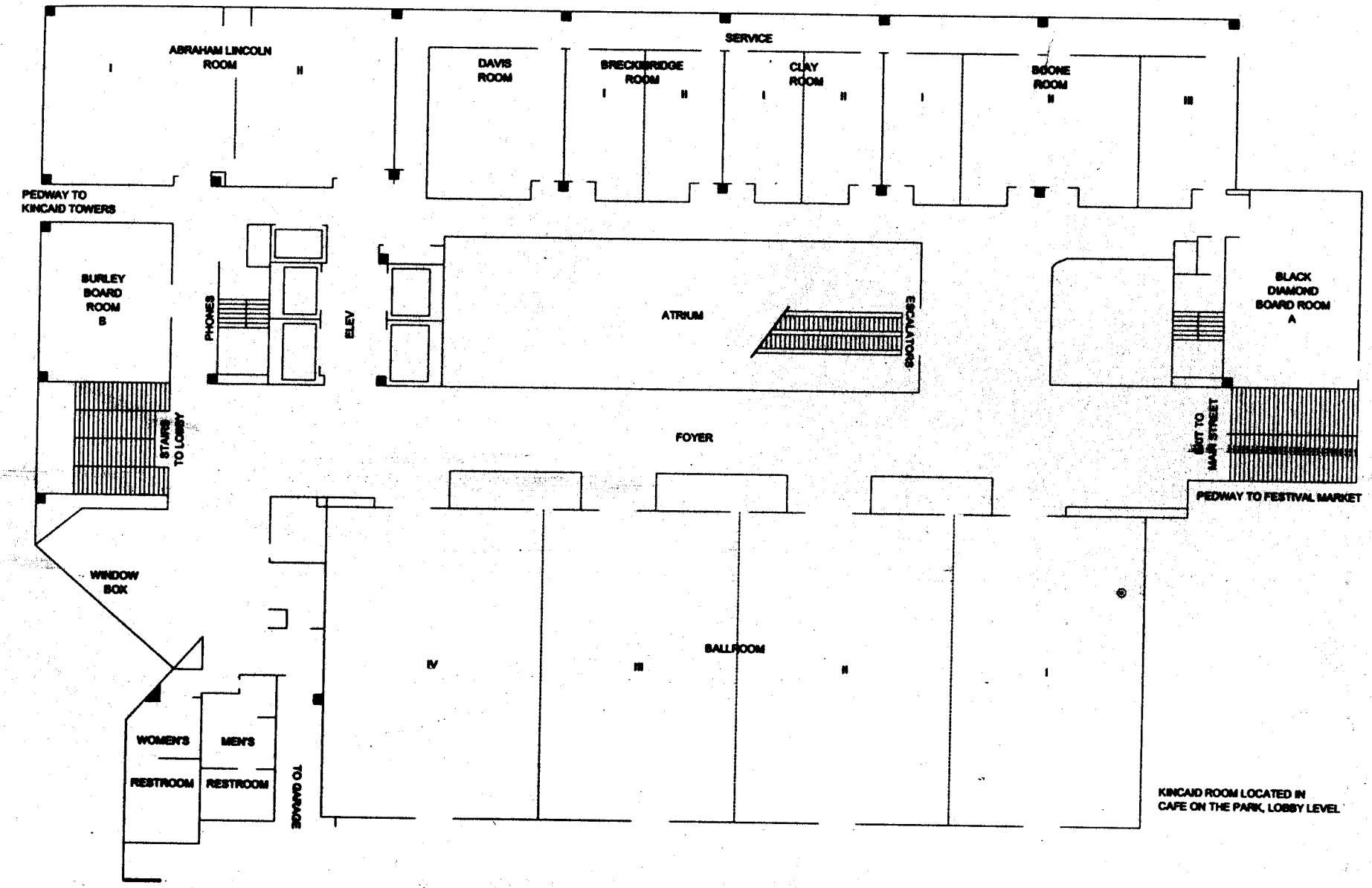
AMERICAN COLLEGE of SPORTS MEDICINE

Southeast Regional Chapter

February 2-4, 1995
23nd Annual Meeting
Radisson Plaza Hotel
Lexington, Kentucky

ABSTRACTS


SERVICE
ABRAHAM LINCOLN ROOM
I
II
DAVIS ROOM
BRECKINRIDGE ROOM
I
II
CLAY ROOM
I
II
I
BOONE ROOM
II
III
PEDWAY TO KINCAID TOWERS
BURLEY BOARD ROOM B
PHONES
ELEV
ATRIUM
ESCALATORS
BLACK DIAMOND BOARD ROOM A
STAIRS TO LOBBY
EXIT TO MAIN STREET
FOYER
PEDWAY TO FESTIVAL MARKET
WINDOW BOX
BALLROOM
IV
III
II
I
WOMEN'S RESTROOM
MEN'S RESTROOM
TO GARAGE
KINCAID ROOM LOCATED IN CAFE ON THE PARK, LOBBY LEVEL

Twenty-Third Annual Meeting

SOUTHEAST REGIONAL CHAPTER AMERICAN COLLEGE OF SPORTS MEDICINE

Radisson Plaza Hotel
Lexington, Kentucky

February 2-4, 1995

Officers

President:
Janet Walberg Rankin, Virginia Tech

Past President:
J. Mark Davis, The University of South Carolina

President-Elect:
J. Larry Durstine, The University of South Carolina

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Carolyn Berry, Winston-Salem State University
Allan Goldfarb, University of North Carolina-Greensboro
David Nieman, Appalachian State University
Beverly Warren, Appalachian State University
Victoria Schnyder, Winston-Salem State University (Student Rep)
Jeff Chandler, Lexington Clinic, (Clinical Consultant)
Edward Howley, University of Tennessee (National ACSM Rep)

Executive Secretary:
Vaughn Christian, Appalachian State University

Meeting Host: Lexington Clinic Sports Medicine Center and University of Kentucky
Jeff Chandler
Robert Shapiro

Publisher and Editor:
Kent Johnson, David Lipscomb University

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

J. Larry Durstine, Program Chair
Jeff Chandler, Co-Host
Robert Shapiro, Co-Host
Jeff Chandler, Clinical Track Chair
Janet Walberg Rankin
J. Mark Davis

Allan Goldfarb
Victoria Schnyder
Vaughn Christian
David Nieman
Carolyn Berry
Beverly Warren

List of Reviewers

Edward Howley
Steve Messier
Patricia E. Mosher
Gay Israel
Victoria Schnyder

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)

ES = Executive Secretary
N = National Representative

S = Student Representative
MD = Physician Representative

CC = Clinical Consultant

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

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AIRCAST

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* *

SUMMARY SCHEDULE FOR THE 1995 SEACSM MEETING

Thursday, February 2

12:00	Foyer	**Registration Begins**
4:00 - 6:00	Foyer	**Posters:** Strength and Fitness
4:00 - 5:00		**Free Communications:**
	Ball Room I	Biomechanical/Motor Control
	Ball Room II	Body Composition
	Ball Room III	Exercise Training I
	Ball Room IV	Nutrition
4:00 - 5:15		**Symposium:**
	Abraham Lincoln	Computerized Strength and Power Testing
5:15 - 6:15		**Tutorials**:
	Ball Room I	Misconceptions Regarding the Role of Exercise in Weight Loss
	Ball Room II	Flexibility/Range of Motion and Low Back Pain
	Ball Room III	The Six Tenets of Health Care Reform: Coverage, Financing, Benefits, Cost Control, Malpractice, Reform, Administration
5:15 - 6:30	Abraham Lincoln	Foot and Ankle Injuries: Basic Anatomy, Injury Mechanisms, and Diagnosis and Treatments
7:45 - 9:00		**Keynote Address: Paul Thompson, M.D.**
	Grand Ball Room	Coronary Artery Complications and Exercise
9:00 - 11:00	Grand Ball Room	**Social**

Friday, February 3

6:45 - 7:45	Kincaid Dinning Area	**Special Interest Group Breakfast**
8:00 - 10:00	Foyer	**Posters:** Cardiovascular
8:00 - 9:00		**Free Communications:**
	Ball Room I	CAD Risk Factors and Exercise
	Ball Room IV	Exercise I
8:00 - 9:00		**Tutorials:**
	Ball Room II	Current Research in Sport Nutrition
	Ball Room III	Important Research Topics Arising from the 1992 International Consensus Conference on Physical Activity, Fitness, and Health
	Abraham Lincoln	Case Studies in Hyperlipidemia
9:15 - 10:15		**SEACSM Special Topic Lecture: Dr. Ronald F. Zernicke**
	Grand Ball Room	The Response of Bone to Exercise and Diet
10:15 - 12:00	Foyer	**Posters:** Motor Control
10:30 - 12:00		**Symposia:**
	Ball Room I	Lipids, Lipoproteins and Exercise
	Ball Room II	Exercise and Childhood Obesity
	Ball Room III	Current Physiological Concepts of Overtraining: Implications for Resistance Exercise
	Ball Room IV	Student Symposium in Biomechanics
	Abraham Lincoln	Evaluation and Management of Running Injuries

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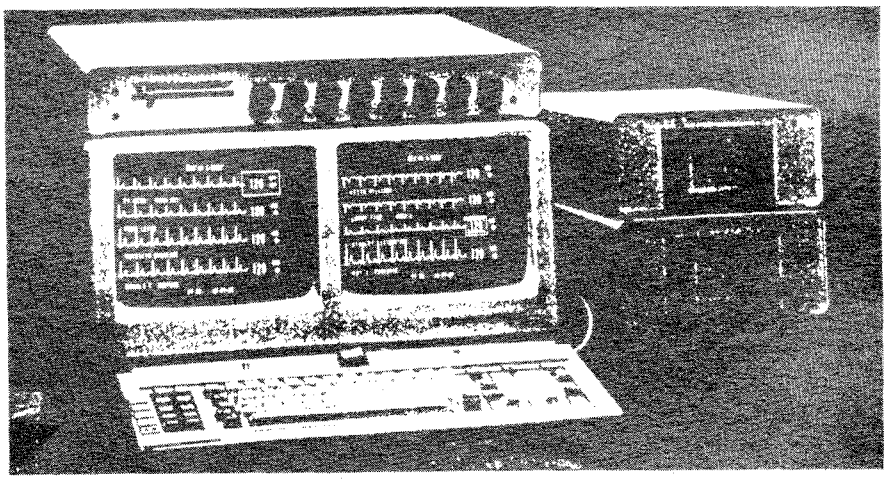

- *Stress Testing*
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- *Treadmill*
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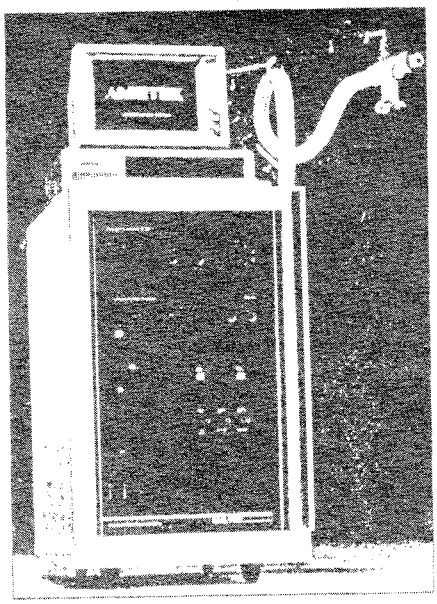
Model OCM-2 Oxygen Uptake System



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This is accomplished by the coupling of precise analytical equipment with a true state-of-the-art data acquisition and analysis software package.

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☐ The S-3A/I OXYGEN ANALYZER
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☐ The CD-3A CARBON DIOXIDE ANALYZER
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☐ K.L.E. TURBINE VOLUME METER
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SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE
23rd ANNUAL MEETING

SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE
23rd ANNUAL MEETING

Thursday, February 2

12:00 - 6:00 **REGISTRATION**
(Foyer)

12:00 - 6:00 Ballot box open for SEACSM elections

12:00 - 2:00 **EXECUTIVE BOARD MEETING**
(Black Diamond)

12:00 - 7:00 **SPEAKER READY ROOM**
(Breckinridge)

2:00 - 6:00 **VISIT EXHIBITS**
(Foyer)

4:00 - 6:00 **POSTER PRESENTATIONS: Strength and Fitness**
Authors present from 5:00 - 6:00
Chair: Lisa Colvin, Valdosta State University - Valdosta.
(Foyer)

1 **Programmatic and personnel changes in fitness and wellness programs across the past decade.** M.A. Collins, S.O. Butler, S. Boyd, P.A. Bishop, H.P. DuVal. Kennesaw State College - Marietta, University of Alabama - Tuscaloosa, University of Georgia - Athens.

2 **Lifestyle behaviors of Alabama public school educators and administrators.** L.H. Anderson, D.D. Pascoe, S.W. Sanders. Auburn University - Auburn.

3 **Effect of education and certification on personal trainers hourly rate and related descriptive data.** C. Fleming, D. Camaione, D. Reibe. The University of Connecticut - Storrs.

4 **Lower body power performance of incumbent female fire fighters.** B.W. Findley, L.E. Brown, R. Gilbert, M. Whitehurst, D.R. Groo, J.A. Ward. Palm Beach Fire-Rescue - West Palm Beach.

5 **Strength training and blood pressure in older females.** B.F. Sharon, K.A. Anderson, L.W. Boyette, L.J. Brandon. VA Medical Center - Decatur, Georgia State University - Atlanta.

Measures of relative strength and power of the knee extensors in sprinters and endurance runners as measured by an isokinetic dynamometer. R. Lindsey, R. Heitman, M. Maneval, D. Diboll. University of Southern Mississippi - Hattiesburg.

The influences of flexibility and muscle strength on gymnastics performance: a preliminary study. J. Carr, L.C. Colvin. Valdosta State University - Valdosta.

Effect of the free-weight squat lift on shear force at the knee. M.H. Rescino. University of Delaware - Newark.

Comparison of various weight training methods for improving muscular strength, power and changing body composition. G.M. Gillam, J.B. Hammett, C.G. Bloomfield. Jacksonville State University - Jacksonville.

Heart rate responses to bench press and situp portions of the YMCA's fitness assessment. M.R. McCammon, D.J. Johnson, N.K. Bruno, R.G.Israel. East Carolina University - Greenville.

4:00 - 5:00 **FREE COMMUNICATIONS: Biomechanics/Motor Control**
Chair: Jean Burke, University of South Carolina - Columbia.
(Ball Room I)

11 (4:00 - 4:15) **Neuromuscular and morphological responses to exercise with muscle lengthening.** T. Hortobágyi, J. Tracy, N. Lambert, J. Houmard, S. Westbrook, R. Dudek, D. Whitehead. East Carolina University - Greenville.

12 (4:15 - 4:30) **Estimation of power output from vertical jump.** C. Dinan, H. O'Bryant, R. Johnson. Appalachian State University - Boone.

13 (4:30 - 4:45) **Ground forces during the tennis serve and selected jumps of competitive junior tennis players.** B.F. Johnson. Georgia State University - Atlanta.

14 (4:45 - 5:00) **Effect of mode of muscle contraction on sympathetic nerve activity.** D.I. Carrasco, C.A. Ray. University of Georgia - Athens.

4:00 - 5:00 **FREE COMMUNICATIONS: Body Composition**
Chair: J.W. Yates, University of Louisville - Louisville.
(Ball Room II)

15 (4:00 - 4:15) **Allometric scaling of maximal aerobic capacity in females.** M.T. Mahar. East Carolina University - Greenville.

(4:15 - 4:30) **Near infrared interactance does not accurately measure body fat in field conditions.** J.T. Lightfoot, D.J. Torok, B.L. Marks. Florida Atlantic University - Davie.

(4:30 - 4:45) **Is degree of fatness related to the number of underwater weighing trials necessary to estimate percent body fat in adult females?** R.G. Israel, C.L. Standard, T. Hortobágyi, K.F. O'Brien, G.L. Tyndall, M.R. McCammon. East Carolina University - Greenville.

(4:45 - 5:00) **Comparisons of muscle morphology measured from MRI and anthropometric variables in older adults.** L.J. Brandon, L. Boyette, B. Sharon, K.A. Anderson. VA Medical Center - Decatur, Georgia State University - Atlanta.

4:00 - 5:00 **FREE COMMUNICATIONS: Exercise Training I**
Chair: Scott K. Powers, University of Florida - Gainesville.
(Ball Room III)

(4:00 - 4:15) **Variation in the aerobic demand of running among trained and untrained subjects.** D. Morgan, D. Bransford, D. Costill, J. Daniels, E. Howley, G. Krahenbuhl. University of North Carolina - Greensboro, Ball State University - Muncie, State University of New York - Cortland, University of Tennessee - Knoxville, Arizona State University - Tempe.

(4:15 - 4:30) **Aerobic training effect in new vs. experienced mall walkers.** T. Waggener, W. Thompson, F. Servedio, R. Smith, R. Kazelskis, A. Waggener. University of Southern Mississippi - Hattiesburg.

(4:30 - 4:45) **Rapid adaptation of delayed onset muscle soreness to daily downhill running.** J.A. Doyle, W.M. Sherman, D.R. Lamb. The Ohio State University - Columbus.

(4:45 - 5:00) **Aerobic power, activity level, and the cardiovascular response during active and passive stress coping.** R. Wood, M. Amaral-Melendez, B.D. Franks, S.L. Harris, V. Bond, Jr. Louisiana State University - Baton Rouge.

4:00 - 5:00 **FREE COMMUNICATIONS: Nutrition**
Chair: Bill Riner, The University of South Carolina - Lancaster.
(Ball Room IV)

(4:00 - 4:15) **Food consumption patterns of African American college students.** J. Rodean. Clark Atlanta University - Atlanta.

24 (4:15 - 4:30) **The effects of L-Carnitine supplementation on maximal cycling performance.** E.A. Dowling, D.R. Redondo. Old Dominion University - Norfolk.

25 (4:30 - 4:45) **Exercise and nutrition counseling on health status in HIV$^+$ patients.** M.P. Kelly, D. Davis. University of New Orleans - New Orleans.

26 (4:45 - 5:00) **Low carbohydrate diet induces changes in central and peripheral beta-endorphin.** J.G. Fatouros, A.H. Goldfarb, A.Z. Jamurtas. University of North Carolina - Greensboro.

4:00 - 5:15 **SYMPOSIUM - CLINICAL TRACK:**

Computerized Strength and Power Testing
L.E. Brown, T.J. Chandler, L. Weiss. South Palm Orthopedics - Boca Raton, Lexington Clinic - Lexington, The University of Memphis - Memphis.

Chair: Kent Johnson, David Lipscomb University - Nashville.
(Abraham Lincoln)

5:15 - 6:15 **TUTORIALS:**

Misconceptions Regarding the Role of Exercise in Weight Loss
David C. Nieman, Appalachian State University - Boone.

Chair: Janet Walberg Rankin, Virginia Tech - Blacksburg.
(Ball Room I)

Flexibility/Range of Motion and Low Back Pain
Wendell Liemohn, The University of Tennessee - Knoxville.

Chair: Johnny McDaniel, Institute of Wellness and Sports Medicine - Hattiesburg.
(Ball Room II)

The Six Tenets of Health Care Reform: Coverage, Financing, Benefits, Cost Control, Malpractice, Reform, Administration
Walter R. Thompson, Georgia State University - Atlanta.

Chair: William Herbert, Virginia Tech - Blacksburg.
(Ball Room III)

5:15 - 6:45 **SYMPOSIUM - CLINICAL TRACK:**

Foot and Ankle Injuries: Basic Anatomy, Injury Mechanisms, and Diagnosis and Treatment
Mary Lloyd Ireland, Robert T. Grant, Richard I. Williams, Kevin Moser, Kirsten Patton, Kentucky Sports Medicine Clinic - Lexington.

Chair: Bill McKenzie, Bowman Gray School of Medicine - Winston-Salem.
(Abraham Lincoln)

6:15 - 7:45 DINNER

7:45 - 9:00 **KEYNOTE ADDRESS**
Introduction: J. Larry Durstine, The University of South Carolina - Columbia.
(Grand Ball Room)

Paul Thompson, M.D.
Director of Preventive Cardiology
University of Pittsburgh Heart Center
Pittsburgh, PA

"***Coronary Artery Complications and Exercise***"

SPONSORED BY GATORADE SPORTS SCIENCE INSTITUTE

BUSINESS MEETING
Janet Walberg Rankin

9:00 - 11:00 **SEACSM SOCIAL**
(Grand Ball Room)

Friday, February 3

NOTE: Remember to vote by 5 pm today!

7:00 - 3:00 **REGISTRATION**
(Foyer)

7:00 - 6:00 **SPEAKER READY ROOM**
(Breckinridge)

7:00 - 5:00 **VISIT EXHIBITS**
(Foyer)

6:45 - 7:45 **SPECIAL INTEREST GROUP BREAKFAST**
Chair: Lee E. Brown, Orthopaedic Surgery Associates - Boca Raton.
Sign-up Sheet is at Registration

8:00 - 10:00 **POSTER PRESENTATIONS: Cardiovascular**
Authors Present 8:30 - 9:15
Chair: Lisa Colvin, Valdosta State - Valdosta.
(Foyer)

27 **Effects of β-blockade on ratings of perceived exertion (RPE) during moderate and high-intensity constant-load exercise.** S.E. Davis, C.J. Womack, A. Weltman, M. Gutgesell, J. Weltman, E. Barrett, G.A. Gaesser. University of Virginia - Charlottesville.

28 **The effects of gender and running medium on perceived exertional (RPE) responses.** R.H. Coker, S.P. Brown, L.F. Chitwood, K.R. Beason, D.R. McLemore. The University of Mississippi - University.

29 **Predicting RPE responses during deep water running.** S.P. Brown, L.F. Chitwood, K.R. Beason, D.R. McLemore. The University of Mississippi - University.

30 **Validation of the aerosport TEEM 100 portable metabolic measurement system.** L. Wideman, N. Stoudemire, K. Pass, C. McGinnis, G.A. Gaesser, A. Weltman. University of Virginia - Charlottesville.

31 **Relationship between smoking, activity level and elderly women's lung capacities.** N. Marsh, L.C. Colvin. Valdosta State University - Valdosta.

32 **Heart rate responses of main streamed and regular elementary physical education students: A preliminary investigation.** L.C. Colvin, L. Owens. Valdosta State University - Valdosta.

33 **Predicting oxygen consumption during deep water running.** L.F. Chitwood, S.P. Brown, K.R. Beason, D.R. McLemore. The University of Mississippi - University.

34 **Continuous heart rate monitoring and cycling time trial performance times.** S. Murr, F. Brannon. Slippery Rock University - Slippery Rock.

35 **Effect of arm exercise in conjunction with leg ergometry on maximal oxygen consumption ($\dot{V}O_{2max}$).** B.R. Abadie, K.R. Landry, J.R. Tollison, B.J. Wax, C. Ways, K.J. Vance, S. Simmons. Mississippi State University - Mississippi State.

36 **Estimation of arm maximal oxygen consumption ($\dot{V}O_{2max}$) with a leg ergometer prediction equation.** C.A. Baldwin, B.R. Abadie, E.J. Gault, S.V. Guynes, C.W. Howerton, W.D. Carter, A.M. Niepel. Mississippi State University - Mississippi State.

8:00 - 9:00 **FREE COMMUNICATIONS: CHD Risk Factors and Exercise**
Chair: Mark Senn, South Carolina Heart Center - Columbia.
(Ball Room I)

37 (8:00 - 8:15) **Effects of dynamic resistance exercise on resting blood pressure: A meta-analytic review of controlled clinical trials.** G.A. Kelley. C. Johnson. Smith University - Charlotte.

38 (8:15 - 8:30) **The relationship of physical fitness to selected risk factors for coronary heart disease in children 8 - 11 yr.** B.J. Warren, R.L. Johnson, R.D. Hatley, T. Reiss, R.A. Frommelt, J.L. Herring, G.G. Haff. Appalachian State University - Boone.

39 (8:30 - 8:45) **Parental history of hypertension does not influence the heart rate or blood pressure response during different cold pressor tests.** D.J. Torok, J.T. Lightfoot. Florida Atlantic University - Davie.

40 (8:45 - 9:00) **Reliability and validation of ergometer caloric algorithms among and between six brands of exercise ergometers.** A.E. Cooper, R.F. Moss. Furman University - Greenville.

8:00 - 9:00 **FREE COMMUNICATIONS: Exercise I**
Chair: Allan Goldfarb, University of North Carolina - Greenville.
(Ball Room IV)

41 (8:00 - 8:15) **Effects of an acute bout of resistance exercise on nocturnal levels of growth hormone.** T.K. Eubank, A.C. Hackney, R.G. McMurray. University of North Carolina - Chapel Hill.

42 (8:15 - 8:30) **Prediction of maximal oxygen uptake in children.** R.G. McMurray, W.K. Guion, M. Whitt, B.E. Ainsworth. University of North Carolina - Chapel Hill.

43 (8:30 - 8:45) **Metabolic and circulatory responses of children to prolonged physical activity.** W.F. Riner, Jr., R.A. Boileau. University of Illinois - Urbana.

(8:45 - 9:00) **The effects of ambient temperature on blood lactate accumulation and clearance rates following maximal anaerobic exercise.** J. Stewart, C. Brawley, H. Popadopoulos, P. Conrady, J. Brandon. Georgia State University - Atlanta.

8:00 - 9:00 **TUTORIALS:**

Current Research in Sport Nutrition
Richard B. Kreider, The University of Memphis - Memphis.

Chair: J. Mark Davis, The University of South Carolina - Columbia.
(Ball Room II)

Important Research Topics Arising from the 1992 International Consensus Conference on Physical Activity, Fitness, and Health
Barbara E. Ainsworth and Carolynn Berry, University of North Carolina - Chapel Hill, Winston-Salem State University - Winston-Salem.

Chair: Russ Pate, The University of South Carolina - Columbia.
(Ball Room III)

CLINICAL TRACK:

Case Studies in Hyperlipidemia
Paul Thompson, University of Pittsburgh - Pittsburgh.

Chair: J. Larry Durstine, The University of South Carolina - Columbia.
(Abraham Lincoln)

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9:00 - 9:15 COFFEE BREAK

9:15 - 10:15 **SEACSM SPECIAL TOPIC LECTURE**
Introduction: Rob Shapiro, University of Kentucky - Lexington.
(Grand Ball Room)

Ronald F. Zernicke, Ph.D.
Department of Surgery
University of Calgary
Calgary, Canada

"***The Response of Bone to Exercise and Diet***"

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10:15 - 10:30 BREAK

10:15 - 12:00 **POSTER PRESENTATIONS: Motor Control**
Authors present 11:00 - 12:00
Chair: Lisa Colvin, Valdosta State University - Valdosta.
(Foyer)

The effects of high heels on posture. S. Westbrook, M-E. Franklin, B. Carpenter, K. Schuffert, T. Hortobágyi. East Carolina University - Greenville.

An alternative method of estimating irregular walking distance. R. Godsen, S. Whitaker, T. Mendez. College of Charleston - Charleston.

Effects of selected kinematic and kinetic variables on instep kicking with dominant and nondominant limbs. W.R. Barfield. College of Charleston - Charleston.

Effect of single versus reciprocal repetitions on acceleration during knee extension on an isokinetic device. D.R. Groo, L.E. Brown, B.W. Findley, M. Whitehurst, R. Gilbert, J.A. Ward. Florida Atlantic University - Boca Raton.

Considerations for the proper selection of diving fins. B.M. Lee. Christopher Newport University - Newport News.

Anthropometric effects on relative strength during knee extension on an isokinetic device. L.E. Brown, B.W. Findley, M. Whitehurst, R. Gilbert, D.R. Groo, J.A. Ward. South Palm Orthopedics - Delray Beach.

Effect of gender on acceleration during knee extension on an isokinetic device. R. Gilbert, L.E. Brown, B.W. Findley, W. Whitehurst, D.R. Groo, J.A. Ward. American Med-Care Center - Palm Springs.

Effect of number of repetitions on acceleration during knee extension on an isokinetic device. J.A. Ward, L.E. Brown, B.W. Findley, M. Whitehurst, R. Gilbert, D.R. Groo. Florida Atlantic University - Boca Raton.

10:30 - 12:00 **SYMPOSIA:**

Lipids, Lipoproteins and Exercise
J. Larry Durstine, Paul Davis, Michael Ferguson, The University of South Carolina - Columbia.

Chair: Tim Lightfoot, Florida Atlantic University - Boca Raton.
(Ball Room I)

Exercise and Childhood Obesity
Mark Loftin and Melinda Sothern, University of New Orleans - New Orleans.

Chair: Dianne Ward, The University of South Carolina - Columbia.
(Ball Room II)

Current Physiological Concepts of Overtraining: Implications for Resistance Exercise
Andrew C. Fry, Richard B. Kreider, Michael Stone, The University of Memphis - Memphis, Appalachian State University - Boone.

Chair: Stephen C. Dodd, University of Florida - Gainesville.
(Ball Room III)

Student Symposium in Biomechanics - A series of nine research communications presented by graduate students in Biomechanics

Chair: Stephen Messier, Wake Forest University - Winston-Salem.
(Ball Room IV)

F.E. Williams, Jr. H.S. O'Bryant, R.A. Frommelt, and B.J. Warren. Appalachian State University.

D. Oeffinger. University of Kentucky.

G. Jameson. University of Kentucky.

S. Westbrook, M.E. Franklin, B. Carpenter, K. Schuffert, and T. Hortobágyi. East Carolina University.

M. Mitchell. Wake Forest University.

T. Brindle. University of Kentucky.

P. Jiang. University of Georgia.

B. Graham. Old Dominion University.

J. Sampson. University of Kentucky.

CLINICAL TRACK:

Evaluation and Management of Running Injuries
David N.M. Caborn, Derren Johnson, David L. Jackson, William Urban, Tony Brosky, John Nyland, University of Kentucky - Lexington.

Chair: George Wortley, Lynchburg Family Residency Practice - Lynchburg.
(Abraham Lincoln)

12:00 - 1:00 LUNCH

WOMEN IN SEACSM LUNCHEON
Chair: Beverly Warren, Appalachian State University - Boone.
(Kincaid Room - First Floor Dinning Area)
Sign-up Sheet is at Registration

1:00 - 2:00 **SEACSM BASIC SCIENCE LECTURE**
Introduction: Scott K. Powers, University of Florida - Gainesville.
(Grand Ball Room)

Bruce Gladden, Ph.D.
Department of Health and Human Performance
Auburn University
Auburn, AL

"***Anaerobic Threshold: Mechanisms***"

SPONSORED BY AIRCAST

2:00 - 4:00 **POSTER PRESENTATIONS: Body Composition and Metabolism**
Authors present from 3:00 - 4:00
Chair: Lisa Colvin, Valdosta State University - Valdosta.
(Foyer)

53 **Eating disorders in female intercollegiate athletes.** C.D. Ashley, J.F. Smith, J.B. Robinson. University of Alabama - Tuscaloosa.

54 **Body composition of professional football athletes.** T. Snow, M. Millard-Stafford, L.B. Rosskopf. Georgia Institute of Technology - Atlanta.

55 **Comparison of bioelectrical impedance analysis (BIA) to dual x-ray absorptiometry (DEXA) measurements in weight trained males.** D. Bullen, K. Harmon, L. Ramsey, P. Grindstaff, M. Miyaji, R. Klesges, R. Kreider, A. Fry, L. Weiss. The University of Memphis - Memphis.

56 **Predicting women's percent body fat: Siri vs. Lohman equations.** B.L. Marks, D. Groo, L. Owens. Florida Atlantic University - Davie.

57 **Effect of a split exercise session on excess postexercise oxygen consumption in young obese women.** M.M. Bronstein, J.F. Smith, M.D. Conerly, J.S. Beaird. The University of Alabama - Tuscaloosa.

58 **Resting cortisol concentration and insulin sensitivity in men and women during training.** G.L. Tyndall, R.W. Kobe, K.F. O'Brien, J.A. Houmard. East Carolina University - Greenville.

59 **The effect of exercise conditioning, diet, and drug therapy on glycosylated hemoglobin levels (HBA1c) in Type 2 diabetics.** S. Khan, J.C. Rupp, P. Davidson. Georgia State University - Atlanta, West Paces Medical Center - Atlanta.

60 **Anabolic effects by Fenoterol in cardiac and skeletal muscle are attenuated with beta-adrenoceptor antagonist.** J.V. Ocel, L.L. Craft, J.H. Williams, C.W. Ward. Virginia Polytechnic Institute and State University - Blacksburg.

61 **The effects of Ca^{2+} antagonism on Clenbuterol induced muscle hypertrophy.** C. Ward, J. Ocel, L. Craft, S. Fauteck, S. Kandarian, J. Williams. Virginia Tech - Blacksburg, Boston University - Boston.

2:00 - 2:15 BREAK

2:15 - 3:45 **SYMPOSIA:**

An Overview of Outcomes in Cardiac Rehabilitation: Causes and Directions
William G. Herbert, Reed H. Humphrey, Shala E. Davis, Paul M. Ribisl, Douglas R. Southard, Virginia Tech - Blacksburg, Medical College of Virginia - Richmond, Wake Forest University - Winston-Salem.

Chair: Ann Swank, University of Louisville - Louisville.
(Ball Room I)

* **Practical Considerations in the Application of Weight Management Programs**
J. Timothy Lightfoot, Faith A. Cape, Bonita L. Marks, Anthony C. Hackney, Florida Atlantic University - Boca Raton, Healthy U, Inc. - Boca Raton, University of North Carolina - Chapel Hill.

Chair: Walt Thompson, Georgia State University - Atlanta.
(Ball Room II)

Nutritional Effects on Central Mechanisms of Fatigue
J. Mark Davis, The University of South Carolina - Columbia.

Chair: Philip D. Watson, The University of South Carolina Medical School - Columbia.
(Ball Room III)

CLINICAL TRACK:

Peak Performance and Injury Risk - Tennis as a Model.
W. Ben Kibler, E. Paul Roetert, T. Jeff Chandler. Lexington Clinic Sports Medicine Center - Lexington, United Stated Tennis Association - Miami.

Chair: David Jackson, University of Kentucky - Lexington.
(Abraham Lincoln)

2:15 - 3:15 **FREE COMMUNICATIONS: Exercise II**
Chair: Gay Israel, East Carolina University - Greenville.
(Ball Room IV)

62 (2:15 - 2:30) **A comparison of the caloric cost of aerobic step dance utilizing hand weights, resistive bands or isometric contractions.** P.E. Mosher, S. Brandon, R. Arnold, R. Belva, R. Smith. University of Tennessee - Chattanooga.

63 (2:30 - 2:45) **Validity of the Conconi Test in predicting lactate threshold on a bicycle windtrainer.** J. Allgeier, J.W. Yates, D. Schmitt, B. Horowitz. University of Louisville - Louisville.

64 (2:45 - 3:00) **Effects of acute stress and serotonergic activity on fatigue during prolonged exercise.** S.P. Bailey, D.H. Overstreet. Medical University of South Carolina - Charleston, Rutgers University - New Brunswick, University North Carolina School of Medicine - Chapel Hill.

65 (3:00 - 3:15) **Comparison of fatigue curves between upper and lower extremity muscle groups performing isokinetic strength testing.** L. Wood, R. Kreider, L. Weiss, A. Fry, P.Grindstaff, D. Bullen, M. Miyaji, L. Ramsey. The University of Memphis - Memphis.

2:15 - 3:15 **FREE COMMUNICATIONS: Biomechanics**
Chair: Robert Shapiro, University of Kentucky - Lexington.
(Daniel Boone)

66 (2:15 - 2:30) **Comparison of Junior and Collegiate female gymnasts performing the handspring front tucked vault.** S.A. Winnier, B.F. Johnson, J.C. Rupp, B.H. Layne. Georgia State University - Atlanta.

67 (2:30 - 2:45) **Feasibility study utilizing an expert system for analysis of the human gait cycle.** G.E. Moore, B.F. Johnson, J.C. Rupp, B.H. Layne. Georgia State University - Atlanta.

(2:45 - 3:00) **The influence of body momentum and racquet velocity on tennis serve ball velocity.** J.T. Johnson, B.F. Johnson, J.A. Doyle, T.C. Oshima. Georgia State University - Atlanta.

3:45 - 4:00 BREAK

4:00 - 5:00 **ACSM PRESIDENTIAL ADDRESS**
Introduction: Janet Walberg Rankin, Virginia Tech
(Grand Ball Room)

Timothy White, Ph.D.
Department of Human Biodynamics
University of California - Berkeley
Berkeley, CA

"***Aging and Muscular Performance***"

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5:00 - 5:15 BREAK

5:15 - 6:45 **CLINICAL TRACK:**

The Female Athlete: Injury Patterns and Insights on Anterior Cruciate Ligament Tears
Mary Lloyd Ireland, Yvonne E. Satterwhite, Scott Crook, Kevin Moser, Kirsten Patton. Kentucky Sports Medicine Clinic - Lexington.

Chair: J.L. Moul, Appalachian State University - Boone.
(Abraham Lincoln)

5:15 - 6:15 **SEACSM STUDENT SYMPOSIUM**

Kathy Read, M.S.
Job Guide - Human Kinetics
Champaign, IL

Introduction: Carolynn Berry, Winston-Salem University - Winston-Salem.
(Grand Ball Room)

"***Searching for a Job in the 21st Century***"

6:15 - 7:15 **GRADUATE SCHOOL FAIR**
Chair: Allan Goldfarb. University of North Carolina - Greensboro.
(Grand Ball Room IV)

8:00 - 10:00 **RECEPTION AT THE UNIVERSITY OF KENTUCKY'S BIODYNAMICS LABORATORY**
Chair: Rob Shapiro, University of Kentucky - Lexington.
Sign-up Sheet at Registration

Saturday, February 4

6:45 - 7:45 **PAST PRESIDENTS BREAKFAST** (Invitation Only)
Chair: J. Mark Davis. The University of South Carolina - Columbia.
(Kincaid Room - First Floor Dinning Area)

7:30 - 9:00 **REGISTRATION**
(Foyer)

7:00 - 11:30 **SPEAKER READY ROOM**
(Breckinridge)

8:00 - 9:00 **FREE COMMUNICATIONS: Strength**
Chair: Mike Stone, Appalachian State University - Boone.
(Ball Room I)

69 (8:00 - 8:15) **Exercise initiation and adherence for strength training and flexibility in older adults.** L.W. Boyette, B.F. Sharon, K.A. Anderson, L.J. Brandon. Atlanta Veterans Affairs Medical Center - Decatur.

70 (8:15 - 8:30) **Morphine alters forearm vascular responses to isometric handgrip in humans.** C.A. Ray, G.A. Hill, E.A. Anderson. University of Iowa - Iowa City, University of Georgia - Athens.

71 (8:30 - 8:45) **Power output of vertical jumps and lifts at the 1991 U.S. National weight lifting championships.** G. Haff, H. O'Bryant, K. Pierce, M. Stone, J, Garhammer, A. Fry. Appalachian State University - Boone, Louisiana State University - Shreveport, Long Beach State University - Long Beach, University of Memphis - Memphis.

72 (8:45 - 9:00) **Plasma proenkephalin peptide F responses to short-term high-intensity resistance exercise overtraining.** L.T. Ramsey, A.C. Fry, W.J. Kraemer, S.J. Fleck, R.S. Staron, J.M. Lynch, A.B. Loucks. University of Memphis - Memphis, Penn State University - State College, Ohio University - Athens, U.S. Olympic Training Center - Colorado Springs.

8:00 - 9:00 **FREE COMMUNICATIONS: Psychological/Social Factors of Exercise**
Chair: Harry DuVal, University of Georgia - Athens.
(Ball Room II)

73 (8:00 - 8:15) **Fitness and Health indicators in volunteer fire fighters of two distinct socioeconomic environments.** K. Gutgsell, A.M. Swank, J.W. Yates, B. Tabler, K. Kleinsteuber. University of Louisville - Louisville.

74 (8:15 - 8:30) **Relationship of psychological profiles of mood, exertion and feeling on isokinetic strength performance.** P. Grindstaff, R. Kreider, L. Weiss, A. Fry, L. Wood, D. Bullen, M. Miyaji, L. Ramsey, M. Walling, Y. Li. The University of Memphis - Memphis.

75 (8:30 - 8:45) **Contrast of cardiac rehabilitation outcomes in men and women with coronary heart disease.** S. Kedersha, P.M. Ribisl, W.J. Rejeski, W.T. Sotile, P.H. Brubaker, H.S. Miller. Wake Forest University - Winston-Salem.

76 (8:45 - 9:00) **Spouse involvement influences entry health status more than patient outcomes in cardiac rehabilitation.** M.A. McCulloch, P.M. Ribisl, S. Kedersha, J.L. Kaiser, W.J. Rejeski, W.T. Sotile, P.H. Brubaker, H.S. Miller, Wake Forest University - Winston-Salem.

8:00 - 9:00 **FREE COMMUNICATIONS: Lipids**
Chair: Patricia E. Mosher. University of Tennessee - Chattanooga.
(Ball Room III)

77 (8:00 - 8:15) **Nutritional status and lipid profiles of trained steroid-using and nonusing athletes.** R.E. Keith, M.H. Stone, R.E. Carson, R.G. Lefavi, S.J. Fleck. Auburn University - Auburn, Appalachian State University - Boone, Armstrong State College - Savannah, U.S. Olympic Committee - Colorado Springs.

78 (8:15 - 8:30) **Relationship between Lp(a) and CHD risk factors in healthy caucasian males with hyperlipoproteinemia.** C.L. Wagner, R.G. Israel, R.H. Marks, R.S. Cayton, M.J. Sullivan. East Carolina University - Greenville.

79 (8:30 - 8:45) **Fluctuations in human plasma lipid and lipoprotein metabolism throughout the normal menstrual cycle.** A.A. Allaithy, R.J. Moffatt, D.M. Quadagno. Florida State University - Tallahassee.

8:00 - 9:00 **FREE COMMUNICATIONS: Exercise Training II**
Chair: Jay Williams, Virginia Tech - Blacksburg
(Daniel Boone)

80 (8:00 - 8:15) **The effects of exercise on six-minute walk distance in older adults with arthritis.** W.K. Guion, C. Hogue, C. Riegger-Krugh, B.E. Ainsworth. Georgia Southern University - Statesboro, University of North Carolina - Chapel Hill.

81 (8:15 - 8:30) **Physical activity and physical fitness in boys and girls from an urban elementary school.** V.M. Alvarez, D.S. Ward, S.G. Trost, H. Williams, J.M. Burke, R.R. Pate. University of South Carolina - Columbia.

82 (8:30 - 8:45) **The effects of exercise cessation or reduced training frequency on body composition and $\dot{V}O_{2max}$.** J.B. Midyette, G.L. Tyndall, J.A. Houmard. East Carolina University - Greenville.

83 (8:45 - 9:00) **Resting lactate and heart rate values in competitive swimmers training at 2800 meters.** M.A. Martino, K. Myers, P.A. Bishop. University of Alabama - Tuscaloosa, Georgia Southwestern College - Americus.

8:00 - 9:10 **SYMPOSIUM:**

Functional Rehabilitation For Sports Related Injuries
Tony Brosky, Karen Benson, Tim Brindle, John Nyland, David Jackson, University of Kentucky - Lexington.

Chair: George Wortley, Lynchburg Family Practice Residency - Lynchburg.
(Abraham Lincoln)

9:00 - 9:15 BREAK

9:15 - 10:15 **SEACSM SCHOLAR LECTURE**
Introduction: Edward Howley, University of Tennessee - Knoxville.
(Grand Ball Room)

Scott K. Powers, Ph.D.
Center for Exercise Science
University of Florida
Gainesville, FL

"*Adventures in Heavy Breathing*"

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10:30 - 11:40 **SYMPOSIUM:**

Skeletal Muscle Fiber Characteristics: Relation to Obesity, Hypertension and Insulin Action in Humans
Matthew S. Hickey, David Bassett, East Carolina University - Greenville, University of Tennessee - Knoxville.

Chair: Robert McMurray, University of North Carolina - Chapel Hill.
(Ball Room I)

10:30 - 11:15 **FREE COMMUNICATIONS: Immunology**
Chair: David Nieman, Appalachian State University - Boone
(Daniel Boone)

(10:30 - 10:45) **Effects of gender on immunological responses to 25 weeks of intercollegiate swim training.** R. Kreider, R. Ratzlaff, E. Bertun, J. Edwards. The University of Memphis - Memphis, Old Dominion University - Norfolk.

*(10:45 - 11:00) **Induction of macrophage beta-interferon mRNA during exercise.** M.L. Kohut, J.M. Davis, D.A. Jackson, D.A. Essig, E.P. Mayer, A. Ghaffar. The University of South Carolina - Columbia.

(11:00 - 11:15) **The effects of high- versus moderate-intensity exercise on the NK cell response in women.** A. Strasner, J.M. Davis, A. Ghaffar, E. Mayer. The University of South Carolina - Columbia.

***Winner of the SEACSM Student Award (Adviser: J. Mark Davis)**

10:30 - 11:45 **CLINICAL TRACK:**

Case Abstracts
Chair: David Richards, Lexington Clinic Sports Medicine Center - Lexington.
(Abraham Lincoln)

(10:30 - 10:40) **Bilateral Distal Biceps Brachii Rupture.** M.L. Ireland. Kentucky Sports Medicine Clinic - Lexington. Discussor: B. Urban.

(10:40 - 10:50) **Calf Pain -- Football.** M.L. Ireland. Kentucky Sports Medicine Clinic - Lexington. Discussor: G. Wortley.

(10:50 - 11:00) **Hamstring Strain With Foot Drop -- Football.** J.A. Brosky, T. Brindle. UK Sports Medicine - Lexington. Discussor: E. Satterwhite.

90 (11:00 - 11:10) **Arm Pain -- Tennis.** R. Dixit. Lexington Clinic Sports Medicine Center - Lexington. Discussor: D.L. Johnson.

91 (11:10 - 11:20) **Upper Trapezius Strain -- Football.** T. Brindle, T. Brosky. University of Kentucky Sports Medicine - Lexington. Discussor: W.B Kibler.

92 (11:20 - 11:30) **Wrist Pain -- Women's Basketball.** J.L. Moul, A.N. Massey, S. Fleming. Appalachian State University - Boone, Boone Orthopedic Associates, PA - Boone. Discussor: B. Livingston.

93 (11:30 - 11:40) **Arm Pain -- Gymnastics.** W.B. Kibler. Lexington Clinic Sports Medicine Center - Lexington. Discussor: D. Jackson.

11:45 - 1:45 **SEACSM LUNCHEON**
Introduction: Paul Ribisl, Wake Forest University - Winston-Salem.
(Grand Ball Room)

SEACSM LUNCHEON SPEAKER

Wayne Sotile, Ph.D.
Wake Forest Cardiac Rehabilitation Program
Wake Forest University
Winston-Salem, NC

"***Controlling Yourself During Uncontrollable Times***"

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2:00 - 4:00 **SEACSM EXECUTIVE BOARD MEETING**
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1

PROGRAMMATIC AND PERSONNEL CHANGES IN FITNESS AND WELLNESS PROGRAMS ACROSS THE PAST DECADE.

M.A. Collins, S.O. Butler, S. Boyd, [1]P.A. Bishop, and [2]H.P. DuVal. Kennesaw State College, Marietta, GA 30061, [1]University of Alabama, Tuscaloosa, AL 35487, [2]University of Georgia, Athens, GA 30602.

The purpose of this study was to determine the programmatic and personnel changes that have occurred in community and corporate fitness and wellness programs across the past decade. A questionnaire was developed and mailed to 203 sites in 1983 and 549 sites in 1994 which were identified as having or possibly having a fitness and/or wellness program. Although numerous sites had the opportunity to participate in both surveys, anonymity makes it uncertain how many of the respondents participated in both. Most sites were either a college, hospital, YMCA or YWCA, private fitness center, or a corporate fitness facility. The response rates were 33% and 31% for 1983 and 1994, respectively. Programmatically, there has been little change with weight training, aerobics, and stationary cycling being the most common activities. Also, educational programs in weight control and nutrition have remained the most popular. There have been some improvements in the area of personnel. In 1983, there were 16 employees identified as having a degree in Exercise Science for the 48 sites reporting to have a program (73% of respondents), and in 1994, there were 121 employees for the 107 sites reporting a program (64% of respondents). This represents a 239% increase in the staffing of Exercise Science graduates when adjusted for the number of sites reporting. In 1983 there were 19 employees who were ACSM certified compared to 134 in 1994, a 216% increase. Disappointingly, the number of employees who do not hold a degree has changed little (3% decrease). Although there are numerous employees who do not hold a degree, particularly in private fitness centers, many hold some form of aerobics certification from agencies other than ACSM. In conclusion, over the past decade, fitness and wellness programs have not changed greatly with regards to the programs they deliver. However, there is some evidence that facilities today tend to have more employees with academic preparation in Exercise Science and employees who hold certifications from various agencies.

2

LIFESTYLE BEHAVIORS OF ALABAMA PUBLIC SCHOOL EDUCATORS AND ADMINISTRATORS

L.H. Anderson, D.D. Pascoe, and S.W. Sanders. Dept. of Health and Human Performance. Auburn University, Auburn, AL 36849

The purpose of this investigation was to examine lifestyle behaviors of administrators and educators in the Alabama Public School System. Fifty-six males and thirty-seven females were administered the Health Risk Appraisal Questionnaire (Carter Center, Emory University). Mean age, height and weight for both groups were (females:46.1 yrs, 1.65 m, 69.2 kg; males:47.1 yrs, 1.83 m, 95.1 kg) respectively. Health risks were partitioned into lifestyle behaviors such as level of physical activity, smoking, drinking, and diet, and non-modifiable genetic factors including race, gender, and age. Data collected indicated that forty-eight percent of the male and twenty-four percent of the female educators and administrators exhibited many of the lifestyle behaviors which are linked to hypertension.

Lifestyle Factors of Hypertensive Subjects (systolic >140 mmHg):

Variable	Male (n=25)	Female (n=9)
Exercise (<3x/week)	56%	66%
Smoking	24%	0%
Drinking (>3 drinks/week)	73%	68%
Cholesterol (>210 mg/dl)	92%	68%

The administrators and educators tested routinely make decisions pertaining to the health and physical education curriculum of secondary and elementary children, but a large proportion of these individuals have lifestyle behaviors contrary to good health practices.

EFFECT OF EDUCATION AND CERTIFICATION ON PERSONAL TRAINERS HOURLY RATE AND RELATED DESCRIPTIVE DATA

Fleming, C., D. Camaione, and D. Reibe. The University of Connecticut, Storrs, CT 06269

Personal trainers (PTs) (n=29) were selected from commercial fitness centers listed in the Hartford SNET Yellow Pages. Data was collected by a self-reported survey. A Test of Homogeneity determined that PTs with a degree in a related field did not charge significantly ($p > 0.05$) more than those that did not possess a degree in a related field. ACSM, ACE PT and AFAA PT certifications significantly ($p < 0.05$) reduced the hourly charge. PTs average charge for PT sessions: $10 7.4%, $15 11.2%, $20 40.7%, and $30 40.7%. PTs with the number of years (yrs) of education past high school: 3 yrs 14.3 %,4 yrs 50 %, 5 yrs 14.3%, 6 yrs 7.1%, and 7 yrs or greater 14.3 %. PTs highest degree obtained: Associate 3.8 %, BA or BS 73%, and Masters 23.1%. PTs had the following majors: Adult Fitness 14.3%, Fitness Management 14.3%, Physical Education 17.9%, Allied Health 3.5%, and other 50%. Fifty-eight point seven percent of the PTs had attended a workshop in the previous year. PTs possessed the following certification: ACE PT 13.8%, AFAA PT 3.4 %, ACSM 27.6%, and other 20.7%. Eighty-six point two percent of the PTs were CPR certified. Sixty-two percent of the PTs were first aid certified. The average age for the PTs was 26.5 yrs . PTs gender: 42.8 % male and 57.2 female. One hundred percent of the PTs exercised themselves. PTs had been exercising for at least the following number of yrs: 5 yrs 31.0%, 10 yrs 20.7%, and 15 yrs 48.3%. The reported yearly income from PTs was: less than $1000 20.0%, $1001-$5000 48.0%, $5001-$10,000 12.0%, $10,001-$15,000 12.0%, $15,001-$25,000 4.0%, and $25,001-$35,000 4.0%. The study concluded that education did not significantly affect the charge per hour for PTs, while certification significantly reduced the average hourly charge for PTs working for commercial fitness centers; therefore, consumers should not assume that a more expensive PT is more qualified.

LOWER BODY POWER PERFORMANCE OF INCUMBENT FEMALE FIREFIGHTERS

B.W Findley, L.E. Brown, R. Gilbert, M. Whitehurst, D.R. Groo and J.A. Ward, Palm Beach County Fire-Rescue, West Palm Beach, FL 33415.

Currently, less than 1% of professional firefighters in the United States are female. Consequently, little information is available regarding job-related physical traits in this population. It has been suggested that elevated levels of lower body power (LBP) may be necessary to meet the demands of firefighting. It is uncertain whether LBP is preserved in incumbent female firefighters (IFF). The purpose of this investigation was to measure LBP of IFF with comparisons made to referenced female firefighter applicants (FFA). Mean power and peak power were measured in eleven IFF subjects (age 31.4 ± 4.1 yrs, ht 166.5 ± 7.9 cm, wt 66.8 ± 9.9 kg, experience 6.6 ± 4.9 yr) during a 30-second Wingate anaerobic test. The results are listed below in watts (mean ± SD).

	Mean Power	Peak Power
IFF	304.3 ± 23.1	391.6 ± 26.6
FFA	398.2 ± 57.0	494.0 ± 84.7
% Deficit	23.6	20.8

These results suggest that LBP is not preserved by IFF when compared to referenced FFA. Therefore, fitness programs targeting IFF should focus on LBP.

5

STRENGTH TRAINING AND BLOOD PRESSURE IN OLDER FEMALES

B.F. Sharon, K. A. Anderson, L. W. Boyette and L.J. Brandon, Rehab R&D Center, VA Medical Center, Decatur, GA, 30033 & Center for Sports Medicine and Sports Science, Georgia State Univ., Atlanta, GA, 30303.

The purpose of this study was to evaluate the effects of a strength training program on blood pressure (BP) in older females. The training protocol for the 15 females (x age=72.0, SD= 5.2 yr; WT= 66.5, SD=10.4 kg; % fat= 27.1, SD 5.7) consisted of 8-12 reps at 50, 60 and 70% of one repetition maximum (1RM) three days a week for 16 weeks. The subjects were evaluated for 1RM initially, after 3, 7, 12, and 16 weeks of training. Daily systolic (SBP), diastolic (DBP) and mean arterial blood pressures (MABP) were averaged for each month and the derived averages were used in this study. The data were evaluated by ANOVA, Scheffe post hoc tests and correlations. Baseline and the four monthly BPs were evaluated for changes over time and relationships with the upper, central, and lower body strength measurements. Following training, a gain of 52.5% was observed for total body strength and each segment increased in strength ($p<.05$). Systolic blood pressure decreased ($p<.05$), while MABP and DBP remained unchanged following training. Baseline BP measurements were poorly associated with the muscle strength measurements, but following weeks 12 and 16 of training, MABP and DBP shared significant relationships ($p<.05$) with all strength measurements. Although strength training greatly improved strength in older females, it had no adverse affect on MABP or DBP and may improve SBP responses.

This study was supported by Grant Number VA E721-RA.

6

MEASURES OF RELATIVE STRENGTH AND POWER OF THE KNEE EXTENSORS IN SPRINTERS AND ENDURANCE RUNNERS AS MEASURED BY AN ISOKINETIC DYNAMOMETER.

R. Lindsey, R. Heitman, M. Maneval, and D. Diboll. Laboratory of Applied Physiology, University of Southern Mississippi, Hattiesburg, MS 39406

The purpose of the present study was to compare the relative functional strength and power characteristics of the knee extensors between varsity collegiate, sprinters and endurance runners. With this data a new variable of relative muscle power (i.e., relative peak torque to time to peak torque ratio), that is not known to exist in the literature, is introduced. All functional tests were designed to distinguish between certain inherent functional characteristics resultant from the assumed muscle fiber type differences that exist between elite power athletes and endurance athletes. Nine sprint/power type athletes and nine endurance type athletes (all males) between the ages of 18 and 25 years were classified according to their particular event(s) and used as subjects. Subjects were tested at five angular velocities ranging from 90° to 450°/sec^{-1} in which the variables of peak torque (PT) (ft-lbs^{-1}), relative peak torque (RPT) (ft-lbs/kg^{-1}), time to peak torque (TPT) (msec^{-1}), and relative peak torque to time to peak torque ratio (RPT/TPT) (ft-lbs/kg/msec^{-1}) were analyzed using a two-way ANOVA with repeated measures on the factor of angular velocity. Results indicated that PT and RPT were significantly greater ($p<0.05$) for the sprint type athletes as expected. The measure of RPT/TPT was also significantly greater ($p<0.05$) for the sprint type athletes; however, it is interesting to note that the reason for this difference was due essentially to RPT, because TPT did not show a significant difference ($p>0.05$) between the two groups. The results of this study confirm the known functional characteristics that exist between endurance type athletes and sprint type athletes due to inherent muscle fiber type differences. The intent of this investigation, primarily with regard to relative power (i.e., RPT/TPT ratio), was to add to the body of knowledge and provide more descriptive information to aid in the search for more valid noninvasive approaches in the prediction of muscle fiber type distribution.

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The Influences of Flexibility and Muscle Strength on Gymnastics Performance: A Preliminary Study

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The purpose of this study was to examine the effects of muscle strength and flexibility on gymnastics performance. Ten (10) preadolescent females, ages 10–14 years, in a local gymnastics club, volunteered to participated. Gymnasts were United States Gymnastics Federation (USGF) Level 5 and 6 athletes. Subjects performed the AAHPERD Sit and Reach test, flexed arm hang and a tumbling pass on the floor consisting of cartwheel, flip–flop, flip–flop, backextension, back walkover, front walkover and an aerial. Each tumbling pass was graded according to USGF regulations and standards. Means and standard deviations for all subjects' scores are revealed below. Level of significance was preset at .05.

Sit and Reach	21.8	± 2.1
Flexed Arm Hang	22.0	± 8.5
Tumbling Pass	8.18	± .61

Statistical analysis using Spearman Rho indicated that a strong relationship (r = .7939) exists between flexibility and gymnastics performance but no relationship (r =.1970) existed between muscular strength and gymnastics performance. A suggestion for follow–up research is to use another measure of muscular strength/endurance instead of the flexed–arm hand.

EFFECT OF THE FREE-WEIGHT SQUAT LIFT ON SHEAR FORCE AT THE KNEE

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The purpose of this investigation was to determine the amount of antero-posterior (A-P) shear force and compressive force present at the knee joint for three different free-weight squat lifts. Skilled weight lifters (N=8) completed quarter, parallel and full free-weight squats with their right foot centered on an AMTI force platform which enabled collection of data on the A-P shear and compressive forces present at the foot. Simultaneously the subjects were videotaped at 200Hz by a NAC high-speed video camera. Utilizing a computer program, the A-P shear and compressive forces at the knee as well as the knee angle, were calculated for each of the three lifts. Application of a one-way ANOVA with repeated measures ($p,0.01$) determined that there was significantly greater A-P shear force present at the knee in the low-bar position of a full squat as compared to either the parallel or quarter squat. There was no statistically significant difference in the A-P shear force between the parallel or quarter squats. The data indicate there was no significant difference in the compressive force for the three squats. These results suggest that the full free-weight squat may lead to a greater risk of injury to the structures in and around the knee. Based on the above results it is suggested that full squats should only be completed by those specifically trained in this lifting technique and that the parallel squat position should be performed for more safety.

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COMPARISON OF VARIOUS WEIGHT TRAINING METHODS FOR IMPROVING MUSCULAR STRENGTH, POWER AND CHANGING BODY COMPOSITION

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Twenty-seven novice lifters performed the bench press and squat on either a traditional (3 sets X 6 reps), high intensity (18 sets X 1 rep), or perodization program for thirteen weeks. Measurements of upper body and lower body strength (1 RM), leg power (Lewis formula), total body weight, sum of skinfolds, and thigh circumference were taken at the beginning and after four, nine and thirteen weeks of training. Although all methods were effective for improving upper and lower body strength, no program was superior to another at any of the testing periods. Likewise no program was found to be more effective than another for increasing leg power, total body weight, muscle hypertrophy, or decreasing body fat.

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HEART RATE RESPONSES TO BENCH PRESS AND SITUP PORTIONS OF THE YMCA's FITNESS ASSESSMENT.

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Fitness assessments are commonly administered in worksite health programs and in fitness facilities. ACSM has determined that fitness assessments can be a safe and effective tool for the "apparently healthy" segment of the population, regardless of age provided exercise heart rates (HR) do not exceed 75% of age-predicted maximum. Many facilities utilize the YMCA fitness protocol, which includes: cardiorespiratory fitness (CR), flexibility, body composition and muscular strength. During the CR portion of the test HR is monitored, and subsequently used to predict VO2 max. However, for the other portions of the evaluation, specifically during the sit up (SU) and bench press (BP), HR monitoring is not addressed. Therefore the purpose of this study was to monitor HR responses during an entire fitness assessment to determine whether or not HRs exceeded the 75% age-predicted max recommended by ACSM. Methods 39 men (mean, 22.6 yrs) and 39 (mean, 23.6 yrs) women participated in the study. The order of the assessments was standardized in the following manner: anthropometrics, flexibility, CR test, BP, SU. HR was monitored during the entire evaluation by a Vantage HR monitor. HRs were downloaded to software provided by the manufacturer and peak HRs were obtained for BP and SU portions. Results The percentage of subjects exceeding the ACSM 75% limit were as follows: (1) BP, men-30.7, women 18; (2) SU, men 43.5, women 61.5. Conclusion Based on these data, HRs for the muscular portions of the fitness evaluation can exceed the safe upper limits recommended by ACSM for a relatively large portion of our sample. Although the subjects in the present study were young, similar HR responses might occur with older adults. When testing older adults, elevated HR responses to the muscular events should be considered.

NEUROMUSCULAR AND MORPHOLOGICAL RESPONSES TO EXERCISE WITH MUSCLE LENGTHENING.

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An initial bout of exercise with muscle lengthening is typically followed by muscle damage, soreness, and force loss. When the same bout is repeated a few weeks later, the responses are moderate and a rapid adaptation occurs. It is possible, however, that after the second exercise bout muscle damage reappears as part of the debris clearing of the muscle tissue undergoing remodeling prompted by the strong mechanical stimulus. We have examined this hypothesis by having 12 subjects perform two bouts of 100 quadriceps lengthening contractions two weeks apart. Tests at baseline (BL), immediately after exercise (IP), 2, 4, and 7 days after exercise included isokinetic quadriceps eccentric, concentric and isometric force (Newtons), tendon reflex amplitude (μV), soreness (arbitrary units), and muscle biopsy for qualitative electron microscopy (EM). The table shows the means. There was an apparent

	Bout 1					Bout 2				
Variables	BL	IP	D2	D4	D7	BL	IP	D2	D4	D7
Eccentric	624	552	380	460	523	622	597	603	603	617
Concentric	441	397	272	344	422	443	440	439	437	447
Isometric	552	491	363	437	496	558	545	556	545	551
Reflex	22.1	25.5	13.8	16.8	19.0	20.5	18.7	25.0	26.8	27.4
Soreness	0.0	0.0	5.2	2.4	1.0	0.0	0.0	1.8	1.7	0.0

recovery of forces and soreness after Bout 2 and some augmentation of tendon reflexes, a sign of neural adaptation suggested but not examined previously. Despite this recovery, the EM data at Day 2 after Bout 2 suggested a recurrence of muscle damage, although to a smaller extent compared to the damage after Bout 1. In combination with prior findings, the current data indicate that muscle breakdown and remodeling may occur simultaneously at least with muscle lengthening. *Supported in part by NICHD (T.H.) and NIA (J.H.)*

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ESTIMATION OF POWER OUTPUT FROM VERTICAL JUMP

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The purpose of this study was to validate vertical jump displacement, obtained with a Vertec, as a field test of power output. Attempts at validation of the vertical jump with Lewis formula as a measure of power lack control for jump-to-jump variation. Twenty-four healthy college males served as subjects (mean ±SEM age = 22.5 ±0.5yrs, body mass = 79.3 ±14.1kg, height = 177.6 ± 1.2 cm). All subjects performed two practice trials and three test trials of a counter movement vertical jump from a (121.9 x 61.0cm) AMTI force plate to a Vertec measurement device. The test trials were videotaped laterally at a camera rate of 60Hz. Videographic analysis using 2-dimensional spatial modeling was used to determine total body center of mass (COM) displacement. Power output was calculated from the best jump trial for each individual using rate of force production and force plate data (FP), a Vertec and the Lewis formula (VL), video derived COM displacement and change in mechanical energy (ΔME), and prediction equations (H) developed by Harman et al. (1991). Mean ±SD peak power from FP and H was 5063 ±1319W and 4482 ±825W. Mean ±SD average power from ΔME, VL, and H was 2734 ±675W, 1281 ±258W, and 1612 ± 398W, respectively. Power values obtained from all equations were significantly different than FP ($p < .01$). The Harman equations and the VL values were significantly different than ΔME. Correlations between video COM displacement and Vertec jump height ($r = .80$) and between ΔME and FP powers ($r = .88$) were high. Regression analysis of these data produced equations for peak power [in Watts = 8602.9 · vertec jump height (m) + 60.9 · body mass (kg) - 4557, ($R^2 = .90$)] and average power [in Watts = 4034 · vertec jump height (m) + 24.1 · body mass (kg) - 1424.3, ($R^2 = .65$)]. The peak power equation predicted to within 10% of its true value for 87% of the subjects and correlated very highly with FP ($r = .95$). These results indicate that the Vertec jump height coupled with a regression equation can provide a field test yielding reasonable estimates of power output.

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GROUND FORCES DURING THE TENNIS SERVE AND SELECTED JUMPS OF COMPETITIVE JUNIOR TENNIS PLAYERS

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The purpose of this project was to determine how the ground forces in a typical tennis serve affect serve velocity. In addition, serving ground forces were compared with those of maximum effort jumps to determine similarities and differences. Twelve male competitive junior tennis players (13.1±0.8 yrs) performed a maximal effort horizontal jump (HJ), vertical jump (VJ) and tennis serve (TS) from an AMTI computerized force platform. Serve velocity was measured with a Peak Performance Motion Analysis System. Upon data reduction and statistical analysis (alpha=0.05), it was determined that the junior players exhibited significant differences between: the horizontal forces of the HJ (0.88±0.3 BW) and TS (0.19±0.1 BW) and the vertical forces of the VJ (2.38±0.3 BW) and TS (1.74±0.4 BW). The juniors exhibited significant positive relationships between the following variables and the resultant velocity of the serve: body weight (460.05±86.7 N) and vertical force (1.74±0.4 BW) during the TS. It was concluded that for the junior players in this study body weight and ground force production, primarily in the vertical direction, had a positive influence on the resultant velocity of the ball after impact (34.39±4.9 $m \cdot s^{-1}$). Furthermore, the peak ground forces produced during a tennis serve are similar vertically (1.74±0.4 BW) to those of a standing HJ (2.06±0.3 BW) and horizontally (0.19±0.1 BW) to a standing VJ (0.19±0.1 BW) for junior players. This research suggests that training tennis players off-the-court with jump training exercises may positively influence the velocity of their tennis serve.

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EFFECT OF MODE OF MUSCLE CONTRACTION ON SYMPATHETIC NERVE ACTIVITY

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Previous studies have demonstrated that the metabolic demand is greater during concentric (CON) than eccentric (ECC) muscle contractions. We hypothesized that the greater metabolic demand during CON contractions would evoke greater muscle sympathetic nerve activity (MSNA) responses than ECC contractions. To address our hypothesis, we studied 7 subjects during CON and ECC arm curls for 2 min (2 s contraction/ 2 s rest) using 50% of their 1 repetition maximum for CON curls. Leg MSNA (peroneal nerve), heart rate (HR), and mean arterial pressure (MAP) were determined before and during exercise. The results are as follows (Total MSNA = mean burst amplitude x burst frequency; Mean ± SE; *p < 0.05 vs. Baseline; †p < 0.05 vs. ECC):

			Exercise	
	Mode	Baseline	1st min	2nd min
MSNA (Burst/min)	ECC	21 ± 2	18 ± 3	24 ± 2
	CON	22 ± 3	25 ± 4	38 ± 7*†
Total MSNA (% change)	ECC	100	98 ± 11	61 ± 31
	CON	100	135 ± 12	265 ± 37*†
HR (bpm)	ECC	69 ± 4	80 ± 7*	84 ± 5*
	CON	66 ± 4	86 ± 4*	91 ± 7*†
MAP (mmHg)	ECC	107 ± 7	123 ± 7*	133 ± 9*
	CON	100 ± 8†	132 ± 9*†	143 ± 9*†

Conclusion: Brief submaximal concentric muscle contractions elicited greater MSNA, HR and MAP responses than eccentric muscle contractions.

ALLOMETRIC SCALING OF MAXIMAL AEROBIC CAPACITY IN FEMALES

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Because maximal aerobic capacity (VO_2 max) is dependent on body size, an adjustment is made to account for differences in body size before comparing VO_2 max among individuals. This adjustment typically takes the form of a ratio (i.e., dividing VO_2 max by body mass). Although these ratios are formed to remove the influence of body mass, the ratio is often still significantly correlated with body mass. Thus, the influence of body mass on VO_2 max is not appropriately removed. The purposes of this study were to determine the appropriateness of expressing VO_2 max relative to body mass (M) to the first power ($ml \cdot kg^{-1} \cdot min^{-1}$) and to determine the exponent (x) in the allometric equation VO_2 max = a (M^x), where x represents the appropriate power function for body mass. If x = 1, then VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$) is independent of body mass (kg). If x < 1, then VO_2 max is significantly and inversely related to body mass (kg). VO_2 max (mean = 34.5 ± 8.4 $ml \cdot kg^{-1} \cdot min^{-1}$) was assessed via indirect calorimetry on 102 females aged 22 to 57 years (mean = 35.8 ± 8.3 years). Body mass was measured with a physician's scale. The exponent x was significantly less than unity (x = 0.34; 95% confidence interval 0.05 to 0.63). Since age was significantly correlated with VO_2 max ($r = -.46$, $p < .001$) and with body mass ($r = .26$, $p < .01$), multiple regression analysis was used to separate the effect of age from the effect of body mass. The resulting exponent for body mass reflects the relationship between VO_2 max and body mass without the influence of age. The exponent was still significantly less than unity (x = 0.53; 95% confidence interval 0.26 to 0.81). These findings indicate that VO_2-to-body mass ratios are not appropriate for females when expressing maximal aerobic capacity relative to body mass. Furthermore, VO_2 max expressed per kg to the first power penalizes heavier females, even when the influence of age is removed. Allometric scaling suggests that valid comparisons can be made among females by dividing VO_2 max ($ml \cdot min^{-1}$) by $kg^{.34}$ or by $kg^{.53}$ when age differences are also of interest.

NEAR INFRARED INTERACTANCE DOES NOT ACCURATELY MEASURE BODY FAT IN FIELD CONDITIONS.

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Several studies have shown that near infrared interactance (NIR) does not accurately estimate body fat percentage under strict laboratory conditions. However, NIR is used quite frequently in field situations instead of other field measurements such as skinfolds (SF) and circumference measurements (CM). The purpose of this study was to determine if the NIR exhibited any relationship to body fat measurements derived using SF and CM. Data from 114 subjects (65 females, 49 males; 24±1 yrs; 68.8±1.4 kg; 169.7±1.2 cm) in six college activity classes where body fat percentages were determined using all three methods was retrospectively analyzed. SF were taken at 3 gender-specific sites and bodyfat percentages calculated using accepted formulas (Jackson & Pollock, 1985). In the males, lower abdominal CM and weight were used and in the women, hip CM and height were used to determine bodyfat percentage (Wilmore, 1988). NIR resulted in significantly ($p<0.05$) higher bodyfat percentages (25.4±0.5%) than SF (18.6±0.7%) and CM (19.6±0.8%). NIR body fat estimates were 70% higher than SF for the males and 21% higher for the females. There was a significant correlation between the NIR and SF readings ($y=14.1+0.61x$; $r=0.81$) and between the NIR and CM ($y=15.47+0.50x$; $r=0.76$). Furthermore, SF and CM readings were significantly related ($y=4.64+0.71x$; $r=0.80$). Our data indicate that while NIR will track SF and CM readings during field conditions, it does not give accurate estimations of body fat percentage as determined using either SF or CM.

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IS DEGREE OF FATNESS RELATED TO THE NUMBER OF UNDERWATER WEIGHING TRIALS NECESSARY TO ESTIMATE PERCENT BODY FAT IN ADULT FEMALES?

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To measure percent body fat (%F), "true" underwater weight (UWW) has conventionally been determined from the mean of UWW trials 8, 9 and 10. Because this procedure is time consuming, subjects can be uncomfortable in the water, and the elderly often fatigue rapidly; it would be desirable to reduce the number of trials needed to obtain valid estimates of %F. For 200 Caucasian females (age 40y, height 163cm, mass 65.1kg), we compared %F estimates derived by 4 selection methods based on the mean of: (1) 3 trials with the highest adjacent trial correlations (trials 4, 5, 6) (29.4%F); (2) 3 successive trials within 100g of UWW (29.2%); (3) any 3 trials within 100g of UWW (29.4%F); and (4) trials 8, 9 and 10 (29.3%F). Multivariate ANOVA showed no significant difference ($p>0.05$) among the 4 methods. Trend analysis indicated a plateau of UWW by trial 5. To examine the influence of degree of fatness on UWW trials needed we grouped the subjects into fatness quartiles. A repeated measures ANOVA revealed no significant difference between the four methods for computing body fat ($F=1.60$, $p=0.20$) and no method by degree of fatness interaction ($F=1.43$, $p=0.20$). In conclusion, degree of fatness does not effect the number of UWW trials needed to reach a "true" underwater weight in adult females.

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COMPARISONS OF MUSCLE MORPHOLOGY MEASURED FROM MRI AND ANTHROPOMETRIC VARIABLES IN OLDER ADULTS

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This study was designed to evaluate the effectiveness of circumferences and skinfolds in estimating muscle morphology in older adults. Forty-three reasonably active older adults (x age=72.1 yr, SD=4.7; WT=71.8 kg, SD=12.3; % Fat=25.2, SD=6.0) underwent a Magnetic Resonance Imaging procedure for the upper arm (MARM) and upper thigh (MTHIGH) area (cm^3), eight skinfolds (chest, axilla, triceps, subscapula, suprailiac, abdomen, thigh, and calf), and seven circumferences (arm, forearm, chest, abdomen, hips, thigh and calf). MRIs were measured in one cm slices and the number of cm in a slice was used to obtain the area. The data were evaluated by Pearson correlation coefficients, and stepwise multiple regression analyses. The correlations ranged from 0.01 to 0.60, with the highest associations observed between MARM with triceps and thigh skinfolds (TS) and arm circumference (AC), and between MTHIGH with TS and AC. The regression analyses showed that the variables in the best prediction equation for MARM included arm circumference and thigh skinfold and produced a multiple R of 0.72. The best prediction equation for MTHIGH included thigh skinfold and forearm circumference and produced a multiple R of 0.77. Since anthropometric variables that best estimate muscle morphology accounted for 52 to 60% of the variability,they do not appear to be an effective method for estimating muscle morphology in older adults.

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VARIATION IN THE AEROBIC DEMAND OF RUNNING AMONG TRAINED AND UNTRAINED SUBJECTS

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Variation in the aerobic demand ($V0_2$) of submaximal running was quantified among trained male distance runners and untrained males stratified by performance capability. Based on a retrospective analysis of seven published studies, submaximal $\dot{V}0_2$ values at similar relative exercise intensities ($\bar{X}$ range = 69.9 to 71.4% $\dot{V}0_2$ max) were analyzed in elite runners (Category 1 (C1); n = 22; $\bar{X}$ $\dot{V}0_2$ max = 75.6 $\pm$ 3.2 ml/kg/min; Olympic trial qualifiers in 5 km, 10 km, and marathon), sub-elite runners (Category 2 (C2); n = 41; $\bar{X}$ $\dot{V}0_2$ max = 70.5 $\pm$ 4.0 ml/kg/min; $\bar{X}$ 10 km time = 33.0 $\pm$ 1.4 min), good runners (Category 3 (C3); n = 16; $\bar{X}$ $\dot{V}0_2$ max = 59.2 ml/kg/min $\pm$ 4.1 ml/kg/min; $\bar{X}$ 10 km time = 40.4 min $\pm$ 2.7 min) and untrained subjects (Category 4 (C4); n = 10; $\bar{X}$ $\dot{V}0_2$ max = 51.4 $\pm$ 3.9 ml/kg/min). Results indicated that $\dot{V}0_2$ max differed significantly ($p < 0.05$) across groups, such that C1 > C2 > C3 > C4. Analysis of submaximal $V0_2$ data also revealed that C4 was more uneconomical (202.2 $\pm$ 11.5 ml/kg/km) than C3 (190.5 $\pm$ 13.6 ml/kg/km), C2 (187.5 $\pm$ 9.7 ml/kg/km), and C1 (181.9 $\pm$ 9.1 ml/kg/km) and that C3 and C2 were less economical than C1. Average within-group variability in submaximal $\dot{V}0_2$ was similar across categories (19.5% $\pm$ 2.1%) and a marked overlap of submaximal $\dot{V}0_2$ values existed across categories. Viewed collectively, these data suggest that 1) trained subjects are more economical than untrained subjects, 2) elite runners are more economical compared to less-talented counterparts, 3) intragroup variation in $\dot{V}0_2$ submax appears independent of performance ability and training status, and 4) economical and uneconomical runners can be found in all performance categories.

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AEROBIC TRAINING EFFECT IN NEW vs. EXPERIENCED MALL WALKERS

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Many urban and suburban elderly persons prefer mall walking to other forms of traditional exercise. This type of exercise is for the most part unmonitored except for frequency and time. The purpose of this study was to determine if there was a noticeable difference in estimated $\dot{V}O_{2max}$ between new mall walkers (CO=less than six weeks of experience) and more experienced walkers (EX=more than six weeks of experience), i.e., if there was a measureable aerobic training effect from mall walking. Three hundred and fifteen mall walkers (mean age: M=65.7 years; F=68.2 years) volunteered for the study, all signed informed consents. Of these, ninety-four (94) were chosen to participate based on ACSM guidelines for exercise testing. Twenty four (N=24) subjects were matched by age, gender, and experience. Estimated $\dot{V}O_{2max}$ values in $mL \cdot Kg^{-1} \cdot min^{-1}$ were obtained using the regression equasion of Rippe, et al., (1988) on a previously measured one-mile course in subjects' malls and were analyzed for significance using a dependent t-test.

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Oxygen Consumption By Group

Variable	Cases	Mean	SD	SE
CO $\dot{V}O_{2\,max}$	12	28.80	11.07	3.197
EX $\dot{V}O_{2\,max}$	12	29.13	10.59	3.158

df = 11 p = 0.926 t = -.10

While more experienced walkers (EX) did report greater oxygen consumption values than their inexperienced cohorts (CO) the differences did not indicate a statistically significant aerobic training effect. The results of this study, though, may be due to the low number of matched subjects and may differ with a larger

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RAPID ADAPTATION OF DELAYED ONSET MUSCLE SORENESS TO DAILY DOWNHILL RUNNING

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It has been previously shown that delayed onset muscle soreness (DOMS) is attenuated when an eccentric exercise bout is performed 2, 3, or 6 weeks after soreness-inducing exercise. The purpose of this study was to determine if daily eccentrically-biased exercise would induce continued DOMS and indicies of muscle damage. Twenty-seven male volunteers, 9 in each group, completed a 7-day training protocol. Each day, downhill runners (RD) ran down a 6% grade for 60 min, followed by 5, 1 min sprints. Cyclists (CY) rode an ergometer and uphill runners (RU) ran up a 6% grade for 60 min @ ~70% $\dot{V}O_{2max}$ followed by 5, 1 min sprints. DOMS was assessed before exercise each day, and blood samples were analyzed for creatine kinase (CK) before exercise on days 1, 3, 5, and 7. RD had significantly elevated DOMS on days 2, 3, and 4 ($p<.01$), but DOMS was not significantly different from baseline on days 5, 6, and 7, despite continued daily eccentric exercise. DOMS was not elevated for CY or RU on any day of the study. CK was not different between groups on day 1, and CK was not significantly increased for CY or RU at any timepoint. However, CK for RD was significantly elevated from baseline and significantly higher than CY and RU on day 3, and remained so on days 5 and 7 ($p<.01$). Daily downhill running did not induce DOMS beyond the normal timecourse seen after one eccentric exercise bout (~72 h), even though indicies of muscle damage remained elevated for 7 days.

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Aerobic Power, Activity Level, and the Cardiovascular Response during Active and Passive Stress Coping.

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Cardiovascular (CV) reactivity to psychological stress is thought to vary with aerobic power and/or chronic aerobic activity. However, empirical evidence does not consistently support this position. Therefore, we assessed heart rate (HR), mean arterial pressure (MAP), and forearm blood flow (FBF) reactivity during the Stroop Color-Word Conflict Test (ST) and a cold pressor (CP) among four groups (n=5) of healthy young male volunteers. These groups differed in estimated maximal VO2 and self-reported history of aerobic activity. Ss were described as Moderately fit and active (MF & ACT), moderately fit and sedentary (MF & SED), Low fit and active (LF & ACT), or low fit and sedentary (LF & SED). ACT Ss demonstrated significantly higher MAP and FBF prior to the ST experiment ($p<.05$) and MF & ACT Ss demonstrated a higher MAP than the other three groups prior to the CP experiment ($p<.05$). During the ST task, HR ($p=.003$) and MAP ($p<.001$) increased as a main effect of the task. There was also an interaction between the task and level of chronic activity on FBF ($p=.017$). ACT Ss demonstrated an increase in FBF during the ST while SED Ss did not. During the CP task there was a significant ($p=.005$) three-way interaction (task x activity level x aerobic power)on MAP. The results of the ST experiment indicate that chronic aerobic activity, known to enhance skeletal muscle vascularization, may therein provide a mechanism for reducing afterload during active stress coping. Aerobic power did not account for any differences in CV reactivity during active or passive coping.

FOOD CONSUMPTION PATTERNS OF AFRICAN AMERICAN COLLEGE STUDENTS

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Food consumption patterns were investigated in 88 female and 44 male students age 20.0 ±2.8 attending one historically black Southern university using a one-day diet recall with a computer assisted (N^2 Computing) dietary analysis. The percentage of subjects reporting consuming breakfast, lunch, dinner, and snacks was 53.8, 62.9, 86.4, and 33.3 respectively. Mean caloric (kcal) consumption was 2008.7 ±1181.5. Although mean consumption as a percentage of kcal from protein, carbohydrate and fat was 14.7 ±6.2, 54.0 ±14.9, and 31.1 ±11.3, a less desirable pattern was reflected by mean servings of milk and vegetables, 0.2 ±.8 and 0.5 ±1.1. The minimum RDA for calcium was consumed by 9%. 43.2% did not consume at least .36 gram of protein per pound of body weight. Only 2 subjects consumed at least 100% and 7 subjects 75-99% of the RDA for 8 key nutrients. Recommendations for nutrition education for students at this institution include improving nutritional quality by emphasizing strategies for incorporating vegetables and sources of calcium in the diet and informing students about dietary practices including meal skipping and appropriate levels of protein consumption. Projects to facilitate informed decision making in dining hall and restaurant environments are also suggested. Further study on the relationship of food consumption patterns to physical fitness and activity levels is also recommended.

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THE EFFECTS OF L-CARNITINE SUPPLEMENTATION ON MAXIMAL CYCLING PERFORMANCE

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The effects of L-carnitine supplementation on maximal cycling performance were studied in a double-blind, cross-over trial on seven competitive male cyclists (mean ± SD: age 28.1 ± 8.1 yrs; height 179.7 ± 6.8 cm; weight 79.2 ± 7.3 kg). Subjects ingested 2 g/day for 7 days of either L-carnitine or a lactose placebo in random order. The initial workload was 100 watts with an increase of 25 watts during each subsequent 2 minute stage until they reached volitional exhaustion. Prior to, and at 5 and 10 minutes post-exercise, 10 ml blood samples were drawn and analyzed for hematological changes. Results showed no changes in maximal performance time, oxygen uptake, ventilation, respiratory exchange ratio, heart rate and rating of perceived exertion. Moreover, no statistically significant differences were observed for serum glucose, lactate, pyruvate, free fatty acid, and glycerol concentrations at rest, and at 5 and 10 minutes post-exercise between the carnitine and placebo trials. In conclusion, carnitine supplementation does not enhance maximal cycling performance in competitive cyclists.

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EXERCISE AND NUTRITION COUNSELING ON HEALTH STATUS IN HIV+ PATIENTS

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Nutritional counseling and nutrition/exercise surveys were given to 10 HIV+ males during a free lecture series (LS). The subjects were questioned on current infectious state, nutrition and exercise habits, and anthropomorphic measures. The subjects were given a follow-up survey three months after the LS. A body composition analysis was performed before and after using bioimpedence-Bioanalogics Electrolipograph (Beaverton, OR). The subjects were put on an isocaloric diet based on the Harris-Benedict formula, an activity factor, and an infection factor determined from the questionnaire. Seven of the subjects remained asymptomatic, and 1 of 3 symptomatic patients reversed to an asymptomatic state as determined by the CDC. All subjects engaged in immune enhancing, infection reducing eating behaviors after the LS. Eighty percent ate 3 meals/day with less red meat and more fish and chicken, 90% ate a more nutrient dense diet, using more multivitamin and antioxidants supplements after the LS. Body composition analysis showed 40% lost 3.6% of their original body weight (BW1)- 2.2% decrease in body fat, 20% maintained their bodyweight, 10% (non-wasting) gained (weight 5.7 lbs), 20% in a wasting state gained an average of 6.3% BW1 (6.2% lean body mass-LBM), and 10% in a wasting state lost 6.1% BW1. Exercise habits varied among subjects- 10% used aerobic dancing, 20% used some resistive exercises sporadically, and 30% did nothing before, whereas, 10% added cardiovascular exercise after the LS. Reasons for not exercising included, 70% felt they lacked time, 60% were unsure how to get started, and 30% had no motivation to start. Results suggest HIV+ patients are willing to adopt appropriate nutritional habits when properly advised and a lack of exercise consultation may be a reason for not engaging in an exercise program. A supervised exercise program may be beneficial, in supplement to nutritional consulting, in countering wasting (maintaining LBM) and preventing the onset of AIDs symptoms.

Thanks goes to the NOAIDS Task Force and the subjects involved.

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LOW CARBOHYDRATE DIET INDUCES CHANGES IN CENTRAL AND PERIPHERAL BETA-ENDORPHIN

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Sprague Dawley male rats (n=21) were assigned to one of two treatments for one week, a normal diet (ND) consisting of 65% carbohydrate (C), or a low (C) diet (LCD) consisting of 5% (C) to determine if dietary manipulation can alter plasma or hypothalamic beta-endorphin (B-EP) concentration. The LCD diet was isocaloric to the ND. Rats were killed by decapitation under pentobarbital anesthesia after a 12 hr fast. Mixed arteriovenous blood and brain tissue were collected. Animal body weight, weight gain and food intake were unaffected by diet. Hypothalamic and plasma B-EP were significantly elevated in the LCD group compared to the ND group (376.7 $\pm$ 17.5 $pmol \cdot g^{-1}$ vs 153 $\pm$ 14.7 $pmol \cdot g^{-1}$, & 8.7 $\pm$ 1.2 $pg \cdot ml^{-1}$ vs 4.7 $\pm$ 1.4 $pg \cdot ml^{-1}$), respectively. Plasma glucose decreased in the LCD group to 63.5 $\pm$ 3.6 $mg \cdot dl^{-1}$ vs 81.9 $\pm$ 3.4 $mg \cdot dl^{-1}$ for the ND. Significant negative correlations were obtained between plasma glucose and hypothalamic B-EP ($r = -0.77$) and plasma B-EP ($r = -0.60$). Plasma insulin decreased while plasma glucagon increased in the LCD group compared to the ND group. This data shows that B-EP alterations due to dietary manipulation can occur independent of insulin elevation. These results support the concept that glucose homeostasis could be regulated, at least in part, by B-EP mechanisms and may occur independent of insulin activation. These results suggest a mechanism for the elevation of B-EP during exercise.

EFFECTS OF ß-BLOCKADE ON RATINGS OF PERCEIVED EXERTION (RPE) DURING MODERATE AND HIGH-INTENSITY CONSTANT-LOAD EXERCISE

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To determine the influence of ß-blockade on perceived exertion, seven males were studied during 60 min of moderate (MOD: > Lactate Threshold (LT)) and 10 min of high-intensity (HIGH: >>LT) constant-load exercise bouts on a cycle ergometer: once under control (CONT) conditions, and once under the influence of propranolol (PROP, 80 mg, oral, 2 h prior to exercise). For HIGH, PROP resulted in significantly ($P < 0.01$) higher RPE for Legs (L) (17.2 ± .5 vs 14.0 ± .5), Central (C) (16.4 ± .7 vs 13.6 ± .7), and Overall (O) (16.4 ± .4 vs 13.6 ± .7). For MOD, PROP also resulted in significantly ($P < 0.05$) higher RPE for L(17.2 ± .4 vs 14.8 ± .8), C (16.0 ± .3 vs 13.4 ± .8), and O (16.8 ± .2 vs 13.8 ± .7). Within both PROP and CONT conditions RPE were similar between MOD and HIGH despite the fact that HIGH resulted in a VO_2 in excess of 90% of VO_2 peak and an end-exercise blood [HLa] of 7.1 ± 2.0 mM compared to MOD which resulted in a VO_2 of ~70% VO_2 peak and an end-exercise blood [HLa] of 2.5 ± .8 mM (within MOD and HIGH, VO_2 and blood [HLa] were not different between PROP and CONT). The results suggest that intensity and duration exert independent effects on RPE and, for subjects on ß-blockers, prescription of exercise based on RPE may need to be modified.

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THE EFFECTS OF GENDER AND RUNNING MEDIUM ON PERCEIVED EXERTIONAL (RPE) RESPONSES

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Ratings of perceived exertion were recorded during vest supported deep water running and treadmill running in twelve men (21±1.9 yr, 77.2±13.0 kg, 14.1±5.8 %fat) and twelve women (20±0.8 yr, 60.4±7.3 kg, 23.2±4.7 %fat) to determine gender and mode specific responses. Water leg speeds were set at metronome rates beginning at 72 bt·min^{-1} and increased 12 bt·min^{-1} each 3 min stage. When the subject could no longer maintain the proper running form (alternately flexing each hip joint to ~45° and hyperextending to ~10°) at the desired cadence the test was terminated. Treadmill speeds were selected to match metronome counts for the water test so that leg speed between the two modes were approximately equal. RPE was recorded during the last ten seconds of each stage. Five of the 24 subjects reached 144 bt·min^{-1}. RPE and oxygen consumption ($\dot{V}O_2$ ml/kgLBM/min) were not significantly different between sexes for either mode of exercise. RPE and $\dot{V}O_2$ responses were greater in the water for both groups. At any level of treadmill RPE water RPE averaged 3.5 points higher. Mean water RPE values ranged from 8.5 - 17.2 and mean treadmill RPE values ranged from 6.3 - 13.8. It was concluded that perceived exertional responses are significantly higher when exercising at equal leg speeds during water wet vest running versus treadmill running.

Supported by a grant from Excel Sports Science

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PREDICTING RPE RESPONSES DURING DEEP WATER RUNNING

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Twelve men (21±1.9 yr, 77.2±13.0 kg, 14.1±5.8 %fat) and twelve women (20±0.8 yr, 60.4±7.3 kg, 23.2±4.7 %fat) were studied during a progressive deep water running test. Flotation belts were worn and subjects were tethered to the pool deck. Subjects performed metronome-controlled simulated jogging starting at 72 bt·min^{-1} and progressed 12 bt·min^{-1} over 7 stages to 144 bt·min^{-1}. Oxygen consumption ($\dot{V}O_2$) was continuously monitored by open circuit spirometry (Sensormedics) and heart rate by radiotelemetry (Polar). Borg's 20 point scale was used to assess perceived exertion at each 3 min stage. Subjects maintained proper running form throughout by alternately flexing each hip joint to ~45° and hyperextending to ~10°. When subjects could no longer perform a 45° hip flexion at the desired cadence the test was terminated. A technician assisted in the water throughout the test by cuing the subject to the desired flexion point. Multiple linear regression (stepwise selection) revealed that cadence was the most important predictor. The resulting model has an R of 0.885 and a SEE of 1.77, and combines gender groups since male and female responses were not significantly different: RPE = -.8439 + .0872(cadence) + .0996($\dot{V}O_2$ ml/kgLBM/min) + .066(respiratory rate). Cadence was the only common predictor of RPE for water and treadmill exercise. The inclusion of $\dot{V}O_2$ (ml/kgLBM/min) in the water equation is indicative of the important role of body fat in predicting water RPE.

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VALIDATION OF THE AEROSPORT TEEM 100 PORTABLE METABOLIC MEASUREMENT SYSTEM

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The purpose of this study was to evaluate the utility of a portable metabolic measurement system, the Aerosport TEEM 100. Data were collected during incremental running and stepping protocols (INC) and during constant load submaximal treadmill running protocols (CL). All subjects (n = 12, mean age = 25 ± 4 years, Ht = 169.9 ± 9.5 cm, Wt = 66.8 ± 10.2 kg) were part of ongoing research studies. A total of 505 data points (242 from INC and 263 from CL) were collected simultaneously, by placing the Aerosport TEEM 100 medium flow pneumotach and mouthpiece in-line with the previously validated Rayfield metabolic measurement system. There were small but statistically significant differences between the 2 metabolic measurement systems during INC exercise for VO_2 (1.79 ± 0.57 vs 1.93 ± 0.63 l/min), V_E (40.65 ± 13.05 vs 41.93 ± 13.63 l/min), RER (0.92 ± 0.14 vs 0.95 ± 0.10), $\%E O_2$ (4.12 ± 0.48 vs 4.37 ±0.41%), and $\%E CO_2$ (16.55 ± 0.36 vs 16.38 ± 0.41%) (for Rayfield and Aerosport TEEM 100, respectively) ($P<0.05$). Similar differences were observed during CL exercise, with differences in VCO_2 also being statistically significant (2.50 ± 1.21 vs 2.29 ± 0.96 l/min). During CL exercise, differences in RER between the 2 measurement systems were not statistically significant. The correlation between the Rayfield and Aerosport for $V0_2$ measures during INC and CL were r = 0.95 (SE ± 0.24 l/min) and r = 0.96 (SE ± 0.32 l/min), respectively. Similarly, the correlations for $VC0_2$ were r = 0.97 (SE ± 0.21 l/min) and r = 0.98 (SE ± 0.39 l/min) for INC and CL respectively. The correlations for measures of V_E during INC and CL were r = 0.96 and r = 0.98. Standard error around the line of identity for VE with INC exercise was ± 3.97 l/min and was ± 4.16 l/min for CL exercise. The correlations for RER were r = 0.82 (SE ± 0.09) and r = 0.47 (SE ± 0.12), for INC and CL, respectively. The correlations for measures of $\%E0_2$ during INC and CL were r = 0.83 with a SE of ± 0.28% and r = 0.90 with a SE of ± 0.37%, respectively. The correlations for measures of $\%EC0_2$ were r = 0.77 (SE ± 0.44%) for INC and r = 0.94 (SE ± 0.43%) for CL exercise. Results from the present investigation indicate that the Aerosport TEEM 100 is a valid metabolic measurement system.

Relationship Between Smoking, Activity Level and Elderly Women's Lung Capacities

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The purpose of this study was to show the effect of exercise on lung capacity in elderly women that have been long term smokers and those who have not smoked. Fifteen (15) women, ages 75–85, from a local retirement community, volunteered to participate. Subjects performed static lung capacities on a Collins Bell Spirometer. Measurements included vital capacity (VC), tidal volume (TV), expiratory volume (E), and inspiratory volume (IV). Means and standard deviations for the groups were as follows:

	Vital Capacity	Tidal Volume	Expiratory Volume	Inspiratory Volume
Smokers/Ex.	1000 ±400.0	433.32 ±175.6	333.33 ±28.9	483.32 ±104.1
Non-smokers/Ex.	1237.1 ±376.4	643.2 ±78.8	370.5 ±160.8	607.7 ±107.4
Smokers/Non-Exercisers	880.0 ±356.4	420.1 ±144.1	360.5 ±102.5	380.4 ±160.5
Nonsmoker/Non Exercisers	1080.2 ±589.1	580.0 ±164.3	320.4 ±178.9	560.0 ±207.4

Analysis of variance ($p<.05$) indicated that significant differences existed between vital capacity and tidal volume between smokers and nonsmokers due, in part, to exercise involvement. The exercising smokers and nonsmokers had results significantly higher than their non-exercising counterparts. This research suggests that exercise is beneficial in lung health in smokers and non-smokers.

Heart Rate Responses of Main Streamed and Regular Elementary Physical Education Students: A Preliminary Investigation

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The purpose of this study was to determine if main streamed physical education students at the elementary level are as active as their regular education counterparts. Twenty-five (25) mainstreamed students and twenty-five (25) regular education students, ages 7–9 years, at a local elementary school, volunteered to participate. Prior consent of a parent/guardian was obtained. Class activities for data collection included a warm-up period, activities in a track and field unit and a cool-down period. Heart rates of children were collected utilizing telemetry. Heart rates measured were resting heart rate (RHR), exercise heart rate (EHR), maximal heart rates (MHR) and recovery heart rate (FHR). Results for groups were as follows:

	RHR	EHR	MHR	FHR
Main Stream	79.9 ±7.82	162.4 ±14.1	197.0 ±9.34	88.4 ±8.98
Regular Ed.	81.6 ±6.84	166.2 ±12.2	193.2 ±6.57	84.3 ±5.78

Statistical analysis ($p<.05$) revealed that there is no significant difference between RHR, EHR, MHR, and FHR between the two groups. Main streamed students produce similar heart rate values as compared to regular education students although time on-task for activities for main streamed children was less than their regular education counterparts. This suggests that regular education physical education can be physiological beneficial to all students in elementary curriculums.

PREDICTING OXYGEN CONSUMPTION DURING DEEP WATER RUNNING

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Heart rate (HR), oxygen consumption ($\dot{V}O_2$) and rating of perceived exertion (RPE) were measured in 12 males (21.0±1.9 yr, 77.2±13.0kg, 14.1±5.8% fat) and 12 females (20.0±0.8yr, 60.4±7.3kg, 23.2±4.7% fat) during a progressive deep water running test. Subjects wore flotation belts and were tethered to the pool while performing metronome-controlled simulated jogging. Cadence (C) began at 72 bt·min^{-1} and increased by 12 bt·min^{-1} over seven three-minute stages to 144 bt·min^{-1}. $\dot{V}O_2$ was continuously monitored by open circuit spirometry (Sensormedics) and HR by radiotelemetry (Polar). Borg's 20 point scale was used to assess RPE at each stage. Subjects maintained proper running form throughout by alternately flexing each hip joint to ~45° and hyperextending to ~10°. A technician assisted in the water throughout the test by cuing the subject to the desired flexion point. When the subject could no longer perform a 45° hip flexion at the desired cadence the test was terminated. Stepwise multiple linear regression revealed that HR and C were predictors of $\dot{V}O_2$ (ml·kg^{-1}·min^{-1}) for both genders, but RPE contributed only to the male model. The resulting models are:
Males:-15.2136 + 0.8717(RPE) + 0.15298(C) + 0.1064(HR) R=.871, SEE=5.12;
Females:-17.3556 + 0.1583(HR) + 0.1556(C) R=.907, SEE = 3.24.
These equations are appropriate for predicting oxygen consumption during deep water vest-supported running at leg speeds between 72 and 144 bt·min^{-1}.

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CONTINUOUS HEART RATE MONITORING AND CYCLING TIME TRIAL PERFORMANCE TIMES

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The purpose of this study was to investigate the effects of pacing by continuous heart rate monitoring on 40 kilometer cycling time trial performance. Endurance athletes are beginning to regulate pace and intensity in training and racing with the use of heart rate monitors (HRM). The increased use of HRMs during competition warrant the determination of a HRM's effectiveness on competition performance. Seven male endurance athletes volunteered for participation in this study. Subjects completed a 40 kilometer time trial (40K TT) on a road bike attached to a stationary magnetic resistance turbo trainer. A varied resistance protocol was used during the 40K TT to simulate a rolling out and back course. Subjects monitored speed, time, and distance as feedback cues for performance (40K TT_1). Seven days later, subjects repeated the test (40K TT_2) and were also able to monitor performance intensity with the continuous feedback of a heart rate monitor. Subjects were instructed to cycle at an intensity corresponding to 85% heart rate reserve. A difference in mean completion times of 4.78 minutes between 40K TT_1 (72.45 min.) and 40K TT_2 (67.67 min.) was found to be statistically significant ($p < 0.05$) using a t-test for related means. The results of this investigation indicated that pacing by continuous heart rate monitoring improved 40K cycling time trial performance.

EFFECT OF ARM EXERCISE IN CONJUNCTION WITH LEG ERGOMETRY ON MAXIMAL OXYGEN CONSUMPTION (VO_{2max})

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The purpose of this study was to determine if arm exercise in conjunction with leg ergometry would increase VO_{2max} over that measured during leg ergometry alone. Eighteen moderately active males between the ages of 20-24 years randomly performed two maximal graded cycle ergometry tests consisting of an initial workload of 37.5 W with increases of 37.5 W every 2 min. One test required subjects to perform a maximal graded leg cycle ergometer test to exhaustion (NW). The other maximal exercise test incorporated the same exercise protocol, but required subjects to pump 1.82 kg wrist weights to shoulder height by flexing the elbow through approximately 110° (WW) at a frequency of 60 pumps per min. The criteria for reaching VO_{2max} included volitional exhaustion, and reaching either age pedicted maximum heart rate (HR) or a respiratory exchange ratio (RER) $\geq$ 1.1. MANOVA-RM (p=.652) indicated no overall difference in maximal HR, VO_{2max}, and maximal RER between the two tests.

	WW	NW
HR ($b \cdot min^{-1}$)	194.94 ±7.06	193.50 ±8.71
RER	1.14 ±0.05	1.14 ±0.09
VO_{2max} ($ml \cdot kg^{-1} \cdot min^{-1}$)	42.77 ±8.76	42.36 ±6.96

The lack of difference between HR and RER suggest that physical exertion during the two tests was equal. The lack of difference in VO_{2max} suggests that VO_{2max} may not be a function of muscle mass employed, but rather is limited by central factors.

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ESTIMATION OF ARM MAXIMAL OXYGEN CONSUMPTION (VO_{2max}) WITH A LEG ERGOMETER PREDICTION EQUATION

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Several investigators have developed regression equations to predict VO_{2max} based on submaximal cycle ergometry (Fox, 1973; Shepard, 1972; & Siconlfi et al., 1982). However, to the knowledge of these investigators, there has not been a regression equation developed to predict arm VO_{2max} from submaximal arm exercise. The purpose of this study was to determine if a leg ergometer equation to predict VO_{2max} can be applied to submaximal arm ergometer exercise to predict arm VO_{2max}. Twenty-four healthy adult males 18-27 years of age who were free of medications which affect heart rate completed a symptom limited exercise test on a Monarch Rehab Trainer (Model 881E) for the purpose of measuring the subject's arm VO_{2max}. Subjects also completed 5 min of submaximal exercise on the Rehab Trainer at a workload that elicited a heart rate between 120 and 150 bpm. The order of testing was counterbalanced to minimize the effect of improved technique. The Shepard (1972), equation was then applied to submaximal arm ergometer exercise data to predict arm VO_{2max}. Predicted maximum heart rate (PMHR) was modified to predict arm VO_{2max}, with the following formula: ((205*.5*age)-10) (bpm). Pearson's correlation established the relationship between measured (M) and predicted (P) arm VO_{2max} to be r=0.55. The standard error of the estimate (SEE), which is an indicator of the predictive accuracy of the measurement was 308.76 $ml \cdot min^{-1}$ or 15.21 % of M VO_{2max}. A paired sample t-test between the M VO_{2max} (2218.29±405.62 $ml \cdot min^{-1}$) the P VO_{2max} (2814.08±638.08 $ml \cdot min^{-1}$) produced a t value of 5.45, p=.0001. These preliminary findings suggest that the Shepard's equation developed for leg erogmetry cannot be used to predict arm VO_{2max}. Therefore, it appears warranted to generate a specific regression equation to predict arm VO_{2max} from submaximal arm exercise.

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EFFECTS OF DYNAMIC RESISTANCE EXERCISE ON RESTING BLOOD PRESSURE: A META-ANALYTIC REVIEW OF CONTROLLED CLINICAL TRIALS

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Using the meta-analytic technique, the purpose of this study was to examine the effects of dynamic resistance exercise (weightlifting) on resting systolic (SYS) and diastolic (DIA) blood pressure in humans. Inclusion criteria were 1) dynamic resistance exercise as the primary mode of training, 2) baseline and post-exercise measures of resting SYS and DIA blood pressure, 3) human exercise training studies (not acute) which lasted 6 weeks or longer and included a control group, 4) subjects apparently sedentary prior to taking part in the study, and 5) published journal studies (English) between January, 1966 and January, 1994. A total of 7 controlled clinical exercise training studies representing a total of 229 subjects (114 exercise, 115 control) met the initial inclusion criteria. With outliers deleted, small but statistically significant treatment effect (Δ) reductions were found for resting DIA but not SYS blood pressure ($\bar{X} \pm SD$, SYS: -1.52 $\pm$3.00, 95% confidence interval, 1.64 to -4.67; DIA: -3.84 $\pm$ 3.55, 95% confidence interval, -0.55 to -7.12). Using the bootstrap technique (1000 repeat samples) it was estimated that 95% of the time changes in resting blood pressure would range from 0.65 to -3.67 and -1.50 to -6.42, resting SYS and DIA blood pressure, respectively. The results of this study suggest that dynamic resistance exercise results in small reductions on resting DIA, but not SYS blood pressure. However, the results of this study should be interpreted with caution as a need exists for additional, well designed studies on this topic.

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THE RELATIONSHIP OF PHYSICAL FITNESS TO SELECTED RISK FACTORS FOR CORONARY HEART DISEASE IN CHILDREN 8-11 YR

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Although epidemiological studies have demonstrated an inverse relationship between level of cardiorespiratory fitness and relative risk for CHD in adults, data derived from studies with children remain equivocal. This study investigated the hypothesis that a high cardiorespiratory fitness level, as determined by maximal oxygen uptake ($\dot{V}O_{2max}$), is associated with a lower risk profile for blood pressure, blood lipids, and relative body fat in preadolescent children. Fifty-eight girls and 46 boys ($\bar{X}$ age= 9.2 yr) voluntarily participated in a physician supervised health screening and a battery of measures to determine a health risk profile. Results indicated that $\dot{V}O_{2max}$ was inversely related to Body Mass Index (r=-.59, p=0.0001), percent body fat (r=-.69, p=0.0001) and the HDL/TC ratio (r=-.24, p=0.02). In addition, VO_{2max} was positively correlated to HDL-C (r=.27, p=0.009). Resting blood pressure was not significantly related to VO_{2max}. When grouped into low (5th%), acceptable (mean), and high (95th) values for blood lipids as outlined by the Lipid Research Clinic Data Book (1993), over 20% of the children evidenced high triglyceride (20.6%) and VLDL-C (23.5%) and low HDL-C (22.5%) concentrations. Our results indicated that there is a low to moderate relationship between cardiorespiratory fitness and selected risk factors for CVD.

PARENTAL HISTORY OF HYPERTENSION DOES NOT INFLUENCE THE HEART RATE OR BLOOD PRESSURE RESPONSE DURING DIFFERENT COLD PRESSOR TESTS.

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The purpose of this study was to examine whether normotensive individuals (<140/<90 mmHg) with or without parental history of hypertension (PPH) had different heart rate (HR) and blood pressure (SBP, DBP, and MABP) responses to different cold pressor (CP) tests (hand (H), foot (F), forehead (FH), and all three combined (C). Thirty-four volunteer subjects (15 with PPH and 19 with no parental history of hypertension (NPH) each received in randomized order each of the three different CP (H, F, & FH) tests (2.5 min in 4-5 °C water) and the C application as the final test. There were no significant ($p < 0.05$) differences between the groups in resting HR's or BP's. The HR & BP responses to the different CP tests were not different with differing parental history of hypertension. Further analysis of the HR data with spectral analysis found no significant differences between groups in the power of the high, mid, or low frequency curves. These results suggest that HR variability and the BP response to the CP test is not influenced one's parental history of hypertension.

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RELIABILITY AND VALIDATION OF ERGOMETER CALORIC ALGORITHMS AMONG AND BETWEEN SIX BRANDS OF EXERCISE ERGOMETERS

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Eleven subjects, mean age 25.5 yrs., performed bouts of exercise on 4 different machines of the same brand of ergometer, Airdyne (AD), Aerobicycle upright (UR), Concept II rower (RW), Aerobicycle recumbent (RC), Stairmaster (SM), and Climax (CM), resulting in 24 bouts/subject. A bout of exercise consisted of a minimum of 7 stages, 4 minutes per stage. The range of workloads was chosen to ensure that levels of caloric expenditure were commensurate with performance levels of most participants in fitness programs. Oxygen uptake (VO2) was determined each minute by indirect calorimetry (IDC). Caloric expenditure was recorded each minute from the ergometer's display. The fourth minute of VO2 was used for determination of caloric expenditure by IDC. Comparison of means for caloric expenditure from ergometer's display and as determined by IDC, indicated that ergometers of the same brand were reliable across ergometers. Example: RW ergometer's 1-4 means for Calories recorded from the ergometer's display and determined from IDC for 4 minutes were 18, 17.5, 17.6, 17.5 versus 20.9, 20.5, 21.1, 20.1 respectively for low workloads; and 52, 53.3, 52.6, 51.5 versus 46.2, 46.4, 45.4, 47.2 respectively for high workloads. However, there were significant differences ($P<0.05$) between Calories displayed and those calculated from IDC at the extreme workloads for all ergometers. The two means were very similar around expenditure rates of 10-12 Calories per minute.

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EFFECTS OF AN ACUTE BOUT OF RESISTANCE EXERCISE ON NOCTURNAL LEVELS OF GROWTH HORMONE

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To determine the effects of an acute bout of heavy resistance exercise on nocturnal levels of growth hormone (GH), eight healthy, resistance trained, young men (age 23.1 yrs., height 179.7 cm., weight 91.9 kg., body fat 17.9%) performed a heavy resistance training session. The exercise session consisted of 3 sets of 6 exercises performed at 80% of 1 repetition maximum to volitional fatigue with 1 min. rest between sets. Blood samples were drawn pre-exercise and immediately, 20, 40 and 60 min. post exercise with subsequent samples drawn each hour, on the hour, overnight until 0700h. Control blood samples were obtained at the same time points on a separate day in which no exercise was performed. Plasma GH levels were determined using double antibody radioimmunoassay. Significant increases in GH levels were observed immediately following exercise and remained elevated for 40 min. as compared to pre-exercise levels (0.16 $ng \cdot ml^{-1}$, vs 4.96 $ng \cdot ml^{-1}$, 2.90 $ng \cdot ml^{-1}$, 1.75 $ng \cdot ml^{-1}$; $p<0.05$). No change was observed in nocturnal GH levels following resistance training as compared to control levels. Our data suggest that nocturnal GH profile is not altered by a heavy resistance exercise bout in young resistance trained subjects.

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PREDICTION OF MAXIMAL OXYGEN UPTAKE IN CHILDREN

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The direct determination of maximal oxygen uptake (VO2max) in children has many difficulties; thus, submaximal exercise testing has appeal. The purpose of this study was to determine the accuracy of two methods of predicting VO2max of children using submaximal cycle ergometry. Forty-five children ages 7-13 years completed a treadmill walking graded exercise test (GXT) to volitional fatigue to assess VO2max. Each child also completed a 6-min, three-stage submaximal cycle ergometer test. Heart rates obtained during the last minute of each stage of the ergometer test were used to predict VO2max based on the EUROFIT methodology (a modification of the PWC170) and a modification of the ASTRAND methodology which utilizes a PWC195 and an estimate of resting metabolic rate. The GXTs of 33 of the children were acceptable. Analyses of data on these 33 subjects indicated that the EUROFIT methodology significantly underestimated the VO2max compared to either the GXT or ASTRAND (GXT = 45.0$\pm$7.1, ASTRAND = 44.7$\pm$6.2, EUROFIT = 42.7$\pm$5.8 ml/kg/min; $p<0.01$). The correlations between the submaximal tests and the GXT were significant ($P<0.001$); however, the correlation of the GXT with ASTRAND ($r=0.788$) was higher than the GXT with the EUROFIT ($r=0.658$). These results suggest that although the EUROFIT method is easier to compute and may be acceptable, the ASTRAND method is more accurate.

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METABOLIC AND CIRCULATORY RESPONSES OF CHILDREN TO PROLONGED PHYSICAL ACTIVITY

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Ten male and ten female prepubertal children performed 60 minutes of treadmill walking at work loads equivalent to 50% (LGTW) and 75% (HVYW) VO_2 max. Metabolic and circulatory responses to the exercise were measured using open circuit spirometry and CO_2 rebreathing techniques, respectively. Analysis of variance was employed to evaluate the response to the effort across the six time periods and to assess the effects of gender and work load on those responses. The height, weight, %body fat and aerobic capacity (VO_2 max) were within normal ranges for children of this age (8.99 - 11.80 years). Measurement methods were determined to be reliable by test-retest procedures. Metabolic response to prolonged work was assessed by determination of oxygen uptake (VO_2), carbon dioxide production (VCO_2) and respiratory exchange ratio (RER). Heart rate (HR), stroke volume (SV), cardiac output (Q_c), arterio-venous oxygen difference ($(a\text{-}v)O_2$ Diff), oxygen pulse and cardiac index (CI) were used to describe circulatory response. Values for all three measures of metabolic response were higher at HVYW for both boys and girls. VCO2 was significantly higher ($p<.05$) in boys at LGTW only. There were no changes with time in either VO2 or VCO2. RER was higher and decreased significantly ($p<.05$) with exercise time only in the girls at HVYW. HR was higher in girls at both loads, while SV was significantly greater in boys at HVYW only. Q_c and CI were also greater in boys at HVYW only. O_2 Pulse was significantly greater in boys at both loads, while $(a - v)$ O_2 difference was higher in males at LGTW only. All circulatory variables were higher at HVYW in both sexes except for SV, which was higher at HVYW in the girls only. There were no significant changes in circulatory function with time. It was concluded that prepubertal children of both sexes can accommodate periods of prolonged physical activity, even at relatively high work intensities, with adequate and appropriate physiological responses.

THE EFFECTS OF AMBIENT TEMPERATURE ON BLOOD LACTATE ACCUMULATION AND CLEARANCE RATES FOLLOWING MAXIMAL ANAEROBIC EXERCISE

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With the Olympic Games coming to Atlanta in the Summer of 1996, much speculation has centered around the effects that elevated temperatures might have on some factors which may affect athletic performance. Eighteen subjects (mean age 26.3 years) performed two maximal exercise bouts on a Monarch Cycle Ergometer, during which resistance was increased .5kp every 2min until exhaustion. One exercise bout was performed in a moderate ambient temperature (mean 75° F.), and the other in a heated environmental chamber (mean 95° F.). Blood lactate was evaluated via finger tip samples using a YSI-100 lactate analyzer. Samples were taken at baseline, at 1min post exercise, and at 6min intervals for the ensuing 30 minutes of recovery. A dependent t-test for repeated measures was conducted to examine mean lactate concentrations and mean lactate clearance. There was no significant difference ($p > .05$) between mean blood lactate accumulation or mean lactate clearance between trials conducted in moderate versus elevated ambient temperatures. These results suggest that, under these conditions, ambient temperature does not affect peak blood lactate concentrations or the rate of lactate removal from the blood following maximal anaerobic exercise.

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THE EFFECTS OF HIGH HEELS ON POSTURE.

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Millions of women wear high heels on a daily basis. High heels may affect posture exacerbating existing low-back problems or predisposing women to low back pain. We have examined the effects of positive heel inclination on postural alignment in terms of pelvic tilt, horizontal displacement of center of gravity, and trunk, hip, and knee joint angles using the Peak 2D Motion Measurement System. Subjects were 10 female students (mean age = 26.7, ±SD = 5.7 years) who were videotaped with 2 trials each of barefoot and high heel stance (average = 2.54 inches). A 19-point spatial model was digitized using reflector markers. Although there was a trend for posterior pelvic tilt during high heel stance, none of the differences were statistically significant between the two conditions ($P > 0.05$): Pelvic tilt decreased from 7.56° (barefoot) to 6.23° (high heels), center of gravity was displaced from 10.14 cm to 10.01 cm in relation to an anatomical landmark, and trunk angle increased from 79.8° (barefoot) to 90.4° (high heels). Changes in hip and knee angles were less than 1°. It is concluded that perhaps a larger sample size may be necessary to more accurately quantify the impact of footwear on postural alignment. Also, a static model to compute muscle/joint moments in the lower back may be useful in future studies.

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AN ALTERNATIVE METHOD OF ESTIMATING IRREGULAR WALKING DISTANCE.

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The capacity to estimate irregular walking distance accurately is desirable in controlled exercise settings. Unfortunately, technology has not kept pace with this desire. The most commonly-used tool available for this task, the pedometer, has not produced acceptable results. This study was conducted to evaluate a "new" method of estimating irregular walking distance--simple stride counting. Eighteen subjects agreed to participate in this investigation. After stride length was estimated from a treadmill walk, subjects walked a pre-measured outdoor course of 1.6 miles. They carried a standard hand counter which was used to count every other stride, and they also wore five different pedometer models which ranged in price from $12 to $30. The total stride count elicited from the walk was converted to distance by multiplying stride number by stride length. The stride-counting distances were compared to the actual course distance and to the performance of the best of five pedometer models (via a "t"-test). The results were quite surprising. Mileage calculated from the raw hand counting data was significantly better than the best of the five pedometers ("t" = 2.47, $P < 0.025$). The average absolute error was 0.14 miles (8.8%) for hand counting and 0.26 miles (16.2%) for the best-performing pedometer. These data support the notion that simple stride counting is a reasonably acceptable method of estimating irregular walking distance. It is significantly more accurate than using a pedometer and may be considerably less expensive as well.

EFFECTS OF SELECTED KINEMATIC AND KINETIC VARIABLES ON INSTEP KICKING WITH DOMINANT AND NONDOMINANT LIMBS

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Soccer players do not kick the ball for maximal speed equally well with the dominant and nondominant limbs. Numerous studies in the literature have assessed a variety of kicking paradigms; however, mechanical differences in dominant and nondominant limbs has not been addressed. The purpose of this study was to investigate selected biomechanical variables which may influence differences between dominant and nondominant instep kicking. Variables chosen for analysis were based on findings from prior research which had studied kicking, but had failed to examine differences between sides. Ball speed for each of twenty kicks (10 dominant, 10 nondominant) was measured with a radar gun, and two kicks (one/side) with greatest speed were selected for analysis among the eighteen subjects. The study kinematically described position, velocity, and acceleration at the hip, knee, ankle and foot of the kicking limb while simultaneously measuring ground reaction forces on the plant foot between support foot contact and ball contact. Following kinematic and kinetic assessment a subset (n=11) of subjects were tested isokinetically for flexion and extension at the hip and knee for dominant and nondominant sides at 180 deg. sec^{-1}. Results showed 19 of 115 variables correleated ($r \geq 0.45$) with ball velocity on the dominant side, the ideal model. Four of fourteen identical variables were correlated with velocity on the nondominant side, although a wider range of variables were seen indicating randomness and variability. Significant differences ($p < .10$) between dominant and nondominant kicks were found in five kinematic variables with linear velocity of the toe at ball contact and maximum linear velocity of the toe on the dominant side accounting for the majority of variability in ball velocity. Based on results, there is a need for development of proper kicking mechanics with respect to achieving maximal velocity of the foot at ball contact for dominant and nondominant limbs.

EFFECT OF SINGLE VERSUS RECIPROCAL REPETITIONS ON ACCELERATION DURING KNEE EXTENSION ON AN ISOKINETIC DEVICE.

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Acceleration (ACC) has been reported to affect the amount of range of motion (ROM) spent at a pre-selected isokinetic velocity or load range. This study sought to determine if knee extension ACC was significantly different between single and reciprocal repetitions. Fifteen males (age 29.6±7.2 yrs) performed three maximal concentric reciprocal knee extension and flexion repetitions at isokinetic speeds of 60, 120, 180, 240, 300, 360, 400 and 450 degrees per second (d/s). ACC was defined as the ROM necessary to attain the pre-selected velocity. The first repetition, starting from a dead stop, was identified as single while the mean of repetitions two and three were identified as reciprocal. Reciprocal repetitions exhibited significantly less ACC at all speeds tested. ROM values below (means±SEM) are in degrees. (* $p<0.05$)

	SINGLE	RECIPROCAL
60 d/s	1.47(.17)	1.00(.00) *
120	3.27(.73)	1.53(.10) *
180	5.13(.62)	2.87(.13) *
240	7.20(.30)	4.53(.33) *
300	10.53(.44)	7.30(.33) *
360	14.33(.47)	11.27(.49) *
400	18.73(.50)	15.13(.47) *
450	32.73(.94)	28.33(.60) *

These results appear to demonstrate that ACC is significantly less during reciprocal repetitions as compared to single repetitions during knee extension on an isokinetic device. Therefore, consideration should be given to repetition type during testing on an isokinetic device in order to maximize load range.

CONSIDERATIONS FOR THE PROPER SELECTION OF DIVING FINS

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The selection of fins may encompass wading through arrays of sizes, shapes, materials, and other fin properties. With all the manufacturers claims of superiority, the choice for the consumer may be a difficult one. Independent investigations have revealed that differences between diving fins are the amounts of water displaced per cycle (power) and also the impedance of the fin to forward movement (drag); the net effect on the diver being varying amounts of resistance (torque) exerted on the lower extremities to move at a given velocity. While previous investigations have attempted to determine the best set of fins, the theory of a single "best" fin may be inappropriate. To test this idea, three sizes (small, medium, and large) and three flexibilities (flexible, medium, and stiff) of diving fins were tested at three intensities (RPE's 9, 13, & 17) using a heterogeneous subject pool (n=18). Qualitative analysis of the finning revealed differences between the divers motions. For this reason, a standardized motion was developed (flexion & extension primarily at the hip with minimal amounts at the knee). Significant interactions existed 1) between fins and intensity ($p < .01$), and 2) between size, flexibility, and intensity ($p < .05$). These results suggest that the efficiency of each set of fins, as well as the effects of both size and flexibility varied depending upon the intensity. Therefore, it was concluded that the proper selection of diving fins must take into consideration the intensity at which the fins will be used before any decisions relating to size and flexibility can be reached. Given this stipulation, plots of these data suggested that less flexibility increased efficiency at the easiest intensity with all sizes of fins and that less flexibility also increased efficiency at the hardest intensity with the large size fins.

ANTHROPOMETRIC EFFECTS ON RELATIVE STRENGTH DURING KNEE EXTENSION ON AN ISOKINETIC DEVICE.

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The purpose of this study was to investigate the relationship between the anthropometric variables of gravity effect torque (GET) and limb length (LL) with peak torque per unit of cross sectional area during knee extension exercise. Fifteen males (age 29.6±7.2 yrs) performed three maximal concentric knee extension repetitions at isokinetic speeds of 180, 240, 300, 360, 400 and 450 degrees per second (d/s). Muscle cross sectional area (cm^2) was estimated using an equation derived from skinfold and circumference measurements. Strength was expressed as peak torque per cm^2 of the quadriceps. Below are the results of Pearson product moment correlations between variables. (* $p<0.05$)

	GET	LL
180 d/s	.68 *	.55 *
240	.65 *	.58 *
300	.75 *	.65 *
360	.76 *	.62 *
400	.76 *	.63 *
450	.71 *	.57 *

These results demonstrate a positive correlation between lower limb anthropometries and peak torque per cm^2 of the knee extensors. This suggests that individuals with heavier and longer limbs may possess an advantage during strength testing. Therefore, consideration should be given to limb length and limb weight when comparing peak torque results of an isokinetic knee extension test.

EFFECT OF GENDER ON ACCELERATION DURING KNEE EXTENSION ON AN ISOKINETIC DEVICE.

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The amount of range of motion (ROM) spent at a pre-selected isokinetic velocity or load range is reported to be affected by the rate of acceleration (ACC). This study sought to determine if gender differences existed for knee extension ACC. Subjects (15 male, 20 female; age 27.5±6.5 yrs) performed three maximal concentric knee extension repetitions at isokinetic speeds of 60, 120, 180, 240, 300, 360, 400 and 450 degrees per second (d/s). ACC was defined as the ROM necessary to attain the pre-selected velocity. Males exhibited significantly less ACC at 120 through 450 d/s. Values below (means±SEM) are in degrees of ROM.

	MALES	FEMALES
60 d/s	1.00(.00)	1.10(.05)
120	1.53(.10) *	1.93(.12)
180	2.87(.13) *	4.02(.18)
240	4.53(.33) *	6.53(.17)
300	7.30(.33) *	10.42(.25)
360	11.27(.49) *	15.53(.51)
400	15.13(.47) *	18.65(.62)
450	28.33(.59) *	36.71(1.13)

* significantly less than females ($p<0.05$)

These results demonstrate that males exhibit less ACC when compared to females during knee extension exercise on an isokinetic device. Therefore, consideration should be given to velocity selection during exercise with females on an isokinetic device in order to maximize load range.

EFFECT OF NUMBER OF REPETITIONS ON ACCELERATION DURING KNEE EXTENSION ON AN ISOKINETIC DEVICE.

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Acceleration (ACC) has been reported to affect the amount of range of motion (ROM) spent at the pre-selected isokinetic velocity or load range. This study sought to determine if number of repetitions significantly affected knee extension ACC. Fifteen males (age 29.6±7.2 yrs) performed 50 maximal concentric knee extension repetitions at an isokinetic velocity of 180 degrees per second. ACC was defined as the ROM necessary to attain the pre-selected velocity. The mean for each five repetitions was calculated for data analysis. ACC significantly increased every 10 repetitions from five through 50. Values below (means±SEM) are in degrees of ROM.

REPETITIONS	ACC ROM
5	4.6(.36)
15	5.7(.55) *
25	6.4(.64) *
35	7.4(.75) *
45	8.3(.71) *
50	9.1(.78) *

* significantly greater than previous value ($p<0.05$)

These results demonstrate a linear relationship between number of repetitions and ACC during knee extension exercise on an isokinetic device. Therefore, in an effort to maximize load range, consideration should be given to selection of the number of repetitions performed during knee extension exercise on an isokinetic device.

EATING DISORDERS IN FEMALE INTERCOLLEGIATE ATHLETES.

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Many female athletes go to great lengths to achieve and maintain a lean body shape, as leanness is thought to confer a competitive advantage in many sports, especially those which place great emphasis on endurance or aesthetics. As such, it might be assumed that athletes participating in "lean sports" such as gymnastics, long distance running, cheerleading, and dancing might have a higher prevalence of disordered eating than athletes competing in other sports. The purpose of this study is to determine the prevalence of disordered eating patterns among females intercollegiate athletes. One hundred forty five female intercollegiate athletes completed the Eating Disorders Inventory (EDI), a 91 item questionnaire which assesses behavior and attitudes of body image, eating and dieting and psychopathology related to anorexia nervosa. Analysis of variance procedures comparing "lean sports" to "other sports" revealed no significant difference ($p > 0.05$) between these two groups on any of the subscales. Comparison of individual athletic teams also revealed no significant difference between the teams ($p > 0.05$). There was a significant difference ($p < 0.05$) between race on the Body Dissatisfaction subscale of the EDI. African Americans had a significantly lower score than white athletes. The results of our study are discordant with those which found a great prevalence of disordered eating in female athletes competing in "lean sports." However, the ethnic difference in Body Dissatisfaction is not surprising as eating disorders are most common in white, upper socioeconomic class females.

BODY COMPOSITION OF PROFESSIONAL FOOTBALL ATHLETES

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To compare body composition methods in professional football players by position, 23 athletes served as subjects. Mean (± SD) physical characteristics were: age 25.7 ± 3.3 yr.; ht. 189.9 ± 7.1 cm; wt. 131.3 ± 23.1 kg. Subjects were evaluated using seven site skinfolds (SF) and hydrostatic weighing (HW) with residual lung volume determined simultaneously. The following mean (± SE) values were obtained:

POSITION	n	SF%	HW%	BODY WT(kg)
Offensive Line	11	21.2±1.3	24.1±1.4*	136.2±4.4
Speed Positions	7	9.5±0.8	10.4±0.7	91.4±4.5
Defensive Line	5	18.2±1.1	17.6±0.6	120.1±2.6

* significantly different from SF% ($p<0.01$).

The % fat by HW was approximately 8.5% higher in offensive lineman (OL) than previous results (Wilmore 1976). Compared to this earlier study, body wt, fat-free wt, and fat wt were 23.5 kg, 8.5 kg, and 15.0 kg higher, respectively, in current OL. In summary, contemporary lineman are heavier than previously reported values, but with the majority of the increase due to gains in fat weight. Furthermore, due to the observed difference in % fat by SF and HW, SF may not be an appropriate measure to assess % fat in OL.

COMPARISON OF BIOELECTRICAL IMPEDANCE ANALYSIS (BIA) TO DUAL X-RAY ABSORPTIOMETRY (DEXA) MEASUREMENTS IN WEIGHT TRAINED MALES

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Body composition assessment during training provides valuable information to the athlete regarding the overall effects of diet and training on total body weight, fat weight, and lean body weight. Athletes often alter their diet and/or training volume based on results of body composition assessments in order to promote desired changes. Therefore, it is critical that body composition measurements are accurate. Bioelectrical impedance analysis (BIA) is a relatively inexpensive, convenient, and popular method of measuring body composition. Studies have indicated that BIA results are generally reliable. However, BIA results have not been reported to be valid when compared to hydrostatic weighing. Recently, whole body dual energy x-ray absorptiometry (DEXA) has been suggested to be the most accurate method of assessing body composition. The purpose of this study was to evaluate the validity of BIA in comparison to DEXA in resistance-trained athletes. 28 experienced resistance-trained males who were 26±6 years old and were training 8.5±2 hrs/wk volunteered to participate in this study. Subjects fasted for 8 hrs prior to undergoing BIA and DEXA following standard procedures. BIA was performed using the Valhalla 1990b Bioelectrical Impedance Analyzer outfitted with the athletic population computer eprom. DEXA was performed using a Hologic QDR-2000 enhanced array whole body dual x-ray absorptiometer. Data were analyzed using Dependent t-tests with Pearson product-moment correlations. Results revealed that BIA significantly underestimated fat weight (11.74±4.6 vs. 8.68±4.6 kg, p=0.004) and percent body fat (14.39±4.7 vs. 10.50±4.2%, p=0.002) while significantly overestimating lean body weight (65.34±8.5 vs. 72.10±9.3 kg, p=0.001). Correlational analysis revealed significant correlations for fat weight (r=0.38, p=0.05) and lean body weight (r=0.85, p=0.001). However, DEXA and BIA determined percent body fat measurements were not related (r=0.23, p=0.25). Results indicate that when compared to DEXA, BIA does not accurately assess body composition nor correlate to percent body fat in resistance-trained males.

PREDICTING WOMEN'S PERCENT BODY FAT: SIRI VS. LOHMAN EQUATIONS.

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Percent body fat (%BF) is most often predicted from Siri's equation ([495/density] - 450), assuming a density of 1.1 g·cc^{-1} for fat free mass (FFM). However, women have less bone mineral content per unit of FFM resulting in a lower FFM density. Therefore Lohman's %BF equation has been promoted for use in this population ([509/density] - 465). The purpose of this study was to determine whether the resultant %BF predictions from these 2 equations were significantly different and clinically relevant. Eight overweight women, 25-45 yrs, participated in a %BF screening. The sum of 3 skinfold sites (SOS = tricep + suprailium + abdomen) were used to calculate body density (BD) per Jackson and Pollock's regression equation (BD = 1.089733 - 0.0009245 [SOS] + 0.0000025 [SOS]^2 - 0.0000979 [age]). The summary statistics are listed below:

	Age	SOS	Siri %BF	Lohman %BF	%BF Diff	r	P*
Mean	35.38	108.58	36.77	35.46	-1.31	.99	0.0000
SD	7.96	27.50	5.29	5.38	0.21		
SEM	2.82	9.72	1.87	1.90	0.08		

*Paired T Test on %BF mean difference. Regression equation to predict Lohman %BF from Siri %BF: -1.844 + 1.0146*Siri %BF; CI = 95%.

Results showed a high correlation between the 2 equations. Lohman's equation predicted statistically lower %BF in all cases. The clinical relevance of the %BF difference may be debated when methods with high prediction error rates (e.g. skinfolds, ± 3.9%, women) are used. In practical terms, the current %BF tables based on Siri's equation are adequate to estimate %BF when greater precision is NOT required.

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EFFECT OF A SPLIT EXERCISE SESSION ON EXCESS POSTEXERCISE OXYGEN CONSUMPTION IN YOUNG OBESE WOMEN

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This research examined the differences in excess postexercise oxygen consumption (EPOC) in young obese women following one long and two short exercise sessions. Subjects were 23 untrained obese females (age = 22.3 ± 4.5 yrs; ht = 164.9 ± 4.9 cm; wt = 81.4 ± 17.3 kg; %fat = 37.5 ± 6.1; VO_2 max = 32.2 ± 7.9 ml/kg/min). Three exercise/postexercise tests were performed during which each subject walked at 3 mph on a grade-adjusted treadmill set to elicit a 75% max workload. Subjects were randomly assigned to one of two exercise trials, performed on two separate days. One session consisted of 30 minutes of continuous exercise and measurement of EPOC, and the second consisted of two 15-minute exercise sessions with EPOC measured following both. EPOC was measured for a minimum of 30 minutes or, until the preexercise resting VO_2 was achieved. MANOVA revealed no significant differences between the three mean EPOC values: 74.4 (± 44.1) and 60.0 (± 30.9) ml/kg/min for the two 15 minute sessions and 83.7 (± 56.3) ml/kg/min for the 30-minute exercise session. A multivariate analysis of variance for repeated measures revealed no significant difference between the sum of the 15-minute EPOCs and the EPOC following 30 minutes of exercise. However, minute-by-minute analysis across time, which tests each measurement separately, did reveal a significant difference between the sum of the 15 minute EPOCs minus the 30 minute EPOC. Evaluation of these data as ratios of EPOC to the exercise oxygen consumption (EOC) revealed that the shorter exercise sessions produced EPOCs almost twice as large as the EPOC for the longer session (23% and 20% vs 12%). Although the energy requirement postexercise may be modest, many recovery periods from short but intense exercise, added over several months may yield better exercise compliance for the obese.

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RESTING CORTISOL CONCENTRATION AND INSULIN SENSITIVITY IN MEN AND WOMEN DURING TRAINING

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Exercise training may increase resting plasma cortisol concentration more profoundly in women than men, however, data supporting this hypothesis is minimal. The primary purpose of this study was to thus compare cortisol in men and women over a training period. An increase in cortisol may produce whole-body insulin resistance; we therefore also examined insulin sensitivity in these subjects. Ten women and 9 men of the university swim team were tested. The athletes were examined three times: PRE, before the initiation of formal training; 9 WKS, after 9 weeks of training averaging 5,500 m/day; 18 WKS after an additional 9 weeks of training averaging 8,300 m/day. VO_2max increased by ~24% ($P<0.05$) in both groups. Resting plasma cortisol concentration, however, did not change in either the women (386.4 ± 8.7, 421.2 ± 38.0, and 404.3 ± 27.7 nmol/L) or men (389.0 ± 21.9, 330.9 ± 31.9, and 381.7 ± 16.8 nmol/L), respectively. Insulin sensitivity, as determined from a oral glucose tolerance test, also did not change with training. These findings indicates that plasma cortisol concentration is unaltered despite a marked increase in training volume and does not vary between sexes. Intense swim training also does not change insulin sensitivity.

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THE EFFECT OF EXERCISE CONDITIONING, DIET, AND DRUG THERAPY ON GLYCOSYLATED HEMOGLOBIN LEVELS (HBAlc) IN TYPE 2 DIABETICS.

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Thirty-nine Type 2 diabetics underwent the following tests, pre and post 15 weeks: Maximal incremental exercise test, blood analysis, and body composition analysis. All subjects were on an oral hypoglycemic agent but no prescribed diet regimen. Twenty-one subjects were prescribed an individualized exercise program for 15 weeks. Significant differences were found in the exercise group after 15 weeks in: total body fat, trunk fat, peak 0_2 consumption and MET values. For the exercise group correlations existed between HbAlc, arm muscle area, and leg lean mass. 62% of this group showed a reduction in HbAlc values. Exercise in conjunction with oral drug therapy did not directly modify HbAlc levels, but did result in favorable effects on blood lipid values, fitness levels, and body composition values. These effects may help to improve glycemic control and decrease the risk of cardiovascular disease in this population.

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ANABOLIC EFFECTS BY FENOTEROL IN CARDIAC AND SKELETAL MUSCLE ARE ATTENUATED WITH BETA-ADRENOCEPTOR ANTAGONIST

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This study sought to examine the acute anabolic effects of the *B*eta-adrenoceptor agonist (*B*AA), fenoterol, on skeletal and cardiac muscle mass, and determine if a treatment effect could be attenuated by a *B*eta-adrenoceptor antagonist. Thirty mice (N=30) were assigned to one of three groups: control (C), fenoterol only (F) and propranolol/fenoterol (P/F) and treated for 16 days via intraperitoneal injections. Pre and post-treatment body masses were not different. Weight change was statistically significant ($p<.01$) in P/F (-3.7 ± 2.2 gms.) compared to C (-0.6 ± 2.9 gms) and F (1.7 ± 2.2 gms). Relative mass (mg/gm wet weight) of the gastrocnemius muscle was significantly greater ($p < .01$) in the F (4.2 ± 0.4 gms) when compared to C (3.5 ± 0.4 mg/gms) and P/F (3.7 ± 0.5 mg/gm). Relative heart mass in C (5.2 ± 0.5 mg/gm) and F (5.9 ± 0.9) were significantly greater ($p < .01$) than P/F (4.6 ± 0.4 mg/gm). Relative heart mass in F and C approached statistical significance ($p = 0.08$). Observation of the data suggests that acute administration of the *B*eta-adrenoceptor agonist fenoterol produces muscle growth exibited by other *B*AA agents such as clenbuterol and cimaterol. Attenuation of response in the mice injected with the beta-andrenoceptor antagonist suggest that the anabolic response is dependent upon an interaction with a *B*-adrenoreceptor.

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The Effects of Ca2+ Antagonism on Clenbuterol Induced Muscle Hypertrophy

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In this study we examined the effect of the Ca^{2+} antagonist Nifidipine on the Clenbuterol induced skeletal muscle hypertrophic response. 40 Male (35-40gm) Swiss-Webster mice (Charles River Labs) were randomly assigned to one of four treatment groups. During the 14 day protocol mice were weighed daily and IP injected (between 7-10am) with either saline (SHAM, 0.1ml, IP), nifidipine(NIF, $1mg \cdot kg^{-1}$ IP), clenbuterol (CLEN $2mg \cdot kg^{-1}$ IP), clenbuterol+nifidipine |CN|. Following the treatment period both EDL muscles were surgically removed and randomly assigned to either *invitro* bath studies or quick frozen (liq.N_2) for biochemical studies. ($p<.05$: x±SEM) Body mass was not statistically different between groups upon completion of the study. No difference in EDL mass was seen between the SHAM(11.5±0.31mg) and NIF (11.67±0.33mg)groups. Significant increases in EDL mass were seen in the CLEN(13.67±0.22mg) and CN(12.30±0.28) groups when compared to the SHAM and or the NIF group. CLEN and CN were also significantly different from each other. Muscle performance was determined *invitro* by analyzing peak twitch (Pt) and peak tetanic (Po) force output at supramaximal stimulation. Pt was not different between the SHAM(49.68±1.26mN) and NIF(49.61±1.36mN) while CLEN(57.24±1.84mN) and CN(53.08±2.27mN) exibited significant increases ($p<.05$) in twitch tension over both SHAM and NIF and between each other. Po of SHAM(255.49±4.50) and NIF(252.24±2.64)was similar; CLEN(278.5±7.45mN) and CN(272.25±6.41mN) groups were also similar but were different from both the SHAM and NIF. When these data were normalized per cross sectional area (N/cm^2), no differences were observed between any group. Protein concentration (μg/mg) did not differ between treatment groups; in addition the percentage of MHC isoform type expressed between groups was not different. These data confirm that clenbuterol increases muscle mass and contractile performance, effects which are attenuated by nifidipine . In addition, these data provide *in vivo* support of the notion that iCa^{2+} is involved in muscle hypertrophy.

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A COMPARISON OF THE CALORIC COST OF AEROBIC STEP DANCE UTILIZING HAND WEIGHTS, RESISTIVE BANDS OR ISOMETRIC CONTRACTIONS

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Aerobic step dance has been shown to be an effective method for improving cardiovascular fitness (Woodby-Brown,1993). In an effort to enhance the caloric expenditure of aerobic dance, resistive exercises using hand weights and surgical tubing have been added to provide additional resistance thereby increasing the total energy expenditure. Twenty college aged females were assessed to compare the caloric expenditure requirements of a 30 minute aerobic step dance routine utilizing resistive bands, 2 lb. hand weights or isometric contractions. Each routine included a 5 minute warmup followed by alternating 3 minute intervals of stepping with 3 minute intervals of resistive exercises followed by a 5 minute cooldown. Each subject completed 3 routines which were identical with the exception of the type of resistance utilized. Oxygen consumption was measured and caloric expenditure was calculated for each routine. The results indicated that the mean caloric expenditure was 181.5 calories for the resistive bands, 180.4 calories for the 2 lb. hand weights and 179.5 calories using isometric contractions. ANOVA for repeated measures indicated there were no significant differences in caloric requirements among the 3 routines. These data suggest that there is no advantage of one type of resistance training mode over another when added to aerobic step benching to increase caloric expenditure.

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VALIDITY OF THE CONCONI TEST IN PREDICTING LACTATE THRESHOLD ON A BICYCLE WINDTRAINER

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The original Conconi test used to determine the lactate threshold (LT) from heart rate (HR) breakpoint, was based on field tests, however, cycling coaches are currently using tests on windtrainers to prescribe training programs for cyclists. The purpose of this experiment was to determine the relationship between HR breakpoint and the LT in 10 well-trained, male, cyclists on a windtrainer. Each cyclist completed two identical tests on a bike mounted on a windtrainer. The test started at 15 mph and increased 1 mph every minute until exhaustion. Subjects rode in the same gear throughout the test which was selected during a 15 min warm-up. HR and speed data were collected via an Apple computer system which was interfaced to a cat-eye mounted on the bike and an ECG belt worn by the subject. The computer system displayed speed during the test and alerted the subject when to increase speed. Blood samples were drawn every two minutes and analyzed for lactate concentration. Results showed that HR breakpoints did not occur in 5 of the 20 tests. Of the 15 remaining tests, the correlation between HR breakpoint and LT was r=.71. Averaged across subjects, the HR breakpoints for trials 1 and 2 equaled 21.4 and 22.6 mph, respectively. Corresponding LT averaged 22.3 and 22.2 mph, respectively. On an individual basis the HR breakpoint ranged from 3 mph less to as much as 4 mph greater than the LT. These data do not support the validity of the HR breakpoint as a predictor of LT nor its use by coaches for prescribing training.

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EFFECTS OF ACUTE STRESS AND SEROTONERGIC ACTIVITY ON FATIGUE DURING PROLONGED EXERCISE

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The purpose of this investigation was to examine the separate and combined effects of acute stress and increased serotonergic (5-HT) activity on fatigue during prolonged exercise in the rat. Flinders Sensitive Line (FSL) and Flinders Restive Line (FRL) rats were used in this investigation because of their susceptibility and resistance to depression, respectively. After a 4 wk treadmill acclimation period, 8 FSL and 8 FRL animals completed 4 runs to exhaustion (22 $m \cdot min^{-1}$ & 7% grade) on a motorized treadmill separated by at least 1 wk. Immediately prior to each run to exhaustion animals were injected interperitoneal (i.p.) with 1 $mg \cdot kg^{-1}$ of quipazine dimaleate (QD; 5-HT agonist) or the vehicle (VEH; 0.9% saline). Twenty-four hr prior to each run to exhaustion animals were subjected to one of two stress conditions; 2 h of restraint in a plexiglass cylinder (RSTR) or no stress (NOST). Consequently, all animals ran to exhaustion under four conditions: CON (VEH & NOST), QD (QD & NOST), RES(VEH & RSTR), and QD-RES (QD & RSTR). Treatments were administered in a randomized fashion. No differences were seen between animals in run time to exhaustion (RUN-EX) during CON (FRL=100.4±11.3 min; FSL=104.5±10.9 min; M±SE). RUN-EX decreased ($p \leq 0.05$) during QD (FRL=60.7±11.2 min; FSL=51.5±11.0 min), but, no differences were seen between groups. RUN-EX was reduced ($p \leq 0.05$) in FSL animals during RES (46.1±10.9 min), while RES had no effect on RUN-EX in FRL animals (91.7±15.0 min). Futhermore, the reduction in RUN-EX during QD-RES was much greater ($p \leq 0.05$) in FSL animals (16.39±2.37 min) when compared to FRL animals (47.2±11.1 min). The results of this experiment indicate that FSL rats are more susceptible than FRL rats to fatigue following acute stress and that this effect is enhanced by increased 5-HT activity.

COMPARISON OF FATIGUE CURVES BETWEEN UPPER AND LOWER EXTREMITY MUSCLE GROUPS PERFORMING ISOKINETIC STRENGTH TESTING

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Muscular force generation is inversely related to the number of repetitions performed, recovery time between sets, and number of sets performed. However, whether muscular force declines to the same degree among various muscle groups remains unclear. The purpose of this study was to evaluate whether upper and lower extremity muscle groups fatigue in a similar or different pattern during successive sets of concentric-only isokinetic exercise. 30 experienced weight trained males who were 26±6 years old, 81.6±10 kg, and were training 8.5±2 hrs/wk volunteered to participate in this study. Subjects completed two isokinetic performance tests. The first test involved performing 5 sets of 15 maximal-effort repetitions on the Ariel computerized bench press at a bar speed of 10 deg/sec with 60 sec of rest recovery between sets. After completing the final set, the subjects rested for five minutes. Subjects then performed 5 sets of 15 maximal-effort repetitions on the Ariel computerized upright squat machine at a bar speed of 20 deg/sec with 60 sec rest relief between sets. Arterialized blood lactate was determined in a subset of 13 subjects prior to and following the bench press and upright squat exercises. Data were analyzed by repeated measures ANOVA with Scheffe' post-hoc analysis. Results revealed that average peak force per set on the bench press significantly declined by 42% ($p<0.05$) during sets 1-5, respectively, (918±144; 730±132; 611±113; 559±112; 530±112 N) while average total work per set significantly decreased by 40% (4,021±805; 3,274±699; 2,811±669; 2,554±661; 2,401±636 J). Blood lactate significantly increased from 2.0±1.2 to 7.7±3.1 mmol/L during the bench press exercise. Average peak force per set on the squat significantly declined by 29% during sets 1-5 (1,680±413; 1,601±403; 1,461±383; 1,294±385; 1,200±401 N) while average total work significantly decreased by 30% (7,066±1,846; 6,671±1,625; 6,031±1,491; 5,435±1,425; 4,957±1,464 J). This lesser degree of loss in force generation occurred despite the fact that blood lactate levels significantly increased from 6.4±2.5 to 13.7±4.4 mmol/L during the squat exercise and that subjects were able to generate one repetition maximal capacity (1 RM) during the first set of exercise. Results indicate that lower extremity muscles experience a lesser degree of loss of muscular force generation during successive sets of repetitive maximal effort isokinetic contractions when recovery time was held constant.

COMPARISON OF JUNIOR AND COLLEGIATE FEMALE GYMNASTS PERFORMING THE HANDSPRING FRONT TUCKED VAULT

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This study compared the biomechanical characteristics of 2 groups of skilled female gymnasts from springboard takeoff (TO) to the final air-phase apex. The subjects were 8 NCAA I ranked collegiate (COLL) gymnasts (20.21±1.2 yrs) and 8 junior (JR) gymnasts (14.98±0.6 yrs). The subjects were videotaped (60Hz) and data were reduced with a Peak 5 motion analysis system. The variables which were statistically (alpha=0.05) analyzed were: preflight and horse (HOR) contact time, off-board to apex time, center of mass (COM) displacement (D) on the HOR and from the HOR to the apex, COM linear velocities (V) at four selected events, and the change in COM linear V while in contact with the HOR. The two groups were statistically different for only 2 variables. The COLLs had both a significantly greater COM vertical (VERT) V at takeoff (TO) from the HOR (2.67±0.3 vs 2.08±0.4 $m \cdot s^{-1}$) as well as a greater COM VERT D from HOR TO the apex of the final air-phase (0.31±0.03 vs 0.22±0.06 m). The COLLs were able to create and maintain a greater COM VERT V departing the HOR which resulted in a greater VERT D to the apex and time to landing during the final air-phase when compared to the JRs. The COLLs displayed temporal and kinematic superiority to the Jrs with respect to variables which directly impact upon higher scoring by the judges. The longer air-time of the COLLs allowed them to more precisely execute the technical requirements of the front tucked vault while the JRs were less precise in their overall performance due to their abbreviated air-time. Therefore, the JRs could improve their performance by increasing their VERT V at takeoff from the HOR as it would increase the air-time needed for successful completion of the vault.

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FEASIBILITY STUDY UTILIZING AN EXPERT SYSTEM FOR ANALYSIS OF THE HUMAN GAIT CYCLE

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Human gait evaluation is often conducted by qualified professionals without the assistance of the technology which would enable them to add the dimension of quantification to their assessments. The purpose of this study was to determine the feasibility of creating a microcomputer software program capable of evaluating specific aspects of the human gait cycle. An extensive literature review was conducted in order to formulate the necessary parameters for ascertaining normalcy. The gait cycle was subsequently divided into six phases: heelstrike, midstance, toe off, initial swing, midswing, and terminal swing. An expert system software program was written to quantitatively evaluate hip, knee, and ankle joint positions measured in degrees as determined from a sagittal plane view of the right hand side of the subject's body. This system enables the professional to conduct a quantitative assessment of limb placement and joint positioning which are critical to accurate, comprehensive evaluations. If any phase within the gait cycle is determined to be abnormal, a display screen is generated to inform the user of the affected phase, the specific joint(s) involved, and advisories pertinent to the current situation. After all phases have been analyzed, a summary screen is generated. Though this study resulted in the successful creation of an expert system capable of quantifying the process of human gait analysis, there remains considerable opportunities for further research in the area of more accurately defining the concept of normalcy, in the area of upper body considerations, and in bilateral and frontal aspect concerns during human gait.

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THE INFLUENCE OF BODY MOMENTUM AND RACQUET VELOCITY ON TENNIS SERVE BALL VELOCITY.

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The purpose of this study was to analyze the role of the body's linear momentum (LM) and racquet velocity (RV) on post-impact ball velocity (PIBV) during the tennis service. The sample consisted of 18 elite male tennis players (6 professional, 6 college, 6 junior). The junior and collegiate players were videotaped (60Hz) during a practice session, while the professional players were videotaped (60Hz) at a professional tournament. The data were analyzed to determine relationships and differences among the groups and variables (alpha = 0.05). Although no significant correlations or regression equations were determined, moderate to high correlations of .5311 (professional), .7461 (collegiate), and .5522 (junior) were calculated between horizontal RV at impact and PIBV. When combining all subjects into one group a moderate correlation (.5460) was calculated between horizontal LM and PIBV, but no such relationship existed between RV and PIBV (.2072). A significant difference was determined for horizontal LM between the professional (142.26 kg×m/s) and junior (74.13 kg×m/s) groups. Significant differences were also found for PIBV between the professionals (47.92 m/s) and the college (39.65 m/s) and junior (38.03 m/s) groups. No other ANOVA results proved to be significant. The results indicate that the professional players use their horizontal LM more effectively in the production of PIBV than the other groups. The correlations also indicate that horizontal LM and RV are beneficial in the production of PIBV.

EXERCISE INITIATION AND ADHERENCE FOR STRENGTH TRAINING AND FLEXIBILITY IN OLDER ADULTS

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Exercise initiation and adherence was examined with older adults in a strength training (ST) and flexibility (F) program. The training period lasted for 4 months and consisted of 18 subjects; 78% females; x age = 72.2. During the exercise intervention (EI), the adherence rate was 95%. Before the EI, 89% of the group reported dissatisfaction (DS) with their Body Image (BI), but after the EI, only 33% reported DS. Six months after the EI, the subjects' dissatisfaction with their body image dropped further to 22%. Seventy-eight % reported that they continued either ST or F while 50% of the group reported continuation of both ST and F. These results also indicated that with ST and F, the level of exertion remained the same yet frequency and duration increased as compared to pre-intervention activity levels. Furthermore, satisfaction increased with current exercise routines and BI improved for those who continued to exercise. These findings suggested that BI is an important factor to consider when promoting exercise initiation in older adults. Results also indicated that a variety of exercise choices for older adults appear to enhance exercise adherence.

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MORPHINE ALTERS FOREARM VASCULAR RESPONSES TO ISOMETRIC HANDGRIP IN HUMANS

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There are conflicting reports for the role of endogenous opioid peptides on cardiovascular responses during exercise. A number of studies have utilized naloxone (an opioid antagonist) to investigate the effect of opioids during exercise. In the present study, we examined the effect of morphine (an opioid agonist) on hemodynamic responses during isometric handgrip. Seven subjects performed 2 min of isometric handgrip (IHG; 30% maximum) followed by 2 min of posthandgrip muscle ischemia (PHGMI) before (control) and after systemic infusion of morphine (0.075 mg/kg loading dose + 1 mg/hr maintenance) or vehicle (saline) in double blinded experiments on separate days. Values for heart rate (HR), mean arterial pressure (MAP), and forearm vascular resistance (FVR; MAP/forearm blood flow; n=5) from the morphine session are shown below (*p < .05 vs. preexercise baseline; †p < .05 vs. control):

	Control			Morphine		
	Baseline	IHG	PHGMI	Baseline	IHG	PHGMI
HR (bpm)	59±5	72±6*	63±5*	58±4	71±6*	61±6*
MAP (mmHg)	88±3	100±3*	102±5*	90±3	100±4*	103±6*
FVR (units)	35±3	35±5	38±4	34±3	28±4*†	37±2

Vehicle (saline) had no effect on any responses (data not shown). Morphine did not effect HR and MAP responses during exercise and muscle ischemia. In contrast, morphine attenuated forearm vascular responses during IHG. We conclude that activation of the endogenous opioid system does not modulate cardiovascular responses to brief isometric exercise. The reduction of forearm vascular resistance during exercise by morphine may be locally mediated based on the fact that efferent muscle sympathetic outflow is known to increase during IHG.

POWER OUTPUT OF VERTICAL JUMPS AND LIFTS AT THE 1991 U.S. NATIONAL WEIGHTLIFTING CHAMPIONSHIPS

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The purpose of this study was to determine the magnitude of power outputs of athletes competing at the 1991 USWF National Weightlifting Championships and to investigate these relationships between lifting and vertical jumping performance. Snatch (S) and cleans (C) performed by the best male lifters (n=12, mean ± SEM body mass = 88.3 ±10.2kg) were selected for analysis. All lifts and post-competition vertical jumps were videotaped laterally at a camera rate of 60 Hz. The pull portions of the lifts and the jumps were analyzed using 2-dimensional spatial models and a Peak Performance analyzer. The mean ± SEM for S, C, static vertical jump (SV) and counter vertial jump (CV) were 133.3 ±8.0kg, 162.5 ±9.5kg, 68.1 ±1.9m, and 74.1 ± 2.0m, respectively. Mean ± SEM power indices calculated using the Lewis formula were 1586.3 ± 167.3W (SVL) and 1656.1 ±174.7W (CVL) for SV and CV, respectively. Mean ± SEM power outputs were determined for the total pull (TP) and the second pull (SP) for both the snatch and clean (TP/S = 2448.7 ±226.8W; SP/S = 3473.9 ±314.2W; TP/C = 2240.4 ±206.9W; SP/C = 3504.8 ±356.4W. Both SVL and CVL correlated high with TP and SP in both S and C (r=.92 to .97). SVL and CVL were correlated to S (r=.84 and .86) and C (r=.77 and .78) weight lifted, respectively. Regression analysis produced prediction equations for TP/S [power = SVL(4.44123) + SV escape velocity(-419.90226) + body mass(-55.94388) + 7952.11440, R^2 = .93], S [weight lifted = CVL(0.14557) + body mass(-1.84563) + 55.15, R^2 = .89], and C [weight lifted = SVL(0.35806) + SV escape velocity(-183.32476) + body mass(-5.37766) + 407.86, R^2 = .77]. General weightlifting ability can be estimated from these data with reasonable accuracy using vertical jump performance without sophisticated measurement equipment.

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PLASMA PROENKEPHALIN PEPTIDE F RESPONSES TO SHORT-TERM HIGH-INTENSITY RESISTANCE EXERCISE OVERTRAINING

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Peptide F [preproenkephalin-(107-140)], along with epinephrine, is secreted from adrenal medullary chromaffin cells in response to intense exercise. Previous research has demonstrated elevated acute epinephrine concentrations in response to resistance exercise overtraining, but it is not known if peptide F follows a similar pattern. As previously reported with aerobic training, comparisons of peptide F and epinephrine concentrations provide information on secretion patterns of adrenal chromaffin cells. Therefore, plasma peptide F immunoreactivity (ir) was monitored to study secretory patterns of adrenal chromaffin cells in response to short-term high-intensity resistance exercise overtraining. Seventeen weight trained males were divided into overtraining (OT; n=11) and control (CON; n=6) groups. Overtrained subjects performed high intensity resistance exercise (100% 1 repetition maximum; RM) daily for two weeks, resulting in a decreased 1 RM ($\bar{X}$ = -12.2 kg; $p<0.05$). The control group exhibited no significant changes in strength. At the beginning, middle, and end of the study (tests 1-3), the maximal number of repetitions were performed at 70% 1 RM on a squat simulating machine. Plasma samples were collected 15 min pre-, immediately pre-, and immediately post-exercise, and analyzed for peptide F ir via radioimmunoassay (^{125}I). Unlike epinephrine, patterns of immediately post peptide F ir were similar for both groups throughout the overtraining protocol ($\bar{X}$±SE; $pmol \cdot mL^{-1}$; test 1 - OT = 0.074±0.004, CON = 0.075±0.002; test 2 - OT = 0.082 ±0.002, CON = 0.077±0.006; test 3 - OT = 0.081±0.006, CON = 0.081 ±0.003). Previously reported increases in acute epinephrine due to this overtraining protocol were not observed for peptide F. Therefore, peptide F does not appear to respond to this overtraining stimulus as does epinephrine. This suggests that within adrenal chromaffin cells, different production and/or release mechanisms exist for peptide F and epinephrine.

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FITNESS AND HEALTH INDICATORS IN VOLUNTEER FIREFIGHTERS OF TWO DISTINCT SOCIOECONOMIC ENVIRONMENTS.

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The purpose of this investigation was to compare selected indicators of fitness and health between two socioeconomically different groups of volunteer firefighters (VFF). There is an abundance of data regarding career firefighters however, descriptive data regarding fitness and cardiac risk is lacking in VFF. High socioeconomic status VFF (HSES) had average income of $78,098 with 85% of adults having some college education and low socioeconomic status (LSES)had average income of $22,183 with 22% of adults having some college education. It was hypothesized that the HSES VFF would have more favorable health and fitness profiles. A convenience sample of 62 VFF (two females and 60 males) from both LSES and HSES VFF departments, age and sex matched was selected for comparison. Each of the subjects underwent a submaximal cycle ergometer test to predict VO2max, cardiovascular risk factor profile, pulmonary function testing and a blood lipid profile. Data was analysed using ANOVA with a Scheffe post hoc test and $p < 0.05$ as the level for significance. Significant differences between the HSES and LSES were found for relative VO2 [37.2±1.5/32.4±1.3], diastolic blood pressure at workloads two and three and systolic blood pressure at workload two during the submaximal test [176/79±3.7/1.7 vs 190/88±4.8/2.4: 81±2.1 vs 90±2.1]. There were no significant differences in the pulmonary function, blood lipid results or self report of cardiac risk factor status. Results indicate that VFF in general have only a fair degree of cardiovascular fitness according to predicted VO2max. VFF of LSES have significantly reduced fitness levels in comparison to a group of HSES VFF. Furthermore both systolic and diastolic blood pressures were elevated in the LSES VFF compared to the HSES VFF during exercise. These data indicate the need for fitness training and education regarding cardiac risk factors in VFF and particularly in VFF of low SES.

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RELATIONSHIP OF PSYCHOLOGICAL PROFILES OF MOOD, EXERTION & FEELING ON ISOKINETIC STRENGTH PERFORMANCE

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Psychological status has been suggested to affect strength performance. The purpose of this study was to examine the relationship of psychological status on strength performance in well-trained weightlifters. 30 experienced weight trained males who were 26±6 years old, 81.6±10 kg, and were training 8.5±2 hrs/wk volunteered to participate in this study. Subjects completed the six item abridged Profile of Mood States (POMS) psychological inventory immediately prior to performing two concentric-only isokinetic performance tests. The first test involved performing 5 sets of 15 maximal-effort repetitions on the Ariel computerized bench press at a bar speed of 10 deg/sec with 60 sec of rest recovery between sets. After completing the final set, the subjects rested for five minutes. Subjects then performed 5 sets of 15 maximal-effort repetitions on the Ariel upright squat machine at a bar speed of 20 deg/sec with 60 sec rest relief between sets. Category-Ratio Rating of Perceive Exertion (RPE) Scale and a 10 point Feeling Scale (FS) data were collected after each set of exercise. Average peak force and total work performed for each set of 15 repetitions as well as the average peak force and total work maintained throughout the five sets of each exercise were divided by body weight in kg in order to express strength data in relative terms. POMS, RPE, and FS data were then correlated to strength data using bivariate Pearson product-moment correlation analyses to determine the relationship of psychological profiles of mood, exertion and feeling to strength performance adjusted for body weight. Results revealed that POMS and FS data did not significantly correlate to peak force or total work performed during the bench press or upright squat tests. RPE data negatively correlated ($p<0.05$) to average squat peak force and total work during the first three sets of exercise. However, this relationship was only moderate (r -0.45 to -0.63) and no relationship was observed in sets 4 or 5 of the squat or in the bench press exercise. These findings suggest that psychological status, as measured in this study, does not relate to isokinetic strength performance in well-trained male weightlifters.

CONTRAST OF CARDIAC REHABILITATION OUTCOMES IN MEN AND WOMEN WITH CORONARY HEART DISEASE .

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Social support has been shown to exert a positive influence upon selected outcomes in rehabilitative programs requiring behavior change. We evaluated 102 cardiac patients, 70 men and 32 women, to determine if gender differences exist in social support and whether it influences desired rehabilitative outcomes. Subjects were evaluated at entry and after 12-wks of cardiac rehabilitation on risk factors (serum lipids, obesity, etc), functional capacity, dietary intake, exercise program attendance, adherence to an exercise HR Rx, General Symptoms Index (GSI) of the SCL-90, as well as social support as measured by the MOS scale (RAND Corp.). Results are presented below as Means ± SEM:

Measure	Males Entry	Males 3 mo.	Females Entry	Females 3 mo.	P level
Age	57.9 ±1.2		60.2 ±1.7		NS
MOS (Total)	84.6 ±1.9		73.4 ±4		#
METs	8.43 ± 0.3	9.67 ± 0.4*	6.53 ± 0.4	7.16 ± 0.4	#@
Diet Score (%)	51.2 ± 2.6	54.6 ± 2.5	56.7 ± 4.8	67.7 ± 3.5	@
HDL mg/dl	33.7 ± 1.1	36.4 ± 1.4*	43.2 ± 2.3	45.3 ± 2.9	#@
GSI (SCL-90)	55.9 ± 1.4	52.2 ± 1.6	62.2 ± 2.0	58.0 ± 2.0	#@

* significant ($p \leq 0.05$) within group change, i.e. entry vs. 3 month
# @ significant ($p \leq 0.05$) between men vs. women at entry=# or at 3 mo=@

Conclusions: Men have significantly greater social support and a more normal psychological profile than women; men also had greater improvement in METs and HDL change along with better attendance and adherence to an exercise Rx. Women had significantly better dietary intake and HDL. Possible confounding influences could be marital status as well as attitudes towards physical activity.

SPOUSE INVOLVEMENT INFLUENCES ENTRY HEALTH STATUS MORE THAN PATIENT OUTCOMES IN CARDIAC REHABILITATION.

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Spousal support has been shown to exert a positive influence upon health behaviors in individuals in preventive and rehabilitative programs. Using a retrospective design we contrasted 56 pairs of patients referred to cardiac rehabilitation whose spouses either participated or did not participate in the program. Subjects were evaluated at entry and after 12-wks of multiple intervention on risk factors (serum lipids, obesity, etc), METs, dietary intake, exercise program attendance, adherence to an exercise HR Rx, and the General Symptoms Index (GSI) of the SCL-90. Results below expressed as Means ± SEM:

Measure	SPOUSE Entry	SPOUSE 3 mo.	NON-SPOUSE Entry	NON-SPOUSE 3 mo.	P level
Age	61.4 ±1.1		55.2 ±1.9		#
Attendance (%)		82.0 ± 1.8		79.0 ± 2.1	NS
HRAdherence (%)		61.8 ± 3.4		68.9 ± 2.9	NS
METs	7.58 ± 0.3	8.76 ± 0.4*	7.65 ± 0.3	8.36 ± 0.4*	NS
Diet Score (%)	54.5 ± 2.8	55.9 ± 2.9	50.2 ± 3.0	49.2 ± 3.2	NS
TC/HDL ratio	5.82 ± 0.2	5.61 ± 0.2	6.67 ± 0.4	6.41 ± 0.4	#
GSI (SCL-90)	55.2 ± 1.9	52.5 ± 1.7	59.3 ± 2.3	55.6 ± 1.8*	NS

* significant ($p \leq 0.05$) within group change, i.e. entry vs. 3 month
# @ significant ($p \leq 0.05$) between SP vs. NSP at entry=# or at 3 mo=@

Conclusions: Compared with patients whose spouses choose not to participate with them in rehabilitation, those with participating spouses have a more healthful profile at entry, i.e., a better dietary score, lower body weight and % fat, better serum lipid profile, and a more normal psychological profile; however, outcomes were no different, since 3 mo. improvements of both groups were comparable.

NUTRITIONAL STATUS AND LIPID PROFILES OF TRAINED STEROID-USING AND NONUSING ATHLETES

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Fourteen trained male anabolic steroid-using bodybuilders (SBB) (19-41 yr) and six national class nonusing lifters (WL) (20-38 yr) were recruited for the study. Three-day diet records were obtained from SBB and analyzed. A resting venous blood sample was drawn from SBB and WL. Serum/plasma was subsequently analyzed for various nutritionally related factors. Results showed that mean dietary energy (4469 ± 1406 kcal), protein (252 ± 109 g), vitamin and mineral intakes of SBB greatly exceeded Recommended Dietary Allowances (RDA). Dietary cholesterol intake was 2.9 times recommended levels. Serum/plasma nutrient analyses revealed that SBB had significantly greater albumin, calcium and LDL-cholesterol and cholesterol:HDL-cholesterol ratios than WL. SBB had significantly lower glucose and HDL-cholesterol. SBB also had a greater number of serum/plasma values outside of normal or recommended ranges. Most notable was hypercalcemia which was present in 42% of SBB but was not seen in WL. The greater serum albumin and calcium, in conjunction with the large nutrient intake in SBB, could indicate a stronger anabolic state in these subjects. However, significantly lower HDL-cholesterol, greater LDL-cholesterol concentrations and greater cholesterol:HDL-cholesterol ratios in SBB may promote an increased risk of cardiovascular disease. In addition, the hypercalcemia noted in SBB may have adverse effects if present over a period of time.

RELATIONSHIP BETWEEN LP(a) AND CHD RISK FACTORS IN HEALTHY CAUCASIAN MALES WITH HYPERLIPOPROTEINEMIA(a)

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Lipoprotein(a) [Lp(a)] is a distinct, low density lipoprotein identified in human blood plasma. Previous research has indicated that an elevated level of plasma Lp(a) (>25 mg/dl) is an independent risk factor for coronary heart disease (CHD). In a previous cross-sectional study, we found no correlations ($p>0.05$) between Lp(a) levels and other classic CHD risk factors (MSSE 26, 425-431, 1994) across a wide range of Lp(a) values (<1.0 - 92 mg/dl). The majority of the individuals in this study had Lp(a) values below 25 mg/dl, the suggested threshold value for increased risk for CHD. The purpose of the current study was to examine the relationship between Lp(a) and other CHD risk factors in a subset of Caucasian males (n=41) with hyperlipoproteinemia(a) (Lp(a) >25 mg/dl). Subject characteristics were as follows: mean age (42 y), weight (87 kg), percent fat (23.1%), and Lp(a) (43.3 mg/dl). Lp(a) and triglyceride data were normalized using a $\log_{10}$ transformation for the data analysis. Pearson Correlation Coefficients between Lp(a) and other key variables were as follows: treadmill time (0.18), % fat (-.31)*, waist-hip ratio (0.14), cholesterol (0.04), triglycerides (-0.18), HDL (-0.04), LDL (0.13), corrected LDL (-0.03), and cholesterol/HDL ratio (0.07). Both correlational and inferential analyses suggest that Lp(a) is an independent risk factor for CHD and it is not closely related to other CHD risk factors even in a subgroup with hyperlipoproteinemia(a).

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FLUCTUATIONS IN HUMAN PLASMA LIPID AND LIPOPROTEIN METABOLISM THROUGHOUT THE NORMAL MENSTRUAL CYCLE

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Ten healthy eumenorrheic females (26.4± 5.2 yrs) were studied during the normal menstrual cycle to determine the effect of the different phases of the menstrual cycle on plasma lipid and lipoprotein concentrations. Blood samples were collected in the early follicular phase (days 4-7); in the ovulatory phase (days 12-14); and in the luteal phase (days 24-26) for the determination of total cholesterol, HDL-C, and HDL-C subfractions as well as LDL-C levels. Repeated measures MANOVA revealed significant ($p<0.05$) increases in plasma total cholesterol levels (12.4% and 24.4%) and in LDL-C levels (20.2% and 30.9%)during the follicular phase compared to the ovulatory and luteal phases of the cycle, respectively. During the ovulatory phase, total cholesterol levels also increased significantly (10.7%) relative to the luteal phase. In addition, during the follicular phase there was a significant increase in plasma levels of HDL-C (19.2%) and HDL_3-C (13.9%) compared to the luteal phase. A significant increase (74.2%) in plasma HDL_2-C levels were demonstrated during the ovulatory phase versus the luteal phase. Furthermore, HDL-C levels were significantly higher (20.8%) during the ovulatory phase compared to the luteal phase. These results suggest the vital importance of defining the exact days and phases of the menstrual cycle when collecting blood samples for the analysis of total cholesterol and lipoprotein in premenopausal women.

THE EFFECTS OF EXERCISE ON SIX-MINUTE WALK DISTANCE IN OLDER ADULTS WITH ARTHRITIS

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Past research has indicated that older adults show many benefits from regular exercise. There are conflicting opinions, however, as to whether the measurements of improvement generalize to normal daily activities especially in frail individuals. The purpose of this investigation was to examine the effects of a 16 week aerobic exercise program on six-minute walking distances (D) in older individuals with osteoarthritis. Seven controls (C) mean age 66 ± 3 and nine exercisers (E) mean age 69 ± 3, all women , were randomly divided into groups receiving either twice per week counseling or three times per week exercise. Subjects performed a six-minute walk prior to (D1), and within two weeks of completing (D2), their respective protocols. T-test analysis (Mean$\pm$SE) showed D1 distances were not different between groups E and C and equaled 1118 ± 86 ft. Analysis of the distance gain scores ($\Delta D = D2 - D1$) were significantly different between groups ($p < .05$) with group E showing a 203 ± 99 ft. increase while group C had a 61 ± 89 ft. decrease. These results suggest that 16 weeks of regular aerobic exercise can improve six-minute walking distances in older frail adults. The six-minute walk may more accurately represent the normal daily activities in this population than other more commonly used physiological assessments.

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PHYSICAL ACTIVITY AND PHYSICAL FITNESS IN BOYS AND GIRLS FROM AN URBAN ELEMENTARY SCHOOL

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The level of physical activity and physical fitness in youth today is of great concern because of the implications in later life if low levels continue. The purpose of this project was to compare physical activity (PA) and physical fitness (PF) levels in a sample of 53 fifth graders from an urban elementary school. Twenty-six boys and 27 girls, 63% white and 37% African-American, completed a PF battery consisting of skinfold measures, mile run, grip strength, sit-ups, sit-and-reach, 20 yd run, and PWC_{170} bicycle test. PA was measured on 3 consecutive days of using the PDPAR, a self-report recall instrument, with type and intensity of activities recorded. Girls' performance scores for the grip, mile, and sit-up tests, and for the bike test, both in absolute and relative kilogram meters, were significantly lower than boys ($p<.05$). Girls also participated on fewer sport teams outside of school and had higher skinfold measurements. However, no differences were found with respect to PA between the genders or races. Also, no race differences were found in the PF. With race and gender groups combined, a significant correlation ($r=0.34$, $p<.05$) between the mile run and mean total activity was noted. This relationship also held for amount of moderate (3-4 METS) and vigorous (≥6 METS) activity. Consistent with previous research, girls in this study had lower PF levels than boys, but no differences were detected in PA. When the entire group was considered, PA level did impact on a measure of cardiovascular performance (mile run), indicating the impact of lifestyle on PF level.

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THE EFFECTS OF EXERCISE CESSATION OR REDUCED TRAINING FREQUENCY ON BODY COMPOSITION AND VO_2MAX

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The purpose of this study was to determine the impact of 14 days of exercise cessation (N=9) or a 50% reduction in training frequency (4 to 2 days/wk, N=10) on body composition and VO_2max in middle-aged men and women (mean ± SE, age, 48 ± 7.5 yrs). The 14 days of either no or reduced training followed a 12 week period of walking/jogging 4 days/wk, 40 min/day in these previously sedentary individuals. A group which maintained training for 14 days (N=9) was also examined. Fat mass (-1 kg) and % body fat (-1%, hydrostatic weighing) decreased significantly ($P<0.05$) in all groups from pre-training to 12 weeks; these measurements did not change with training cessation or reduced training. Waist girth, an indicator of regional adiposity, decreased ($P<0.05$) by ≈2 cm with training and remained unchanged in any of the groups over the ensuing 14 days. VO_2max increased ($P<0.05$) by 11% and did not decrease with 14 days of either no or reduced training. Exercise time during the treadmill test increased with training (14%, $P<0.05$) but was unaltered with the 14 d interventions. These findings indicate the maintenance of positive exercise-induced changes in body composition and cardiorespiratory capacity with short-term rest or minimal training in.

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RESTING LACTATE AND HEART RATE VALUES IN COMPETITIVE SWIMMERS TRAINING AT 2800 METERS

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Although altitude training for endurance athletes has been investigated, little is known about the effects of altitude on sprint athletes. Competitive swimmers (14 F, 8 M) trained anaerobically 20 days at 2800 m. Lactate (measured with YSI 2300 Sport) and heart rates (HR) were measured immediately upon awakening, prior to any activity. Lactates were measured on days 4 and 14 and HR on day 7, 14, and 19. Means (sd) (low-high) are shown below (*p<.05):

Day	Lactate (mmol/dl) Male	Female
4	2.1 (0.81) (1.4-3.9)	2.0 (0.62) (1.3-3.6)
14	2.1 (0.59) (1.3-3.1)	1.2*(0.64) (0.7-2.5)
Day	**HR (bpm)**	
7	59 (9) (48-76)	66 (9) (56-84)
14	59 (5) (48-64)	64 (9) (52-80)
19	54 (4) (48-60)	58*(6) (52-72)

At altitude resting lactates can reach high values even at rest. There were no significant differences between days 4 and 14 for males, but females showed significant decreases in both physiological measures. Apparently the female athletes acclimatized more rapidly than the males. High resting lactates raise questions regarding the 4 mmol "threshold". We observed significant sprint swimming improvements following training at altitude which may be related to the high levels of lactate of rest and training.

EFFECTS OF GENDER ON IMMUNOLOGICAL RESPONSES TO 25 WEEKS OF INTERCOLLEGIATE SWIM TRAINING

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Intense training has been reported to alter immune status and promote immunosuppression. The purpose of this study was to determine whether men and women respond differently to the immunological challenge of intense training (≈18 hrs·wk^{-1}). Fasting blood samples were obtained from 10 male & 10 female swimmers at weeks 0, 4, 10, 14, 15, 22, & 25 of training. Blood samples were analyzed for the percentage of lymphocytes in peripheral blood mononuclear cells; lymphocyte proliferation induced by pokeweed (PWM) and phytohemagglutinin (PHA) mitogens; and, plasma immunoglobulin A (IgA). Subjects also completed a 30 item daily and retrospective Symptoms of Infection Inventory (SII). Data were analyzed ANOVA with one measure repeated. Gender analysis revealed that total B cells (CD19) [9.9±3.5; 8.2±2.6%; p=0.06] and T-helper cells (CD4) [35.7±7.0; 30.5±9.2%; p=0.06] tended to be lower in females. However, no significant gender differences were observed in male and female, respectively, total T cells (CD2) [70.5±9; 67.1±13%; p=0.33], T-suppressor cells (CD8) [16.1±8; 12.2±6%; p=0.16], the ratio of CD4/CD8 [2.79±1.4; 2.87±1.3; p=0.85], PWM [43,237±43,918; 38,924±15,430 cpm; p=0.47], PHA [35,726±24,985; 41,248±43,600 cpm; p=0.48], or plasma IgA levels [173±67; 157±76 mg·dl^{-1}; p=0.59]. SII analysis revealed no significant differences between male and female responses to 24 of 30 SII questions. However, females reported significantly greater frequency and severity of headaches, fever/chills and coughing. Results indicate that although females tended to have slightly lower percentage of lymphocyte subpopulations and may experience greater frequency and severity of selected symptoms of infection during training, no significant differences were observed in T-lymphocyte functional status as determined by mitogen stimulation or humoral immunity as determined by circulating IgA levels. These findings suggest that the immune systems of males and females appear to respond similarly to the immunological challenge of intense training.

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INDUCTION OF MACROPHAGE BETA-INTERFERON mRNA DURING EXERCISE

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Recent data from our laboratory demonstrates that alveolar macrophages (Mϕ) obtained from mice exercised to fatigue are more susceptible to infection with herpes simplex virus Type I (HSV-1) than Mϕ from control mice. Mϕ's produce interferon beta (IFN-β) in response to viral infection. This serves to protect surrounding healthy cells. The purpose of this study was to determine whether there is a difference between IFN-β production in alveolar Mϕ obtained from exercised mice compared to control mice. Because of the difficulties in measuring the extremely low levels of IFN-β protein, we have utilized a sensitive reverse transcriptase polymerase chain reaction (RT PCR) method to measure the mRNA content of IFN-β. Exercised mice (EX , n=7) ran on a treadmill until fatigue (~ 3 hours), while control mice (CON, n=7) remained in lanes above the treadmill, subjected to the same handling and noise stresses. Immediately post exercise, mice were sacrificed and alveolar Mϕ were removed. The Mϕ were then incubated with HSV-1 for 48 hours. In addition, peritoneal Mϕ were harvested from 4 mice, then incubated with either media + poly I:C (a known inducer of IFN-β) or media alone. Total RNA was then isolated from Mϕ and reverse transcribed to cDNA using random priming. Next, the cDNA sequence corresponding to IFN-β mRNA's were amplified by PCR using a rapid air thermocycler. Samples were analyzed using PAGE and quantified over a broad range of thermocycles based upon incorporation of P^{32}-labelled CTP into the amplified DNA fragments. The cDNA sequence corresponding to mouse β-actin mRNA was quantified by similar methods and used to control for differences in reverse-trancriptase efficiency. After controlling for RT efficiency, alveolar Mϕ IFN-β mRNA was 5 fold greater in EX than CON. Induction was also observed in peritoneal Mϕ incubated with poly I:C which exhibited 12 fold greater mRNA levels than peritoneal Mϕ not incubated with poly I:C. These results clearly show increased production of IFN-β mRNA following exercise. This may reflect a higher degree of infectivity within Mϕ obtained from exercised mice.

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THE EFFECTS OF HIGH- VERSUS MODERATE-INTENSITY EXERCISE ON THE NK CELL RESPONSE IN WOMEN

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The natural killer (NK) cell response pattern to acute exercise has been well established in men and appears to be related to exercise intensity. The purpose of this investigation was to evaluate the effect of high- versus moderate-intensity exercise on the natural killer(NK) cell response in women on oral contraceptives. Each subject(n=8) completed two exercise sessions and one control session in a randomized, counterbalanced order. Treatments consisted of 25 minutes of cycle ergometer exercise at either 80% (HI-INT) or 40% (MOD-INT) VO_{2max}, and a 25 minute sedentary control (CON) session in which the subject remained seated on the bike. Blood samples were obtained at times corresponding to pre. (PRE), immediate post (POST), 90 minutes post(90M) and 3 hours post (3H) exercise. NK cell activity was quantified using a standard ^{51}Cr release assay and analyzed using a two-factor ANOVA design with repeated measures. During CON, NK cell activity gradually increased from PRE to 3H, suggesting a diurnal variation in NK cell activity in this population. HI-INT elicited a significant increase in NK cell activity and total number at POST relative to control values. NK cell activity showed a tendency towards suppression below control values at 90M in HI-INT, returning to resting levels by 3H. NK cell activity did not differ significantly from control values at any time period in MOD-INT. The findings from this investigation demonstrate that the NK cell response to exercise when expressed relative to control in women is similar to the exercise response previously shown in men.

BILATERAL DISTAL BICEPS BRACHII RUPTURE

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HISTORY: 31YO right-hand dominant white male was seen for severe pain of both elbows. He had been doing preacher curls with 125 lbs. on an unfamiliar bench when he felt a painful pop.

PHYSICAL EXAM: Patient had ecchymosis and soft tissue swelling superior anterior aspect of both elbows. Neurovascular examination was within normal limits. He had pain on active flexion and supination.

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CALF PAIN AND FOOTBALL

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HISTORY: 22 YOWM collegiate football center developed insidious onset of multiple joint pain and swelling including both shoulders, right elbow, right wrist, right knee over a 4-day period. When fall practice began, increased right knee pain and swelling occurred. He underwent arthroscopy, partial medial meniscectomy, and extra-articular reconstruction 4 years previously from which he had done well. He developed calf pain, swelling, and redness. He also had a low grade elevated temperature and easy fatigability.

PHYSICAL EXAM: T 99. There was pain on ROM of both shoulders and ROM of right knee. Wrist exam showed diffusely boggy synovium, pain over medial clavicle on palpation. Right knee exam showed moderate effusion, 10- to 110 degrees range of motion. He had severe pain on palpation of the posterior knee and increased calf girth by 2 inches. He had a positive Homan's sign with neurovascular status intact otherwise.

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HAMSTRING STRAIN with FOOT DROP-FOOTBALL

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HISTORY-- a 23 year old male division III tailback and sprinter has a history of chronic hamstring strains and left ankle fracture (1989). Running the lead off in a 4X100 relay in March (1994) he sustained a severe left hamstring strain during baton exchange. Symptoms included causalgia and tightness in the posterior aspect of his left thigh. Over the course of several weeks he developed radiating pain and weakness in his lower leg, which developed into a complete foot drop. Initial treatment included electrical stimulation, stretching, and strengthening. He returned to football in fall and was hampered by ankle weakness and instability. He sustained a left lateral ankle sprain in September and was referred to a Sports Medicine clinic.

PHYSICAL EXAM-- Chief complaint was pain and tenderness in the lateral aspect of his lower leg and ankle. Walking and running gait were unremarkable. ROM of his lumbar spine, hip, knee, and ankle were normal. Mild swelling noted in lateral aspect of the left ankle. Hamstring flexibility and strength are WNL. Diminished strength of evertors and dorsiflexor graded 3+/5 and special tests reveal grade II talar tilt and anterior drawer of left ankle. Impaired proprioception and kinesthetic awareness noted by increased postural sway and diminished single leg stance test. A positive Tinel's sign elicited over the left common peroneal nerve.

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ARM PAIN -- TENNIS

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HISTORY -- 19-year-old collegiate tennis player presented with five day history of pain, weakness, and dysfunction right arm after playing three matches in two days. Noted increasing soreness after first two matches, hit a forehand in third match, felt a sharp pain around elbow, and noted decreased strength. Soreness and vague, non point tender pain persisted, and he could not grip racquet or swing hard enough to continue. Patient had one similar episode two months prior, but symptoms had resolved with rest.

PHYSICAL EXAM -- No atrophy. ROM decreased - 10 degrees flexion contracture, 15 degrees supination contracture. Muscle strenght decreased into wrist extensors, finger extensors, thumb extensors, and supinator. Decreased sensation over dorsal thumb web space. Point tender area just lateral to brachialis muscle just proximal to elbow.

UPPER TRAPEZIUS STRAIN- Football

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HISTORY- 16 year old, well developed football player recieved a blow to the superior aspect of his right shoulder, while his arm was abducted and externally rotated. He has no history of previous shoulder injury. Lack of motion and diminished strength was reported throughout his right upper extremity for a couple of hours. Ice was applied immediately, he was put in a sling and was instructed to visit the clinic the next day.

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PHYSICAL EXAM- Right shoulder appears elevated and protracted. Abduction and flexion is limited to 90°, there is diminished strength in all planes and there is no residual neurologic deficit. Cervical exam is unremarkable. Passive range for internal rotation and external rotation is normal, but during flexion and abduction there is limitation secondary to guarding of the upper trapezius and the levator scapulae. Scapular rotation is not observed with flexion and abduction, he is, however able to actively depress and retract his scapula with some discomfort.

WRIST PAIN -- WOMEN'S BASKETBALL

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HISTORY -- 23-year-old female basketball player with a complaint of right wrist pain. The pain began when she caught a pass and her wrist hyperextended. She describes a "catching" sensation with movement. No history of previous wrist injury exists. She has continued to play with her wrist supported despite pain.

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PHYSICAL EXAM -- Point tenderness is present in the area of the flexor carpi ulnaris insertion. She has pain with active and passive wrist flexion, extension, and ulnar deviation. Limited range of motion is noted in hyperextension, flexion and ulnar deviation. No deformity exists. Swelling is present over the medial aspect of the wrist.

ARM PAIN -- GYMNASTICS

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HISTORY: 20-year-old male gymnast/tumbler presented with a four week history of left arm pain, with increasing numbness and dysfunction. Had acute onset of symptoms after a severe external rotation and retraction injury to the left shoulder and scapula. Initial x-rays read as normal. Noted increasing numbness and pain exacerbated by shoulder abduction or external rotation. Would occasionally have pain down into arm.

PHYSICAL EXAM: Abnormal posture of left shoulder, drooping and protraction, tenderness over entire medial have of clavicle, pain over S-C joint, palpable deficit at S-C joint. Shoulder ROM normal at 0 degrees abduction, with restriction of external rotation as shoulder was abducted. Glenohumeral stability normal. Spotty neurologic deficit in arm and hand, greater with shoulder abduction. Radial pulse normal at 0 degrees abduction, diminished with abduction greater than 45 degrees.

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