 kcal/d). The resting ECG signal was converted into frequency components with power peaks so that frequency bands representing sympathetic and parasympathetic activity could be determined by spectral analysis. The R-R SD interval (ms) was measured to obtain the time domain analysis of 65.74 (±33.6) at baseline rest for the 8 subjects. Spectral analysis confirmed vagal tone domination at baseline rest. Despite no significant change in % fat, weight, or fitness, the diet/exercise case study interventions resulted in a 17.3% increase in R-R SD, suggesting improved cardiac function. However, the spectral analyses results were less clear. Spectral analyses for the "exercise only" subjects (n=2) revealed decreased sympathetic activity and improved vagal tone whereas spectral analysis for the diet+exercise subject and diet-only subject showed the opposite effect. These case studies suggest that even modest dietary/exercise manipulation may effect autonomic cardiovascular functioning and warrant further investigation.

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INLUENCE OF DIETARY SODIUM AND PHYSICAL ACTIVITY ON THE BLOOD PRESSURE OF THE SPONTANEOUSLY HYPERTENSIVE RAT.

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30

Male SHR (5 wks of age) were assigned to either sedentary (SED) or exercise (EX) conditions and consumed either low (0.1%) or high (3.0%) sodium diets for 9-11 weeks. Rats (n=11-14/group) in the exercise groups were housed in cages with attached running wheels. After catheterization of the femoral artery and vein, the animals recovered for a 24 hour period without exercise and were studied. Mean arterial blood pressure (MAP) and heart rate (HR) were determined from conscious, unrestrained animals. The decrement in blood pressure after ganglionic blockade (ΔBP-GB) was measured as an index of sympathetic support of blood pressure. Results were as follows:

	SED-0.1%	SED-3.0%	EX-0.1%	EX-3.0%
MAP (mmHg)	166±3	155±3	159±3	154±3
HR (bpm)	323±8	313±7	327±10	322±9
ΔBP-GB (mmHg)	56±3	47±2	57±4	59±6

There were no significant exercise or NaCl main effects or interaction on MAP, HR and ΔBP-GB. We conclude that dietary sodium and voluntary wheel running did not significantly influence resting blood pressure determined from conscious, unrestrained SHR during the light cycle. Twenty-four hour BP measurements are needed to more completely determine the influence of physical activity and dietary sodium on the blood pressure of the SHR.

FOREARM VASCULAR RESISTANCE IS AUGMENTED DURING ISOMETRIC KNEE EXTENSION FOLLOWING MUSCLE DAMAGE

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31

The purpose of the present investigation was to examine the effect of muscle damage on cardiovascular responses during exercise. Seven subjects performed unilateral isometric knee extensions (IKE) at 30% of maximum voluntary contraction (MVC) before and 48 hours after muscle damage. IKE was performed for 3 minutes at the same absolute force before and after muscle damage. Muscle damage was elicited by the subject performing 8 sets of 10 repetitions of eccentric muscle actions of the quadriceps, lowering a weight equivalent to 75% of eccentric maximum load. One leg of each subject performed the muscle damage protocol while the other leg served as a control. Exercise time to fatigue for IKE at 30% MVC in the damaged leg was significantly decreased from predamage to postdamage IKE (293±11 s to 206±28 s), but was unchanged in the control leg (290±11 s to 280±21 s). Cardiovascular changes from baseline to each minute of IKE were calculated. The results for the damaged leg are as follows (mean±S.E.; MAP, mean arterial pressure; FBF, forearm blood flow; FVR, forearm vascular resistance; $^{*}p<0.05$ vs. baseline; $^{\dagger}p<0.05$ vs. before):

	Time	Baseline	ΔEx-1	ΔEx-2	ΔEx-3
MAP	Before	96±3	14±4*	25±4*	34±5*
(mmHg)	After	96±6	12±2*	28±5*	36±4*
Heart Rate	Before	73±4	16±2*	22±3*	25±3*
(beats min^{-1})	After	69±4	15±4*	23±5*	24±5*
FBF	Before	5.5±1.1	1.7±0.7*	3.5±1.3*	3.0±0.8*
(ml $100ml^{-1}$ min^{-1})	After	5.5±1.1	1.5±0.6*	0.8±0.4†	0.3±0.5†
FVR	Before	22.5±4.5	-2.3±1.8	-6.2±3.0*	-4.6±2.1*
(units)	After	23.8±6.2	-1.9±1.3	2.8±1.5†	1.8±2.3†

There were no significant changes in any variables with the control leg. The results indicate that FVR is augmented during IKE following muscle damage. The data suggest that muscle damage may elicit greater exercise-induced muscle sympathetic nerve activity.

32

THE EFFECTS OF 300 mg/kg OF SODIUM BICARBONATE ON POWER PRODUCTION, BLOOD LACTATE, AND HEART RATE DURING THREE MINUTE INTERVAL ROWING

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The current study was conducted to determine if orally ingesting sodium bicarbonate ($NaHCO_3$) at 300 mg/kg of body weight affected: (a) total power produced in four bouts of three minute maximal rowing, (b) power produced during each individual three minute bout, (c) plasma lactate during recovery in four bouts of three minute maximal rowing, (d) max heart rate during each bout, and (e) recovery heart rate. Six healthy male subjects participated in one orientation session, one peak oxygen consumption testing session, and four rowing sessions. During each rowing session subjects exercised maximally on a Concept II Rowing Ergometer for four 3 minute bouts. Maximal rowing bouts were separated with four minutes of active recovery. Subjects ingested 300 mg/kg of $NaHCO_3$ or a placebo 75 minutes prior to exercise. The subjects received each substance twice. A counterbalanced double blind design was used to determine the pattern of ingestion. Blood samples were taken at rest 75 minutes after ingestion, 3 minutes after the third bout, and at 1, 3, and 5 minutes after the final bout. Power output was analyzed with a Nested Factorial ANOVA and a t-Test for Sample Means. Plasma lactate also was analyzed with a t-Test for Sample Means and heart rate was analyzed with a Matched Pairs t-Test. The t-Test for power indicated that there was a significant difference between the mean power produced in the experimental and that for the placebo during the third bout and for total power produced. Each of the $NaHCO_3$ recovery blood lactates was significant difference than that for the placebo. No differences were observed in max heart rate, however recovery heart rate for 3 minutes after the third $NaHCO_3$ bout was significantly different than the corresponding recovery rate for the placebo. Ingestion of 300 mg/kg of $NaHCO_3$ 75 minutes prior to maximal rowing allows for greater power production and higher blood lactate concentrations.

33

EFFECTS OF DETRAINING ON CARDIORESPIRATORY AND METABOLIC RESPONSES AFTER SIX WEEKS HIGH-INTENSITY CYCLING

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This study evaluated novel submaximal indicators of cardiorespiratory fitness during high constant-load (HCL) exercise tests, in response to detraining. A central variable was the slow component VO_2 (SC); SC is defined as the difference between end-exercise VO_2 and 3-min VO_2. (Gaesser et al. *ESSR*, 1996). Exercise heart rate (EHR) and blood lactate (HLa) were taken at the end of the HCL tests. Ten sedentary males (18-30 yr) were screened and gave informed consent, before performing maximal and HCL cycle ergometer tests. The maximal test variables, VO_2pk and lactate threshold (LT), were used to set loads for the HCL tests and the training protocol. Cycle ergometer training was done ~30 min/day, 5 days/wk for 6 wk at .70 (LT-VO_2pk). Subjects were tested at 6 wk of training (Table shows training changes for SC, EHR, HLa). Subjects then detrained for 2 wk. HCL tests were repeated at 1 and 2 wk of detraining and an additional maximal test was perfomed after 2 wk. Differences were found in EHR at 1 and 2 wk of detraining compared to post-training values, but not for SC and HLa.

Table 1. Submaximal responses during detraining across trials (mean ± SD)

Variables	Pre-train	Post-train	DT-1	DT-2
SC (ml/min)	$536 \pm 203^{a,d}$	274 ± 133^{a}	365 ± 103^{d}	308 ± 152^{d}
EHR (bpm)	$186 \pm 8.9^{a,d}$	$161 \pm 8.9^{a,b,c}$	$171 \pm 7.9^{b,d}$	$169 \pm 7.7^{c,d}$
HLa (mMol)	11.2 ± 2.8^{a}	7.6 ± 2.3^{a}	8.1 ± 1.9	8.6 ± 1.1

Identical superscripts (a, b, c, d) denote statistically significant differences in variables across trials ($p < 0.001$)

While EHR is know to exhibit a rapid time course change in detraining, SC and HLa need to be studied under a longer detraining period.

EXPERT RANKING OF EXERCISE DETERMINANTS FOR OLDER ADULTS

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34

Determinants, or factors, affecting exercise initiation and adherence by older adults need to be identified and ranked according to their importance. An understanding of these determinants will help in the development of exercise plans that encourage older adults to exercise more. The purpose of this study, therefore, was to prioritize exercise determinants for initiation and adherence based on rankings of acknowledged experts in the fields of exercise, geriatrics, and wellness. These determinants cluster into five groups: 1) personal characteristics (demographics); 2) knowledge, attitudes, and beliefs; 3) psychological/ behavioral attitudes; 4) activity characteristics; and 5) environmental characteristics. Only personal characteristics are examined in this paper. The nine subcategories of personal characteristics are: age, gender, ethnicity, occupation, education, socioeconomic status, biomedical status, smoking status, and past exercise participation. The experts ranked both initiation and adherence determinants, on a scale of 1 to 10, with 10 being most important. The analyses involved averaging the ranking for each subcategory to determine its importance. Results indicate that the most important determinants for initiation are biomedical status, socioeconomic status, and past exercise participation with rankings of 8.8, 7.6, and 7.6. For adherence, the experts also believe that biomedical status, socioeconomic status, and past exercise participation are the most important factors for adherence, with respective rankings of 9.1, 7.9, and 7.8. The other adherence factors received rankings of 6.7 to 4.6, with occupation being the least important for this age group. In conclusion, when developing an exercise program for an older adult, it is important to consider how these determinants act as incentives or barriers to exercise. The exercise plan should include strategies to increase the incentives and to reduce the barriers that relate to these determinants.

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THE YMCA SUBMAXIMAL CYCLE PROTOCOL DOES NOT ACCURATELY PREDICT VO_{2MAX}.

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35

The YMCA submaximal protocol is used extensively in the health and fitness industry to predict maximal aerobic capacity (VO_{2max}). Results obtained from the assessment are used for exercise programming and risk stratification. To date, the effectiveness of this protocol in reliably predicting aerobic capacity has not been extensively examined. Therefore the **purpose** of this study was to evaluate the accuracy of the YMCA cycle protocol in estimating maximal aerobic capacity. Thirty subjects (16 women, 14 men; mean age 21.9 $\pm$2.2 yr) were administered two YMCA cycle tests on separate occasions. VO_{2max} was assessed by indirect calorimetry (SensorMedics 2900 Metabolic Measurement Cart) on an incremental cycle test to volitional fatigue. **Results** Men had a significantly ($P > 0.05$) higher measured VO_{2max} than women (3,611 $\pm$634; 2,288 $\pm$348 ml/min). Intraclass reliability, using a one-way ANOVA model, was .85 (all subjects), .90 (men) and (.34) women. Correlations (R) between measured VO_{2max} and estimated VO_{2max} for tests one and two were adequate for men (R = .79 & .82) but not for women (R = .30 & .64). Standard error ranges for both submaximal tests were high for men (580 - 621 ml/min) and women (491 - 391 ml/min). SEE, expressed in ml/kg/min, was also high for men and women (~7.1 ml/kg/min). **Conclusion** Based on these data, the YMCA does not accurately predict VO_{2max}. Consequently, caution should be used when utilizing this assessment method for exercise programming and risk stratification.

36

THE EFFECT OF PRIOR SUBMAXIMAL EXERCISE UPON SUPRAMAXIMAL ARM ERGOMETER PERFORMANCE

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The purpose of this experiment was to examine the effect of prior performance using a standardized submaximal exercise task upon maximal arm ergometry. All subjects (males=13, females=10; age=25.1 ± 2.37 yrs) performed a one-min bout of maximal arm ergometry against a resistance of 0.0375 kp x kg body mass on two separate occasions, once when fully rested to establish baseline data and once immediately after the completion of a standardized submaximal exercise protocol. This protocol consisted of three-min of treadmill running (6.8 mph, 0-12 % grade) and stair stepping (32 steps). Subjects were instructed and verbally encouraged throughout the arm crank test to perform as many revolutions as possible. Revolutions were recorded and converted to total work (W_{tot}). Fifteen minutes after completion of the second bout of arm ergometry, maximal aerobic capacity ($VO_{2\,max}$) was determined during an incremental treadmill test. Respiratory gas was collected during the submaximal exercise task for the purpose of determining % $VO_{2\,max}$ and analyzed using standard open circuit spirometric techniques. The submaximal exercise task required 83.6 ± 10 % $VO_{2\,max}$ (39.3 ± 10 ml · kg^{-1} · min^{-1}). Post test W_{tot} was decreased by 15.6 % from baseline (1148.5 ± 558.4 kgm to 965.6 ± 464.5 kgm; $p < 0.01$). The decline in W_{tot} was inversely correlated ($r = -0.739$, $p < 0.01$) with $VO_{2\,max}$ (47.7 ± 6.8 ml · kg^{-1} · min^{-1}) and positively correlated ($r = 0.676$, $p < 0.01$) with % $VO_{2\,max}$ during submaximal exercise. These results indicate that prior submaximal work will reduce maximal arm ergometer performance and that this performance decrement is inversely related to $VO_{2\,max}$.

37

EFFECTS OF A NEW ICE-COOLING TECHNIQUE ON WORK IN PROTECTIVE CLOTHING AT 28 C, 23 C AND 18 C WBGT's.

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Productivity in protective clothing (PC) can be increased with the use of ice vests. Current vests have the disadvantage of requiring frequent PC removal to recharge the ice, thus risking contamination and reducing productivity. The purpose of this study was to test a new ice vest design which permits recharge without PC removal. Six males performed one walk in an impermeable coated Tyvek suit (NOCL) and a second in the same suit with the new ice vest (COOL), in environments of 18, 23 and 28 ± 1 C WBGT's, at a weighted metabolic rate of 450W. Rectal temperature (Tre), Comfort (0-8), and RPE (6-20) were all recorded.

Results (mean ± sd) (*=p<.05, for NOCL vs. COOL) were :

	18 C		23 C		28 C	
	NOCL	COOL	NOCL	COOL	NOCL	COOL
Tol.time (min),% inc	109±20	120±0 10%	62±8	107±23* 71%	43±6	80±21* 88%
Tre inc. C	0.73±0.34	0.55±0.35	1.17±0.24	0.86±0.69	1.18±0.29	1.31±0.14
Rest Tre dec. C	0.74±0.62	0.71±0.26	0.06± 0.28	0.62±0.25*	-0.31±0.21	0.64±0.54*
Max HR (bpm)	147±21	117±14*	160±12	142±24*	164±16	160±16
RPE	13.8±1.2	13.2±0.9	15.3±1.5	14.3±1.4	15.5±1.9	15.2±1.2
Comfort	5.8±0.5	5.0±1.1*	6.7±0.7	5.7±1.2*	6.4±0.4	6.2±0.5

This new design seems to provide comparable cooling to conventional vests and also provides greater practicality for field use. Even in experimental form the suit demonstrated increased productivity due to extended exposure time and decreased rest/recharge time.

THE ACUTE EFFECT OF SHORT-TERM, INTENSE EXERCISE UPON MECHANICAL PULMONARY FUNCTION

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Most exercise scientists are personally familiar with the respiratory distress which accompanies intense exercise. Subjects who complete maximal treadmill tests often complain that they "just couldn't breathe any more." But is this perception of respiratory incapacity associated with a reduced ability to move air? We tested nineteen healthy adults (mean age=29±11 yrs) to determine if maximal exercise of short duration would bring about a reduction in forced vital capacity (FVC) and forced expiratory volume/one second (FEV1). All subjects had prior experience with laboratory tests and reported to the lab in a rested state. A pulmonary function test was administered to simultaneously measure FVC and FEV1. Each subject was then asked to give a maximal effort on a progressive treadmill test designed to produce voluntary termination within about six minutes. Heart rate was monitored throughout; duration of the effort and approximate MET level achieved were recorded. Immediately after the test was completed, FVC and FEV1 were again measured to determine if these mechanical pulmonary functions changed as a result of this intense exercise. As the subsequent summary indicates, maximal aerobic effort of short duration did not have a significant negative impact upon FVC and FEV1.

VARIABLE	MEAN±SD, Pre	MEAN, Exercise	T-VALUE	P
FVC (liters)	4.03±0.8	3.99±0.9	0.74	0.47
FEV1 (liters)	3.42±0.6	3.42±0.8	0.04	0.97
Heart Rate (BPM)	77.11±9.9	177.58±9.0		
MET Level		15.16±1.9		
Exercise time (min)		5.99±0.6		

These data demonstrate that maximal aerobic effort of short duration did not significantly reduce mechanical pulmonary function and suggests that the decision to voluntarily terminate such exercise is probably minimally affected by a diminution in the capacity to move air.

Epidemiology

39

THE EFFECTS OF A VIDEO PRESENTATION ON CHILDREN'S DEFINITION OF PHYSICAL ACTIVITY

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Assessing children's attitudes and beliefs about physical activity is an important area of research; yet, the extent to which young children understand the concept of physical activity has not been investigated. The purpose of this study was to (a) evaluate the completeness of children's definition of physical activity; and (b) assess the efficacy of two intervention designed to enhance children's concept of physical activity. Six 4th-grade (n=128) and six 5th-grade classrooms (n=134) from two elementary schools participated in the study. Classroom were randomly assigned to one of three treatment conditions. The VIDEO group watched a 5-min. video describing physical activity. The VERBAL group listened to a description of physical activity. The CONTROL group received no instruction. All students completed a 17-item survey testing the accuracy of their definition of physical activity. Students were considered "masters" if they scored 15 out of the 17 activity items correctly. The effects of school, grade level, and treatment on the level of mastery were tested via multiple logistic regression. Students watching the video were 2.3 times more likely than control students to be classified as a master (p=.01). Verbal students were 1.4 times more likely than controls to be classified as a master, however, the odds ratio failed to reach significance (p=.32). A greater percentage of video students (70%) were classified as masters relative to verbal students (55%), however this difference was not significant (p=.11). The results suggest that aids such as video can significantly enhance the accuracy of children's definition of physical activity.

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40

EXERCISE PATTERNS AND PERCEPTIONS OF FEMALE AFRICAN AMERICAN COLLEGE STUDENTS

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Exercise benefits, facilitators, and barriers were explored and compared to patterns of physical activity (PA) and exercise adoption stages of change (SC) in 70 female students at one historically black Southern university. The Lipid Research Clinics PA questionnaire was used to categorize activity level (AL). A 3-minute step test estimated VO_{2max}, and body mass index (BMI) was calculated from height and weight. Weekly exercise time (TIME) was calculated from exercise frequency (FREQ) and duration. The number of subjects identifying themselves at pre-contemplation (PC), contemplation (C), preparation (P), action (A), and maintenance (M) stages of exercise adoption was 4, 15, 26, 21, and 3 respectively. There were 35 inactive (IA), 17 moderately inactive (MI), and 17 active (AC) subjects. SC was significantly related to AL, TIME, and FREQ ($r=.44, .44, .37$; $p < .05$). AL was significantly related to FREQ, TIME, SC, and BMI ($r=.73, .47, .44, -.33$). Open-ended responses to questions about exercise benefits (BEN), facilitators (FAC), and barriers (BAR) were categorized and compared by AL and SC. Differences for the following categories were found: appearance (APP), health (HEA), mental/emotional (MEM), fitness (FIT), social (SOC). Arrows indicate response patterns that were higher or lower for groups by AL and SC: IA: ↑APP BEN, ↓HEA BEN, ↑MEM BAR, ↓HEA BAR; MI: ↓FIT BEN, ↑HEA BEN, ↑SOC BAR; AC: ↓APP BEN, ↓MEM BAR; PC/C: ↓HEA BEN, ↓APP FAC, ↓SOC BAR, ↑MEM BAR; P: ↑APP BEN, ↑HEA BEN; A/M: ↑HEA BEN, ↓SOS FAC, ↓MEM BAR. Further research on perceived exercise benefits, facilitators, and barriers may lead to enhanced effectiveness of population-specific PA intervention strategies.

THE LONG-TERM IMPACT OF A REQUIRED PHYSICAL EDUCATION PROGRAM ON COLLEGE ALUMNI

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The purpose of this study was to determine if alumni who had completed a required physical education program (RPEP) differed in selected health behaviors and attitudes from alumni of a college with no RPEP. A questionnaire containing items from two previous alumni studies and the National Cancer Institute's Health Habits Questionnaire was mailed to 630 college alumni (309 RPEP/321 non-RPEP). The overall response rate was 59.5% (mean age 33.3 $\pm$ 2.6 yr.), with 57% of non-RPEP and 62% of RPEP alumni responding. Data were analyzed by institution and gender. Responding on a Likert scale (5-very important to 1-no importance), RPEP alumni perceived their college experience as more important than non-RPEP alumni in contributing to: their knowledge about health and physical fitness (3.0 $\pm$ 1.0 to 2.6 $\pm$ 1.2; $p = .002$); and a positive attitude toward physical activity (3.1 $\pm$ 1.0 to 2.8 $\pm$ 1.3; $p = .009$). Differences in blocks walked per day and flights of stairs climbed per day were not significant between institution or gender groups. RPEP alumni ($p = .01$) and males ($p = .0003$) reported regularly exercising at higher intensities as reported on Borg's scale of self-assessed perceived exertion. Fewer of the RPEP alumni (14% to 25%) were overweight (BMI > 27.8 M, > 27.3 F). A smaller percentage of RPEP alumni were smokers (22% to 30%). A higher percentage of women were smokers (F = 33%, M = 21%). Data suggest that a RPEP may impact alumni knowledge and attitudes, however, the impact on alumni behaviors is less evident.

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42

KNOWN GROUPS VALIDITY EVIDENCE FOR THE BODY SELF-IMAGE QUESTIONNAIRE

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The purpose of conducting this study was to obtain validity evidence for the nine subscales of the Body Self-Image Questionnaire (BSIQ; Rowe, 1996). All Ss were undergraduate students at a state university in the Southeast. The BSIQ was administered to 589 females from the general student body (GS), 12 eating-disordered females (ED), and 15 female dance performers (DP). Mean BSIQ subscale scores of ED and of DP were compared to mean BSIQ subscale scores of GS, using independent groups t-tests (alpha controlled for multiple comparisons), and effect sizes. Effect sizes and t-test results (* $p < .05$) are presented below.

	AE	FE	AG	HFE	HFI	SD	HD	NA	II
ED	-1.19*	0.39	-0.23	-0.63	-0.06	0.35	0.08	0.94*	0.55
DP	0.99*	-0.64	-0.10	1.88*	0.90*	0.03	-0.08	-0.51	2.33*

note: AE = Appearance Evaluation; FE = Fatness Evaluation; AG = Attention to Grooming; HFE = Health/Fitness Evaluation; HFI = Health/Fitness Influence; SD = Social Dependence; HD = Height Dissatisfaction; NA = Negative Affect; II = Investment in Ideals

From previous research, ED were expected to report more negative evaluation of their bodies, and higher dissatisfaction, and DP were expected to report more positive evaluation of their bodies, and higher satisfaction, when compared to GS. ED mean scores indicated they evaluated their overall appearance, health/fitness level, and fatness more negatively, and expressed more negative affect about their bodies, compared to GS. DP evaluated their overall appearance, fatness, and health/fitness more positively than GS, and expressed less negative affect about their bodies, which agreed with other, limited research in this area. This pattern of responses provided known groups evidence which supported the construct validity of the questionnaire. No previous research exists for the constructs underlying the HD, HFI,

43

OBESITY MODIFIES PERCEPTIONS OF BARRIERS AND BENEFITS OF EXERCISE

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The purpose of this study was to evaluate the influence of obesity on the perceptions of barriers and benefits to participation in exercise. The 43-item Exercise Benefits/Barriers Scale (Sechrist et al., 1987) was completed by 327 obese adults (body fat %: ≥35% for women; ≥30% for men) and 327 non-obese subjects randomly matched for gender and age. The results indicated that obese subjects perceived more barriers to exercise ($p=0.0001$) and fewer benefits ($p=0.047$). Of the 13 barrier items, obese subjects reported higher scores for perceptions of tiredness, fatigue, too much time to exercise, embarrassment, inconvenience, lack of support, and lack of places to exercise ($p<0.05$). Of the 29 benefits items, obese subjects reported lower scores for enjoyment; and the influence of exercise on stress reduction, work quality, well-being, and longevity ($p<0.05$). Multiple regression, using body fat as the independent variable, indicated that the results were not related to gender ($p=0.29$) and age ($p=0.43$); but were associated with smoking ($p=0.002$, $R^2=0.01$), socioeconomic status ($p=0.03$, $R^2=0.02$), and race ($p=0.02$, $R^2=0.01$). The profile of a moderate-to-high SES, Caucasian, non-smoker had higher benefits and lower barrier scores compared to a lower SES, non-Caucasian, smoker. The greater significance of the barrier scores compared to the benefits scores suggest that efforts to improve exercise participation of obese adults should focus on minority races by reducing the perceptions of barriers, rather than on extolling the benefits of exercise. Most notably by a providing convenient, less threatening environment, with more effort to involve the spouse.

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EFFECTS OF A FIVE WEEK RUNNING PROGRAM ON THE EMOTIONAL SELF-CONTROL OF ELEMENTARY SCHOOL CHILDREN

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One class of third-graders (n = 26) participated in a running treatment program for five weeks in lieu of a regular physical education class, while another class of third-graders (n = 25) served as controls. Physical fitness was assessed at pre-test and post-test as times in an 800 meter run. Analysis of variance results indicated that the treatment program resulted in decreased emotional self-control, measured using modified versions of the "Aggression" and "Benign Control" scales of the Emotional Control Questionnaire-II (ECQ2) (Roger & Najarian, 1989). Physical fitness did not change significantly for either group. Though contrary to the hypothesis, the results are interpreted as possible support for the original idea that increased fitness corresponds with increased emotional self-control by decreasing fatigue. Suggestions for future research to examine the relationships among fitness, fatigue, and self-control are offered.

45

ULTRASONOGRAPHY FOR DETECTION OF DAMAGE IN DELAYED ONSET MUSCLE SORENESS

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The purpose of this study was to evaluate the effectiveness of noninvasive high resolution ultrasonography in the detection of lucid muscle damage in delayed onset muscle soreness (DOMS). Twelve subjects (eight male and four females) performed 20 sets of one-legged calf raises at 90 percent of their 10 RM to the pecipitate of DOMS. Subjects ranged from sedentary to highly fit individuals (22.3±3.4 yrs). Relative degrees of soreness, based on a scale of 0-6, and bilateral ultrasonography images, obtained from the belly of the gastrocnemius muscle, were assessed immediately before (IB), immediately post (0P), 36 hours post (36P), and 72 hours post (72P) exercise. Additionally, subjects were asked to contract the exercised muscle, then to report degree soreness. Mean (± SD) soreness scores were: 0 (±0) IB, 0.4 (±.5) IA, 3.7 (±1.2) 36P, 2.2 (±2.1) 72P. Responses indicated moderate soreness levels, at 36 and 72 hours post, between 2 (light continuous feeling) and 4 (annoying pain). Only 2 subjects registered scores of 6 (unbearable soreness) and in these two instances the appearance of injury was present as a sonolucent or hypoechoic zone within the exercised muscle. This is typically representative of a hematoma in the muscle. In all other instances there were no observable differences found between the exercised leg and the non-exercised (control) leg. Since lesser degrees of DOMS were not distinguishable, the applications of sonography in the evaluation of muscle damage in DOMS was limited to the detection of severe damage.

46

VELOCITY-SPECIFIC TRAINING EFFECTS, THE IMPORTANCE OF NEURAL ADAPTIONS

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The data supporting the specificity of fast velocity training is equivocal. Some studies show fast fiber hypertrophy and strength gains follow fast training at the training speed and slower speeds, while other studies show strength gains at only the specific training speed. Since fast fiber hypertrophy would be expected to contribute to strength at both the training velocity and slower velocities, improvement at the fast speeds only seems to implicate neural factors as the primary adaption. Therefore to ascertain the importance of neural adaptions to velocity-specific training, the effects of 2 days of practice at a slow (0.52 rad · sec^{-1}) and a fast (4.71 rad · sec^{-1}) velocity on velocity-specific strength gains were examined. It was assumed that 2 days of velocity specific practice was too brief a time to allow for muscular adaptions (fiber hypertrophy), and hence any gains would be neural adaptions only. Eighteen males (19-35 y) volunteered to participate in the study, and were randomly divided into two groups, slow velocity training (0.52 rad · sec^{-1}) and fast velocity training (4.71 rad · sec^{-1}). Knee extension peak torque was determined on three occasions at 0.52, 1.57, 2.62, 3.67 & 4.71 rad · sec^{-1}. Test 1 was given on day 1 and Test 2 on day 4. Following Test 2 subjects performed their respective training protocols on days 7 and 9, and performed Test 3 on day 11. The torque values for Test 1 and Test 2 were not significantly different for either group for all velocities. For Test 3, the fast velocity training group showed a significant ($p<0.05$) increase in torque at their training velocity (4.71 rad · sec^{-1}), but not at any of the slower speeds. The slow velocity training group showed no significant change in torque at any speed. The magnitude of the increase in torque (19.2%) for the fast velocity training group was similar to that reported by other investigators using 6-10 week training protocols. This suggests that improvements in torque production specific to a single training velocity could be attributed primarily to neural adaptions.

UNIFORM TITIN CYTOSKELETAL PROTEIN EXPRESSION IN ELITE OLYMPIC-STYLE WEIGHTLIFTERS

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47

Titin is a large cytoskeletal protein (MW≈3000 kDa) that provides structural support to the skeletal muscle sarcomere, and contributes to passive force characteristics of skeletal muscle. It has been previously reported that some humans appear to express two titin isoforms while some express only one isoform in their skeletal muscle. The purpose of the present study was to study titin isoform characteristics of elite Olympic-style weightlifters who exhibit high levels of muscular strength and power. Muscle biopsies were obtained from the vastus lateralis of male (n=6; $\bar{X}$±SE, age=27.0±2.1 yrs) and female (n=3; 24.3±0.3 yrs) weightlifters (WL), and from recreationally active male control subjects (Con; n=15; 25.4±2.9 yrs). All weightlifters had qualified and participated in national or international level competition, with three athletes winning U.S. national championships, and one athlete medaling at the world championships. Expression of titin isoforms was determined by 3%-6% gradient SDS-PAGE. The resulting protein bands were visualized via silver staining. Titin bands were verified by their migration patterns, and by western blot analysis. Fiber type profiles were determined by mATPase histochemistry, and myosin heavy chain (MHC) isoforms were determined by SDS-PAGE techniques, and have been previously reported. All the weightlifters exhibited only one titin isoform (titin-1). Among the controls, 10 subjects exhibited only one titin isoform (titin-1), while 5 subjects exhibited two isoforms (titin-1 and titin-2). The weightlifters exhibited a significantly ($p<.05$) greater percentage of IIA fibers (WL=50.5±3.2, Con=34.1±3.0) and a lower percentage of IIB fibers (WL=1.7 ±1.4, Con=12.9±2.1). Myosin heavy chain analysis indicated weightlifters had a significantly greater percentage of MHC IIa isoform (WL=65.3±2.4, Con=54.9±2.4), and less MHC IIb (WL=0.9±0.9, Con=12.8±2.4). These results suggest that these elite weightlifters possess only one isoform of titin cytoskeletal protein. If these results are representative of the entire elite weightlifting population, further research is necessary to determine whether such titin isoform expression in weightlifters is simply due to natural selection, or is due to an adaptational process as has been demonstrated for fiber types and myosin heavy chain expression.

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THE EFFECTS OF ACUTE ECCENTRIC AND CONCENTRIC TRAINING ON NEUROMUSCULAR EFFICIENCY

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48

The entire motoneuron pool is not fully activated during eccentric muscle contractions performed by sedentary individuals. We hypothesized that acute eccentric as compared to concentric training would result in greater neural adaptation mediated by improved neuromuscular efficiency. All subjects were tested for isokinetic eccentric (e) and concentric (c) force at 60 deg/s and isometric (i) force on a KinCom dynamometer (Chattecx, Chattanooga, TN) and paired based on the average peak force measured in the three contraction modes. Subjects were then randomly assigned to either an eccentric (n=3) or a concentric (n=3) group. Training consisted of 8 days, 6 sets of 10 repetitions with the respective contraction mode at the same absolute force, according to the concentric subject pair. Vastus lateralis and medialis (VM) surface EMG activity was measured with the Noraxon/ Myosoft (Scottsdale, AZ) telemetric system. Control subjects' (n=6) data from another study showed no change in the dependent measures over the same time period due to testing alone. EMG/force ratio was used as an indicator of muscle efficiency. The Table shows the results for force and VM EMG. Acute eccentric and concentric training increased peak e, i, and c force by ~2% and ~11% but neuromuscular efficiency improved 28% and deteriorated 37%, respectively. This neural adaptation to training may indicate a more efficient muscle and suggests once again the importance of eccentric contractions in training.

Training	Testing	Peak Force, N			Peak VM EMG, μV			EMG/Force Ratio		
		Pre	Post	%Δ	Pre	Post	%Δ	Pre	Post	%Δ
	e	897	951	6	938	822	-12	1.04	.86	-17
Eccentric	i	673	694	-3	842	614	-27	1.25	.88	-29
	c	645	623	3	1144	694	-39	1.77	1.11	-37
	e	1056	1191	13	927	1225	32	0.87	1.03	17
Concentric	i	985	977	-1	974	1167	20	0.98	1.19	20
	c	800	968	21	744	1579	112	0.93	1.63	75

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49

HUMAN SKELETAL MUSCLE MYOSIN HEAVY CHAIN (MHC) mRNA LEVELS BEFORE AND AFTER CONCENTRIC AND ECCENTRIC EXERCISE TRAINING. T. Hortobágyi, J. Hill, D. Zheng, J. Houmard, D. Fraser, and L. Dohm. Biomechanics and Human Performance Laboratories, Department of Biochemistry, East Carolina University, Greenville, NC 27858 and Eastern Carolina Internal Medicine, Pollocksville, NC 28573

Previous animal studies have suggested that the hypertrophic response to exercise is specific to mechanical loading. At last year's meeting we reported that small changes occurred in human myosin light chain and α-actin mRNA levels consequent to exercise training with eccentric and concentric contractions. Because ~60% of the myofibrillar proteins are encoded by MHC mRNAs, the purpose of the present study was to investigate the changes in type I, IIa, and IIx MHC isoforms before and after 12 weeks of concentric (n = 8) and eccentric (n = 7) exercise training. Training involved 4-6 sets of 6-12 repetitions of isokinetic knee extension exercise at 60 deg/s three times per week. As previously reported (*JAP, 80:765, 1996*), there were significant increases in muscle strength and type II muscle fiber size especially after eccentric training. Total RNA was isolated by the guanidium thiocyanate-phenol-chloroform extraction method from biopsy samples of the vastus lateralis that were taken about 24 h after the last contraction. Ribonuclease protection assay (kit II, Ambion, Austin, TX) was performed to determine the changes in type I, IIa, and IIx MHC mRNA isoforms and expressed in relation to glyceraldehyde-3-phosphate dehydrogenase mRNA. Post/pre ratios for each mRNA isoform were compared between the two treatment groups with an unpaired t-test. Expression of type I and IIa MHC mRNA increased 1.5 (±.4 SD) and 1.7 fold (±.4) after concentric training and the same isoforms were downregulated 0.7 (.±2) and 0.7 (±.2) fold after eccentric training (all $p < 0.05$). Type IIx MHC mRNA isoform did not change with either training modality. As in prior animal studies, the present data in humans also suggest that the pretranslational processes of muscle hypertrophy are dependent on the type of mechanical loading.

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50

INSULIN SIGNALING IN HUMAN INSULIN RESISTANCE: MINIMAL MODEL vs. EUGLYCEMIC CLAMP

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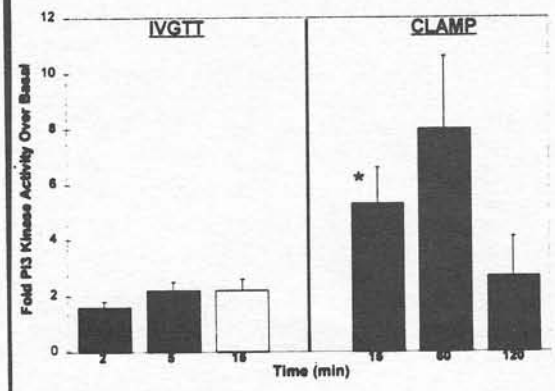
In order to determine the efficacy of assessing proximal steps in the insulin signaling cascade in human skeletal muscle in-vivo, 15 subjects were studied. All participants were apparently healthy, non-obese males with no history of diabetes, and participated in one of two experimental protocols. During the intravenous glucose tolerance test protocol (IVGTT), a bolus of insulin (0.025 $U \cdot kg^{-1}$ body mass) was administered, and insulin stimulated PI3 kinase activity was determined from percutaneous needle biopsies at 2, 5, and 15 minutes post-bolus. In the second group a, 2 h, 100 $mU \cdot m^{-2} \cdot min^{-1}$ euglycemic hyperinsulinemic clamp was performed, and biopsies were obtained at 15, 60 and 120 minutes after beginning insulin infusion. The groups did not differ in age (25.4±1.9 vs. 23.8±1.0 y), percent body fat (14.0±1.5 vs. 13.1±1.4), or fasting insulin (18.5±1.1 vs. 18.9±1.0 $pm \cdot L^{-1}$), IVGTT vs. clamp, respectively. Insulin stimulated PI3 kinase activity above baseline by 1.6±0.2, 2.2±0.3 and 2.2±0.4 fold at 2, 5 and 15 minutes during the IVGTT. During the clamp protocol, PI3 kinase was elevated by 5.3±1.3, 8.0±2.6 and 2.7±1.4 fold above basal at 15, 60 and 120 minutes. Insulin stimulated PI3 kinase activity at 15 minutes post-insulin administration was significantly greater during the clamp protocol vs. the IVGTT ($P<0.05$). These observations suggest that insulin-stimulated PI3 kinase activity is detectable in needle biopsies of human skeletal muscle, and further, that the euglycemic, hyperinsulinemic clamp protocol may be a more useful tool to assess insulin signaling in-vivo.



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51

ACTIVATION OF PHOSPHATIDYLINOSITOL 3-KINASE *IN-VIVO*: RELATION TO INSULIN ACTION, FIBER TYPE, AND BODY FAT.

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Phosphatidylinositol 3-kinase (PI3-kinase) is a cellular intermediate in the insulin signaling cascade. The purpose of this investigation was to examine the activation of PI3-kinase by insulin in human skeletal muscle *in-vivo*, and to study this activation in the context of other physiological variables previously reported to influence insulin action. Eight non-diabetic male subjects volunteered to participate. The mean age, height, weight, & % fat were 23.8±1.0 y, 180±1.1 cm, 80.5±2.3 kg, and 13.1%, respectively. All subjects completed a 2h, 100 $mU \bullet m^{-2} \bullet min^{-1}$ euglycemic, hyperinsulinemic clamp. Percutaneous muscle biopsies were obtained from the vastus lateralis muscle prior to the start of the clamp (PRE), and at 15, 60, and 120 minutes after the start of the insulin infusion. Muscle samples were analyzed for fiber type and for PI3-kinase activity. PI3-kinase was significantly increased over PRE levels at 15 min. (5.3±1.3 fold), and at 60 min. (8.0±2.6 fold), but not at 120 min. (2.7±1.4 fold). Peak activation of PI3-kinase (60 min.) was inversely related to both BMI ($r=-0.62$, $P<0.10$) and % fat ($r=-0.52$, $P<0.10$). PI3-kinase activation was positively related to M-value (glucose disposal rate from clamp) ($r=0.66$, $P<0.10$). Finally, PI3-kinase activation was moderately associated with the % type I fibers ($r=0.50$), and inversely related to the % type IIb fibers ($r=-0.40$). These preliminary observations suggest that the determination of insulin signaling from needle biopsy samples of human skeletal muscle may provide physiologically relevant results concerning the function of the insulin signaling cascade.

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52

EXERCISE INDUCED PLASMA LACTATE RESPONSES, BUT NOT PLASMA VOLUME SHIFTS, DEMONSTRATE CHRONOBIOLOGICAL SENSITIVITY

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Certain physiological variables, both at rest and during exercise, fluctuate throughout the day as a result of chronobiological rhythms. The purpose of the present study was to assess the effects of those rhythms on exercise induced plasma volume shifts and lactate responses. Ten healthy, untrained male subjects (age = 21.1 ± 3.0 yrs, height = 179.1 ± 5.4 cm, mass = 80.2 ± 8.3 kg) participated in the investigation. In a randomized fashion, each subject performed a graded maximal aerobic exercise test on a cycle ergometer at 0800, 1200, 1600, and 2000 h. Venous blood was obtained at rest and immediately following exercise. Whole blood was used to determine hematocrit and hemoglobin values. Those data were then used to assess exercise related plasma volume shifts. Whole blood was then centrifuged and pre- and post-exercise plasma samples were used to measure lactate responses to exercise performed at different times of day. Repeated measures ANOVA was employed to analyze the impact of chronobiological effects on those two exercise related responses. Results indicated that plasma volume shifts were similar ($P=0.94$) at each time point exercise was performed. In contrast, lactate response to maximal exercise at 2000 h (13.1 ± 3.1 mmol) was significantly greater ($P<0.05$) than that observed at 0800 h (10.9 ± 2.4 mmol). These data suggest that metabolic, but not hemodynamic variables, are sensitive to biorhythmic influences.

53

A COMPARISON OF THE ONE, THREE, AND TEN-REPETITION MAXIMUM STRENGTH TESTS

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The purpose of this study was to determine the relationship between the one, three and ten-repetition maximum (RM) tests for upper body strength. Eleven male and 12 female subjects (18-29 years) performed a 1, 3, and 10-RM bench press on three separate days. There were no significant differences ($p < 0.05$) in absolute or relative strength between the 1, 3, and 10-RM (117.6 ± 57.9, 111.1 ± 52.1, and 91.9 ± 41.6 lbs; .77 ± .30, .73 ± .25, and .61 ± .19 lbs/lb BW). A strong correlation was observed in absolute strength between the 1 and 3-RM (r = .98), 1 and 10-RM (r = .98), and 3 and 10-RM (r = .99). The correlation between 1 and 3-RM (r = .97), 1 and 10-RM (r = .96), and 3 and 10-RM (r = .97) for relative strength was also strong but slightly lower than absolute strength. There were no significant differences in absolute or relative strength between the 1, 3, and 10-RM in male subjects (164.5 ± 46.1, 154.5 ± 39.4, and 130.6 ± 32.4 lbs; .99 ± .26, .92 ± .21, and .79 ± .15 lbs/lb BW) or female subjects (74.6 ± 23.7, 71.3 ± 19.9, and 62.9 ± 15.4 lbs; .57 ± .14, .54 ± .12, and .48 ± .08 lbs/lb BW). The strongest correlation for male subjects was seen in absolute strength between the 3 and 10-RM (r = .98); the weakest correlation was in relative strength between 1 and 10-RM (r = .91). In female subjects, correlations in absolute and relative strength between the three tests were lower than the male subjects. The strongest correlation for female subjects was seen in absolute strength between the 1 and 10-RM (r = .95); the weakest correlation was in relative strength between the 1 and 10-RM (r = .87). The results of this study suggest that gender and type of strength measurement (absolute or relative) should be considered when comparing the 3 and 10-RM to the 1-RM

54

CHANGES IN PHYSICAL ACTIVITY OF 3RD THROUGH 9TH GRADERS

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The self-reported leisure activities of a cohort of school children were examined for changes through adolescence. In Spring 1991, 2109 third and fourth graders (50.5% female, 23.7% non-white), reported the three activities they did most often. Each Spring, subjects continued to report their top three activities. 1190 subjects were assessed as 8th and 9th graders Data were collected at public elementary, middle and high schools in 12 counties across North Carolina. The top 10 activities of 3rd and 4th graders were homework, bicycling, watching TV, running, basketball, baseball, reading, playing video games, dancing, and housework. As the subjects aged, walking, softball, talking on the phone, and playing or listening to music were added while housework, dancing and video games dropped out of the top 10. Differences between genders were striking with girls participating in a wider variety of activities (including more lifestyle activities) over the years and tending to select more sedentary activities as they age. The top two activities of 3rd/4th grade girls were homework (37% reporting) and bicycling (28.9%) but by 8th/9th grade the top two activities were walking (25.5%) and talking on the phone (42.8%). Boys reported mostly sports activities with a few sedentary activities becoming more prevalent as they age. For example the top two activities of 3rd and 4th grade boys were baseball (31.6% reporting) and basketball (30.4%) but the top two were basketball (42.8%) and television viewing (22.4%) by 8th/9th grade. These trends in gender activity patterns imply two things: 1) the need for including more lifestyle activities in physical education classes if we are to interest more females in physical activity and 2) the need for community interventions or revised physical education curricula to improve participation in leisure-time physical activities.

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RESISTANCE EXERCISE PREVENTS GLUCOCORTICOID-INDUCED MYOPATHY IN HEART TRANSPLANT RECIPIENTS

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55

Steroid-induced muscle atrophy complicates heart transplantation. The purpose of this study was to determine the effect of resistance exercise training on glucocorticoid-induced muscle atrophy in heart transplant recipients. Fourteen male heart transplant recipients were randomly assigned to a resistance exercise group that trained for 6 months (54±3 yr old; mean±SD) or a control group (51±8 yr old; mean±SD). Fat mass, fat free mass, and total body mass were measured by dual-energy X-ray absorptiometry before and 2 months after transplantation, and after 3 and 6 months of resistance exercise or control period. Knee extension, chest press, and lumbar extensor strength were measured before and after 3 and 6 months of resistance exercise or control period. The exercise regimen consisted of lumbar extension exercise (MedX) performed 1 d/wk and variable resistance exercises (Nautilus) performed 2 d/wk. Each exercise consisted of one set of 10 to 15 repetitions to volitional fatigue. Pretransplantation fat mass, fat free mass, and total body mass did not differ in the two groups. Fat free mass was significantly decreased below baseline at 2 months after transplantation in both the control (-3.4±2.1%) and training groups (-4.3±2.4%). Fat mass was significantly increased at 2 months after transplantation in both the control (+8.3±2.8%) and training groups (+7.3±4.0%). Six months of resistance exercise restored fat free mass to levels 3.9±2.1% greater ($p \leq 0.05$) than before transplantation. Fat free mass of the control group decreased progressively to levels that were 7±4.4% lower than pretransplantation values ($p \leq 0.05$). Both groups increased knee extension, chest press, and lumbar extensor strength but the improvements in the training group were 4 to 6 fold greater ($p \leq 0.05$). Our results demonstrate that glucocorticoid-induced changes in body composition in heart transplant recipients occur early in the post-operative period. However, 6 months of specific resistance exercises restore fat free mass to levels greater than before transplantation and dramatically increase skeletal muscle strength. Our findings suggest that resistance exercise therapy, as part of a strategy to prevent steroid-induced muscle wasting and weakness, is safe and should be initiated early after heart transplantation.

CARDIORESPIRATORY FITNESS ADAPTATIONS IN PARKINSON'S DISEASE PATIENTS: A PILOT TRAINING STUDY

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56

This investigation was undertaken to determine if aerobic exercise training (AET) could improve the cardiorespiratory fitness (CRF) of persons with Parkinson's disease (PD). Eighteen subjects with PD (11 male, 5 female) volunteered to participate in this study and were stratified by disability, then randomized to an AET group (n = 8; age = 62 ± 4 yr; body mass = 70.33 ± 13.81 kg), or a control group (n = 8; age = 61 ± 9 yr; body mass = 77.12 ± 14.00 kg). The AET group trained at a self-selected walk-run intensity 3 times per week (ultimately achieving an exercise duration of 1.0 hr), for 12 weeks. A MANOVA was run between-subjects on the differences between pre and post treatment data. Following AET, significant increases were observed in estimated VO_{2max} (34%), maximal double product (DP_{max}, 44%), and HR_{max} (27%), ($p < 0.001$).

	ΔVO_{2max} (ml/kg/min)	ΔDP_{max} (HR_{max} x SBP_{max})	ΔHR_{max} (BPM)
Treatment group	8.82 ± 4.26*	6893.50 ± 4366.82*	32 ± 13*
Control group	0.57 ± 3.80	1043.50 ± 4114.82	-2 ± 10

*$p < 0.001$; Values are mean ± SD

It is concluded that persons with PD can significantly improve their level of CRF following 12 wk of walk-run exercise for 1.0 hr duration, 3 times per week at a volitional intensity.

57

EFFECTS OF SHORT-TERM EXERCISE ON GLUCOSE TOLERANCE IN YOUNG OBESE MALES

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To study the effects of short term exercise on responses to an oral glucose challenge (OGTT), we measured glucose tolerance and insulin response to a glucose load before and after 10 d of exercise in six sedentary, obese, young men [mean (SE): VO_{2max}, 27.1 (0.9) ml.kg^{-1}.min^{-1}; Mass, 130.0 (5.6) kg; BMI, 41.3 (1.7) kg.m^{-2}; % Fat, 39.6 (1.0) %; WHR, 0.98 (0.01); age, 25.2 (1.2) years]. 75gm OGTTs were performed prior to participation and 24 h after the last exercise session. Exercise bouts were 40 min. in duration and consisted of treadmill walking at 60% VO_{2max}. Three-day dietary recalls were used to evaluate the subjects' diets during the exercise period. Average caloric intake was 2557 kcal (49% CHO; 35% fat; 16% protein). Subjects demonstrated elevated baseline insulin (45.0 ± 6.6 µIU.ml^{-1}). No significant changes in body mass were noted following 10 d of exercise (130.0 ±5.6 kg vs.129.7 ±5.6 kg). No significant changes ($p > 0.05$) in fasting glucose and insulin concentrations were observed following 10 d of exercise training as compared to pre-exercise [Glucose: (96.5 ±3.6 mg.dl^{-1} vs. 93.3 ± 2.6 mg.dl^{-1}), Insulin: (45.0 ± 6.6 µIU.ml^{-1} vs. 38.5 ± 7.6 µIU.ml^{-1})]. There were no significant changes ($p > 0.05$) in glucose concentration during the glucose challenge (30, 60, 90,120) when comparing the pre-exercise OGTT to the post-exercise OGTT. Insulin concentration at 120 min., however, was significantly ($p < 0.05$) lower following the 10 d as compared to pre-participation (142.0±14.1 µIU.ml^{-1} vs. 101.8±11.8 µIU.ml^{-1}). Areas under the glucose and insulin curves were not significantly changed ($p > 0.05$) following 10 d of exercise as compared to pre-exercise [Glucose:(15,960.0 ±511.1 mg.dl^{-1} vs. 15,707.5 ±154.4 mg.dl^{-1}), Insulin:(17,750.0 ±1,289.2 µIU.ml^{-1} vs. 16,245.0 ±785.2 µIU.ml^{-1})]. The area under the insulin curve, however, decreased 8.5% following the 10 d of training as compared to pre-participation. The data suggests that short-term exercise was somewhat effective in reducing the insulin response to glucose. The lack of improvement in plasma glucose to an oral glucose challenge following short-term exercise may be due to the fact that the subjects selected in the present study were not hyperglycemic.

58

RELATIONSHIPS OF IMMUNOREACTIVE GLUCAGON AND HEPATIC NOREPINEPHRINE SPILLOVER TO HEPATIC GLUCOSE PRODUCTION DURING HEAVY EXERCISE

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The relationship between arterial, portal vein (PV), hepatic vein (HV) immunoreactive glucagon (IRG), hepatic norepinephrine spillover and hepatic glucose production (R_a) was studied in 5 normal, 18 hr fasted dogs. Surgery was done >16 days prior to the experiment at which time flow probes were implanted on the PV and the hepatic artery to measure blood flow and catheters were implanted in the carotid artery, PV and HV. Dogs were infused with [3-^{3}H] glucose to assess R_a. At least 48 hr prior to each study a treadmill test was done to determine the work rate that elicited a ~120 bpm increase in heart rate (85% HR max). Each study consisted of a 30 min basal and a 20 min heavy treadmill exercise (HE;5.5±0.63 mph, 18.8±1.8% grade) period. IRG was 51±4, 63±7 and 57±5 pg/ml in the artery, PV and HV, respectively, during the basal period. Arterial IRG increased slightly to 74±11 pg/ml with HE, while PV and HV IRG levels rose to 131±32 and 103±24 pg/ml. There was a marked increase in the arterial to PV IRG gradient with HE that was due mainly to an increase in net extrahepatic splanchnic IRG release of 3.5fold, but to a lesser extent to a fall in hepatic plasma flow of 28%. HE increased hepatic norepinephrine spillover by ~3fold. R_a was more closely correlated to PV IRG (r=0.95), than hepatic norepinephrine spillover (r=0.68). In summary, arterial IRG greatly underestimates the IRG in the blood perfusing the liver due to an ~3.5fold increase in the arterial to PV IRG gradient. The increase in PV IRG is more closely associated with R_a, than hepatic norepinephrine spillover. These data support the hypothesis that IRG is the primary determinant of R_a during HE.

59

EFFECT OF A SINGLE BOUT OF EXERCISE ON THE SUSCEPTIBILITY OF LOW DENSITY LIPOPROTEIN TO IN VITRO OXIDATION

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The cardiovascular benefits of aerobic exercise are well documented. Paradoxically, exercise increases oxygen utilization and is accompanied by increased oxygen free radical formation. This may be of concern due to evidence which suggests that oxidation of low density lipoprotein (LDL) is a key step in generation of a pro-atherogenic lipoprotein. To address this apparent paradox we measured the susceptibility of LDL to *in vitro* oxidation using a 5 μM copper system. LDL was isolated from 25 fasting, healthy volunteers, immediately before and after an acute bout of exercise. The exercise bout was performed on a treadmill at 70% VO_2 peak for 30 minutes. Subject characteristics included (mean ± standard deviation): age = 26.6 ± 2 years, BMI = 22.7 ± 3.5 kg/m^2, VO_2 peak = 49.3 ± 13.5 ml/kg/min, total plasma cholesterol = 162 ± 36.6 mg/dl, LDL cholesterol = 81.9 ± 34.6 mg/dl. Results: There was no difference in the oxidizability of LDL isolated from a subject before the exercise bout compared to after the exercise bout (lag time = 96.3 ± 39 Vs. 93.4 ± 39 minutes, $p < 0.79$). These results may suggest that exercise of this duration and intensity is not sufficient to seed LDL with lipid peroxide and/or the body adequately provides anti-oxidant protection to LDL in response to an acute oxidative stress of this nature.

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60

EFFECT OF A SESSION OF LONG-DURATION EXERCISE ON LIPOPROTEIN(a)

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An elevated plasma concentration of lipoprotein(a) **[Lp(a)]**, a lipoprotein in the upper density range of low-density lipoprotein, is related to an increased risk for coronary artery disease. For the most part, cross-sectional studies, studies involving a single session of exercise, and exercise-training studies have failed to show a relationship between exercise and Lp(a) concentrations. However, some studies employing exercise of longer duration have suggested that Lp(a) concentrations may increase following such exercise, possibly as an acute phase response to muscle damage. The purpose of this study was to examine the effect of a prolonged treadmill exercise session on Lp(a) concentrations. Eleven young, physically active men (age: 26.7±6.1; $\dot{V}O_{2max}$: 56.3±6.6 mL·kg^{-1}·min^{-1}, mean±SD) ran at 70% $\dot{V}O_{2max}$ for a duration eliciting 1500 kcal of energy expenditure (112±12 min, mean±SD). Fasted blood samples were obtained immediately before (**0-pre**), immediately after (**0-post**), 1 day after (**1-post**), and 2 days after (**2-post**) exercise. After correction for estimated plasma volume change, Wilcoxon Signed-Rank analyses revealed no significant differences in Lp(a) concentrations following exercise compared with 0-pre ($p>0.05$).

Lp(a) (mg·dL^{-1})

	0-pre	0-post	1-post	2-post
Median:	5.2	4.2	2.7	4.3
Mean±SD:	6.7±6.4	4.5±3.7	4.3±3.6	6.4±5.5

These results demonstrate that level treadmill exercise at 70% $\dot{V}O_{2max}$ for approximately 2 hours does not elicit an increase in Lp(a) concentrations in young, physically active men.

61

RELATIONSHIP BETWEEN FOOT STRUCTURE AND KNEE JOINT LAXITY IN MATCHED SUBJECTS WITH AND WITHOUT ANTERIOR CRUCIATE RECONSTRUCTED KNEES

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It has been suggested that there may be a relationship between poor biomechanical forefoo structure and knee injuries, particularly of the anterior cruciate ligament (ACL). Although severa studies have reported a positive correlation between subtalar joint structure and knee joint laxity to date, no study has reported the relationship between forefoot structure and knee joint laxity i subjects with ACL-reconstructive surgery. The purpose of this study was to determine th relationship between foot structure and knee joint laxity in subjects with and without ACL reconstructive surgery. 30 subjects (17 females and 13 males, 28 ± 8 yr of age) in an ACL-injure group and 30 age and gender-matched subjects in a control group were measured for static forefoo and rearfoot range of motion using a goniometer according to the procedure by Root et al. (1977 and knee-joint laxity using a KT-1000 Knee Ligament Arthrometer®. Results from paired t-test indicated a significant difference in left-right side knee laxity between the two groups ($p \leq .05$ Multiple regression analysis indicated foot structure measurements were not predictive of increase knee-joint laxity ($p \leq .05$). Forefoot and rearfoot measures were not different between the tw groups($p > .05$). We conclude that static forefoot and rearfoot measures are not positively correlate to knee-joint laxity in subjects with ACL-reconstructed knees and there is a significant differenc postsurgery between ACL-injured surgical and nonsurgical knees.

62

INCIDENCE OF INJURY IN MALE AND FEMALE COLLEGIATE ATHLETES

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The purpose of this study was to evaluate the incidence of injury in male and female NCAA Division I athletes. Injury percentage and injury rate were determined for five, male teams and six, female teams. Soccer accounted for the highest percent of injuries in both male (39.7%) and female (36.4%) athletes followed by basketball (27.0% and 31.2%, respectively). Baseball had a higher injury percentage (26.2%) than softball (18.2%) and volleyball (13.0%). Tennis and cross country had the lowest injury percentage for both male and female athletes (< 4.0%). Basketball had the highest injury rate with 1.7 and 1.6 injuries per player for males and females, respectively, followed by soccer at 1.2 injuries per male soccer player and 1.3 injuries per female soccer player. Baseball and softball players had a similar injury rate (0.8) while volleyball players were slightly lower at 0.5 injuries per player. Tennis and cross country had the lowest injury rates for both male and female athletes (<0.3). Freshman and sophomore athletes accounted for the highest percentage of injuries (62.7% for male athletes; 72.7% for female athletes). The most prevalent type of injury was a sprain representing 32.5% and 27.3% of the injuries in male and female athletes, respectively. The most frequently injured areas of the body were ankles and knees accounting for 26.2% and 32.5% of the total number of injuries in male and female athletes, respectively. Male athletes had a higher injury percentage (62.1%) in comparison to the female athletes (37.9%). However, the injury rate for these athletes was similar at 0.89 for the male athletes and 0.86 for the female athletes. The injury rate seems to provide more qualitative information for athletic trainers. Results from this study may be useful in planning prevention programs for male and female collegiate athletes.

THE EFFECT OF ANKLE POSTURE ON SIT-AND-REACH TEST PERFORMANCE IN CHILDREN

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63

The sit-and-reach (SR) test provides an indication of hamstring length/flexibility and is an easy field test to administer. Performance of this test requires that the participant place the soles of either both feet or one foot, with shoes removed, against the testing box with the ankle joint(s) fixed in dorsiflexion. Recent studies have exhibited greater flexibility in test performance when adults were permitted to plantar flex their ankles. The purpose of this investigation was to study the effect of ankle posture on SR performance of male and female grade-school-aged students. One-hundred fifty-five school children (80 females and 75 males, mean ages 11.2 and 11.3, respectively) performed the SR in fixed dorsiflexion (FDF) and in passive plantar flexion (PPF), in alternating order. Participants performed three trials of each position. Interclass correlation coefficients (ICCs) between trials for each test ranged from 0.95 to 0.97. The r's between the second and third test administrations were 0.97. A 2 x 3 x 2 ANOVA with repeated measures on the trials variable was used. Results indicated a significant trials effect (F = 12.62, p = 0.0005). There was a significant difference between PPF and FDF mean scores (based on trials 2 and 3) (F = 7.06, p = 0.0088). Female students did significantly better than male students for both the FDF test (30.53 vs. 22.80 cm, t = 6.92, p = 0.0001) and the PPF test (32.69 vs. 26.56 cm, t = 5.91, p = 0.0001). These results support the claim that SR test performance is significantly better when the ankles are allowed to assume a passive plantar-flexed position as opposed to being fixed in dorsiflexion.

64

ENERGY EXPENDITURE COMPARISON: FASTRAK2 SKI SIMULATOR VERSUS TREADMILL WALKING

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The addition of arm resistance for the purpose of increasing energy expenditure is a common claim of many home equipment manufacturers. The purpose of this investigation was to examine the differences in energy expenditure (VO_2) and respiratory exchange ratio (RER) at a fixed heart rate between simulated skiing on a Fastrac 2® (FT) and treadmill walking (TM). Fifteen (9 male and 6 female) subjects participated in two exercise trials consisting of 8 minute bouts on FT and TM. All exercise trials were randomized with 5 minute rest intervals between bouts and an average of 8 days between trials. VO_2 and RER were determined using a Medgraphics® metabolic cart via open spirometry techniques.

Activity	*N*	VO_2 ($ml \cdot kg^{-1} \cdot min^{-1}$)	RER	Heart rate
FT	15	16.67± 3.6	.88± .05	128.7± 5.6
TM	15	18.86± 4.6	.87± .06	128.6± 4.8

Findings indicate higher VO_2 ($p<.05$) for TM compared to FT. RER and HR, however, were not different between exercise modes. These findings suggest that TM is a more metabolically taxing activity than FT even though the FT contained upper arm resistance. These data suggest that to obtain equivalent VO_2, an increase in heart rate may be necessary for FT.

65

THE METABOLIC COST OF CHAIR DANCING EXERCISE FOR INDIVIDUALS WITH MULTIPLE SCLEROSIS.

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The purpose of this study was to evaluate the metabolic cost of chair dancing exercise. Eight healthy (HI) and eight individuals with multiple sclerosis (MS) volunteered for the study. Each group, HI and MS consisted of four females and four males, mean age (HI) 37.4 ± 16.1 years, (MS) 44.4 ± 6.2 years, wt. (HI) 74.5 ± 12.3 kg., (MS) 69.7 ± 15.4 kg., and ht. (HI) 168 ± 6.8 cm., (MS) 171 ± 7.7 cm. A video tape display of the chair dance routine was provided for all familiarization and intervention trials. Open circuit spirometry and telemetry heart rate were employed during seven minutes of upper extremity steady state exercise. The following data were obtained:

	VO2 (ml/kg/min)	Ve (L/min)	HR (BPM)	RER
HI	7.6 ± 1.2	19.6 ± 4.9	88 ± 14	.87 ± .08
MS	6.8 ± 1.5	17.0 ± 7.6	89 ± 22	.90 ± .08

Chair dancing elicits a comparable metabolic requirement of approximately 2.0 METS for both HI and MS groups. This low energy cost may provide sufficient stimulus for MS patients to reduce symptoms of fatigue and muscle weakness without large elevations in core temperature. Weight supported upper body exercise should be considered a viable training mode for MS patients.

EFFECTS OF 16 WEEKS OF BRISK WALKING ON LIPID PROFILE AND BODY COMPOSITION IN POSTMENOPAUSAL WOMEN

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66

The purpose of this study was to examine the effects of a 16-wk brisk walking program on lipid profile and body composition in postmenopausal women (non-users of hormone replacement therapy). Twenty sedentary women volunteered to exercise (EXER) or remain sedentary (CON). Ten EXER completed 16-wks of supervised brisk walking (60% Heart Rate max) 3 times/wk for 50 minutes. Two-way ANOVA revealed increased maximal exercise time, VO_2, ventilation, and decreased resting HR in the EXER compared to the CON ($p < 0.05$). The following significant ($p < 0.05$) differences were observed between the groups for Total Cholesterol (T-CHL), high and low density lipoproteins (MEAN + SD mg/dl):

	EXER-PRE	CON-PRE	EXER-POST	CON-POST
T-CHL	230.0±57.6	205.0±48.1	215.1±48.8	221.4±60.0
HDL	64.4±14.0	71.0±22.3	61.8±14.0	55.1±11.0
LDL	137.7±41.6	105.8±44.6	125.6±44.6	134.9±52.6

There were no differences in VLDL and T-CHL/HDL. There was a significant decrease in hip girth, lean wt and fat wt, and body fat % in the EXER compared to CON ($p < 0.05$). There were no differences in hip-to-waist ratio between the groups. There were no group differences in energy, protein, fat, carbohydrates and alcohol intake. In conclusion, based on the findings of this study 16-wks of brisk walking improved lipid profile, body composition and oxygen uptake in sedentary postmenopausal women who are nonusers of hormone replacement therapy.

EFFECTS OF MOTIVATION ON AEROBIC EXERCISE IN OLDER ADULTS

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67

The purpose of this study was to evaluate aerobic treadmill exercise participation with no motivation (NM), video tape viewing (VTV), and interactive game feedback (IGF) in older adults. Rating of perceived exertion (RPE), ranking of the different exercise conditions, and exercise time in the heart rate training zone (HRTZ) were evaluated. Forty-one older subjects (mean age = 68.5 yr) were compared with 14 middle aged (mean age = 51.2), and 5 younger (mean age = 28.4 yr) adults. The results showed that the exercise time of the older adults was 39.2, 42.2, and 41.7 minutes for NM, VTV, and IGF exercises, respectively. Although the tota exercise time for the older subjects was not different for the three conditions, they were within the HRTZ longer ($p<.05$) during IGF. The older adults ranked exercising with VTV as most desirable and NM as least desirable. In fact, exercising with NM received the lowest RPE and was significantly lower than the other two conditions for this age group. The older subjects exercised longer than the middle-aged and younger subjects but their exercise intensity was lower under the three conditions. Middle-aged adults exercised longer while VTV than with NM or IGF. Total exercise time was longest with NM and shortest for IGF for the younger subjects. Middle-aged and younger adults had shorter exercise times for IGF than for NM or VTV. The middle-aged group was within their HRTZ the shortest time for the VTV while the shortest time for the younger adults was with NM. Similar to the older adults, the younger adults had the longest exercise time in the HRTZ during IGF exercise. These results suggested that older adults are motivated differently from middle-aged and younger adults during aerobic exercise participation. The length of exercise time for older adults is not affected by VTV, NM, or IGF but their exercise intensity increased when playing interactive games.

Study supported by Department of Veteran Affairs, Grant #E721-RA

68

LOWER EXTREMITY STRENGTH TRAINING AND MOBILITY IN OLDER ADULTS

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This study was designed to evaluate the effects of a 4-month strength training (ST) program on mobility in older adults. The strength training exercises were calf raises, leg curls, and leg extension. The effects of both absolute strength and strength relative to body weight on mobility were evaluated. Forty-three subjects (mean age = 72.0 yr) were evaluated for time required to get out of a chair and walk 10 feet (chair), to get off the floor (floor), to walk 50 feet (walk), to walk up a flight (upstairs), and down a flight of stairs (downstairs), before and after the ST program. The importance of the different muscle groups for the mobility tasks was evaluated with a stepwise regression procedure. Significant improvements were obtained for both absolute and relative strength for all the strength variables following training and for chair and floor mobility tasks. The results showed that leg curls was a significant absolute strength variable for floor, walk, and upstairs before training. Following training for absolute strength, leg extension was a significant variable for walk, upstairs, and downstairs; calf was a significant variable for floor; and leg curls was a significant variable for chair. Prior to training for relative strength, leg curls was a significant strength variable for floor and walk. Following training for relative strength, leg extension was a significant variable for floor, walk, and downstairs, and leg curl was a significant variable for chair and upstairs. Not more than one significant variable was found for any of the mobility tasks on the pre- or post-training assessments for either absolute or relative strength. There were no significant pre-training variables for absolute strength with chair and downstairs, and for relative strength with chair. The R was used to determine the contribution of strength to mobility tasks. The R ranged from 0.3 to 0.4 for pre-test comparisons and from 0.31 to 0.48 for post-test comparisons. These results showed that in relatively fit older adults, factors other than strength greatly affected mobility.

Study supported by Department of Veteran Affairs Grant E721-RA

69

EFFECT OF GENDER ON RATINGS OF PERCEIVED EXERTION

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The purpose of this study was to determine if the Borg rating of perceived exertion scale relates equally to men and women at given percentages of maximal VO_2 during exercise testing. Our hypothesis is that men will give lower ratings of perceived exertion than women during submaximal and maximal exercise. Subjects consisted of 6 men and 6 women between the ages of 30 and 60. Participants in this study underwent a maximal exercise test using a ramping treadmill protocol. The Borg scale of perceived exertion was used to test work perception in both men and women. Maximal VO_2 measurements were determined for each individual using a Sensor Medics (Yorba Linda, CA) Metabolic Measurement System. Percentages of the maximal VO_2 were determined at 25%, 50%, 75%, and 100%. For both men and women, the mean rating of perceived exertion was plotted as a function of percentage of VO_2 max. The means were compared between groups for each of the percentages of VO_2 max. The mean rating of perceived exertion values were 7.3, 12.0, 14.0, and 18.0 for men and 7.1, 10.5, 13.1, and 17.0 for women at 25%, 50%, 75%, and 100%, respectively. A student t-test revealed no significant difference ($P > 0.05$) in the values of rating of perceived exertion for men vs. women at 25%, 50%, 75%, or 100% of VO_2 max.
Conclusion: Gender has no significant effect on values given for ratings of perceived exertion during exercise testing.

70

AN EVALUATION OF THE MICRO MEDICAL MICROSPIROMETER

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In many labs, pulmonary spirometry is a regular part of exercise and physical evaluations. Most spirometry equipment is cumbersome to use, especially if one needs to move a spirometer to a subject. In recent years, hand-held spirometers have been developed which add convenience to spirometric measures. Our investigation was conducted to evaluate one of these devices, the Microspirometer (Micro Medical, Ltd.). The evaluation proceeded along two lines. First, a calibrated syringe (Quinton, Inc) was used to assess simple volumetric accuracy (VOL) over a range of one to six liters. Second, the Microspirometer was validated against a standard spirometer (Vitalograph, Inc) via simultaneous measurement of forced vital capacity (FVC) and forced expiratory volume/one second (FEV1) in a group of human subjects. The correlation between the Microspirometer values and syringe values was very high (R=0.99) for VOL; however, the slope was less than 1.0 (0.94). This resulted in a small but significant underestimation of VOL in the physiological range. The tendency toward small but significant underestimations was confirmed for FVC in a group of human subjects as well. The FEV1 validation showed just the opposite tendency, however. The Microspirometer significantly overestimated FEV1 in human subjects, again by a small margin. The following table is a data summary (mean values in liters ±SD).

COMPARISON	VARIABLE	MEAN, Micro	MEAN, Standard	T-VALUE	P	R
Micro vs. Syringe	VOL	3.00±1.64	3.12±1.75	2.71	0.03	0.99
Micro v. Vitalograph	FVC	4.07±0.67	4.20±0.67	2.99	0.02	0.98
Micro v. Vitalograph	FEV1	3.32±0.64	3.18±0.70	3.44	0.01	0.99

Although the data analysis revealed significant differences between the Microspirometer and accepted standards, the actual amount of error was small. If the user can tolerate FVC errors of about 3% and FEV1 errors of about 4%, then the Microspirometer is an acceptable and convenient substitute for a standard spirometer.

71

THE USE OF RATINGS OF PERCEIVED EXERTION FOR SELF-MONITORING SWIMMING INTENSITY

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This study examined the use of Borg's category Ratings of Perceived Exertion (RPE) scale for self-monitoring swimming intensity. Nineteen competent swimmers ages nineteen to fifty-eight participated in six trials. Each trial was separated by a minimum of forty-eight hours. During cycling, perceptual feelings at 60 RPM's and zero resistance were anchored to RPE 7. Perceptual feelings at 60 RPM's and maximal exertion were anchored to RPE 19. After overall perceptual feelings were anchored, subjects were asked, on a separate day, to swim at designated intensities based on their overall perceptual feelings. Mean heart rate response at estimated overall RPE 12 and overall RPE 16 during cycling was compared to mean heart rate response reproduced at overall RPE 12 and RPE 16 during swimming. Also, following arm ergometry anchor trials, mean heart rate response at estimated arm RPE 12 and arm RPE 16 during arm ergometry was compared to mean heart rate at reproduced arm RPE 12 and arm RPE 16 during swimming. A one-way analysis of variance was used with a Schefe' post hoc for heart rate comparisons. Data was considered significant at 0.05. No significant difference in heart rate was found at overall RPE 16 between cycling and swimming. Significant differences were noted in heart rate at overall RPE 12 between cycling and swimming, and at arm RPE 12 and arm RPE 16 between arm ergometry and swimming. These findings suggest that Borg's category Ratings of Perceived Exertion Scale is most useful in exercise prescription for swimmers at higher intensities. In exercise prescription, adjustments from RPE 12 are needed for establishing a lower intensity. Results do however show overall RPE 16 may be very effective in defining an upper boundary for swimming intensity.

72

USE OF RPE IN CARDIAC REHABILITATION PATIENTS

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The purpose of this study was to examine use of the Borg 6-20 RPE scale to prescribe exercise intensity in Phase III cardiac rehabilitation patients. Twelve male and 3 female cardiac rehabilitation patients (67.4 ± 9.7 years) were asked to perform 20 mins of treadmill exercise at an intensity equivalent to a RPE of 14 (@140 bpm and 80% of age-predicted maximum heart rate). Heart rate was monitored by Polar heart rate monitors; no subjects were taking beta-blockers. All subjects had been participating in a supervised cardiac rehabilitation program for at least six months prior to testing and were familiar with treadmill exercise and the heart rate monitors; patients were also utilizing the Borg 6-20 RPE scale to subjectively regulate exercise intensity. Overall, subjects had an exercise heart rate of 123.9 ± 19.5 bpm representing 76.1 ± 10.2% of their age-predicted maximum heart rate. Subjects under the age of 70 had an exercise heart rate (139.0 ± 3.9 bpm) that was significantly higher ($p < 0.05$) than subjects 70 years old and older (113.8 ± 19.3 bpm). Subjects under the age of 70 exercised at a significantly higher percent of their age-predicted maximum heart rate (81.8 ± 2.7%) than subjects 70 years old and older (72.2 ± 11.7%). Cardiac rehabilitation patients under the age of 70 exercised at a heart rate and percent of age-predicted maximum heart rate that corresponded well with an intensity equivalent to 14 on the Borg 6-20 scale. However, use of RPE as an indicator of exercise heart rate and percent of age-predicted maximum heart rate by cardiac rehabilitation patients 70 years old and older may not be an effective instrument in prescribing exercise intensity.

73

DOES GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY AFFECT THE CREATINE KINASE CONCENTRATION IN RESPONSE TO TWO MODES OF EXERCISE? A CASE STUDY.

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Glucose-6-Phosphate-Dehydrogenase (G6PD) is an important enzyme for recycling glutathione which may prevent oxidative stress and damage to cells. The limited literature in this area suggests that vigorous exercise could make G6PD deficient individuals (G6PDD) more susceptible to muscle damage. Therefore, the purpose of this study was to examine the creatine kinase (CK) response as a result of aerobic (A) and weight lifting (WL) exercises in a G6PDD and compare it to the response of normal individuals (N) (n=4). The A consisted of 30 minutes of treadmill running at 75-80% VO_{2max} whereas the WL exercise consisted of seven exercises (70% 1-RM, 3 sets, to volitional exhaustion). The G6PDD had a 50-fold lower G6PD value compared to N (0.124 U/g Hb vs 6.32 U/g Hb). The A did not affect the CK values in either condition (G6PDD: pre=71 IU/L vs post=72 IU/L; Normal: pre=132 IU/L vs post=148 IU/L). The WL exercise did not affect the CK immediately post-exercise in both conditions but by 72 hours post-exercise N demonstrated a 5-fold increase in CK compared to a 2-fold increase in G6PDD (G6PDD=259 IU/L vs Normal=903 IU/L). The attenuated response of CK in G6PDD was observed until 120 hours post-exercise. These results suggest that G6PD deficient individuals show a similar CK response to an aerobic exercise compared to normal individuals but weight lifting exercises appear to result in a blunted CK response.

PERSONNEL QUALIFICATIONS AND PROGRAMMING IN FITNESS/WELLNESS CENTERS

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74

The purpose of the study was to determine the types of exercise programs, types of educational offerings, and the training level of personnel in fitness/wellness centers in the state of Alabama (AL). In addition, the results were compared with those from a similar survey previously conducted in Georgia (GA). A questionnaire was mailed to 430 sites in AL which were identified as possibly having a fitness/wellness program. The sites were divided into five categories: college, hospital, YMCA, private fitness center, or corporate fitness facility. The response rate was 23%. In both AL and GA, cycling, weight training, and the stair master were the most common exercise program activities and nutrition and weight control were the most prevalent educational programs. The ratio of number of employees per site for various degrees and certifications was calculated to determine training level of personnel. The ratio for non degree employees in AL was 4:1, whereas in GA it was 1.7:1. The ratio for employees that had an exercise science degree was 0.7:1 in AL and 1.1:1 in GA. The two highest ratios for non degree certifications in both states was for aerobic instructors and ACSM certification (2.9:1 and 0.9:1 for AL; 2:1 and 1.3:1 for GA respectively). When all types of certifications were considered, AL had a slightly larger number of certified personnel/site than GA (5.0 vs 4.2). For both states, the YMCA's employed the largest number of ACSM certified employees. In conclusion, AL and GA have similar exercise program and educational offerings and although the number of certified employees/site is similar for both states, AL fitness/ wellness centers have more non-degree employees than the GA fitness centers surveyed.

A REVIEW OF THE DEMAND FOR LICENSURE OF CLINICAL EXERCISE PHYSIOLOGISTS WITHIN THE STATE OF GEORGIA

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75

The purpose of this study is to evaluate the demand for licensure of Clinical Exercise Physiologists. A survey instrument was developed and mailed to hospital cardiac rehabilitation/wellness centers within the Georgia Hospital Association, members of the American college of Sports Medicine identifying themselves as "Exercise Physiologists," within the state of Georgia, individuals and/or organizational members of the American Association of Cardiovascular and Pulmonary Rehabilitation, the Association of Hospital Health and Fitness, and Physical Education departments within the University System of Georgia.

A survey was mailed to 258 possible Clinical Exercise Physiologists. One-hundred twenty-nine (50%) of these surveys were completed and returned. Seventy-seven (59%) of these did not currently employ a Clinical Exercise Physiologist. Fifty (39%) were completed with comments and used for tabulation. Two (2%) returned surveys did not meet the requirements of the study.

The data from the completed surveys was recorded with frequencies and percentages computed. The following recommendations were made from the conclusions of the study: (1) the state of Georgia should require licensure for Clinical Exercise Physiologists; (2) The American College of Sports Medicine is highly regarded as the organization to provide accreditation for Clinical Exercise Physiology programs; (3) The American College of Sports Medicine is also highly regarded as the organization to provide the certification for licensure in the state of Georgia; (4) internship/previous job experience is highly regarded for potential licensure; (5) a Bachelor's degree is preferred prior to attainment of licensure. However, a Master's degree is also highly regarded.

In conjunction with Valdosta State University, Valdosta GA

76

MEASUREMENTS OF SKELETAL MUSCLE MAXIMAL OXIDATIVE CAPACITY AND MAXIMAL OXYGEN CONSUMPTION IN SEDENTARY WOMEN

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To determine the feasibility of measuring skeletal muscle maximal oxidative capacity by ^{31}P Magnetic Resonance Spectroscopy (^{31}P MRS) in an obesity-prone population and its relationship with maximal oxygen consumption (VO_2max), ATP production from oxidative phosphorylation (OxPhos), (i.e., oxidative capacity) was determined during a maximal 90-s isometric plantar flexion exercise in moderately obese women before and after diet-induced weight reduction to normal-weight state. Magnetic resonance images and 2-s time resolved ^{31}P MRS were collected on a 4.1 T whole body imager/spectrometer system. Gastrocnemius/soleus muscle volumes and ATP production rates from OxPhos were determined by the methods of Boska (Magn Reson Med, 1994). VO_2max was determined by indirect calorimetry. Preliminary results in 12 women (37±6 years, 81±5 kg, mean±SD) show that maximal effort resulted in a similar volume normalized average force production during the 90-s exercise (0.63±0.14 vs 0.64±0.30 N/ml respectively), and similar end-exercise PC/Pi ratio (1.08±0.42 and 1.13±0.30 respectively, resting PC/Pi ~12). OxPhos correlated with VO_2max in the obese ($r=0.62$) and postobese states ($r= 0.75$); and OxPhos was also highly correlated between the obese and postobese states ($r=0.79$, $P<0.05$ for all), thus indicating low-intra-subject variability. Interestingly, considerable inter-subject variation in OxPhos (>1000%) was found in both obese and post obese states, compared to the small inter-subject variation in VO_2max (<38%). These results indicate that measuring OxPhos by ^{31}P MRS during maximal exercise is: 1) feasible in an obesity-prone population, 2) reproducible, and 3) correlated with VO_2max. They also provide evidence that skeletal muscle oxidative capacity can not be the only factor influencing VO_2max.

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77

EFFECT OF WEIGHT LOSS AND SUBSEQUENT EXERCISE TRAINING ON SERUM LEPTIN LEVELS IN OBESE HUMANS.

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Gastric bypass surgery (GB) induces rapid and profound weight loss in morbidly obese humans, and appears to improves cardiovascular risk status. In order to clarify the long-term metabolic consequences of GB, 6 weight-stable subjects were studied 24-30 months post-GB, and six subjects matched for adiposity served as non-surgery controls (CON). Subjects did not differ in age (40.4±1.4 vs. 41.2±1.1 y), % fat (40.7±1.6 vs. 40.2±2.4), or VO_{2max} (20.5±1.5 vs. 20.1±1.2 $ml \cdot kg^{-1} \cdot min^{-1}$, GB vs. CON, respectively). However, serum leptin levels were significantly lower in GB vs. CON (22.3±2.3 vs. 35.8±1.9 $ng \cdot ml^{-1}$). Fasting plasma insulin (23.0±2.0 vs. 95.3±9.7 pM) and fasting plasma glucose (4.82±0.14 vs. 5.70±0.30 mM) were also significantly lower in GB vs. CON. Minimal model-derived insulin sensitivity (S_I) was significantly higher in GB vs. CON (3.90±0.74 vs. 1.75±0.45 x 10^{-5} min/pM). After 7 consecutive days of exercise, fasting serum leptin decreased 16% in GB (18.8±2.1 $ng \cdot ml^{-1}$, $P<0.05$), but was unchanged in CON (34.1±1.9 $ng \cdot ml^{-1}$). No training-induced changes were observed in fat mass, percent fat, or fasting glucose. Fasting insulin decreased 25% following training in CON (71.7±8.3 pM, $P<0.05$) but remained significantly higher than GB (26.0±3.3 pM). Finally, S_I increased 53% in GB (5.96±1.17, $P<0.05$), but was unchanged in CON (1.98±0.48). These data suggest that weight loss alters both the body fat-leptin and body fat-insulin action relationships in humans through a currently undefined mechanism.

Supported by the North Carolina Institute of Nutrition and NIH AG-10025.

HEAT SENSITIZES SKELETAL MUSCLE AFFERENTS DURING ISCHEMIC EXERCISE IN HUMANS

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The muscle metabo- and mechanoreflexes have been shown to increase muscle sympathetic nerve activity (MSNA) during exercise. Group III and IV afferents, which mediate this response, have been shown to be thermosensitive. The purpose of the present study was to evaluate the effect of muscle temperature on MSNA responses during exercise. Eleven subjects performed ischemic isometric handgrip at 30% of maximal voluntary contraction to fatigue followed by 2 minutes of postexercise muscle ischemia (PEMI) with and without local heating of the forearm. Local heating of the forearm increased forearm muscle temperature from 34.4±.5°C to 38.9±.7°C (p=0.0001). MSNA responses were greater during ischemic handgrip with local heating compared to control (no heating) after the first 30 seconds. MSNA responses at fatigue were greater during local heating. MSNA increased by 20±2 and 6±2 (bursts·30 s^{-1}) for heating and control, respectively (p=0.02). When expressed as a percent change in total activity (sum of the bursts' amplitudes), MSNA increased 758±583% and 340±281% for heating and control, respectively (p=0.0001). However, MSNA was not different during PEMI between trials. Diastolic and mean arterial pressures were augmented during exercise in the heat. Heart rate tended to be greater during exercise with local heating (p=0.07). These results demonstrate that increased muscle temperature elicits augmented MSNA responses during exercise. Therefore, these findings suggest that skeletal muscle afferents are thermosensitive in humans and can play an important role in the regulation of MSNA.

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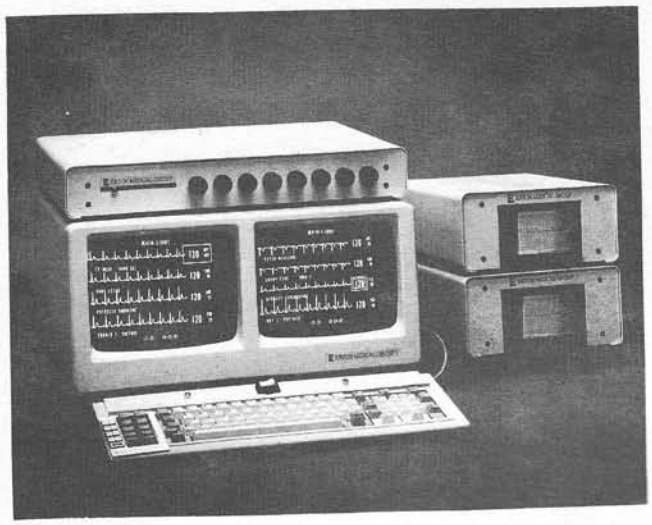

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