AMERICAN COLLEGE of SPORTS MEDICINE

SOUTHEAST REGIONAL CHAPTER

January 25-27, 2001
29th Annual Meeting
Sheraton Columbia Hotel & Conference Center
Columbia, South Carolina

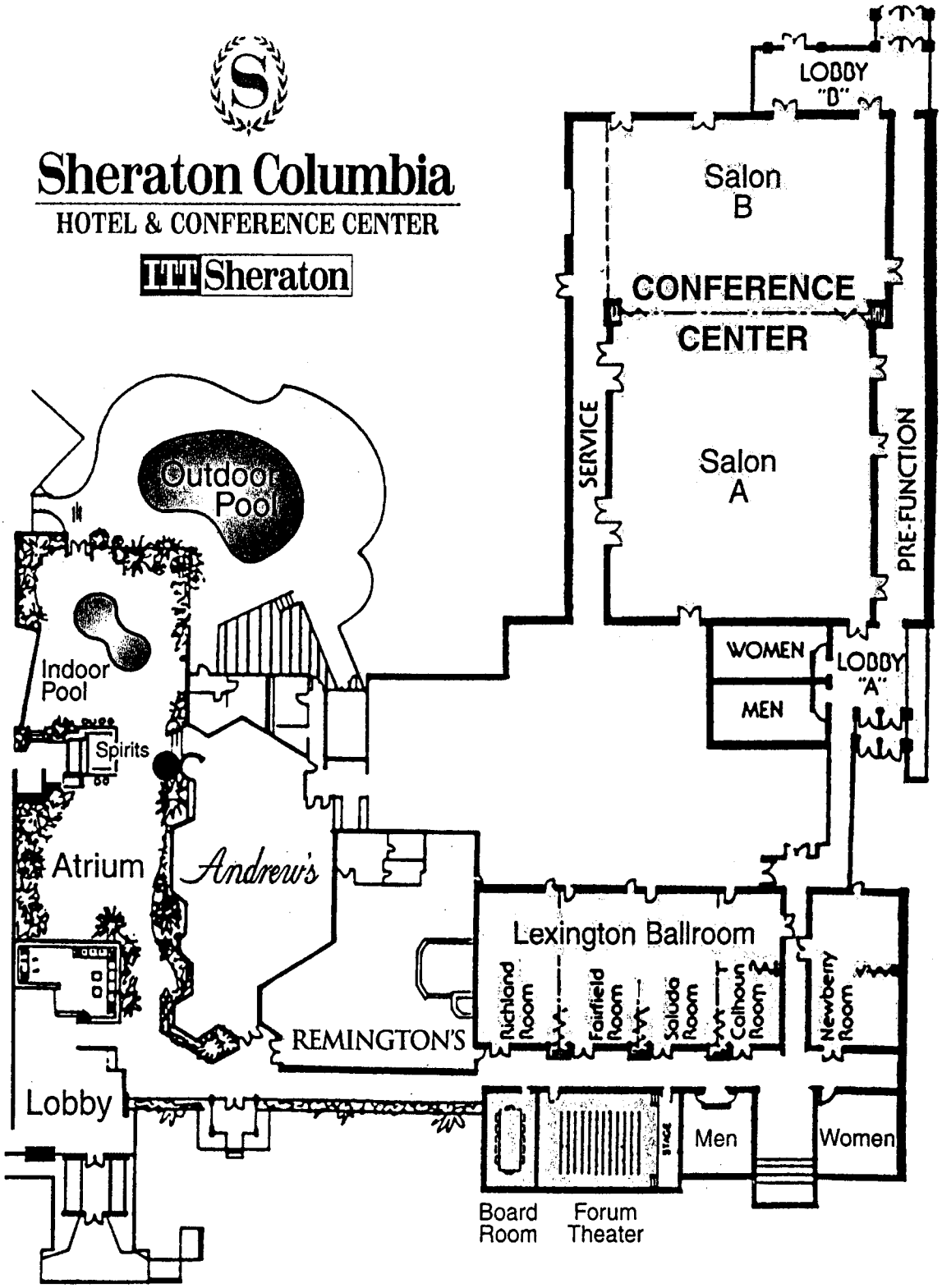
ABSTRACTS

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

Sheraton Columbia

HOTEL & CONFERENCE CENTER

ITT Sheraton



Twenty-Ninth Annual Meeting

SOUTHEAST REGIONAL CHAPTER AMERICAN COLLEGE OF SPORTS MEDICINE

Sheraton Columbia Hotel and Conference Center
Columbia, South Carolina
January 25-27, 2001

Officers

President:
Mindy Millard-Stafford, Georgia Institute of Technology

Past President:
Jeff Rupp, Georgia State University

President-Elect:
David Nieman, Appalachian State University

Executive Board:
Ted Angelopoulos, University of Central Florida
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Liz Dowling, Old Dominion University
Bruce Gladden, Auburn University
Keith DeRuisseau, Florida State University (Student Rep.)
George Wortley, Lynchburg Family Practice Residency (Clinical Rep.)

Executive Secretary:
Vaughn Christian, Appalachian State University

Meeting Host:
J. Larry Durstine, University of South Carolina

Publisher and Editor:
Don Torok, Florida Atlantic University

Meeting Objective for Clinical Track

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

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

Accreditation

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

AMA/PRA

The American College of Sports Medicine designates this activity for 7.5 hours of category 1 credits towards the AMA Physician's Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the education activity.

Continuing Education Credits

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

Faculty Disclosure

In accordance with ACCME requirements, faculty at all educational activities that receive CME credit must provide the audience with (1) disclosure of financial relationships they have with the supporters of this conference or with the manufacturers of products discussed in their presentations, and (2) disclosure of unlabeled or unapproved uses of drugs or devices that are discussed in their presentations. Therefore, the following information is provided: All other faculty returned disclosure forms indicating that they have no affiliation or financial interest in any organization(s) that may have a direct interest in the subject matter of their presentation(s).

Disclosure of Unlabeled/Unapproved Uses of Drugs or Devices

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

Acknowledgement of Commerical Support

The Southeast Chapter of the American College of Sports Medicine gratefully acknowledges the unrestricted educational grants from: Pharmacia, Pfizer, Coca-Cola Company:Powerade, Gatorade Sports Science Institute, South Carolina Cancer Center, Barry University, and these Departments from The University of South Carolina: Bicentennial Commission, SPH Prevention Research Center, Department of Epidemiology and Biostatistics and Department of Exercise Science.

Target Audience:

SEACSM and ACSM members and professionals interested in the field of sports medicine and exercise science.

Planning Committee

David Nieman
Ted Angelopoulos
Vaughn Christian
J. Larry Durstine
Don Torok
Mindy Millard-Stafford
Craig Broeder
Keith DeRuisseau
Bruce Gladden
George Wortley
Jeff Rupp
Linda Chitwood
Liz Dowling

SEACSM List of Reviewers

Alan Utter
Greg Haff
Chuck Dumke
Mitch Craib

SEACSM Meetings & Officers

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

	Date/Place	Pres./PastPres./PresElect	Executive Board
11th	Feb. 4-5, 1983 Gainesville, FL	Russ Pate Bill Herbert Kirk Cureton	Jon MacBeth (ES) Earl Allen David Cundiff Scott Powers
12th	Feb. 3-4, 1984 Auburn, AL	Kirk Cureton Russ Pate Chris Zauner	Ron Bos (ES) Emily Haymes Phil Sparling Mike Stone
13th	Jan. 31-Feb. 2, 1985 Boone, NC	Chris Zauner Kirk Cureton Robert McMurray	Ron Bos (ES) John Billings Harry DuVal Diane Spitler J. W. Yates
14th	Jan. 23-25, 1986 Athens, GA	Robert McMurray Chris Zauner Scott Powers	Ron Bos (ES) Terry Bazarre John Billings J. Larry Durstine Russ Pate (N) Diane Spitler
15th	Jan. 29-31, 1987 Charleston, SC	Scott Powers Robert McMurray Diane Spitler	Ron Bos (ES) Terry Bazarre J. Larry Durstine Steve Messier Allen Moore (S) Russ Pate (N) Janet Walberg
16th	Jan. 28-30, 1988 Winston-Salem, NC	Diane Spitler Scott Powers Phil Sparling	Ron Bos (ES) Dalynn Badenhop Gay Israel Steve Messier Russ Pate (N) Janet Walberg Rankin Mark Senn (S)
17th	Jan. 19-20, 1989 Atlanta, GA	Phil Sparling Diane Spitler Emily Haymes	Ron Bos (ES) Dalynn Badenhop Kirk Cureton (N) Mark Davis Gay Israel Ben Kibler (MD) David Peltzer (S) Art Weltman
18th	Feb. 1-3, 1990 Columbia, SC	Emily Haymes Phil Sparling Harry DuVal	Ron Bos (ES) Jerry Brandon Maria Burgess (S) Kirk Cureton (N) Mark Davis Ben Kibler (MD) Dianne Ward Art Weltman

	Date/Place	Pres./PastPres./PresElect	Executive Board
19th	Jan. 31-Feb. 2, 1991 Louisville, KY	Harry DuVal Emily Haymes Steve Messier	Ron Bos (ES) Jerry Brandon Maria Burgess (S) Kirk Cureton (N) Kevin Davy (S) Alan Rogol (MD) Jeff Rupp Amanda Timberlake Dianne Ward
20th	Jan. 30-Feb. 1, 1992 Auburn, AL	Steve Messier Harry DuVal Gay Israel	Ron Bos (ES) Kevin Davy (S) Bill Duey (S) Ben Kibler (MD) Mindy Millard-Stafford Bob Moffatt Alan Rogol (MD) Jeff Rupp Phil Sparling (N) Amanda Timberlake
21st	Jan. 28-30, 1993 Norfolk, VA	Gay Israel Steve Messier J. Mark Davis	Vaughn Christian (ES) Barbara Ainsworth Michael Berry Jeff Chandler (CC) Shala Davis (S) Mindy Millard-Stafford Bob Moffatt Alan Rogol (MD) Phil Sparling (N) Kevin Tipton (S)
22nd	Jan. 20-22, 1994 Greensboro, NC	J. Mark Davis Gay Israel Janet Walberg Rankin	Vaughn Christian (ES) Barbara Ainsworth Michael Berry Jeff Chandler (CC) Shala Davis (S) Allan Goldfarb Victoria Schnyder (S) Phil Sparling (N) Beverly Warren
23rd	Feb. 2-4, 1995 Lexington, KY	Janet Walberg Rankin J. Mark Davis J. Larry Durstine	Vaughn Christian (ES) Carolyn Berry Jeff Chandler (CC) Allan Goldfarb Ed Howley (N) David Nieman Victoria Schnyder (S) Beverly Warren
24th	Feb. 1-3, 1996 Chattanooga, TN	J. Larry Durstine Janet Walberg Rankin Bruce Gladden	Vaughn Christian (ES) Carolyn Berry Ed Howley (N) Tim Lightfoot Patricia Mosher David Nieman Stewart Trost (S) George Wortley (MD)

	Date/Place	Pres./PastPres./PresElect	Executive Board
25th	Jan. 23-25, 1997 Atlanta, GA	Bruce Gladden J. Larry Durstine Bob Moffatt	Vaughn Christian (ES) Dave Bassett Ed Howley (N) Tim Lightfoot Patricia Mosher Ann Swank Stewart Trost (S) George Wortley (MD)
26th	Jan. 29-31, 1998 Destin, FL	Bob Moffatt Bruce Gladden Dianne Ward	Vaughn Christian (ES) Dave Bassett Mark Davis (N) Bonita Marks Mike Overton Ann Swank Melicia Whitt (S) George Wortley (MD)
27th	Feb. 4-6, 1999 Norfolk, VA	Dianne Ward Bob Moffatt Jeff Rupp	Vaughn Christian (ES) Mark Davis (N) Steve Dodd Bonita Marks Mike Overton Dixie Thompson Melicia Whitt (S) George Wortley (MD)
28th	Jan. 27-29, 2000 Charlotte, NC	Jeff Rupp Dianne Ward Mindy Millard-Stafford	Vaughn Christian (ED) Ted Angelopoulos Linda Chitwood Mark Davis (N) Keith DeRuisseau (S) Steve Dodd Dixie Thompson George Wortley (MD)
29th	Jan. 25-27, 2001 Charlotte, NC	Mindy Millard-Stafford Jeff Rupp David Nieman	Vaughn Christian (ED) Ted Angelopoulos Linda Chitwood Bruce Gladden (N) Keith DeRuisseau (S) Craig Broeder Liz Dowling George Wortley (MD)

ES = Executive Secretary
CC = Clinical Consultant

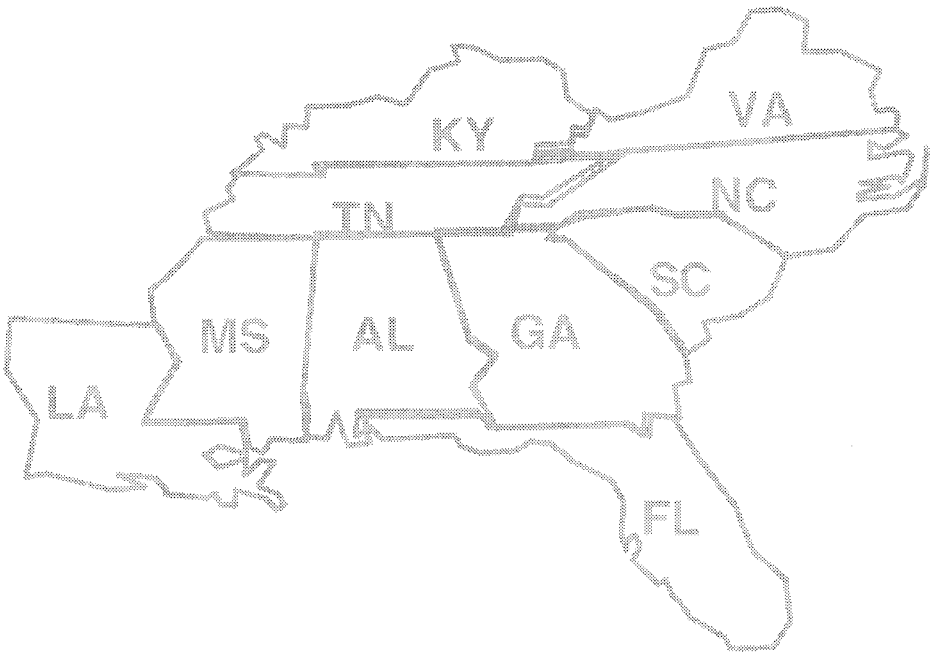
ED= Executive Director
N = National Representative

S = Student Representative
MD = Physician Representative

2002 SEACSM Meeting in Atlanta, GA

SEACSM Award Winners

	Scholar Award	Service Award	Student Award
1989	Hugh Welch	Ron Bos	
1990	Russ 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	Ed Howley	David Criswell
1995	Scott Powers	Gay Israel	Marian Kohut
1996	Mel Williams	Russ Pate	Marvin Rainwater
1997	Henry Montoye	Emily Haymes	Kathryn Gracey
1998	Ed Howley	Kent Johnson	Heather Vincent
1999	Steve Messier	Vaughn Christian	Christopher Hewitt
2000	Bruce Gladden	J. Larry Durstine	Katherine Brittingham
2001	Barbara Ainsworth		Jamie Golden



	Salon A	Salon B	Newberry	Saluda	Calhoun	Fairfield	Richland	Forum	Remington
Thursday									
4:00-4:30		posters	S1*	S2	T1	O1-O3	O4-O7		
4:30-5:00		P1-P13	S1*	S2	T1	O1-O3	O4-O7		
5:15-6:00		authors:5-6	S1*	S2			O8-O10		
7:30-9:00	KEYNOTE								
9:00-11:00		SOCIAL							
Friday									
6:30-8:00									Women's Breakfast
8:00-8:30		posters	T5	T4	T6	T3	T2		
8:30-9:00		P14-P26	T5	T4	T6	T3	T2		
9:00-9:30		P14-P26							
9:30-10:00	BASIC SCIENCE*								
10:00-10:30	BASIC SCIENCE*								
10:30-11:00	INVITED LECTURE	posters		S5		S4	S3		
11:00-11:30	INVITED LECTURE	P27-P36		S5		S4	S3		
11:30-12:00	INVITED LECTURE	authors:11-12		S5		S4	S3		
12:00-1:00									PAST PRESIDENTS
1:00-2:00			A-O11-O14 B-O15-O19	T9	O20-O23	T8*	T7*	T10	
2:00-2:30			B-O19						
2:30-3:00	SPECIAL TOPICS								
3:00-3:30	SPECIAL TOPICS								
3:30-4:00	MONTOYE LECTURE*								
4:00-4:30	MONTOYE LECTURE*								
4:30-5:00	MONTOYE LECTURE*								
5:15-6:15		STUDENT SYMPOSIUM							
6:15-7:30	GRAD FAIR								
Saturday									
8:00-9:00	PRESIDENTIAL*								
9:00-10:00		posters: P37-P47		T13	T14*	T12	T11	BIOMECHANICS	
10:00-10:30		authors:9:30-10:30		T13	T14*	T12	T11	BIOMECHANICS	
10:45-11:00		CLINICAL TRACT*			O27-O30	S7	S6*	O24-O26	
11:00-11:30		CLINICAL TRACT*			O27-O30	S7	S6*	O24-O26	
11:30-12:00		CLINICAL TRACT*				S7	S6*		
12:00-2:00	LUNCHEON								
		Sessions with a * are CME Sessions							

SOUTHEAST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE
2001 MEETING SCHEDULE SUMMARY
Sessions for which CME 1 credit is available are noted below as (CME1*)

THURSDAY, JANUARY 25, 2001

12:00 - 2:00 PM	BOARD MEETING **(Presidential Suite, Room 540)**
12:00-4:00 PM	ACSM Registered Clinical Exercise Physiologist (RCEP) Exam **(Forum Room)**
12:00 - 6:00 PM	REGISTRATION **(Conference Center Lobby "B")**
12:00 - 9:00 PM	SPEAKER READY ROOM **(Board Room)**
2:00 - 7:30 PM	EXHIBITS **(Conference Center Pre-Function Area)**
4:00 - 6:00 PM **(Salon B)**	**POSTER PRESENTATIONS I** (Authors present 5:00-6:00) Biomechanics Skeletal muscle Endocrinology Rehabilitation Athletic Care/Athletic Trauma
4:00 - 5:30 PM **(Newberry Room)**	**SYMPOSIA** Physical activity and arthritis: contributions from the Aerobics Center Longitudinal Study- **CME1***
(Saluda Room)	The influence of exercise on lipoproteins and lipid transport
4:00 - 5:00 PM **(Calhoun Room)**	**TUTORIAL** Using MS Excel in the laboratory
4:00 - 5:00 PM **(Fairfield Room)** **(Richland Room)**	**FREE COMMUNICATIONS** Cardiovascular Physiology (4:00-4:45) Nutrition and Sports *Sponsored by Barry University*
5:15 - 6:00 PM **(Richland Room)**	**FREE COMMUNICATIONS- STUDENT AWARD WINNERS**
7:30 - 9:00 PM **(Salon A)**	**BUSINESS MEETING AND KEYNOTE ADDRESS** Chris Carmichael, USOC Coach of the Year, 1999, Colorado Springs, CO **"Perspectives on Coaching Elite Cyclists"** *Sponsored by Powerade (Coca Cola)*
9:00 - 11:00 PM	**SEACSM SOCIAL (Salon B)**

FRIDAY, JANUARY 26, 2001

6:30 - 8:00 AM **Remington's**	**WOMEN'S BREAKFAST**- (REGISTRATION REQUIRED) Speaker: Priscilla Clarkson, Ph.D. **"The Choices We Make"**
7:30 - 6:00 PM	REGISTRATION **(Conference Center Lobby "B")**
7:30 - 6:00 PM	SPEAKER READY ROOM **(Board Room)**
8:00 - 7:30 PM	EXHIBITS **(Conference Center Pre-Function Area)**

8:00 – 9:30 AM
(Salon B)

POSTER PRESENTATIONS II (Authors present 8:30-9:30)
Psychology and Psychiatry
Competitive Athletes
Energy Balance and Weight Control
Nutrition and Sports
Environmental Physiology
Research Design and Statistics
Hematology/Immunology

8:00 - 9:00 AM

TUTORIALS

(Richland Room) The role of aerobic and resistance training in modulating blood lipids
(Fairfield Room) Practical pedometry: everything you need to get started
(Saluda Room) Applied research in extreme environments
(Newberry) Dynamical systems approach and gait analysis
(Calhoun Room) The "exercise paradox" revealed: how exercise-induced oxidative stress relates to the cardioprotective effects of endurance training

9:30 - 10:30 AM
Salon A

SEACSM BASIC SCIENCE LECTURE CME1*
Larry Kenney, Ph.D., Noll Physiological Research Center, Pennsylvania State University
"Aging and Cardiovascular Responses to High Heat and Humidity"
Sponsored by the Gatorade Sports Science Institute (GSSI)

10:30 - Noon
(Salon B)

POSTER PRESENTATIONS III (Authors present 11-12)
Chronic Disease and Disability
Epidemiology and Preventive Medicine
Growth, Development, and Aging

10:45 - 11:45 AM
Salon A

INVITED LECTURE
Jason Conviser, Ph.D., Vice President, Bally's Total Fitness.
"Twenty Career Opportunities for the Fitness Professional Which Pay over $60,000 and Are Fun and Intellectually Stimulating"

10:45 - 12:00 PM

SYMPOSIUM

(Richland Room) Central nervous system responses in animal models of exercise
(Fairfield Room) Teaching exercise science: improving by reflecting
(Saluda Room) Integrating technology into an exercise science curriculum: the use of A.D.A.M. interactive anatomy and physiology software as a teaching tool.

12:00 – 1:00 PM

PAST PRESIDENT'S LUNCH (Remington's)

1:00 - 2:00 PM

TUTORIAL/SYMPOSIUM

(Richland Room) Antioxidant diets, exercise, and myocardial protection **-CME1***
(Fairfield Room) Exercise and gallstone disease **-CME1***
(Saluda Room) The incidence of childhood obesity is increasing at an alarming rate
(Forum Theater) University campus settings and physical activity behavior: can we promote healthful changes that will be sustained?

1:00- 2:00 PM

FREE COMMUNICATIONS

(Newberry Room A) Cellular Regulatory Mechanisms
(Newberry Room B) Biomechanics (1:00-2:15)
(Calhoun Room) Epidemiology and Preventive Medicine

2:30 - 3:30 PM
(Salon A)

SPECIAL TOPICS LECTURE
Dick Cotton, Ph.D., Vice President of FitnessFirst.com Inc.
"Fitness on the Net: the Technology, the Opportunity and a Few Cautions"

3:45 - 4:45 PM
(Salon A)

HENRY J. MONTOYE SCHOLAR LECTURE -CME1*
Barbara Ainsworth, Ph.D., University of South Carolina
"From the Lab Bench to the Park Bench: A Plea for Interdisciplinary Research in Exercise Science"

5:15 - 6:15 PM **(Salon B)**
STUDENT SYMPOSIUM
Jason Conviser, Ph.D., and Dick Cotton, Ph.D.
"Career Opportunities for Fitness Professionals"

6:15 - 7:30 PM **(Salon A)**
SEACSM GRADUATE STUDENT FAIR
Sponsored by the University of South Carolina Bicentennial Commission

SATURDAY, JANUARY 27, 2001

7:30 - 9:00 AM
REGISTRATION (Conference Center Lobby "B")

7:30 - 6:00 PM
SPEAKER READY ROOM **(Board Room)**

8:00 - 9:00 AM **(Salon A)**
ACSM PRESIDENTIAL ADDRESS -CME1*
Priscilla Clarkson, PhD., University of Massachusetts
"Gender differences in exercise-induced muscle damage"
Sponsored by the Gatorade Sports Science Institute (GSSI)

9:00 - 11:00 AM **(Salon B)**
POSTER PRESENTATIONS IV (Authors present 9-10)
Exercise Evaluation
Fitness
Body Composition

9:15 – 10:30 AM **(Forum Theater)**
BIOMECHANICS STUDENT SYMPOSIUM

9:15 - 10:15 AM
TUTORIALS
(Richland Room) The future of cardiac rehabilitation: science, practice, and reimbursement.
(Fairfield Room) Exercise training, substrate utilization, and obesity
(Saluda Room) Does attainment of a critical body core temperature limit endurance performance and VO_{2max} in the heat?
(Calhoun Room) A review of the scientific evidence for and against antioxidant supplementation as a way to reduce the incidence of chronic disease- **CME1***

10:45 - 11:45 AM **(Salon B)**
CLINICAL TRACT – INVITED TUTORIAL -CME1*
Kerry Courneya, Ph.D., University of Alberta, Canada.
"Exercise for cancer patients: benefits, precautions, and guidelines"
Sponsored by the University of South Carolina School of Public Health, SPH Prevention Research Center, Department of Epidemiology and Biostatistics, and South Carolina Cancer Center

10:45 - 11:30 AM **(Forum Theater)**
FREE COMMUNICATIONS
Chronic Disease and Disability

10:45-11:45 AM **(Calhoun Room)**
FREE COMMUNICATIONS
Exercise Evaluation

10:45 – Noon
SYMPOSIA
(Richland Room) Exercise, aging and functional outcomes: a critical dimension for meaningful results **-CME1***
(Fairfield Room) The effect of altered loading on skeletal muscle gene expression and function

12:00 - 2:00 PM **(Salon A)**
SEACSM LUNCHEON & LECTURE
Craig Horswill, Ph.D., Research Director, Gatorade Sports Science Institute
"The Scientific History of Sports Drinks"
Sponsored by the Gatorade Sports Science Institute (GSSI)

2:30 PM
SEACSM EXECUTIVE BOARD MEETING (Board Room)

SOUTHEAST CHAPTER OF THE AMERICAN COLLEGE OF SPORTS MEDICINE
2001 ANNUAL MEETING SCHEDULE SUMMARY

January 25-27, 2001
Sheraton Columbia Hotel and Conference Center
2100 Bush River Road, Columbia, South Carolina 29210
Phone: 803-731-0300

Meeting Objectives

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, symposia, and free communications.

Learning Objectives:
At the conclusion of this course, participants should be able to: ¨
1) Understand the biological, biomechanical, and psychological bases for changes that occur during and following exercise in both normal and pathological states.
2) Identify new approaches to problems in exercise science and sports medicine through interaction among scientists and clinicians.
3) Recognize contemporary controversial issues related to sports medicine and exercise science.
4) Examine state-of-the art and innovative basic science, applied science, and clinical information, which will increase their knowledge of exercise, fitness, health, physical performance and sports medicine.

Target Audience:
SEACSM and ACSM members and professionals interested in the field of sports medicine and exercise science.

Sessions for which CME 1 credit is available are noted below as (CME1*)

THURSDAY, JANUARY 25, 2001

12:00-2:00 PM	BOARD MEETING **(Presidential Suite, Room 540)**
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3:00-9:00 PM	SPEAKER READY ROOM **(Board Room)**
2:00-7:30 PM	EXHIBITS **(Conference Center Pre-Function Area)**
4:00-6:00 PM	**POSTER PRESENTATIONS I** **(Salon B)** Authors present from 5:00-6:00 PM Chair: Tibor Hortobágyi, East Carolina University

Biomechanics

[P1] An electromyographic comparison of abdominal muscle activation between curl-up and reverse curl-up exercises performed on a therapy ball and the floor.
G.M. Dominick, K.D. Browder, C.E. Broeder, M.J. Davenport.
East Tennessee State University

[P2] Greater muscle coactivity in old compared to young adults during maximal knee extension. K. Smith, D. Tunnell, J. Moody, P. DeVita, T. Hortobágyi. East Carolina University

[P3] Old compared to young adults use greater relative muscle activity during stair locomotion. J. Jolla, K. Smith, S. Beam, C. Mizelle, Z. Vestal, P. DeVita, T. Hortobágyi. East Carolina University

[P4] Changes in ground reaction forces utilizing the pose method of running. C. Sol, K. Mitchell, D. Torok, S. Graves, R. Welsh. Florida Atlantic University

[P5] Degree of bilateral deficit during dynamic knee extension and flexion in trained college aged males and females. B. Sirikul, B. Dale, J. Kozusko, P. Bishop. The University of Alabama, Tuscaloosa

[P6] Comparison of a traditional and modified bicycle crank during maximal stationary cycling. J.J. Drew, A.P. Marsh, D.N. Simmons, M.J. Berry. Wake Forest University.

[P7] Kinetic comparison of free weight and machine cleans. R.M. Jones, A.C. Fry, L.W. Weiss, S.K. Kinzey. The University of Memphis

Skeletal muscle

[P8] Effects of passive stretching on vertical jumping performance. E.T. O'Bryant, H.S. O'Bryant, C.M. O'Bryant. Appalachian State University

Endocrinology

[P9] Estrogen replacement therapy: influence of administration method and exercise on circulating estradiol-beta-17 in post-menopausal women. J. Dobridge, C. Williams, W. Meyer, A.C. Hackney. University of North Carolina, Chapel Hill

[P10] Influence of oral contraception use on markers of muscle damage following eccentric exercise. A. Carter, J. Dobridge, A.C. Hackney. University of North Carolina, Chapel Hill

Rehabilitation

[P11] Describing patient adherence in a contemporary cohort of outpatient monitored cardiac rehabilitation patients. C. Bopp, S.E. Davis, G.B. Dwyer, J. Smith, J.L. Durstine. University of South Carolina

Athletic Care/Athletic Trauma

[P12] Differences in bone mineral density between two college aged female populations. J.F. Otteni, W.R. Barfield, A.M. McBryde, P.J. Nietert. Medical University of South Carolina

[P13] Low back pain in runners and walkers. S.K. Woolf. Medical University of South Carolina

4:00-5:30 PM
[S1]

SYMPOSIA
Physical activity and arthritis: contributions from the Aerobics Center Longitudinal Study.
Jennifer M. Hootman. Centers for Disease Control.
Chair: Janet Walberg-Rankin, Virginia Tech (CME I*)
(Newberry Room)

[S2]

The influence of exercise on lipoproteins and lipid transport.
Peter W. Grandjean, Steven F. Crouse, J. Larry Durstine, Paul G. Davis.
Auburn University, University of North Carolina—Greensboro, University of South Carolina, Texas A&M University
Chair: Ted Angelopoulos, University of Central Florida
(Saluda Room)

4:00-5:00 PM
[T1]

TUTORIAL
Using MS Excel in the laboratory.
Mark G. Cullum. University of Kentucky
Chair: Phil Sparling, Georgia Institute of Technology
(Calhoun Room)

4:00-4:45 PM

FREE COMMUNICATIONS
Cardiovascular Physiology
(Fairfield Room)
Chair: Robert Zoeller, University of Southern Mississippi

[O1] 4:00-4:15

One-week stability of heart rate variability during physiological perturbations.
C.M. Lee, R.H. Wood, M.A. Welsch. Louisiana State University

[O2] 4:15-4:30

Gender differences in the blood pressure response to incremental resistance exercise.
R. Reyes, M. Welsch, R. Wood. Louisiana State University

[O3] 4:30-4:45

A comparison of cardiac responses to exercise and dobutamine stress as evaluated by echocardiography. J.A. Stewart, J.A. Doyle, B.H. Layne, J.C. Rupp.
Georgia State University

4:00-5:00 PM

FREE COMMUNICATIONS
Nutrition and Sports
Sponsored by Barry University
(Richland Room)
Chair: Debra Vinci, Appalachian State University

[O4] 4:00-4:15

Effect of creatine and clenbuterol supplementation on cardiac muscle in endurance exercised rats. J. McClung, J.A. Carson, J.M. Davis, G.A. Hand.
The University of South Carolina

[O5] 4:15-4:30

The effects of a carbohydrate drink enriched with BCAA on cycling time in cyclists.
P. Moran, J. Zachwieja, P. Vicnair, R. Ours, M. Welsch.
Pennington Biomedical Research Center

[O6] 4:30-4:45 The effect of creatine supplementation on repeated bouts of high-intensity exercise in the heat. C. Papadopoulos, R. Imamura, L.J. Brandon. Georgia State University

[O7] 4:45-5:00 Nutritional behaviors among an elite group of academically talented minority students. K. Rook, C. Achem, S.N. Pearman, J.B. Chandler. Furman University

5:15-6:00 PM **STUDENT AWARD WINNERS—ORAL PRESENTATIONS (Richland Room)**
Chair: Mindy Millard-Stafford, Georgia Institute of Technology

[O8] 5:15-5:30 **Third Place (Mahmoud Alomari, Louisiana State University)**
Influence of vascular function on exercise tolerance in heart failure.
M. Alomari, T. Parish, R. Wood, D. Kalb, M. Welsch. Louisiana State University.
Advisor: M. Welsch

[O9] 5:30-5:45 **Second Place (Laura Wilson, University of North Carolina, Chapel Hill)**
Training and thyroid hormone profiles of collegiate, female rowers during fall and winter training.
L.S. Wilson, and A.C. Hackney FACSM. University of North Carolina, Chapel Hill.
Advisor: A.C. Hackney

[O10] 5:45-6:00 **First Place (Jamie Golden, East Tennessee State University)**
Physiological effects of 12 weeks of progressive resistance training on patients with chronic obstructive pulmonary disease.
J. Golden, L. Panton, C. Broeder, K. Browder, D. Fogle, D. Cestaro-Seifer, F. Seifer. East Tennessee State University
Advisor: L. Panton

7:30-9:00 PM **Salon A** **BUSINESS MEETING AND KEYNOTE ADDRESS**
Chris Carmichael, USOC Coach of the Year, 1999, Colorado Springs, CO
"Perspectives on Coaching Elite Cyclists"
Sponsored by Powerade (Coca Cola)
Presiding: Mindy Millard-Stafford, Georgia Institute of Technology
Introduction of Speaker: David Nieman, Appalachian State University

9:00-11:00 PM **SEACSM SOCIAL (Salon B)**

FRIDAY, JANUARY 26, 2001

6:30-8:00 AM **Remington's** **WOMEN'S BREAKFAST** (Registration required)
Speaker: Priscilla Clarkson, Ph.D.
"The Choices We Make"
Chair: Mindy Millard-Stafford, Georgia Institute of Technology

7:30 AM - 6:00 PM REGISTRATION **(Conference Center Lobby "B")**

7:30 AM - 6:00 PM SPEAKER READY ROOM **(Board Room)**

8:00 AM - 7:30 PM EXHIBITS **(Conference Center Pre-Function Area)**

8:00-9:30 AM **POSTER PRESENTATIONS II**
(Salon B)
Authors present 8:30-9:30 AM
Chair: Elizabeth Dowling, Old Dominion University

Psychology and Psychiatry

[P14] The effect of distraction during cycle ergometry on ratings of perceived exertion and affect scores in overweight individuals. L.H. Williams.
Medical University of South Carolina

[P15] A test of prospect theory: gain-framed vs. loss-framed messages for exercise.
S. Wilcox, A. Skiba. University of South Carolina

[P16] A comparison of perceptual and attitudinal components of body image in trained and untrained females. J. Fraley, H. Vincent, M. Skelton. Stetson University

Competitive Athletes

[P17] The relationship between multiple definitions of the lactate threshold and 40 km cycling time trial performance.
T.L. McGlashan, J.A. Doyle, D.E. Martin, J.C. Rupp. Georgia State University

[P18] Injuries sustained while practicing the martial arts.
S.A. Kemerly, C.L. Nix, S.J. Kinzey, J.S. Hallam. University of Mississippi

[P19] The effect of wetsuits on swim performance in collegiate female swimmers.
J.M. Kozusko, K.D. Nicolaou, P.A. Bishop. The University of Alabama, Tuscaloosa

Energy Balance and Weight Control

[P20] Effects of voluntary wheel running on the development of diet-induced obesity in C57BL/6 mice.
S.M. Jimenez, P.F. Bodary, J.M. Davis, R.R. Pate. University of South Carolina

[P21] Self-esteem and self-reported weight change behaviors among young adolescents.
C.B. Bradley, R.G. McMurray, S. Deng, J.S. Harrell.
The University of North Carolina, Chapel Hill

Nutrition and Sports

[P22] The effects of caffeine as an ergogenic aid.
D.A. Frechette, C.M. DeWitt. University of South Carolina, Aiken

Environmental Physiology

[P23] Effects of simultaneous exercise and loud music on hearing acuity and auditory function. S. Alhassan, P.W. Grandjean, S. Krishnamurti. Auburn University

Research Design and Statistics

[P24] Reliability of the Tritrac-R3D physical activity monitor. C.D. Baggett, R.G. McMurray, J.S. Harrell, S. Bangdiwala, S. Deng.
University of North Carolina, Chapel Hill

Hematology/Immunology

[P25] Cytokine changes after a marathon race. D.E. Kaminsky, D.C. Nieman, D.A. Henson, L.L. Smith, A.C. Utter, C.M. Vinci, J.M. Davis. Appalachian State University

[P26] Change in salivary IgA following a competitive marathon race. G. Trone, D.C. Nieman, D.A. Henson, O.R. Fagoaga, S.L. Nehlsen-Cannarella, A.C. Utter, D.M. Vinci, J.M. Davis. Appalachian State University

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

[T2] The role of aerobic and resistance training in modulating blood lipids.
Judith A. Flohr, John O. Cox. James Madison University
Chair: Matthew Feigenbaum, Furman University
(Richland Room)

[T3] Practical pedometry: everything you need to get started.
Catrine Tudor-Locke, David Bassett.
University of South Carolina and University of Tennessee
Chair: Jennifer Hootman, Centers for Disease Control
(Fairfield Room)

[T4] Applied research in extreme environments.
Neal W. Pollock. Duke University Medical Center
Chair: Kirk Cureton, University of Georgia
(Saluda Room)

[T5] Dynamical systems approach and gait analysis.
Li Li. Louisiana State University
Chair: Michael Welsch, Louisiana State University
(Newberry)

[T6] The "exercise paradox" revealed: how exercise-induced oxidative stress relates to the cardioprotective effects of endurance training.
John Quindry, Craig Broeder. East Tennessee State University
Chair: Amanda Timberlake, Life University
(Calhoun Room)

9:30-10:30 AM **SEACSM BASIC SCIENCE LECTURE** (CME I*)
Salon A Larry Kenney, Ph.D., Noll Physiological Research Center, Pennsylvania State University.
"Aging and Cardiovascular Responses to High Heat and Humidity"
Sponsored by the Gatorade Sports Science Institute (GSSI)
Chair: Philip Bishop, University of Alabama

10:30-Noon **POSTER PRESENTATIONS III**
(Salon B)
Authors present 11:00-Noon
Chair: Elaine Cress, University of Georgia

Chronic Disease and Disability

[P27] Reproducibility of the six-minute walking test in patients with chronic heart failure. T.R. Parish, M. Alomari, R.H. Wood, M.A. Welsch. Louisiana State University

[P28] Effects of 12 weeks of progressive resistance training on pulmonary function in patients with chronic obstructive pulmonary disease. T.C. Jones, J. Golden, L.B. Panton, C.E. Broeder, K.D. Browder, D.J. Fogle, D.J. Cestaro-Seifer, F.D. Seifer. East Tennessee State University

Epidemiology and Preventive Medicine

[P29] Field evaluation of the inter-instrument reliability of the Tritac accelerometer and Digiwalker pedometer.
D.J. Crotts, J.R. Berggren, M.T. Mahar. East Carolina University

[P30] Laboratory validation of CSA (model 2.2) frequency counts. R.W. Thompson, J. Hamilton, C. Tudor-Locke, M.J. Lamonte, J.L. Durstine, B.E. Ainsworth. The University of South Carolina

Growth, Development, and Aging

[P31] The effects of age, gender, and pubertal status on energy expenditure during cycling. L.S. Kelaher, R.G. McMurray, J.S. Harrell, C.D. Baggett, S. Deng. The University of North Carolina, Chapel Hill

[P32] Physical reserve: oxygen cost of physical function in older adults. J.H. Laity, J.M. Slade, J.K. Petrella, T.A. Miszko, S.K. Agrawai, M.E. Cress. University of Georgia, Athens

[P33] Longitudinal profile for strength development, jumping ability and physical growth trends in a weight trained, middle school aged female. C.M. O'Bryant, H.S. O'Bryant, E.T. O'Bryant. Appalachian State University

[P34] Functional abilities among a tri-ethnic population: the cross-cultural activity participation study. K.L. Drowatzky, H. Williams, B.E. Ainsworth. The University of South Carolina

[P35] Physical functional ability among rural- and urban-dwelling seniors in Southeastern Louisiana. C. King, R. Wood, R. Reyes. Louisiana State University

[P36] Physical functional and short-term heart rate variability in old age. J. Favaloro-Sabatier, R.H. Wood. C.M. Lee, R.Reyes. Louisiana State University, Baton Rouge

10:45-11:45 AM **INVITED LECTURE**
Salon A Jason Conviser, Ph.D., Vice President, Bally's Total Fitness.
"Twenty Career Opportunities for the Fitness Professional Which Pay over $60,000 and Are Fun and Intellectually Stimulating"
Chair: David C. Nieman, Appalachian State University

10:45-12:00 AM **SYMPOSIA**

[S3] Central nervous system responses in animal models of exercise.
Gregory A. Hand, Laura J. Fulk, J. Mark Davis, Paul R. Burghardt.
University of South Carolina
Chair: Linda Chitwood, University of Mississippi
(Richland Room)

[S4] Teaching exercise science: improving by reflecting.
Phillip A. Bishop. University of Alabama
Chair: Robert McMurray, University of North Carolina, Chapel Hill
(Fairfield Room)

[S5] Integrating technology into an exercise science curriculum: the use of A.D.A.M. interactive anatomy and physiology software as a teaching tool.
M.J. Saunders, N. J. Dalton, L.P. Borkowski. James Madison University
Chair: Don Torok, Florida Atlantic University
(Saluda Room)

Noon-1:00 PM **PAST PRESIDENT'S LUNCH (Remington's)**

1:00-2:00 PM **TUTORIALS**

[T7] Antioxidant diets, exercise, and myocardial protection.
Scott Powers. University of Florida (CME I*)
Chair: Craig Broeder, East Tennessee State University
(Richland Room)

[T8] Exercise and gallstone disease.
Alan C. Utter. Appalachian State University (CME I*)
Chair: Patricia Nixon, Wake Forest University
(Fairfield Room)

[T9] The incidence of childhood obesity is increasing at an alarming rate.
Robert G. McMurray. University of North Carolina, Chapel Hill
Chair: Bonita Marks, University of North Carolina, Chapel Hill
(Saluda Room)

[T10] University campus settings and physical activity behavior: can we promote healthful changes that will be sustained?
Phillip B. Sparling. Georgia Institute of Technology
Chair: Michael Berry, Wake Forest University
(Forum Theater)

1:00-2:00 PM **FREE COMMUNICATIONS**
Cellular Regulatory Mechanisms
(Newberry Room A)
Chair: Gregory Haff, Appalachian State University

[O11] 1:00-1:15 Effects of eccentric exercise on plasma protein carbonyls and the relationship to DOMS and creatine kinase. A.H. Goldfarb, J. Lee, R. Rescino, K. Apperson. University of North Carolina, Greensboro

[O12] 1:15-1:30 Neuromuscular adaptations to two weeks of muscle unloading. K.M. Will, M.R. Deschenes. The College of William & Mary

[O13] 1:30-1:45 Neural factors account for unweighting induced strength decrements. J.A. Giles, R.W. McCoy, M.R. Deschenes. The College of William & Mary

[O14] 1:45-2:00 Adaptations to muscle unloading are different in young adult and senescent muscle fibers. W.C. Chandler, A.A. Britt, M.R. Deschenes. The College of William & Mary

1:00-2:15 PM **FREE COMMUNICATIONS**
Biomechanics
(Newberry Room B)
Chair: Kathy Simpson, University of Georgia

[O15] 1:00-1:15 A kinematic analysis of a judo leg sweep—osoto-gari. R.T. Imamura, B.F. Johnson. Georgia State University

[O16] 1:15-1:30 Characteristics of vertical ground reaction forces before and after the walk to run transition. Li Li. Louisiana State University

[O17] 1:30-1:45 Impaired muscle balance in athletes fully rehabilitated from a prior hamstring injury. T. Hortobágyi, M. Hanley, D. Tunnel, J. Moody, P. DeVita. East Carolina University

[O18] 1:45-2:00 Knee joint position sense affects functional performance in patients with knee osteoarthritis. S. Beam, J. Moody, P. DeVita, J. Garry, T. Hortobágyi. East Carolina University

[O19] 2:00-2:15 High intensity warm-up alters rectus femoris muscle activity but not knee joint angular displacement during an involuntary activity. J.C. Smith, A.S. McCampbell, S.J. Kinzey, J.S. Hallam, D.L. Cheek. University of Mississippi

1:00-2:00 PM **FREE COMMUNICATIONS**
Epidemiology and Preventive Medicine
(Calhoun Room)
Chair: Barbara Ainsworth, University of South Carolina

[O20] 1:00-1:15 Physical activity in Russian children: the Russian Longitudinal Monitoring Study. C. Tudor-Locke, B.E. Ainsworth, B.M. Popkin. University of South Carolina

[O21] 1:15-1:30 The influence of physical activity and fitness on functional limitation among adults with arthritis. J.M. Hootman, C.G. Helmick, C.A. Macera, S.N. Blair. Centers for Disease Control and Prevention

[O22] 1:30-1:45 Physical activity patterns among an elite group of academically talented minority students. C. Achem, K. Rook, S.N. Pearman, J.B. Chandler. Furman University

[O23] 1:45-2:00 Epidemiological patterns of melanoma—risk factors, prevention and treatment issues. C.M. Howard, S.N. Pearman. Furman University

2:30-3:30 PM **SPECIAL TOPICS LECTURE**
Salon A Dick Cotton, Ph.D., Vice President of FitnessFirst.com Inc.
"Fitness on the Net: the Technology, the Opportunity and a Few Cautions"
Chair: Bruce Gladden, Auburn University

3:45-4:45 PM **HENRY J. MONTOYE SCHOLAR LECTURE** (CME I*)
Salon A Barbara Ainsworth, Ph.D., University of South Carolina
"From the Lab Bench to the Park Bench: A Plea for Interdisciplinary Research in Exercise Science"
Chair: Jeffrey Rupp, Georgia State University

5:15-6:15 PM **STUDENT SYMPOSIUM**
Salon B Jason Conviser, Ph.D., and Dick Cotton, Ph.D.
"Career Opportunities for Fitness Professionals"
Chair: Keith DeRuisseau, Florida State University

6:15-7:30 PM **SEACSM GRADUATE STUDENT FAIR**
Salon A *Sponsored by the University of South Carolina Bicentennial Commission*
Chair: Ted Angelopoulos, University of Central Florida

SATURDAY, JANUARY 27, 2001

7:30-9:00 AM REGISTRATION (**Conference Center Lobby "B"**)

7:30 AM - 6:00 PM SPEAKER READY ROOM (**Board Room**)

8:00-9:00 AM **ACSM PRESIDENTIAL ADDRESS** (CME I*)
Salon A Priscilla Clarkson, PhD., University of Massachusetts
"Gender differences in exercise-induced muscle damage"
Sponsored by the Gatorade Sports Science Institute (GSSI)
Chair: J. Larry Durstine, University of South Carolina

9:00-10:30 AM **POSTER PRESENTATIONS IV**
(Salon B)
Authors present 9:30-10:30 AM
Chair: Lynn Panton, East Tennessee State University

Exercise Evaluation

[P37] Pulse palpation (6, 10, and 15 seconds duration) as a measure of heart rate during rest and 3 submaximal exercise intensities.
W.W. Peveler, J.M. Green, A.M. Bosak. Western Kentucky University

[P38] Peak torque occurrence in the range of motion during isometric and isokinetic knee flexion and extension. M.J. Sabatier, R.H. Wood, M.A. Welsch.
Louisiana State University

Fitness

[P39] Physical activity patterns and enjoyment ratings for urban, commuter university students. M.A. Collins, B. Goldfine, M.V. Nahas, J. Petrillo, C. Ash, J. Wang. Kennesaw State University

[P40] Recovery following 3 sets to failure of 8 resistance exercises. J.R. McLester, P. Bishop, J. Smith, M. Richardson, R. Lomax. State University of West Georgia

Body Composition

[P41] Comparison of BIA and hydrostatic weighing in obese women. C.G. McMahon, A.M. Swartz, D.L. Thompson. The University of Tennessee

[P42] The effects of 12 weeks of cardioresistance, resistance, or cardiovascular training on body composition. E.M. Miller, M.J. Saunders, J.A. Fohr. James Madison University

[P43] Comparison of obesity assessment procedures in African American and white women. L.J. Brandon, M.B. Elliott-Lloyd, J. Calloway. Georgia State University

[P44] Muscle lipid content by MR spectroscopy is correlated with body fat in healthy men. L.J. White, R.A. Robergs, W.L. Sibbitt, M.A. Ferguson, W. Brooks. University of Florida

[P45] A comparison of methods to estimate percent body fat in college tennis players. B.L. Marks, E. Galleher, L.M. Katz, T.A. Moore. University of North Carolina, Chapel Hill

[P46] A comparison of BMI and DEXA scans as a measure of body composition between two college-aged female populations. W.R. Barfield, J.F. Otteni, A.M. McBryde, J.S. Carter, P.J. Nietert. College of Charleston and Medical University of South Carolina

[P47] Can bioelectrical impedance track body composition following resistance training compared to DEXA? J.G. Inglis, J. Quindry, K. Brittingham, L.B. Panton, C.E. Broeder. East Tennessee State University

9:15-10:30 AM **BIOMECHANICS STUDENT SYMPOSIUM**
Forum Theater Chair: Li Li, Louisiana State University

9:15-10:15 AM **TUTORIALS**

[T11] The future of cardiac rehabilitation: science, practice, and reimbursement. Carl N. King. St. Joseph's Health System
Chair: Robert Wood, Louisiana State University
(Richland Room)

[T12] Exercise training, substrate utilization, and obesity. Craig Broeder. East Tennessee State University
Chair: Judith Flohr, James Madison University
(Fairfield Room)

[T13] Does attainment of a critical body core temperature limit endurance performance and VO_{2max} in the heat?
Sigurbjörn Árni Arngrímsson, Kirk J. Cureton. University of Georgia
Chair: David Bassett, University of Tennessee
(Saluda Room)

[T14] A review of the scientific evidence for and against antioxidant supplementation as a way to reduce the incidence of chronic disease.
Amanda Timberlake. Life University (CME I*)
Chair: Alan Goldfarb, University of North Carolina-Greensboro
(Calhoun Room)

10:45-11:45 AM
Salon B

CLINICAL TRACT— INVITED TUTORIAL (CME I*)
Kerry Courneya, Ph.D., University of Alberta, Canada.
"Exercise for cancer patients: benefits, precautions, and guidelines"
Sponsored by the University of South Carolina School of Public Health, SPH Prevention Research Center, Department of Epidimeology and Biostatistics, and South Carolina Cancer Center,
Chair: David C. Nieman, Appalachian State University

10:45-Noon

SYMPOSIA

[S6] Exercise, aging and functional outcomes: a critical dimension for meaningful results. M. Elaine Cress, John Petrella, Robert H. Wood, Michael A. Welsch. Louisiana State University (CME I*)
Chair: Scott Powers, University of Florida
(Richland Room)

[S7] The effect of altered loading on skeletal muscle gene expression and function.
James A. Carson, Larry Lowe, Christopher Ingalls. University of South Carolina, Benedict College, Georgia State University
Chair: Gregory Hands, University of South Carolina
(Fairfield Room)

10:45-11:30 AM

FREE COMMUNICATIONS (Powerpoint Session)
Chronic Disease and Disability
(Forum Theater)
Chair: Alan Utter, Appalachian State University

[O24] 10:45-11:00 Reorganization of neuromuscular function during stairway locomotion due to knee osteoarthritis. P. DeVita, J. Moody, S. Beam, J. Jolla, K. Smith, J. Garry, T. Hortobágyi. East Carolina University

[O25] 11:00-11:15 Effects of 12 weeks of progressive resistance training on the 12-minute walk in patients with chronic obstructive pulmonary disease. J. Quindry, L. Rhea, J. Golden, L. Panton, C. Broeder, K. Browder, D. Fogle, D. Cestaro-Seifer, F. Seifer. East Tennessee State University

[O26] 11:15-11:30 Effects of 12 weeks of progressive resistance training on bone density in patients with chronic obstructive pulmonary disease. J. King, J. Golden, L.B. Panton, C.E. Broeder, K.D. Browder, D.J. Fogle, D.J. Cestaro-Seifer, F.D. Seifer.
East Tennessee State University

10:45-11:45 AM **FREE COMMUNICATIONS (Powerpoint Session)**
Exercise Evaluation
(Calhoun Room)
Chair: Mitch Craib, Appalachian State University

[O27] 10:45-11:00 Effects of 2 minutes active recovery on a "booster" VO_{2max} test during cycle ergometry. A.M. Bosak, J.M. Green, T.R. Crews, W.W. Peveler.
Western Kentucky University

[O28] 11:00-11:15 Validity of the Cosmed K4b2 portable metabolic system. A. Jung, J. Turner, M. Craib, D. Kaminsky, A. Arnholt, M. Shute, D. Nieman.
Appalachian State University

[O29] 11:15-11:30 Association of the ventilatory threshold with workrate by means of a fixed RPE-value. C.S. Katsanos, K.C. DeRuisseau, H.G. Simoes, R.J. Moffatt.
Florida State University

[O30] 11:30-11:45 Physiological responses during RPE estimation-production treadmill exercise at 0% and 10% incline. J.M. Green, T.R. Crews, A.M. Bosak, W. Peveler.
Western Kentucky University

Noon-2:00 PM **SEACSM LUNCHEON AND LECTURE**
Salon A Craig Horswill, Ph.D., Research Director, Gatorade Sports Science Institute
"The Scientific History of Sports Drinks"
Sponsored by the Gatorade Sports Science Institute (GSSI)
Introduction of Speaker: Janet Walberg-Rankin, Virginia Tech

2:30 PM **SEACSM EXECUTIVE BOARD MEETING (Board Room)**

T1

USING MS EXCEL IN THE LABORATORY

Mark G. Cullum, Department of Kinesiology and Health Promotion, University of Kentucky, Lexington, KY

Microsoft Excel has many potential uses in the laboratory for the calculation, analysis, and management of data. Many of its features, however, are often not utilized, frequently because the user is not aware of the software's full capabilities. This tutorial is intended to give a brief introduction to Excel, and to demonstrate some of the overlooked features that can be useful in a laboratory setting. Among the areas covered will be basic and advanced calculation techniques, various formatting options, techniques for charting data, and other features, such as filters and macros, that can give the user more flexibility. This presentation is intended for students and professionals who have either no experience or a basic familiarity with MS Excel.

T2

THE ROLE OF AEROBIC AND RESISTANCE TRAINING IN MODULATING BLOOD LIPIDS.

Judith A. Flohr, James Madison University, John O. Cox, University of Maryland, College Park.

Numerous health benefits have been associated with both aerobic and resistance training. Additionally, regular aerobic exercise appears to be a potent stimulus for improving the blood lipid profile. However, there is limited evidence that resistance training produces comparable changes in blood lipids. Furthermore, the effects of resistance training on blood lipids are confounded by the variance in training protocols, that is, the amount of resistance and number of repetitions. The purpose of this tutorial is to review the contemporary literature contrasting the benefits of the various forms of aerobic and resistance training. Studies examining the relationship between blood lipid profile and risk status following aerobic and resistance training will be reviewed. Potential questions for future research will be addressed in the tutorial. This tutorial should appeal to individuals interested in the role aerobic, resistance training or combined training programs play in CAD risk related to blood lipids.

T3

PRACTICAL PEDOMETRY: EVERYTHING YOU NEED TO KNOW TO GET STARTED

D.R. Bassett, University of Tennessee, USA; C. Tudor-Locke, University of South Carolina, USA.

There has been an increased interest in using objective motion sensors for research and surveillance, as well as for clinical and program applications. Pedometers are the most practical motion sensor available; they are simple to use, inexpensive, acceptable to research subjects, and require no additional computer hardware or software to download and manipulate data. For these reasons, researchers and practitioners can easily incorporate pedometers into their studies and programs as a measure of physical activity, specifically ambulatory activity. This tutorial will provide necessary information and insight from two pedometer researchers. Both the strengths and limitations of pedometry from a measurement perspective will be addressed. Dr. Bassett will begin with an overview of accuracy, reliability, and validity of pedometry. The question of what pedometers do and do not measure will be answered. Dr. Tudor-Locke will present methodological considerations for using pedometers to assess physical activity in the field and a protocol for motivating individuals to increase their steps/day.

T4

APPLIED RESEARCH IN EXTREME ENVIRONMENTS

Neal W. Pollock, Center for Hyperbaric Medicine and Environmental Physiology, Duke University Medical Center, Durham, NC 27710

The Center for Hyperbaric Medicine and Environmental Physiology has been involved in basic and applied research in environmental physiology since 1963. The applied physiology group is currently investigating decompression stress (in astronauts conducting extra-vehicular activity and when flying follows diving), breath-hold physiology, and developing oxygen delivery systems (portable treatment and prophylactic systems). This presentation will provide an overview of issues in environmental physiology relevant to underwater, high altitude and microgravity exposure. Recent and ongoing research projects will be described and future planned discussed. This presentation will be suitable for those with a general interest in environmental physiology and those wishing to enhance discussion of extreme environments in their physiology courses.

T5

DYNAMICAL SYSTEMS APPROACH AND GAIT ANALYSIS

Li Li, Department of Kinesiology, Louisiana State University, Baton Rouge, LA

Purpose: Introduce the application of Dynamical Systems Approach in gait analysis to the audience. Content: Coordination of human movement studied by dynamical systems approach in different investigations reported in the literature. Higher dimension evaluation of coordination structure and its change with control parameters provide us a tool to explore human motion as a system. The performance and adaptation of the human movement system is constrained by the organism, task and environment. To evaluate human gait, for example, joint and segment phase angle are calculated in this approach. Pairing key segments/joints, relative phase and the variability of relative phase can be determined. Theoretical bases of dynamical system approach and its relevancy to human movement will be introduced. Different data processing techniques will be compared. Clinical applications and its potential will be discussed in this tutorial. Target audience: researchers who interested in gait analysis, movement disorder, and coordination of human movement.

T6

THE "EXERCISE PARADOX" REVEALED: HOW EXERCISE-INDUCED OXIDATIVE STRESS RELATES TO THE CARDIOPROTECTIVE EFFECTS OF ENDURANCE TRAINING

John Quindry, Craig Broeder. East Tennessee State University, 405 South Second St, Elizabethton, TN 37643.

Cardiovascular disease (CVD) etiology has been linked to inflammatory mediated responses. Inflammation in the development of CVD is a local process where antioxidants must be overwhelmed by radical species before initiation of atherosclerosis occurs. Acute exercise induces a potent radical stress regardless of training status. Alternately, chronic endurance exercise prevents the development of CVD independent of other lifestyle alterations. The "exercise paradox" results from the inability of researchers to fully explain how exercise prevents CVD while also generating radical species known to initiate CVD. This tutorial will discuss the acquisition and prevention of CVD according to the currently recognized model of CVD etiology. Specific attention will be given to exercise training in the fortification of antioxidant defenses and attenuation of radical species generation. Finally, limitations in study design and techniques used to measure oxidative stress will be used to illustrate new horizons in exercise-radical research.

T7

ANTIOXIDANT DIETS, EXERCISE, AND MYOCARDIAL PROTECTION

Scott K. Powers. Department of Exercise and Sport Sciences and Physiology, Center for Exercise Science, University of Florida, Gainesville, Florida. USA

Myocardial ischemia-reperfusion (I-R) injury is the major contributor to the morbidity and mortality associated with coronary artery disease. Hence, developing countermeasures to prevent myocardial I-R injury is important. Although several factors contribute to I-R-mediated myocardial injury, strong evidence indicates that production of radicals and other reactive oxygen species are important mediators of this type of cardiac damage. It follows that increasing myocardial levels of antioxidants could provide cardioprotection against an I-R insult. This tutorial lecture will discuss recent experiments examining the independent effects of nutritional antioxidants and endurance exercise training in providing cardiac protection against I-R injury. In this regard, new evidence in animals suggests that supplementation with nutritional antioxidants can reduce myocardial oxidative injury resulting from an I-R insult. Further, both short term (days) and long-term (weeks) endurance exercise training reduces I-R-induced myocardial injury. Potential mechanisms responsible for the exercise-induced cardioprotection will be discussed. Target audience includes undergraduate students, graduate students, and faculty.

T8

EXERCISE AND GALLSTONE DISEASE.

Alan C. Utter, Ph.D., M.P.H., FACSM, Department of Health, Leisure, and Exercise Science, Appalachian State University, Boone N.C., 28608, USA

Gallstone disease affects approximately 10-15% of the US population. Whereas, the prevalence of physical inactivity in the US is approximately 25%. While epidemiological studies have demonstrated a strengthened relation between physical inactivity and gallstone disease, the experimental research has yet to determine a clear underlying physiologic mechanism for such a relation. The purpose of this tutorial is to examine the association between physical activity and exercise to gallbladder function and gallstone disease. Recommendations for future research and the practical implications for the primary prevention of gallstone disease will also be discussed. The target audience may include clinical exercise physiologists, health promotion specialists, physical activity epidemiologists, and gastroenterologists.

T9

CHILDHOOD OBESITY: CAUSES AND TREATMENTS.

Robert G. McMurray, University of North Carolina-Chapel Hill, Chapel Hill, NC 27599-8700

The incidence of childhood obesity is increasing at an alarming rate. Recent studies suggest that 25-30% of youth are now considered obese. The reasons for the increased rate of obesity are complex, including both familial factors (genetics, parenting behaviors, SES) and environmental factors (food intake, physical activity, geography, psycho-social factors). Although the etiology is complex, the prevention and treatment appear to be even more complex. Various approaches have been attempted; including dietary manipulation, increased physical activity, behavior modification, parental involvement, and school-based programs. The purpose of this presentation is two fold: one, to examine the scope and causes of childhood obesity, and two, to analyze approaches to the prevention and treatment of childhood obesity. The discussion focuses on what interventions have succeeded and why. The presentation is intended for researchers and practitioners working with youth who are concerned with childhood physical activity, nutrition, and obesity.

T10

UNIVERSITY CAMPUS SETTINGS AND PHYSICAL ACTIVITY BEHAVIOR: CAN WE PROMOTE HEALTHFUL CHANGES THAT WILL BE SUSTAINED?

Phillip B. Sparling, EdD, Department of Health & Performance Sciences, Georgia Tech, Atlanta, GA

The purpose is to demonstrate how physical activity research with college students may be approached in a disciplined and systematic fashion. The following topics will be reviewed: descriptive epidemiology, relevant theories, update on current interventions, measurement issues, and evaluating new interventions. Questions and issues will be raised for discussion. The presentation will be planned for 30 minutes with the remaining 30 minutes set aside for audience participation. An aim is to attract a diverse audience and to have others share comments on associated research efforts that are being considered or are underway at other colleges and universities.

T11

THE FUTURE OF CARDIAC REHABILITATION-SCIENCE, PRACTICE, AND REIMBURSEMENT

Carl N. King, Institute for Cardiopulmonary Health, Mission St. Joseph's Health System, Asheville, NC 28803

The purpose of this symposium is to examine the disparity between the scientific literature, including the Clinical Practice Guideline for Cardiac Rehabilitation, the general practice patterns, and reimbursement schedules, particularly, HCFA reimbursement. The symposium will examine the science behind the practice of cardiac rehabilitation, including all of the disciplines represented, the common implementation patterns, and the reimbursement for those practice patterns. Included in the discussion, will be ACSM and AACVPR guidelines and recommendations. The target audience will be students, faculty, and cardiac rehabilitation professionals.

T12

EXERCISE TRAINING, SUBSTRATE UTILIZATION, AND OBESITY

Craig Broeder, East Tennessee State University, Johnson City, TN 37614

This tutorial's purpose will be to help those interested in obesity research understand how both endurance and strength training play a positive role in altering a person's metabolic state for the prevention or treatment of obesity. This tutorial also will include a comprehensive presentation of how exercise can alter substrate utilization at rest and during exercise from an obesity perspective. Information will be provided that helps a person understand the intricacies of how exercise plays a role in not only altering a person's energy balance, but a person's fat, carbohydrate, and protein balance. In addition, new data will be presented on how leptin, fat weight and fat-free weight interact with each other as well as information on a new diabetic/ obesity related gene called "Beacon". And finally, all of the material presented in this tutorial will be discussed in a way so that complex biochemical and physiological aspect of obesity metabolism are integrated from an applied functional perspective. In this context, those interested in the clinical aspects of treating obese individuals will benefit from this tutorial.

T13

DOES ATTAINMENT OF A CRITICAL BODY CORE TEMPERATURE LIMIT ENDURANCE PERFORMANCE AND VO2MAX IN THE HEAT?

S.A. Arngrimsson and K.J. Cureton. Department of Exercise Science, The University of Georgia, Athens, GA 30602

The purpose of this tutorial is to review the literature suggesting that attainment of a critical body core temperature limits endurance performance and VO2max in the heat. Endurance performance in warm or hot conditions is generally decreased compared to thermal neutral conditions. The decrease in performance is commonly explained by increased circulatory strain as reflected by decreased stroke volume and increased heart rate caused by displacement of blood to the skin. However, VO2max is often not reduced when measured in the heat, creating uncertainty concerning the metabolic basis for reduced performance. Considerable animal and human data suggest that attenuated performance may result from attainment of a critical core temperature that causes termination of exercise. Similarly, VO2max is reduced if measured under hot conditions in which core temperature rises to a critical level. Thus, reduced performance probably reflects reduced VO2max. The target audience for this tutorial includes students and professionals in exercise science, coaches, and athletes.

T14

A REVIEW OF THE SCIENTIFIC EVIDENCE FOR AND AGAINST ANTIOXIDANT SUPPLEMENTATION AS A WAY TO REDUCE THE INCIDENCE OF CHRONIC DISEASE

Amanda Timberlake, Dept of Nutrition, Life University, Marietta, GA 30060

The purpose of this tutorial is to expose participants to an overview of the scientific evidence for and against antioxidant supplementation as a means to reduce the incidence of chronic disease. In this country most individuals self select antioxidant supplements without regard to the scientific legitimacy of the supplement, especially when selecting the dosage. Consequently, a basic understanding of the popular antioxidant supplements and their supposed mechanism of action is useful to all those working in the health care field. Special emphasis will be placed on distinguishing between antioxidant epidemiological studies, both looking at food intake and/or supplements, and clinical trials using supplements. Included in this presentation will be a discussion of the commonly marketed antioxidant supplements, Vitamins E and C and Beta-carotene as well as an overview of many of the other antioxidants now recognized as beneficial (Anthocyanidins, quercetin, genistein, lycopene). In addition, this tutorial will address the consequences of megadosing including the The National Academies of Sciences/Institute of Medicine recommended maximum intake of certain dietary antioxidants.

S1

PHYSICAL ACTIVITY AND ARTHRITIS: CONTRIBUTIONS FROM THE AEROBICS CENTER LONGITUDINAL STUDY

Jennifer M. Hootman PhD, ATC, Arthritis Section, Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA.

BACKGROUND: The relationship between physical activity and arthritis has not been clearly identified. Some studies report physical activity increases the risk for arthritis while other studies report no association. Methods to measure physical activity vary between studies and may contribute to the lack of consistent findings.
PURPOSE: The purpose of this symposium will be to report the findings from several studies on arthritis and physical activity conducted using data from the Aerobics Center Longitudinal Study and to compare these results with other longitudinal health studies.
CONTENT: 1.) Background information regarding the lack of consistent results of previous studies investigating the relationship between physical activity and arthritis, 2.) Present results from four physical activity and arthritis studies conducted using data from the Aerobics Center Longitudinal Study, and 3.) Discuss the results with special attention to areas of needed research.

TARGET AUDIENCE: Sports medicine clinicians, researchers, exercise physiologists, physical therapists.

S2

THE INFLUENCE OF EXERCISE ON LIPOPROTEINS AND LIPID TRANSPORT

Peter. W. Grandjean, Auburn University, Paul G. Davis, U.N.C. - Greensboro, J. Larry Durstine, U.S.C., Steven. F. Crouse, Texas A&M University

Intravascular lipid transport is a process that is necessary for nutrient delivery, cell growth and repair and hormone production. However, this process can also contribute to atherosclerosis and the decline of cardiovascular function. Thus, various measures of blood lipids and lipoproteins serve as important markers of cardiovascular disease risk. Physical activity and, in particular, endurance exercise can have a substantial impact on blood lipids, lipoproteins and intravascular lipid transport. This tutorial has been designed to 1) provide an overview of lipids, lipoproteins and intravascular lipid transport 2) relate our current understanding of the acute lipid responses to exercise and the impact of exercise training, and 3) explore possible mechanisms by which exercise exerts an influence on lipid transport. The information covered in this tutorial should be of interest to exercise scientists, exercise science graduate students, nutritionists and other sports medicine professionals.

S3

CENTRAL NERVOUS SYSTEM RESPONSES IN ANIMAL MODELS OF EXERCISE.

G.A. Hand, L.J. Fulk, P.R. Burghardt, and J.M. Davis. Departments of Exercise Science and Pharmacology and Physiology, University of South Carolina.

The purpose of the session is to present current data concerning animal models of central nervous system responses to exercise. Mammalian organisms are similar in that they have developed a complex nervous system designed to maintain homeostasis both at rest and during stressful events. Adjustments to this system affect virtually every bodily function from mood state to immune reactivity. The objectives of this symposium are to discuss general aspects of appropriate animal models for CNS responses to exercise and present "state of the art" experimental approches to research in the area of nervous system physiology and exercise. Topics will include: the regulation of specific neural pathways during exercise, the effect of intense exercise training on pain tolerance, the olfactory bulbectomy model of depression/ anxiety and exercise, and the effect of exercise on immune system function. The information presented will be relevant to scientists and clinicians interested in the neurobiology of exercise and control of physiological functions during exercise.

S4

TEACHING EXERCISE SCIENCE: IMPROVING BY REFLECTING

Phillip A. Bishop, University of Alabama, Tuscaloosa, AL 35487-0312

Most ACSM members have some teaching responsibilities. Yet most of us have had only minimal formal training in teaching. At the same time, many of our students find exercise science material to be especially complex. Given these factors, high-quality teaching is greatly needed in our field. Proposed is a symposium TO HELP EDUCATORS REFLECT EFFECTIVELY ON THEIR OWN TEACHING EFFECTIVENESS. It would deal with the issues of TEACHING TECHNIQUES, BLOOM'S TAXONOMY OF COGNITION AND THE ROLE OF HIGHER-ORDER THINKING, PLANNING AND DELIVERING INSTRUCTION, EFFECTIVE ILLUSTRATIONS, THE IMPORTANCE OF RELEVANCE, FEEDBACK, AND GRADING. Proposed is a participative format designed to equip teachers to continue to improve their own style and methods. Attendees would be encouraged to share from their own experiences, both good and bad. Part of the emphasis would be individuality of style. This 90-minute symposium would be DIRECTED AT ALL TEACHERS with emphasis on exercise science applications.

S5

INTEGRATING TECHNOLOGY INTO AN EXERCISE SCIENCE CURRICULUM: THE USE OF A.D.A.M. INTERACTIVE ANATOMY AND PHYSIOLOGY SOFTWARE AS A TEACHING TOOL

M.J. Saunders, N.J. Dalton, and L.P. Borkowski, School of Kinesiology and Recreation Studies, James Madison University, Harrisonburg, VA 22807

Instructional techniques that accommodate both verbal and visual learning styles can insure that all students have equal opportunities for learning. One way to accomplish this goal is by integrating technology into the exercise science curriculum. The purpose of this symposium will be to describe an experimental undergraduate curriculum that used A.D.A.M. Interactive Anatomy and Physiology software in several exercise science courses. Faculty and students involved in the program will discuss how this software was used to maximize student learning in both basic and applied science courses. Examples of lecture materials, self-paced computer lab experiences, and a student-created resource module will be described. In addition, presenters will discuss the advantages and disadvantages of using this technology in creating learning/resource modules for the fitness industry. This presentation will be targeted toward faculty, program coordinators, and other individuals involved in the development of exercise science curricula.

S6

EXERCISE, AGING AND FUNCTIONAL OUTCOMES: A CRITICAL DIMENSION FOR MEANINGFUL RESULTS.

M. Elaine Cress, University of Georgia; John Petrella, University of Georgia; Robert H. Wood, Louisiana State University; Michael A. Welsch, Louisiana State University.

The purposes of this symposium are fourfold: 1.) to acquaint the audience with socio-medical models of disablement and the importance of developing sensitive and specific measures of physical functional ability in modeling the disablement process; 2.) to present the validity and sensitivity of performance-based functional measures that are appropriate for independent-living older adults; 3.) to present data regarding the efficacy of various exercise treatment strategies for enhancing physical functional ability in apparently healthy older adults; and 4.) to present data regarding the implementation of a patient education program in a primary care setting and its potential to improve function and quality of life in patients with chronic hypokinetic disease. The intended audience for this symposium includes geriatricians, geriatric health care providers, and exercise scientists with an interest in primary and secondary prevention of physical disability in older adults.

S7

THE EFFECT OF ALTERED LOADING ON SKELETAL MUSCLE GENE EXPRESSION AND FUNCTION.

James A. Carson1, Larry Lowe2, and Christopher Ingalls3. 1Department of Exercise Science, University of South Carolina, Columbia SC; 2Biology and Physical Sciences, Benedict College, Columbia SC; 3Department of Kinesiology and Health, Georgia State University, Atlanta GA.

This symposium's focus will be changes in skeletal muscle gene expression during altered loadin paradigms that leads to changes in muscle mass and function. Skeletal muscle remodeling (i.e. injury and hypertrophy) induced by chronic and intermittent overload will be examined, as well as, muscle atrophy induced by microgravity or a lack of muscle loading. Dr. Ingalls will present the first talk examining mechanisms of strength adaptation in eccentric contraction-induced muscle injury. This presentation will focus on skeletal muscle remodeling after single and multipl bouts of eccentric contraction-induced muscle injury, specifically examining the mechanisms responsible for the adaptation in muscular strength. Dr. Carson will be the second speaker and discuss alterations in gene expression during the onset of skeletal muscle hypertrophy induced by chronic overload. This presentation will emphasize the signaling mechanisms that appear important for alterations in gene expression at the onset of overload-induced hypertrophy in skeletal muscle. The third talk by Dr. Lowe will examine the effect of space flight (microgravity) on gene expression and specifically on helix/loop/helix myogenic regulatory gene expression in skeletal muscle. Skeletal muscle placed in microgravity conditions (unloading), such as with astronauts during spaceflight, induces atrophy of skeletal muscle. Understanding gene expression changes due to microgravity will lead to countermeasures to offset this muscle loss. The target audience will be professors and graduate students interested in basic and applied research related to skeletal muscle plasticity.

P1

AN ELECTROMYOGRAPHIC COMPARISON OF ABDOMINAL MUSCLE ACTIVATION BETWEEN CURL-UP AND REVERSE CURL-UP EXERCISES PERFORMED ON A THERAPY BALL AND THE FLOOR

Dominick, G.M., Browder, K.D., Broeder, C.E., & Davenport, M.J. East Tennessee State University, Johnson City, TN 37614

Therapy balls (TB) have become a popular mode of exercise for abdominal training. It has been suggested that TB strengthen stabilizer function and improve range of motion (ROM), joint alignment, muscle strength, sensory and perceptual stimulation, and balance control. Unfortunately, there is little scientific research concerning the use of TB for training. The purpose of this study was to compare abdominal muscle activation between TB and traditional floor (FL) exercises. Fifteen inexperienced (age: 21±3 yr) and five experienced (age: 23±1 yr) males performed curl-up (CU) and reverse curl-up (RC) exercises on TB, FL, and a raised bench (BE) that was designed to mimic ROM of TB exercises. Subjects underwent a 5-day familiarization period. They were then randomly assigned to perform combinations of CU and RC exercises for the three modes. Electromyographic (EMG) recordings (Noraxon USA, Myosystem 1200) were obtained for the upper rectus abdominus (URA), lower rectus abdominus (LRA), external oblique (EO), gluteus medius (GM), and rectus femoris (RF). EMG was quantified as a percent of MVC. A repeated measures ANOVA was calculated to determine differences in muscle activation due tc mode of exercise. Significant differences ($p<0.05$) were found for URA and LRA. FL caused less activation than TB and BE for the URA and LRA; there was no difference between BE and TB. No differences were found in EO, GM, or RF. TB did elicit greater muscle activation than FL, but the lack of difference between TB and BE indicates that TB may not provide the superior training effect that has been advertised.

P2

GREATER MUSCLE COACTIVITY IN OLD COMPARED TO YOUNG ADULTS DURING MAXIMAL KNEE EXTENSION.

K. Smith, D. Tunnell, J. Moody, P. DeVita, and T. Hortobagyi. Department of Exercise & Sport Science, East Carolina University, Greenville, NC 27858.

Muscle coactivity is defined as a simultaneous activity in the muscles comprising the agonist-antagonist set, which stabilizes the joint by increasing stiffness during voluntary movement. Current research shows that older adults display more coactivity than young adults during activities of daily living that require submaximal force (J. EMG. Kinesiol. 10:117, 2000). Therefore, the purpose of the study was to compare muscle coactivity during single-joint, maximal voluntary contractions in old and young adults. Old (n=27, age 71) and young (n=10, age 20) subjects performed maximal knee extension on a KinCom dynamometer. EMG data were collected with a telemetric system (Noraxon USA). The table shows the hamstring to vastus lateralis peak EMG activity ratios measured during maximal voluntary contractions. An age by contraction mode ANOVA revealed no significant interaction ($p= 0.5215$) or ontraction mode main effect ($p=0.0976$). The age main effect was significant ($p=0.0206$). These data suggest that, as observed during activities of daily living performed at submaximal force, old individuals also exhibit greater muscle coactivity during single-joint, maximal voluntary contractions.

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	Eccentric(90deg/s) Mean (SD) (SD)	Isometric Mean (SD)	Concentric(90deg/s) Mean (SD)	Group Mean
Old	0.33 (0.18)	0.29 (0.15)	0.32 (0.19)	0.31 (0.17)
Young	0.21 (0.10)	0.13 (0.09)	0.24 (0.23)	0.19 (0.15)
Both	0.29 (0.17)	0.25 (0.15)	0.30 (0.20)	

P3

OLD COMPARED TO YOUNG ADULTS USE GREATER RELATIVE MUSCLE ACTIVITY DURING STAIR LOCOMOTION.

J. Jolla, K. Smith, S. Beam, C. Mizelle, A. Vestal, P. DeVita, and T. Hortobágyi. Dept. of Exercise & Sport Science, East Carolina University, Greenville, NC 27858

It has been suggested that execution of activities of daily living (ADL) requires a small fraction of the available maximal torques in young and old adults (ESSR 23:65, 1995). Because the EMG to torque relation is influenced by age it is reasonable to hypothesize that age would also influence the relative muscle activation level necessary to execute an ADL. The purpose of the study was to compare the relative muscle activation levels during stair ascent and descent between young (n = 11, age 22) and old (n = 5, age, 73) adults in relation to a maximal effort task. Surface peak (mV) and average (mV·s) root-mean-square EMG activity of the vastus lateralis was determined during the stance phase of 5 trials each of stair ascent (915 ms [+/-70]) and stair descent (892 ms [+/- 60]), respectively. EMG was also measured during maximal effort supine leg press at 5 different knee joint positions. The Table shows the mean (SD) percent of muscle activity during stair locomotion relative to leg press and the unpaired t-test p values for the age-group comparisons. During ascent and descent, respectively, relative muscle activity was about 1.6 and 2.4 times greater in old compared to young adults. The data suggest that old compared to young adults use substantially greater relative muscle activation to perform ADLs.

	Ascent				Descent			
	Peak EMG	p	Average EMG	p	Peak EMG	p	Average EMG	p
Young	50.4 (28)		27.9 (16)		27.6 (15)		20.5 (12)	
Old	73.6 (34)	0.16	48.9 (24)	0.06	71.0 (35)	0.002	50.5 (30)	0.01

Supported by National Institute of Aging

P4

CHANGES IN GROUND REACTION FORCES UTILIZING THE POSE METHOD OF RUNNING

C. Sol, K. Mitchell, D. Torok, S. Graves, R. Welsh. Florida Atlantic University, Department of Exercise Science and Health Promotion, Davie, Florida; Good Samaritan Medical Center Orthopaedics Research Laboratory, West Palm Beach, Florida

The prevalence of knee injuries associated with running over the last 20 years has been identified as the most common cause of injury in recreational runners. The majority of recreational runners tend to be heel strikers, a running style producing the greatest impact forces. This study was undertaken to determine if changing a running style would decrease the impact forces at the knee joint. The subject population consisted of 14 heelstriking recreational runners and triathletes. There were 8 subjects in the training group. This group trained for about 1.5 hours, once a week for 12 weeks, on how to run on the midfoot as per the Pose Method of Running. The other 6 subjects were in the control group. All subjects performed the same pre and post testing conditions of kinetic and kinematic measures. The kinematics and kinetics were measured utilizing six Motion Analysis Corporation (MAC) cameras at 240 Hz, an SGI Indy Workstation, 2 video processing units, 64 channel A/D, and MAC capture and analysis software, plus two Advanced Mechanical Technology Inc. (AMTI) 6 Component Force Platforms. The variables measured were stance phase, maximum loading rate as a % of stance phase, maximum ground reaction forces (GRF) at landing during impact phase and maximum GRF at the knee joint during impact phase. The data were analyzed with a repeated measures ANOVA with significance set at ($P<0.05$). Significant changes were found in all the variables for the training group, no significant changes were found in the control group. These preliminary results are encouraging in that changing the running style from heel striking to midfoot results in less stress at the knee joint and may lead to a reduction in knee related injuries associated with running.

P5

DEGREE OF BILATERAL DEFICIT DURING DYNAMIC KNEE EXTENSION AND FLEXION IN TRAINED COLLEGE AGED MALES AND FEMALES

B. Sirikul, B. Dale, J. Kozusko, and P. Bishop. Dept. of Human Performance Studies, The University of Alabama, Tuscaloosa, AL 35401

Many studies have studied the deficit in maximal voluntary force that is thought to occur when bilateral muscle groups contract simultaneously. A true bilateral deficit (BD) would suggest a significant limitation of neuromuscular control; however, the literature remains uncertain. Our purpose was to determine whether there is a BD in the knee extensors and flexors of trained college-aged subjects during dynamic contractions and quantify the extent of BD in both muscle groups. Six males and five females performed unilateral (UL) and bilateral (BL) dynamic knee extensions and flexions at 75% and 100% maximal voluntary contraction (MVC) during two sessions spaced 72 hours apart. No significant differences were found between UL and BL force generation at either intensity for either the extensors or flexors. A significant facilitation ($p=0.016$) was observed in the extensors at 100% MVC (BL 87.7 ± 22.7 kg vs. UL 81.4 ± 24.4 kg). Extensors showed twice the facillitation of the flexors being significantly different at 100% MVC ($p=0.005$). These results provide no of a significant limitation in neuromuscular control between BL and UL isometric contractions of the knee extensors and flexors in trained college aged subjects.

P6

COMPARISON OF A TRADITIONAL AND MODIFIED BICYCLE CRANK DURING MAXIMAL STATIONARY CYCLING

Justin J. Drew, Anthony P. Marsh, Dave N. Simmons, Michael J. Berry. Wake Forest University, Winston-Salem, NC

During cycling with a traditional bicycle crank, the effective force applied to the pedals is reduced at a crank angle of 0 and 180 degrees resulting in a "dead spot". A bicycle crank (Z crank) was designed to eliminate this "dead spot". The purpose of this study was to compare gross efficiency at work rates of 150 and 200 watts, peak oxygen consumption (VO2peak), peak work rate and rating of perceived exertion (RPE) between a traditional crank and the Z crank. One female and nine male cyclist (32.4 ± 7.0 yrs) completed two maximal graded exercise tests using the traditional and Z cranks on a stationary bicycle mounted on a Velodyne trainer. Expired gases were measured using a Medical Graphics CPX/D system. When using the traditional and Z cranks, participants achieved similar peak work rates (357.5 ± 69.8 vs 350.8 ± 39.9 watts, respectively), VO2peak (56.0 ± 5.8 vs 55.7 ± 4.7 ml/kg/min, respectively), and gross efficiencies at 150 watts (19.5 ± 2.2 vs 19.5 ± 1.7 percent, respectively) and 200 watts (20.8 ± 2.2 vs 20.5 ± 1.6 percent, respectively). Subjects reported a significantly ($P<0.05$) higher RPE at peak exercise with the traditional crank (9.6 ± 0.5) compared to the Z crank (8.8 ± 0.8). There appears to be limited benefit of the Z crank at either submaximal or peak work rates during a graded exercise test.

P7

KINETIC COMPARISON OF FREE WEIGHT AND MACHINE CLEANS

R.M. Jones, A.C. Fry, L.W. Weiss, S. K. Kinzey†. Dept of Exercise and Sport Science, The University of Memphis, Memphis TN 38152. †Dept of Exercise Science and Leisure Management, The University of Mississippi, Oxford, MS 38677

The purpose of this study was to investigate and compare the differences in performance between a free weight power clean (FW) and a machine power clean (M). These exercise modalities were compared using vertical power, vertical velocity, vertical force, and maximum strength (RM). Weight trained, college age males ($x \pm SD$; $n = 14$; age = 24.9±6.2 yrs) participated in two familiarization sessions and two testing sessions. After the RM was determined, performance was analyzed at 85% of 1-RM using a FiTROdyne® dynamometer. The results from paired t-tests indicate that the RM (kg; FW = 87.3± 16.5, M = 65.8± 11.4; $p< 0.001$) for the FW was significantly greater than the M. The average power (W; FW = 928.8 ± 190.5, M = 769.8 ± 116.4; $p<0.01$), and force at peak power (N; FW = 1444.6± 266.3; M = 1231.4 ± 194.2; $p<0.05$) were significantly greater with the FW. Peak velocity ($m \cdot s^{-1}$; FW = 2.02 ± 0.18; M = 2.56± 0.21; $p<0.001$), average velocity ($m \cdot s^{-1}$; FW = 1.24 ± 0.12; M = 1.37 ± 0.21; $p<0.01$), and velocity at peak power ($m \cdot s^{-1}$; FW = 1.77 ± 0.28; M = 2.20± 0.24; $p<0.001$) were all significantly greater with the M. No significant difference was observed for peak power (W; FW = 2520.0 ± 487.0; M = 2693.6 ± 443.7). The bar trajectory of the M could be one factor contributing to the observed differences. In addition, the use of similar relative intensities, not absolute intensities, could account for some of the differences.

P8

EFFECTS OF PASSIVE STRETCHING ON VERTICAL JUMPING PERFORMANCE

E.T. O'Bryant, H.S. O'Bryant* and C.M. O'Bryant**. Watauga High School, Boone, NC 28607, **Blowing Rock School, Blowing Rock, NC 28605 and *Biomechanics Laboratory Appalachian State University, Boone, NC 28608.

Thirteen females and 9 males (n=22) volunteered as subjects (mean ±SEM physical characteristics: age=23.9±0.9y, body height=173.7±2.0cm, body mass=71.6 ±3.9kg) to investigate how passive stretching (PS) affects vertical jump performance. After a general warm-up of low intensity double-leg and single-leg hops (140s total), subjects performed two practice and one maximal vertical jump (VJ1). Another maximal vertical jump (VJ2) was performed immediately post PS followed by 30s rest and a third maximal vertical jump (VJ3). PS consisted of static front lunges and PNF stretching of the hamstrings. All PS positions were held for 10s for a cumulative total of 140s. Jumping performance was measured using a "Vertec" and a forceplate. The Vertec measured vertical jump displacement to the nearest 1.27cm (0.5inch). The forceplate measured vertical ground reaction forces (GRF) at a sample frequency of 500Hz. GRF were conditioned at a frequency of 1050Hz and analyzed for peak rate of force development (PRFD), time to PRFD, peak force (PF), time to PF, peak power (PP), time to PP, peak velocity (PV), time to PV and predicted vertical displacement (DIS). Data were analyzed using a one-way ANOVA for the main effect comparisons and a paired t-test for pairwise comparisons (difference between jumps). No statistically significant difference ($p>.05$) was found for PRFD, PF, time to PF and PP [eccentric + concentric phases] or time to PRFD, time to PF, time to PP [concentric only phase] as result of PS. Statistical significance ($p<.05$) was demonstrated for DIS (VJ2 vs. VJ3), time to PRFD (VJ1 vs. VJ3), time to PP (VJ1 vs. VJ2 / VJ1 vs. VJ3), PV (VJ2 vs. VJ3), time to PV (VJ1 vs. VJ2 / VJ1 vs. VJ3) [eccentric + concentric phases] and time to PV (VJ1 vs. VJ2) [concentric only phase]. PS does not appear to adversely affect vertical jump height (DIS), PRFD or PF but may slow the muscles' reactive ability during the eccentric phase of counter type movements.

P9

ESTROGEN REPALCEMENT THERAPY: INFLUENCE OF ADMINISTRATION METHOD AND EXERCISE ON CIRCULATING ESTRADIOL-BETA-17 IN POST-MENOPAUSAL WOMEN

J. Dobridge, C. Williams, W. Meyer & A.C. Hackney, FACSM Dept. of Exercise & Sport Science, University of North Carolina, Chapel Hill, NC. 27599.

This study examined the effects of both administration method and exercise on estradiol-beta-17 (E2) in post-menopausal women receiving estrogen replacement therapy (ERT). Eleven women (mean age = 53.7 ± 6.5 years) all received ERT under two different administration methods: trans-dermal (TD) patch and oral pill (OP). After appropriate dosage periods under each administration method, the subjects performed 45 min of walking exercise at 60% VO2max. In each exercise session blood samples were collected at rest (-15 min, 0 min), at 15-min intervals during exercise (+15, +30, +45 min), and 30 min into recovery from exercise. Repeated measures ANOVA revealed a significant main effect for administration method ($p<0.01$). Circulating E2 levels were significantly greater during the TD trial than during OP trial at all sampling times. Furthermore, a significant E2 increase in response to exercise occurred in the TD trial (+30, +45 min > 0 min; $p<0.05$), but not so for the OP trial. The results indicate that women using a TD administration of ERT experience significantly higher circulating levels of E2 at rest and during exercise than women using the OP administration of ERT. These findings have implications for the ERT method chosen by post-menopausal physically active women, and researchers who study such women.

P10

INFLUENCE OF ORAL CONTRACEPTION USE ON MARKERS OF MUSCLE DAMAGE FOLLOWING ECCENTRIC EXERCISE.

A. Carter, J. Dobridge, and A.C. Hackney FACSM. Department of Exercise & Sport Science, University of North Carolina Chapel Hill, NC 27599.

This study examined whether oral contraception (OC) usage affects the markers of muscle damage following eccentric exercise. It was hypothesized the higher estrogen status associated with OC use has protective effects on muscle. Markers were creatine kinase (CK) and delayed onset muscle soreness (DOMS). Seventeen OC users and ten eumenorrheic (EU) subjects completed a 30-min downhill running bout at ~65% VO2max. The OC completed the exercise during the mid-luteal phase (day 22.9 ± 1.5; high estrogen) while the EU did their exercise in the mid-follicular phase (day 9.6 ± 4.4; low estrogen) of the menstrual cycle, respectively. Physical activities prior to and during the experiment were controlled. The CK activity and DOMS were assessed pre-exercise, immediate-post, 24, 48 and 72 h post-exercise. ANOVA results showed significant increases in CK activity at 24, 48 and 72 h post for the OC and EU groups, respectively ($p<0.001$). The CK interaction of group x time was significant ($p<0.01$); i.e., the OC group had lower CK at 72 h post than did the EU group. Exercise caused an increase in DOMS in both groups ($p<0.001$); but, the interaction effect only approached significance ($p=0.15$). The findings support that elevated estrogen levels (via OC usage) have a protective effect on muscle tissue following eccentric exercise. The mechanisms of this protective effect are unclear but possibly relate to the antioxidant characteristics and tissue membrane stability properties associated with estrogen and its derivatives.

P11

DESCRIBING PATIENT ADHERENCE IN A CONTEMPORARY COHORT OF OUTPATIENT MONITORED CARDIAC REHABILITATION PATIENTS

C. Bopp, S.E. Davis, G.B. Dwyer, J. Smith & J.L. Durstine. Movement Studies and Exercise Science Department, East Stroudsburg University, East Stroudsburg, PA 18301; Department of Exercise Science, School of Public Health University of South Carolina, Columbia, SC 29208

A high rate of patient adherence in outpatient monitored cardiac rehabilitation has been shown to greatly enhance th benefits associated with involvement in a structured rehabilitation program following a cardiac event. A low adherence rate has been associated with minimal benefits and an increased risk of further cardiovascular events. The purpose of this study was to predict a patient's rate of adherence in outpatient monitored cardiac rehabilitation based upon pre-existing physiological data and to determine which basic physiological discriminators were most indicativ of adherence tendencies. Eligible subjects were participants in outpatient monitored cardiac rehabilitation programs. Physiological data was obtained from 269 outpatient monitored cardiac rehabilitation patient charts; twenty-nine patients met exclusion criteria, resulting in 240 total subjects. Mean age was 63.3±11.2 years. T- tests were performe to measure differences between various subject groups. ANOVA was performed to determine adherence differences among the three most common diagnoses. These three admitting diagnoses represented 78% of all subjects. A discriminant function analysis was also performed to predict adherence based upon four physiological discriminator Statistically significant findings included; adherent subjects were older than non-adherent subjects ($p=0.05$), adheren males were older than non-adherent males ($p=0.05$), and males had a significantly lower resting heart rate than females ($p=0.05$). ANOVA showed that subjects diagnosed with stable angina showed lower adherence rates than those subjects with an admitting diagnosis of CABG or Post-MI ($p=0.05$). The discriminant function analysis performed during this investigation was able to correctly place 65% of subjects into the appropriate adherence category. This represents a 15% improvement over relying on chance alone. Posterior probability analysis indicated that the most adherent subjects were older adults with lower diastolic blood pressure values. By identifying those patients at risk for low adherence to prescribed cardiac rehabilitation prior to the first exercise session, additional interventions can be employed to insure the patient gains all the benefits associated with outpatient monitored cardi rehabilitation.

P12

DIFFERENCES IN BONE MINERAL DENSITY BETWEEN TWO COLLEGE AGED FEMALE POPULATIONS

JF Otteni, MD[1], WR Barfield, PhD[2], AM McBryde Jr., MD[3], PJ Nietert, PhD[4],1 Dept. of Orthopaedics, Medical University of South Carolina., Charleston, SC 29425, 2 College of Charleston, Charleston, SC, and Dept. of Orthopaedics, MUSC, Charleston, SC 29425, 3 Dept. of Orthopaedics, MUSC and University of South Carolina, Columbia, SC 29208 , 4 Dept. of Biostatistics, MUSC, Charleston, SC, 29425

Bone mineral density (BMD) is a commonly used method to determine the risk of fracture. This has been used in elderly populations to predict the risk of osteoporotic fractures and has recently been applied to young athletic populations as well. Differences in BMD have been correlated with differences in stress fracture risk. Previous studies have shown a correlation between regional differences in BMD and increased stress fractures. Up to a certain point, physical activity increases bone mineral density. Beyond this undetermined point, the microtrauma caused to the bone by activity overwhelms the body's ability to repair the bone, causing BMD to decrease and stress fractures to occur. As part of an ongoing prospective study evaluating factors contributing to stress fractures in female cadets, DEXA (dual energy x-ray absorptiometry) studies were performed to evaluate bone density differences between two distinct female college populations, The Citadel and The College of Charleston (CofC.) A total of 45 women participated in the study, 32 from the Citadel and 13 from CofC. The anatomical locations studied were the lumbar spine (four different vertebral levels) and the hip (four different locations) because these are the most metabolically active areas involved in bone turnover. This descriptive, cross-sectional prospective study demonstrates significant differences between these two populations with The Citadel students having significantly higher BMD values than the College of Charleston students at two hip sites, the greater trochanter and the intertrochanteric region ($p < 0.05$.) This supports our hypothesis that due to the increased physical activity involved in a military education, The Citadel female cadets would have higher BMD than the CofC females. We also hypothesize that if stress fractures were frequent in The Citadel group, the differences in BMD would be reversed. Further data currently being gathered may demonstrate this to be the case.

P13

A STUDY OF LOW BACK PAIN AMONG RUNNERS AND WALKERS

Shane K. Woolf, M.D. Department of Orthopaedic Surgery, Medical University of South Carolina, Charleston, SC 29425

Low back pain (LBP) is a problem frequently encountered by athletes and is well-studied among those involved in various athletic activities. However, investigations dedicated to examining relationships between LBP and factors specific to running and walking are limited. The available literature suggests runners and walkers have a lower relative risk for significant LBP. The purpose of this study was to investigate the incidence, prevalence, natural history, and possible risk factors for LBP among runners and walkers. A survey was administered to participants who registered for either a 10-kilometer run or a four mile walk. A total of 539 responses were received. A previous history of LBP was reported by 74% of respondants overall. The prevalence of LBP at the time of survey completion was 13.6% overall. Most of these athletes had experienced at least one episode of LBP in the past year. LBP was experienced more frequently by obese runners, by those who reported an uneven pattern of shoe wear, and by walkers who also engaged in weight training. Regular participation in aerobics correlated with a reduced lifetime risk for LBP. We anticipate this knowledge will benefit not only athletes in training, but other fitness enthusiasts, including casual runners and walkers and those who jog or walk to rehabilitate low back injuries.

P14

THE EFFECT OF DISTRACTION DURING CYCLE ERGOMETRY ON RATINGS OF PERCEIVED EXERTION AND AFFECT SCORES IN OVERWEIGHT INDIVIDUALS

Lauren H. Williams, Charleston, SC 29407

The purpose of this study was to determine the effect of distraction, in the form of reading, on ratings of perceived exertion (RPE) and affect scores during moderate-intensity cycle ergometry in mild to moderately obese individuals (BMI = 27-40 kg/m2). All subjects were classified as untrained, having a predicted VO2max of <43 ml/kg/min for males and <34 ml/kg/min for females. Specifically, this study examined these ratings in response to different types of reading materials (high-interest reading distraction, low-interest reading distraction, no reading distraction). Fourteen subjects, ages 19-45 participated in three 30-minute practice cycling trials and three 30-minute experimental trials in which RPE and affect were measured at ten minute intervals (10 minutes, 20 minutes, 30 minutes). Reading materials were given to the subjects during two of the experimental trials and one trial served as a control condition. RPE was measured using Borg's 6-20 scale and affect was measured using the Feeling Scale. Repeated measures ANOVA did not reveal any significant differences between treatment conditions ($F = 1.113$, $p = 0.360$) or any interaction effect between treatment conditions and time ($F = 0.660$, $p = 0.634$). However, a significant increase in RPE scores over time was found ($F = 9.283$, $p = 0.004$), with scores ranging between 13.79 and 14.86 across all conditions. A Friedman Test with Fisher's Exact Test did not reveal any significant differences in affect scores between treatment conditions over time ($p = 0.236$). Paired samples T-tests for RPE scores at minute 30 of each treatment condition did not reveal any significant differences between treatment conditions. Additionally, a Friedman Test with Fisher's Exact Test for affect scores at minute 30 of each treatment condition did not reveal any significant differences between treatments.

P15

A TEST OF PROSPECT THEORY: GAIN-FRAMED VS. LOSS-FRAMED MESSAGES FOR EXERCISE

S. Wilcox & A. Skiba, Department of Exercise Science, School of Public Health, University of South Carolina, Columbia, SC 29208

Prospect theory suggests that health messages framed in terms of gains (advantages/benefits) are more effective for prevention behaviors (e.g., sunscreen use), whereas messages framed in terms of losses (disadvantages/ costs) are more effective for detection behaviors (e.g., mammograms). According to this theory, gain-framed messages should be more effective than loss-framed messages for promoting exercise. The purpose of this study was to compare gain-framed with loss-framed messages for exercise. Ppts were 55 adults (Mean = 21 ± 3 years; 80% women) who did not meet CDC/ACSM criteria for physical activity. Ppts were randomly assigned to read a gain-framed or loss-framed pamphlet and to complete questionnaires. Contrary to hypotheses, no post-manipulation condition differences in intentions to exercise were found. Repeated measures ANOVA, however, revealed a significant Time x Condition interaction ($p=.025$) for stage of change: ppts in the gain-framed condition increased their stage of readiness to change at the 2-wk follow-up whereas those in the loss-framed condition did not. There was a trend for ppts to increase mins/wk of moderate and vigorous exercise at the 2-wk follow-up ($ps=.066$ and $.071$), but there were no differences by condition. This study provides initial support for a gain-framed advantage for increasing stage of readiness for exercise change.

P16

A COMPARISON OF PERCEPTUAL AND ATTITUDINAL COMPONENTS OF BODY IMAGE IN TRAINED AND UNTRAINED FEMALES

J. Fraley, H. Vincent, and M. Skelton. Department of Sport & Exercise Science, Stetson University, DeLand, FL 32720

Perceptual and attitudinal components of body image and standard anthropometrical measurements were examined among two groups of NCAA Division I female athletes(n = 26) and a one group of untrained females (n = 11). Body image components were assessed by using the Stunkard Body Shapes Figure Scale (SBSFS), Body Esteem Scale (BES;self-rated), and modified Body Esteem Scale (mBES; societal-rated). There was a significant difference ($p < 0.05$) between the trained and untrained females on four items of the Sexual Attractiveness (SA) subscale of the BSE(Cheeks, Sex Drive, Sex Organs, & Sex Activities). Trained and untrained females also differed significantly on on three items of the mBSE (SA subscale: Sex Organs & Sex Activities; Physical Condition (PC) subscale: Biceps). Trained females scored lower on these items which indicates a more negative perception. There was a significant difference between volleyball players (n = 13) and basketball players (n = 13) on four items of the BSE (SA subscale: Sex Drive & Sex Organs; PC subscale: Physical Coordination & Agility) and three items of the mBSE (SA: Sex Organs & Sex Activities; PC: Biceps). Volleyball players scored higher on these items which indicates a more positive perception. There were no significant differences among the groups on the SBSFS. There was a significant difference in height and weight but not body composition between the trained and untrained females. It appears that specific perceptual and attitudinal components of body image may differ between trained and untrained subjects and between specific sport teams. Differences in perceptions based on self-ratings and societal-ratings may be due to the new "female ideal" where the traditional feminine image of thinness may be blending with a new ideal that emphasizes greater muscle tone and physical ability.

P17

THE RELATIONSHIP BETWEEN MULTIPLE DEFINTIONS OF THE LACTATE THRESHOLD AND 40 KM CYCLING TIME TRIAL PERFORMANCE

T.L. McGlashan, J.A. Doyle, D.E. Martin and J.C. Rupp. Dept. of Kinesiology and Health, Georgia State University, Atlanta, GA 30303

The blood lactate response determined by an incremental, maximal exercise test is frequently used to predict performance and to design training protocols. The purpose of this study was to determine if the existing definitions of the lactate threshold, defined as the breakpoint from resting blood lactate concentration (BLC), 1.0 mM above resting BLC, 2.5 mM, Dmax method, and 4.0 mM- OBLA, were accurate predictors of performance in a 40 km time trial (TT); and whether there was a significant relationship between field test TT performance and a laboratory performance test on a cycle ergometer. Subjects consisted of nine trained cyclists (age = 24.3 ± 5.3 yr.; weight = 73.5 ± 9.6 kg; % body fat = 8.1 ± 3.2; VO2max = 56.6 ± 4.8 ml·kg-1·min-1; Workmax = 355 ± 38 Watts). The study involved three testing protocols, which were separated by a minimum of 1 week. The first test procedure consisted of an incremental maximal exercise test on a cycle ergometer. The workload started at 100 W, increasing 40 W every 4 minutes until the subject could no longer maintain a cadence above 40 rpm. VO2 was measured throughout the test procedure. Whole blood lactate concentration ([La]) was measured from finger stick capillary blood samples, which were collected at rest, at the end of each stage, and at 1, 2, 5 and 10 minutes post exercise. The second test involved a 40 km TT field performance test (FPT) on moderately rolling terrain. Forty km TT time (average = 63.92), heart rates, and pre- and post- exercise whole blood [La] were measured. The final procedure was a laboratory performance test (LPT), which involved subjects riding a cycle ergometer for the amount of time it took them to complete the FPT. Subjects were instructed to accumulate as much work as possible. Finger stick capillary blood samples, subsequently analyzed for whole blood [La], were obtained every 10 minutes throughout the LPT. There was a significant inverse correlation between FPT time and LPT average power ($r = -0.75$; $p <= 0.05$), suggesting that the LPT was a fair simulation of the FPT. The only definition of the lactate threshold that had a significant correlation with the LPT average power was the fixed level of 4.0 mM ($r = 0.733$; $p <= 0.05$), which was interesting, considering the average [La] over the LPT was 4.62 mM. The results from this study suggest that none of the current methods of using whole blood [La] are strong predictors of performance concerning a 40 km TT. It also appears that cyclists may be able to maintain higher whole blood lactate levels during TT endurance events than those currently used to indicate training intensities and predict performance.

P18

INJURIES SUSTAINED WHILE PRACTICING THE MARTIAL ARTS

S.A. Kemerly, C.L. Nix[1], S.J. Kinzey, and J.S. Hallam. Exercise Science Division, University of Mississippi, University, MS 38677
[1]Department of Health and Physical Education, Louisiana Tech University, Ruston, LA 71272

We attempted to determine the most common injury type, and most common body part injured, during the practice of martial arts. Additionally, age, gender, and years of experience were examined for their ability to predict the occurrence of these injuries. Eighty-seven questionnaires were completed with 780 injuries reported for the previous year. The most common injury type was the bruise with 478 instances reported. Bruising accounted for 61.3% of all injuries reported in the study. The most commonly injured area was the shin with 160 injuries reported, accounting for 20.4% of all injuries. The most common injury was the bruised shin with 153 injuries reported accounting for 19.6% of all injuries. Years of experience had a slight effect on dislocations, fractures, and sprains or strains. Gender had a slight effect on bleeding injuries and none of the factors had any effect on bruiding injuries. These results lead to the conclusion that most of the injuries sustained while participating in the martial arts were due to contact, rather than musculoskeletal failure.

P19

THE EFFECT OF WETSUITS ON SWIM PERFORMANCE IN COLLEGIATE FEMALE SWIMMERS

J.M. Kozusko, K.D. Nicolaou, P.A. Bishop. The University of Alabama, Tuscaloosa, AL 35401

Use of wetsuits during the swim portion of triathlons has increased in popularity. The purpose of this study was to quantify the impact of both the full-body and sleeveless wetsuits on 800m swim performance in females. Nine collegiate female swimmers swam three counterbalanced trials of 800m. Velocity (V), distance per stroke (DPS), swimming efficiency index (SEF = V * DPS), heart rate (HR), RPE, and comfort were recorded for all trials, full-body wetsuit (FWS), sleeveless wet suit (SWS), and swimsuits (S). Both types of wetsuits showed improvements in V compared to S (S = 1.28±0.059 m/sec, FWS = 1.31±0.033m/sec, SWS = 1.36 ±0.065 m/sec, $p < 0.004$). Additionally, horizontal position enhancement occurred in 83% of the subjects that used either FWS or SWS. No significant differences between the trials were found in DPS, RPE, HR, or SEF and no significant difference was found in the comfort levels between the two wetsuits. Observed inhibition in kicking occurred in 50% of subjects with FWS and 28% with SWS. These results suggest that the use of a wetsuit can increase V while maintaining a constant HR.

P20

EFFECTS OF VOLUNTARY WHEEL RUNNING ON THE DEVELOPMENT OF DIET-INDUCED OBESITY IN C57BL/6 MICE.

Stephanie M. Jimenez, Peter F. Bodary, Ph.D., J. Mark Davis, Ph.D., Russell R. Pate, Ph.D. Department of Exercise Science, School of Public Health, University of South Carolina

Objective: To observe the effects of seven weeks of voluntary wheel running on the development of obesity in C57BL/6 mice fed a high fat, high sucrose diet. Research Methods and Procedures: Seventeen mice were randomly divided into either a voluntary running wheel cage (WHEEL, n=9) group or a control cage (CON, n=8) group at 4 weeks of age. Both groups were fed a high-fat, high-sucrose (HF/HS) diet throughout the seven-week study period. Food consumption and body weight were recorded at regular intervals during the study. Blood was collected at several time points for the measurement of plasma leptin, glucose, and insulin. All mice were sacrificed at the completion of the seven week protocol and fat composition was determined using a chloroform-methanol isolation of the total body lipid content. Results: No significant differences were found between the groups for body weight or food consumption during the study period. However, a significantly lower body fat percentage was measured at the completion of the study for WHEEL compared to CON (WHEEL: 22.2 + 2.6%; CON: 30.4 + 2.6%). In addition, plasma leptin was significantly lower at two weeks for WHEEL compared to CON (WHEEL: 2.2 + .31 ng/ml; CON: 4.7 + .96 ng/ml). However, the difference in leptin between the groups was not statistically different at the completion of the study (WHEEL: 4.0 + 1.4 ng/ml; CON: 8.7 + 2.8 ng/ml). No differences were found between the groups for resting insulin and glucose concentration during the study. Discussion: The presence of a voluntary running wheel appears to attenuate the development of obesity in mice provided a HF/HS diet. These preliminary findings suggest a beneficial effect of voluntary running wheel activity in the prevention of obesity in this diet-induced obesity model. Future studies need to examine a longer experimental period and determine the influence of the voluntary wheel on the development of complications of obesity including dyslipidemia and atherosclerosis.

P21

SELF-ESTEEM AND SELF-REPORTED WEIGHT CHANGE BEHAVIORS AMONG YOUNG ADOLESCENTS

C.B.Bradley, R.G. McMurray, FACSM, S. Deng, J.S. Harrell, School of Nursing, The University of North Carolina, Chapel Hill, NC 27599

This study examined self-reported dieting behavior, self-esteem, BMI, body fat, caloric intake and reported physical activity (PA) in 1140 middle school students age 11 to 14. Subjects completed Rosenberg's Self-Esteem Scale and questionnaires assessing dieting behavior in the past month, PA, and eating habits. Height, weight and skinfolds (SSF) were measured. Nearly 30% (n=339) reported being on a diet to either gain or lose weight. Dieters had lower self-esteem than non-dieters (29.7 vs 31.5, p=.0001) with those wanting to lose weight being lowest. Those attempting to lose weight had the highest BMI and SSF, the highest reported PA, but no sign of caloric restriction. There were no gender differences in the percent reporting weight change behaviors. However, whites were less likely than blacks to report recent weight change behaviors (females: 39.4% black, 27.0% white, p=.006; males: 36.9% black, 25.7% white, p=.047). More males than females and more blacks than whites reported attempts at gaining weight (both p=.001). Those attempting to gain weight had the lowest BMI and SSF, highest caloric intake and higher reported PA. Regression models controlling for race and gender show that recent dieting behavior, high BMI, and low PA are predictive of lower self-esteem. Thus, dieters have lower self-esteem than non-dieters whether their diets are aimed at weight gain or loss. In addition, those attempting weight change may be sabatoging their efforts with inconsistent eating or PA habits. Weight control education needs to address self-esteem issues for adolescents who might wish to lose or gain weight.

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P22

THE EFFECTS OF CAFFEINE AS AN ERGOGENIC AID

D.A. Frechette and C.M. DeWitt. Exercise Science. University of South Carolina Aiken, Aiken, SC 29801

Ten individuals (5 males and 5 females) served as subjects for a placebo-controlled, double blind, cross over designed study on the efficacy of caffeine as an ergogenic aid. The hypothesis of the investigation was that caffeine consumption prior to exercise would decrease the subject's perceived exertion and fatigue level during the exercise bout without causing side effects such as dehydration, nausea, tremors, and headaches. Sixty minutes prior to their exercise bout, subjects were given a large container of water to consume. The water either contained caffeine (9 mg/kg of the person's body mass) or no caffeine (placebo). The subject was blind to the contents. Following consumption, each subject was instructed to exercise strenuously for a duration of at least 60 minutes and to subsequently complete a questionnaire addressing perception of the exercise bout and symptomatology. One week later each subject repeated the exact procedure of fluid consumption, exercise, and question answering. This time the subject was administered the opposite fluid. Following completion of all exercise bouts, the data obtained from the questionnaires was statistically analyzed using paired t-tests and the results were tabulated. When subjects received caffeine prior to exercise, there was a lower perceived exertion halfway through the workout and at the end of the workout compared to the exercise bout without caffeine. Subjects also had a better overall feeling about the effectiveness of their exercise session. However, subjects reported minor side effects when they received the caffeine-containing water. The side effects reported included mild nausea, muscle tremors, headaches, and a large degree of insomnia. The only side effect that was statistically significantly different between groups was insomnia. The investigators conclude that while caffeine consumption provides exercise ergogenicity it comes at a cost of side effects, especially insomnia.

P23

EFFECTS OF SIMULTANEOUS EXERCISE AND LOUD MUSIC ON HEARING ACUITY AND AUDITORY FUNCTION.

S. Alhassan, P. W. Grandjean and S. Krishnamurti Department of Health & Human Performance, Department of Communication Disorders Auburn University, AL. 36849

Hearing acuity can be reduced temporarily after exposure to loud noise and the physiological responses that occur with exercise may enhance this effect. Currently, it is not known whether short-term reductions in hearing acuity after noise exposure and exercise are a result of temporary changes in auditory function. Therefore, the purpose of this investigation was to determine the acute effect of simultaneous exercise and loud music on hearing acuity and auditory function in young, healthy women. Nine females (age = 22 + 5 yrs, BMI = 23.9 + 2.2, VO2peak = 30.6 + 6.0 ml/kg/min) with normal hearing thresholds (< 20 dB hearing level) underwent each of 3 conditions in a randomized counterbalanced design: 1) loud music exposure of 90 dB sound pressure level for 20 minutes, 2) exercise at 60% VO2peak on a cycle ergometer for 20 minutes, and 3) simultaneous exercise and music exposure for 20 minutes. Hearing acuity and auditory function were assessed via pure tone testing and distortion product otoacustical emission amplitudes, respectively, at frequencies of 2, 3, 4, 6 and 8 kHz presented in random order before and after each condition. Results from a 3 (condition) x 2 (time) repeated measures ANOVA indicate that hearing acuity and auditory function remained unaltered after exposure to each condition. These findings provide evidence that hearing acuity and auditory function in young women is maintained after short-term exposure to moderate-intensity exercise and loud music.

P24

RELIABILITY OF THE TRITRAC-R3D PHYSICAL ACTIVITY MONITOR

C. D. Baggett, R.G. McMurray, J.S. Harrell, S. Bangdiwala, & S. Deng School of Nursing, Department of Exercise & Sport Science, Department of Biostatistics, University of North Carolina, Chapel Hill, NC 27599

Reliable and valid measures are imperative in physical activity epidemiology. Without reliable measures investigators may not find links between various diseases/risk factors and physical activity or erroneously associate these diseases/risk factors and physical activity. While it has been suggested that the Tritrac-R3D is a reliable tool for categorizing intensity of physical activity during walking and jogging, there are few data that indicate its usefulness for assessing other activities of daily living or that compare multiple Tritrac units. The purpose of this study was to determine the inter-unit reliability of the Tritrac-R3D accelerometer during physical activities commonly performed by today's youth. Fifty-six subjects (boys=26, girls=30; age=14.3±2.8 yr) performed 5 activities for 10 minutes: playing a board game, computer game, standing arcade video game, sweeping, and running. In all, six Tritrac units were tested. Subjects wore two randomly assigned Tritrac units during each activity. As has been reported, inter-unit reliability was high during running (r2=0.78) and was also high during arcade video game play (r2=0.81). However, while playing a board game and computer game as well as during sweeping the agreement between units was poor: r2= 0.24, 0.49, 0.56, respectively. While these data concur with previous studies that the Tritrac is reliable during running, the inter-unit reliability can be extremely low, particularly during more sedentary and low intensity activities. These results imply that conclusions drawn in studies comparing data from multiple Tritrac units should be interpreted with caution when large portions of the measurement time consists of activities with limited motion.

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P25

CYTOKINE CHANGES AFTER A MARATHON RACE

Kaminsky DE, Nieman DC, Henson DA, Smith LL, Utter AC, Vinci CM, Davis JM. Dept HLES, Appalachian State University, Boone, NC 28608

The influence of carbohydrate (1 liter/h, 6% carbohydrate beverage), gender, and age on pro- and anti-inflammatory plasma cytokine and hormone changes was studied in 98 runners for 1.5h following two competitive marathon races. The marathoners were randomly assigned to carbohydrate (C) (N=48) and placebo (P) (N=50) groups, with beverages administered in a doubl blind fashion during the races using color codes. Plasma glucose was higher and cortisol lower in C compared to P groups post race ($p<0.001$). For all subjects combined, plasma levels of IL-10, IL-1ra, IL-6, and IL-8 rose significantly immediately post-race, and were still above pre-race levels 1.5h later. The pattern of change in IL-10, IL-1ra, and IL-8, but not IL-6, differed significantly between C and P groups, with higher post-race values measured for IL-10 (109% higher) and IL-1ra (213%) in P, and IL-8 in C. The pattern of change in all cytokines did not diffe significantly between the 12 women and 86 men in this study, and the 23 subjects 50 yr and 75 <50 yr of age. Post-race plasma glucose was significantly and negatively correlated with IL-1ra ($r=-0.34$, $p=0.001$) and IL-10 ($r=-0.37$, $p=0.001$), but not with IL-6 and IL-8. Post-race plasma cortisol was correlated with IL-10 ($r=0.24$, $p=0.026$), but not IL-1ra, IL-8, and IL-6. Post- race IL-1ra was significantly correlated with IL-10 ($r=0.51$, $p<0.001$), but not IL-8 and IL-6, and IL-8 wa significantly correlated with IL-6 ($r=0.64$, $p<0.001$). In conclusion, plasma levels of IL-10, IL-1ra IL-6, and IL-8 rose strongly in runners following a competitive marathon, and this was not influenced by age or gender. Carbohydrate ingestion, however, had a major effect in attenuating increases in cortisol and two anti-inflammatory cytokines, IL-10 and IL-1ra.

P26

CHANGE IN SALIVARY IGA FOLLOWING A COMPETITIVE MARATHON RACE

G.A. Trone, D.C. Nieman, D.A. Henson, O.R. Fagoaga, A.C. Utter, D.M. Vinci, J.M. Davis, S.L. Nehlsen-Cannarella. Dept HLES, Appalachian State University, Boone, NC 28608

The influence of carbohydrate (1 l/h of a 6% carbohydrate beverage), gender, and age on salivary IgA (sIgA) changes and incidence of upper respiratory tract infection (URTI) was studied in 98 runners following two competitive marathon races. The pattern of change in sIgA concentration differed significantly between carbohydrate (C) (N=48) and placebo (P) (N=50) groups, with higher post-race values measured in P. However, when this was adjusted for saliva protein concentration and saliva secretion rate, no difference between groups was measured. For all subjects combined, sIgA concentration, saliva protein IgA (spIgA) concentration, and sIgA secretion rates fell significantly (21%, 31%, and 25%, respectively) below pre-race levels by 1.5-l post-race ($p<0.001$). The pattern of change in all saliva measures did not differ significantly between the 12 women and 86 men in this study, and the 23 subjects >50 yr and 75 <50 yr of age Ninety-three subjects returned health/sickness logs, and of these, 16 (17%) reported developing URTI during the 15-d period following the race event. The 1.5-h post-race spIgA concentration was lower in runners reporting URTI compared to those who did not (254±30 and 388±26 g/mg, respectively, $p=0.002$), and this was negatively correlated with the post-race plasma cortisol concentration ($r=-0.36$, $p<0.001$). Of the 16 runners, six were in C and 10 in P (Chi square = 1.11, $p=0.293$). In conclusion, the output of sIgA decreased in runners following a competitive marathon, and this was not influenced by carbohydrate ingestion, age, or gender.

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P27

REPRODUCIBILITY OF THE SIX-MINUTE WALKING TEST IN PATIENTS WITH CHRONIC HEART FAILURE

T.R. Parish, M. Alomari, R.H. Wood, and M.A. Welsch. Department of Kinesiology, Louisiana State University, Baton Rouge, LA 70803

The 6-minute walking test is increasingly used in clinical populations to assess exercise tolerance and monitor progress during interventional trials. However, a scarcity of studies report the stability of physiological measures in addition to the maximum walking distance (MWD) achieved during this test. The purpose of this study was to examine the stability of hemodynamic measures, symptom ratings, and MWD in 13 patients (age = 57±15) with chronic heart failure (CHF). Each patient performed two 6-minute walking tests one week apart. Prior to each test patients were told to report any discomforts and that they could terminate the test at any time. Patients were not coached during the test, but made aware of time remaining to completion. During the test, blood pressure, heart rate, symptom ratings, and perceived exertion were monitored every minute. Reproducibility was reported as mean+sd, the intraclass correlation coefficient (ICC), and coefficient of variation (CV). Results revealed a MWD of 162±64m and 169±65m with an ICC and CV of 0.97 and 8.9% for visit 1 and 2, respectively. Hemodynamic measurements prior to and during the walk test were not significantly different from visit 1 to visit 2. The ICC and CV for HR in the last minute of exercise was 0.99 and 2.0%, whereas the ICC for BP ranged from 0.694 to 0.772 with CV of 6.3 to 13.0%, respectively. Reports of symptoms and ratings of perceived exertion were inconsistent from visit 1 to visit 2. These data indicate the 6-min walk test reveals adequate reproducibility for MWD and HR responses. However, clinicians should recognize the lower stability of blood pressure and lack of consistency for symptoms and ratings of perceived exertion during the tests, which may prevent the use of such measures to monitor changes during interventional trials.

P28

EFFECTS OF 12 WEEKS OF PROGRESSIVE RESISTANCE TRAINING ON PULMONARY FUNCTION (PF) IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD).

Jones, T.C., Golden, J., Panton, L.B., Broeder, C.E., Browder, K.D., Fogle, D.J., Cestaro-Seifer, D.J, Seifer, F.D. ETSU & Johnson City Medical Center. Johnson City, TN 37614

The purpose of this study was to investigate the effects of progressive resistance training on PF in COPD patients. Seventeen COPD patients that were enrolled in an accredited aerobic based program were randomly placed into either an aerobic group (AERO; n=8; 63±8 yr; mean±SD) or an aerobic/resistance group (ARES; n=9; 61±7 yr). All patients had moderate to severe COPD (% predicted FEV1: AERO=39.5±32; ARES=41.9±16). Both groups participated in the aerobic based program 2x/wk during the 12-week treatment period. The ARES trained an additional 2x/wk on 12 resistance machines (Cybex), performing 3 sets of 8-12 repetitions at 32 to 64% of 1-RM. PF was measured before and after training by the standard Forced Vital Capacity (FVC) Test. The spirometry test was repeated until two values were obtained that varied less than 5%. Repeated measures ANOVAs and ANCOVAs were used to analyze data. Significance was accepted at $p<0.05$. After completing the 12 weeks of training, the ARES significantly increased upper (36%) and lower (36%) body strength while the AERO showed little change in upper (3%) and lower (9%) body strength. FVC did not differ between the two groups (AERO:1.73±1.12 to 1.83±1.1 l/min; ARES:2.26±0.56 to 2.29±0.68 l/min). Forced expiratory volume in one second (FEV1) (AERO:0.96±0.84 to 0.97±0.87 l/min; ARES:1.17±0.44 to 1.06±0.44 l/min) and % predicted FEV1 (AERO:39.5±31.9 to 40.8±32.1 % l/min; ARES:41.9±16.0 to 38.2±17.2 %) were significantly lower in ARES after training. Most researchers have documented maintenance in PF following resistance training. Given the results of this study, further research in this area is needed to understand the PF response to resistance training.

P29

FIELD EVALUATION OF THE INTER-INSTRUMENT RELIABILITY OF THE TRITRAC ACCELEROMETER AND DIGIWALKER PEDOMETER

D.J. Crotts, J.R. Berggren, and M.T. Mahar, Department of Exercise and Sport Science, East Carolina University, Greenville, NC 27858

The purposes of this study were to examine (a) the inter-instrument reliability of the Tritrac-R3D accelerometer and Digiwalker pedometer for walking 1 mile, running 1 mile, and over 1 day; and (b) the relationship between these different instruments. Twenty-six participants, aged 19 to 31 years, wore two Tritracs bound together in a hip pack and two pedometers while walking 1 mile and running 1 mile at a self-selected pace on an indoor track. Participants also wore the monitors for 1 day. Tritracs and Digiwalkers were randomly selected for each participant from a pool of monitors. The average time for walking 1 mile was 15.5 ± 3.5 min and participants took 2164 ± 230 steps. The average run time for 1 mile was 11.8 ± 5.9 min and participants took 1497 ± 262 steps. The average number of steps for 1 day was 9546 ± 4280 steps. Inter-instrument reliability was estimated with one-way analysis of variance models. The Digiwalkers were highly reliable for the walk ($R = .96$), run ($R = .99$), and over 1 day ($R = .99$). Tritrac output was expressed as the vector magnitude, which is a composite measure of movement in three dimensions. Inter-instrument reliability estimates for the Tritracs were .79 for the walk, .95 for the run, and .89 over 1 day. Correlations were calculated between the Digiwalkers and Tritracs separately for each condition (i.e., walk, run, and over 1 day). The correlation between the Digiwalker and Tritrac for the walk was low ($r = .27$). For the run and for the entire day the correlations between the Digiwalker and Tritrac were high ($r = .80$ for the run and $r = .88$ for the entire day). In conclusion, inter-instrument reliability estimates were high for the Digiwalkers under all three conditions. For the Tritracs, inter-instrument reliability estimates were lower, but still acceptable. The two measures of physical activity were poorly correlated under the walking condition, but were highly correlated for the running condition and over 1 day.

P30

LABORATORY VALIDATION OF CSA (MODEL 2.2) FREQUENCY COUNTS

Thompson, R.W, J. Hamilton, C. Tudor-Locke, M.J. Lamonte, J.L. Durstine, B.E. Ainsworth. Department of Exercise Science, Prevention Research Center, Department of Epidemiology and Biostatistics, The University of South Carolina, Columbia, SC 29208

Computer Science Application, Inc (CSA) recently revised the CSA activity monitor to include a measure of frequency of movement (Freq). Freq is analogous to the movement detected by pedometers (i.e., steps). The purpose of this study was to determine the validity of Freq output from the CSA (Model 2.2) against observation of steps. Ten volunteers (5 male, 5 female, age: 26.3 +/- 4.5 yr, height: 171.5 +/- 8.0 cm, weight: 69.1 +/- 10.3 kg) exercised in random order at five treadmill velocities (57.2, 100.1, 143.0, 185.9, and 228.8 m/min) for 10 min at each velocity with a 2-min pause between periods. During the exercise periods, volunteers wore a CSA on the right hip. Simultaneously, each period was video recorded to later determine the steps taken with hand tally. CSA monitors were initialized prior to each session and were down loaded following each session. CSA data files were processed with software provided by CSA and imported into SAS. All data were recorded as the sum of 10-min periods. Two-way repeated measures ANOVA showed differences in steps taken for treadmill velocities ($p < .001$), but no differences were found between Freq and Observed steps. Observed steps were greater at 57.2 m/min (888.9 +/- 92.3 vs. 826.0 +/- 130.8) and lower at speeds > 143.0 m/min (1626.3 +/- 140.2 vs. 1653.0 +/- 132.6) compared to Freq. Correlations between Freq and Observed steps were lower at 57.2 m/min ($r = .57$) and greater at higher velocities ($r=.89$ to $r=.99$). These results indicate a strong association between the CSA Freq counts and Observed steps at moderate to high treadmill velocities. In conclusion, the Freq output from the CSA (Model 2.2) activity monitor is a valid measure of steps at all but the slowest velocity.

P31

THE EFFECTS OF AGE, GENDER, AND PUBERTAL STATUS ON ENERGY EXPENDITURE DURING CYCLING

L S. Kelaher, R.G. McMurray, J.S. Harrell, C.D. Baggett, & S. Deng. School of Nursing, Dept. of Exercise and Sport Science, The University of North Carolina, Chapel Hill, NC 27599

The purpose of this study was to evaluate the effects of age, gender, and pubertal status on energy expenditure. Oxygen uptake for 61 females and 74 males (aged 8-18 years) was measured during cycling at a speed of 8 mph (12.8 kpm) with the Cosmed K4b2. Pubertal status, age, and gender were analyzed as main effects. Pubertal status was categorized into five levels by a questionnaire. The results indicated that pubertal status significantly effected exercise energy expenditure ($r2 = 0.37$, $p<0.0001$) whereas age ($p=0.07$) and gender ($p=0.35$) did not. Energy expenditure (ml/kg/min) decreased from pubertal stage one (P1) through pubertal stage five (P5), (P1=32.66, P2=29.95, P3=27.14, P4=22.52, and P5=21.23). Analysis of net energy expenditure (exercise energy expenditure-resting energy expenditure) showed a significant effect of pubertal status ($p<0.035$) indicating that resting energy expenditure did not account for all of the variation in exercise energy expenditure. The results of this study suggest that the physiological changes associated with adolescent development, categorized by pubertal stage, may be a more important contributor to energy expenditure than chronological age.

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P32

PHYSICAL RESERVE: OXYGEN COST OF PHYSICAL FUNCTION IN OLDER ADULTS

Jennifer H. Laity, Jill M. Slade, John K. Petrella, Tanya A. Miszko, Subodh K. Agrawal, M. Elaine Cress. Department of Exercise Science & Gerontology Center, University of Georgia, Athens Heart Center, Athens, GA 30602

Advancing age, sedentary lifestyle and disease are associated with decreases in fitness, leading to functional limitation and disability. Physical reserve (PR) is described as physiologic capacity in excess of that required to perform everyday tasks. The purpose of this study was to assess physical reserve in older adults(mean age 76.2 +/- 6.15yrs), living in the community or in assisted living/retirement facilities. Subjects were recruited who could be categorized into two groups, Independent (I:n=15) and Dependent (D:n=14). Dependent subjects indicated self-perceived physical function (SF36PF)<85 and/or lived in an assisted living/retirement facility. VO2peak during a graded treadmill test and oxygen consumption during physical functional performance (VO2pfp) were measured using the Cosmed K4b2 portable metabolic system. Physical function was measured with the Continuous Scale Physical Functional Performance test (CS-PFP) and SF36 Physical Function Scale (SF36PF). Results from a one way ANOVA ($p<0.05$) indicated a significant difference between groups for: PR (I:15.66 +/- 6.31 ml/kg/min, D:9.72 +/- 3.07 ml/kg/min), VO2peak (I: 24.10 +/- 7.02 ml/kg/min, D: 17.63 +/- 3.03 ml/kg/min), CS-PFP scores (I: 60.33 +/-8.38, D: 45.57 +/- 9.39) and SF36PF scores (I: 91.33 +/- 4.81, D: 71.07 +/- 15.71). VO2pfp was not significantly different between groups. The correlation between PR and CS-PFP scores was r=0.433. These data indicate that older adults with a higher physical reserve accomplish the same physical functional work at a lower percentage of their maximal capacity. Interventions to improve physical reserve may allow older adults to maintain their independence for a longer period of time.

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P33

LONGITUDINAL PROFILE FOR STRENGTH DEVELOPMENT, JUMPING ABILITY AND PHYSICAL GROWTH TRENDS IN A WEIGHT TRAINED, MIDDLE SCHOOL AGED FEMALE

C.M. O'Bryant, H.S. O'Bryant* and E.T. O'Bryant**. Blowing Rock School, Blowing Rock, NC 28605, **Watauga High School, Boone, NC 28607 and *Exercise Science, Appalachian State University, Boone, NC 28608.

Motor skill development can be "awkward" during pre-teen and early-teen years when the rapid increase in body segment lengths outpace muscular strength. Weight training can provide an adequate stimulus for muscle development but has not been traditionally promoted for this age citing concerns for normal growth (including injury potential) and motor skill competence. Little scientific study has addressed these issues with this age group and gender (longitudinal data is virtually non-existent). A weight trained, female (age 9 thru 14y) was used for this observation. Records were obtained during a 5-year period and used to characterize a longitudinal profile for strength development, jumping ability and physical growth trends. These parameters were identified from: 1) Best marks for the long jump in sanctioned Junior Olympic competition for years 1995 thru 1999, 2) Body weights averaged monthly across weight training sessions, 3) Growth chart data (age, height & weight) for years 1995 & 1999 compared to norms developed by Hamill et al [1979], 4) Weekly average bar weight and total sets during parallel squat and supine bench press weight training for 1996 thru 2000, 5) Monthly predicted one repetition maximum (1RM) for parallel squat and supine bench press during weight training sessions for 1996 thru 2000 [Predicted 1RM's were calculated from weight and repetitions performed in daily workouts using algorithms and charts by Wathan, 1994]. The profile characterized by these data did not support any detrimental effects of weight training. Above normal growth and development was coupled with noticeable improvements in muscular strength. This subject displayed positive gains in long jump performance while actively engaged in weight training exercise.

P34

FUNCTIONAL ABILITIES AMONG A TRI-ETHNIC POPULATION: THE CROSS-CULTURAL ACTIVITY PARTICIPATION STUDY

K.L. Drowatzky, H. Williams, and B.E. Ainsworth, FASCM, University of South Carolina, Columbia, SC 29208

The purpose of the project was to add to the growing body of data on physical functional performance of active minority and Caucasian women in the decades prior to and during old age (40-80 years). Forty-two African American (AA), 47 Native American (NA), and 48 Caucasian (CAU) women, with an average age of 54.7 ± 11.1 years served as subjects. Participants performed four tasks designed to assess selected physical functional abilities important to maintaining independence in old age. The tasks included: 1) sit and reach (SR); 2) tandem balance (TB); 3) tandem balance/gait (TG); and 4) timed get up and go (TGG). To examine age-related differences in these functional abilities, participants were grouped by decade (40-49, 50-59, 60-69, 70-79, and 80+). Results indicated that the 40-49 yr olds had significantly better hip flexibility (SR) than other age groups; CAU women had better hip flexibility than AA women. 40-49 and 50-59 yr olds also had significantly better balance (TB) than 60-69 yr olds. The interaction between age and race for TB indicated that NA women 60-69 yr olds had poorer balance than either AA or CAU women. For TG, 40-49 and 50-59 yr olds had a significantly faster gait than either 70-79 or 80+ age groups. 60-69 yr olds also had better gait performances than 70 -79 yr olds. In addition, both NA and CAU women had significantly faster gait scores than AA women, while CAU women had better gait scores than NA women. Finally for the direct measure of mobility (TGG), 40-49 yr olds had better mobility scores than either 60-69 or 70-79 yr olds. CAU women had better mobility scores than either AA or NA women. The single best discriminator of age and gender differences in this tri-ethnic population was the tandem gait, a measure of dynamic balance and gait. Based on these data, functional abilities in our sample of active women underwent declines in the decade of the 60's and were significant during the 70's decade.

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P35

PHYSICAL FUNCTIONAL ABILITY AMONG RURAL- AND URBAN-DWELLING SENIORS IN SOUTHEASTERN LOUISIANA

Christina King, Robert Wood, Rafael Reyes. Department of Kinesiology, Louisiana State University, Baton Rouge, 70803.

The rate of physical disability among older adults appears to be highest in rural states, with the highest rate of disablement appearing in the state of Louisiana. The relationship between rurality and disablement in elders is undoubtedly multi-causal, but would likely manifest itself in poor physical fitness levels, even among independent-living older adults in rural areas. Therefore, the purpose of this investigation was to examine the functional fitness of rural-dwelling (n=40) and urban-dwelling (n=50) inhabitants of Southeastern Louisiana. These independent-living older adults were evaluated for age, race, education level, occupation, and performance on the AAHPERD functional fitness test battery for older adults. Group differences in age and functional fitness were assessed using Analysis of covariance, and differences in race, education, and occupation were assessed using a Chi-square test of homogeneity. The results indicated that the urban group was older (75.3 +/- 7.9 vs. 69.7 +/- 7.2 years) and had greater educational and occupational achievements. When age was treated as a covariate, the urban dwelling seniors performed better on the AAHPERD tests of agility and dynamic balance, muscular strength and endurance, and cardiovascular endurance. These data indicate that this sample of urban-dwelling seniors demonstrated greater functional fitness than their rural-dwelling counterparts, and underscores the need for the development and promotion of community-based health services in rural Louisiana.

P36

PHYSICAL FUNCTIONAL AND SHORT-TERM HEART RATE VARIABILITY IN OLD AGE

Jennifer Favaloro-Sabatier, Robert H. Wood, C. Matthew Lee, Rafael Reyes Louisiana State University Department of Kinesiology Baton Rouge, Louisiana, 70803

Heart rate variability (HRV) is predictive of cardiac and all-cause mortality, and linked to autonomic modulation of the heart. While HRV appears to be inversely associated with age, traditional tests of physical fitness reveal a positive association between fitness and HRV. Unfortunately, many older adults cannot satisfactorily perform traditional fitness tests. Therefore, the purpose of this investigation was to evaluate the relationship between HRV and physical function as determined by the AAHPERD functional fitness test for older adults. Thirty-nine adults (ages 60-88) were assessed for short-term HRV (time and frequency domain parameters) and physical function using the AAHPERD test, which includes tests of body composition, flexibility, agility and dynamic balance, coordination, muscular strength and endurance, and aerobic endurance. Pearson correlation revealed that age was inversely related ($r = -0.1468$, $p < 0.05$) to overall HRV (standard deviation of normal R-R intervals) and to performance on the agility, coordination, strength, and aerobic endurance tasks ($R2 = 0.64$, 0.32, 0.28, 0.20, respectively). Moreover, HRV was associated with coordination and agility task scores ($R2=0.18$ and 0.14, respectively). Stepwise multiple regression indicated that coordination was the strongest predictor of HRV, and age and agility scores were of no additional predictive value. These data confirm an age-related decline in HRV and extend findings that support a positive influence of physical fitness on HRV to very-old adults, and suggest that field tests of physical function are sensitive to such an association. Moreover, the link between cognitive (i.e. coordination) and autonomic function warrant further investigation.

P37

PULSE PALPATION (6,10, AND 15SEC DURATION) AS A MEASURE OF HEART RATE DURING REST AND 3 SUBMAXIMAL EXERCISE INTENSITIES

WW Peveler, JM Green, AM Bosak. Dept. of Physical Education and Recreation, Western Kentucky University, Bowling Green, KY 42101

Heart rate (HR) is a common measure of exercise intensity. The accuracy of HR estimations may be influenced by a) palpation method (6, 10, 15sec duration) and b) elevations in pulse rate resulting from increased exercise intensity. Previous research however, has not thoroughly examined the potential effects of these factors. Male and female (n=28) volunteers cycled at 60 revolutions per minute (RPM) on a Monark ergometer at 60, 120, and 175 watts (W) for 6min at each intensity. HR estimations were made by subjects using 6, 10, and 15sec carotid pulse palpations at the 2nd, 4th, and 6th minute respectively of each intensity.Actual heart rate was assessed using a polar heart rate monitor. Using two 3 (method) x 4 (intensity) repeated measures ANOVA's with Bonferroni follow-up tests, the following were compared:a) Delta values for HR (actual – estimated) and b) Delta values for actual vs. estimated HR expressed as a percent of estimated maximal HR (220-age). Results were considered significant a $p \leq 0.05$. No significant method x intensity interactions were detected. For HR delta values, main effects between 6sec (12.9±1.2), 10sec (12.1±1.3), and 15sec (12.0±1.0) methods were not significantly different.However, main effects for intensity showed HR delta values for rest (7.7±0.9) were significantly lower than for 60W (13.1±1.3), 120W (12.6±1.2), and 175W (16.0±2.0) with no significant difference between 60W, 120W, and 175W. For HR delta values expressed as % of estimated maximal HR, rest (4.0±0.5) was not significantly different than 60W (6.5±0.6), and 120W (6.3±0.7) but was significantly lower than 175W (7.6±1.0). There was no significant difference between 60W, 120W, and 175W. Results suggest palpation methods (6, 10, and 15sec duration) all provide similar accuracy in estimating actual HR. While palpationprovides a moe accurate estimate of actual *resting* HR, increasing exercise intensity does not seem to significantly alter the accuracy of HR estimations.

P38

PEAK TORQUE OCCURRENCE IN THE RANGE OF MOTION DURING ISOMETRIC AND ISOKINETIC KNEE FLEXION AND EXTENSION

Manning J. Sabatier, Robert H. Wood, Michael A. Welsch. Department of Kinesiology,Louisiana State University, Baton Rouge, LA, 70803

The purpose of this study was to assess knee flexion and extension during isometric (IM) and isokinetic (IK) testing protocols. The specific objectives were to assess 1) the occurrence of peak torque (PT) in the range of motion; and 2) test, re-test reliability during angle-specific IM, and slow (30° · sec-1 and 90° · sec-1), and moderate (180° · sec-1) IK testing protocols in healthy adult women (n = 23; age = 22±2). The Biodex System III dynamometer was used to record unilateral knee flexion and extension strength on two occasions separated by one week. The group mean PT for IM extension and flexion was 132±39 ft·lbs and 61±17 ft·lbs at 68° and 31° of knee flexion, respectively. The average PT at 30° · sec-1 for extension and flexion was 107±39 and 51±15 ft·lbs occurring at 63° and 31°, respectively. Average PT at 90° · sec-1 was 100±33 and 46±14 ft·lbs at 59° and 40° for extension and flexion. The average PT at 180° · sec-1 was 76±24 and 37±16 ft·lbs at 56° and 47° of knee flexion for extension and flexion, respectively.The percent decrement in PT from the IM test was 15%, 22% and 42% for 30° · sec-1, 90° · sec-1 and 180° · sec-1, respectively, but similar for knee flexors and extensors. Pearson correlation coefficient for the angle-specific IM test ranged from 0.77 to 0.93 and from 0.67 to 0.96 for the IK tests for both extension and flexion. These results agree with previous reports indicating PT occurs later in the range of motion with increasing angular velocity. The magnitude of the decrement in PT with increasing velocity is similar for knee flexors and extensors. Future studies should examine the differences in the magnitude of force decrements between limbs to further our understanding regarding the balance of strength. Finally, these data indicate adequate reproducibility for both IM and IK tests separated by one week.

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PHYSICAL ACTIVITY PATTERNS AND ENJOYMENT RATINGS FOR URBAN, COMMUTER UNIVERSITY STUDENTS

M.A. Collins, B. Goldfine, M.V. Nahas, J. Petrillo, C. Ash, and J. Wang. Kennesaw State University, Kennesaw, GA & Universidade Federal de Santa Catarina, Florianopolis, SC, Brazil.

The role of physical activity as a behavioral intervention for health promotion and disease prevention is widely accepted. Currently, many universities offer a wellness/fitness course with the goal of eliciting positive behavioral changes of increasing physical activity among the student population. Prior to implementing behavioral strategies, it is important to establish the current characteristics of the target population. Therefore, the purpose of the following study was to ascertain the physical activity patterns and enjoyment ratings of urban, commuter university students. Data were collected from 1136 students enrolled in General Education courses, utilizing an 8-item, Likert scale questionnaire. The data were analyzed using simple descriptive statistics. Fifteen percent of the students reported they get no vigorous, moderate, or low intensity (e.g., walking) exercise during a typical week. Approximately 55% participate in vigorous or moderate exercise from one to three days per week. Regarding strength and flexibility exercises, approximately 40% reported no activity per week and only 30% reported exercising three or more days per week. Over 60% of the students reported they spent from 2-5 hours per day involved in sedentary activity, excluding sleep. For the 18 enjoyment scale questions, the student responses seem to parallel the physical activity patterns. Most of the students reported positive feelings with respect to physical activity. For example, 57% reported they had a strong level of enjoyment regarding physical activity. In conclusion, the activity patterns of urban, commuter university students were higher than those reported for the general population (US Department of Health and Human Services, 1996), and the majority of those surveyed reported positive feelings regarding physical activity. However, a large percentage of the students did not engage in muscular strength or flexibility related physical activity.

P40

RECOVERY FOLLOWING 3 SETS TO FAILURE OF 8 RESISTANCE EXERCISES

McLester, J.R., P. Bishop, J. Smith, M. Richardson, and R. Lomax. State University of West Georgia and The University of Alabama

The purpose of this study was to examine the course of recovery after 3 sets to momentary muscular failure of 8 resistance training exercises in ten healthy male subjects (aged 18 to 30 years) recreationally experienced in resistance training. The number of repetitions performed with the weight load for approximately 10-RM was recorded for each of the 8 exercises during session 1. Recovery status as indicated by number of repetitions performed with the same weight load was observed at 24, 48, 72, and 96 hours (counterbalanced among subjects) after the previous session. Repeated measures analysis of variance was used to investigate differences in recovery over time and differences in recovery between the upper- and lower-body over time. For group mean comparisons, performance was significantly ($p<0.05$) lower after 24 hours. At 48-hours of recovery 60% of the subjects were performing below baseline values. Number of repetitions performed at 72-hours was significantly ($p<0.05$) higher than that in session 1, with 80% of the subjects performing above baseline. After 96 hours of recovery, 30% of the subjects were still increasing their number of repetitions performed, 20% were still at 72-hour values, and 40% were demonstrating decreases in performance. No significant difference ($p>0.05$) was found between the recovery of the upper- and lower-regions of the body over time. Large inter-subject variability was observed at all time points. The results suggest that full recovery may occur at a later time than previously believed. In addition, individual recovery testing prior to exercise protocol prescription may be warranted to maximize training benefits.

P41

COMPARISON OF BIA AND HYDROSTATIC WEIGHING IN OBESE WOMEN

C.G. McMahon, A.M. Swartz, D.L. Thompson, FACSM. Dept. of Exercise Science and Sport Management, The University of Tennessee, Knoxville, TN 37996.

Finding valid body composition techniques for diverse populations remains problematic. The Tanita TBF-305 is a bioelectrical impedance (BIA) device which positions both the source and the sink for electrical currents on the bottom of the feet. Published data on this device is limited, and it is unknown if body fat distribution patterns (i.e., waist-to-hip ratio (WHR)) will influence results. Our primary purpose was to compare body composition from the TBF-305 with hydrostatic weighing (HW) in obese females and secondly to assess the impact of WHR on the measurements. Forty obese, pre-menopausal females (age = 39.7 ± 1.2 y; body mass index = 35.3 ± 1.1 kg/m^2) served as subjects. 12 of these women had lower body obesity (WHR≤ 0.75), and 13 had upper body obesity (WHR ≥ 0.85). Overall, there was no significant differences between HW and the TBF-305 in estimation of percent body fat (%BF), fat mass (FM), or fat-free mass (FFM).

	%BF	FM (kg)	FFM (kg)
HW	46.5 ± 1.0	44.9 ± 2.4	49.9 ± 1.2
TBF-305	45.2 ± 0.7	43.5 ± 2.0	51.3 ± 1.3

Repeated measures ANOVA revealed no significant impact of WHR on the BIA's prediction of %BF ($p=0.77$). Additionally, there was no significant correlation between WHR and the prediction accuracy of the TBF-305 ($r=0.03$; $p=0.85$). The TBF-305 accurately predicted body composition in obese, pre-menopausal women, and differences in body fat distribution had no influence on these estimates.

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THE EFFECTS OF 12 WEEKS OF CARDIORESISTANCE, RESISTANCE, OR CARDIOVASCULAR TRAINING ON BODY COMPOSITION

E.M. Miller, M.J. Saunders, and J.A. Flohr.

Cardioresistance training (CR) incorporates both cardiovascular (CV) and resistance (R) training into a single workout, potentially decreasing total exercise time. If CR can be demonstrated to elicit similar health benefits as those derived from traditional CV and R training, it may prove to be an optimal form of training for those with limited time to exercise. The purpose of this study was to determine if changes in body composition were similar following 12 weeks of CR, R, or CV training. Twenty-three subjects (46±10 years) were randomly selected into one of the three training groups. Each of the groups trained for 40 minutes per day, three days per week. Body fat % was measured by hydrostatic weighing before and after 12 weeks of training. Training elicited no significant ($p<.05$) changes in % fat in the CR (34.6±2.4, 34.2±2.7), R (39.3±2.2, 39.3±1.5), or CV (33.9±4.8, 32.9±4.8) groups. In addition, training produced no significant changes in body density or body weight in any of the groups. These results suggested that total energy expenditure was insufficient to elicit changes in body composition in any of the groups. However, all forms of training were equally successful at maintaining subjects' initial body composition levels.

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COMPARISON OF OBESITY ASSESSMENT PROCEDURES IN AFRICAN AMERICAN AND WHITE WOMEN

L. J. Brandon, M. B. Elliott-Lloyd, and J. Calloway, Department of Kinesiology and Health, Georgia State University, Atlanta, GA 30303

Stevens (1991) in a 25-year prospective study reported that African American (AA) women were twice as likely as white women to have a body mass index (BMI) greater than 30. It is unclear whether the greater prevalence of a higher BMI in AA is providing information about obesity or overweight. Therefore, the purpose of this study was to evaluate the consistency of existing procedures in estimating obesity in sedentary obese AA and white (W) women. The subjects (27 AA; 34.8 yr. and 25 W; 41.1 yr) were evaluated for obesity as %fat was estimated by dual energy x-ray absorptiometry (DEXA), and skinfolds, and predicted from BMI (Deurenberg et al. 1991). BMI, WHR, and excess body weight (greater than 120% of ideal body weight based on height and weight tables) were also assessed. All of the procedures, except WHR for the W women, classified both samples as obese. The mean of each procedure was compared with the minimal obesity standards for each, respective, procedure to determine the percent that each group was above the minimal obesity standard. The percentage that the mean of each procedure was above the minimal obesity standard ranged from 49% for DEXA to 2% for WHR and was typically greater for AA. Although DEXA %fat of the AA and W women were not different, more AA women were classified as obese than W women by the other procedures. These findings suggest that overweight and obesity are not identical and that procedures based on weight and body fat produce different obesity classifications. Further, the different procedures produce inconsistent results when AA and W women are compared.

P44

MUSCLE LIPID CONTENT BY MR SPECTROSCOPY IS CORRELATED WITH BODY FAT IN HEALTHY MEN

White, L.J., R.A Robergs, W.L Sibbitt Jr., M. A. Ferguson,W. Brooks. Clinical and Magnetic Resonance Research Center, University of New Mexico and Department of Exercise & Sport Sciences, University of Florida.

The purpose of this study was to examine the relationship between body composition and muscle lipid content in eleven active men (30.8 ± 1.5 y, VO2max 61.8 ± 4.6 ml.kg-1.min-1, mean ± SE,). Proton magnetic resonance spectroscopy (1H-MRS) was used to evaluate the lipid content of the vastus lateralis using a 1.5T Signa whole body magnet (PRESS, TE 60 ms, TR 2,000 ms, 128 acquisitions). Muscle was analyzed for both intra-and extramyocellular lipid content using peaks resonating at 1.28 (IMCL) and 1.52 (EMCL) ppm, respectively. Percent body fat was estimated using three-site skinfold measurements. When lipid peaks (arbitrary units, au) were expressed relative to muscle water content (au/H20), percent body fat was positively correlated with total muscle lipid (r=0.91, P=0.01), and EMCL (r=0.87, P=0.01), but not correlated with IMCL (r=0.23, P>0.05). EMCL was negatively correlated with VO2max expressed in either absolute (L/min)(r=-0.61, P=0.04) or relative terms (ml.kg-1.min-1) (r=-0.63, P=0.04), whereas IMCL was not related to VO2max (P=0.65). These preliminary findings suggest that muscle lipid content detected by 1H-MRS may coincide with estimated subcutaneous adiposity in healthy active males.

P45

A COMPARISON OF METHODS TO ESTIMATE PERCENT BODY FAT IN COLLEGE TENNIS PLAYERS.

B.L.Marks, E. Galleher, L.M.Katz, and T.A. Moore. Depts. of Exercise and Sports Science and Emergency Medicine,University of North Carolina at Chapel Hill, NC and Dept.of Exercise Science, University of South Carolina at Columbia, SC.

In tennis research, percent body fat(%BF)is usually determined from skinfold assessments, however this is not considered the 'gold standard' method. The purpose of this pilot study was to compare %BF estimates obtained on 10 male NCAA Division-I tennis players during the off-season using underwater weighing (with forced vital capacity [UWWfvc]and the oxygen dilution method [UWWo2]to determine residual lung volume), skinfolds (SKF3-site: thigh, chest, abdomen; SKF 4-site: tricep, aabdomen, suprailium, thigh), and bioelectrical impedance (BIA, Tanita Model-305). Subjects arrived well-rested to the lab in the morning after an overnight fast. All were euhydrated and rarely participated in aquatic activities. The athletes weighed 76.9 kg(range: 64.6-87.4) and body densities ranged from 1.05 to 1.09. Mean (SD)%BF results: SKF 3-site= 8.7%(4.1); SKF 4-site= 9.7%(3.3);BIA= 11.4%(4.1); UWWo2=11.5%(4.7); UWWfvc= 12.5%(5). Repeated measures ANOVA with planned contrasts showed %BF obtained from BIA vs. UWW were not significantly different ($p > 0.230$) whereas the SKF %BF estimates were significantly lower in comparison ($P < 0.05$). Residual lung volume determination method did not significantly impact the %BF UWW estimates (p=0.23). Intraclass correlations ranged from 0.56 (BIA vs. UWWfvc) to 0.96 (SKF 3-site vs.4-site). Similar results were seen for Pearson correlations. All of the %BF estimates were within acceptable measurement error range. Standard error of the estimates (SEE) between %BF methods ranged from 0.20 (SKF 3-site vs. SKF 4-site)to 3.38(BIA vs. UWWfvc). Although BIA vs.UWW %BF were not significantly different, these comparisons had the highest SEE. The BIA vs. SKF had slightly better correlatons and SEE than the SKF vs. UWW. Thus,it remains to be clarified if UWW should not be the method of choice in tennis players unacclimated to aquatic conditions for determination of %BF.

P46

A COMPARISON OF BMI AND DEXA SCANS AS A MEASURE OF BODY COMPOSITION BETWEEN TWO COLLEGE-AGED FEMALE POPULATIONS

W.R. Barfield,[1] J.F. Otteni,[2]A.M. McBryde,[3] J.S. Carter,[4] and P.J. Nietert[2]; 1College of Chas & Dept of Orthopaedics, MUSC, Charleston, SC 29425 2Dept of Orthopaedics, MUSC, Charleston, SC 29425 3Dept of Orthopaedics, USC, Columbia, SC 29203 4The Citadel, Charleston, SC 29409

Body mass index (BMI) is a common clinical tool utilized to estimate body composition in healthy and unhealthy populations. As part of a larger prospective, descriptive cohort study assessing stress fracture risks among two distinctly different college-aged female populations we examined BMI and compared our estimated assessment of body composition with measurement of body composition with dual x-ray absorptiometry (DEXA). The purpose of this component of our study was toexamine differences in estimates of body composition, based on height and weight measures compared with DEXA scans. A total of 45 females volunteered to participate in the study (32 from The Citadel {Cit} and 13 from College of Charleston {CofC}). Both groups had height and weight measures taken. A DEXA scan provided separate values for each arm and leg, the trunk, and a total fat percentage for a total of six different measurements. Our hypotheses were that: there would be mild correlation between the two assessments of body composition and, (2) there would be statistically significant differences between the two female populations on the DEXA scans. BMI for the two groups was no significantly different (Cit: 22.16±2.83; CofC: 22.25±3.62). Wilcoxon Rank Sum Tests found DEXA scans to b significantly different for the left arm (Cit:32.69±6.8; CofC: 36.54±6.22, p=<0.05) right arm (Cit: 31.73±6.4; CofC:35.74±6.7, p<0.10), right leg (Cit: 30.56±5.76; CofC: 35.56±7.64, p<0.10) and for total fat (Cit: 24.19±4.85; CofC: 27.54±6.34, p<0.10). For the entire group of study participants, BMI was most highly correlated with trunk fat, with a correlation coefficient of r=0.55. Among Cit females, BMI was found to be correlated with trunk fat (r=0.53, p <0.01) and with total fat (r=0.47, p<0.01). Among the CofC females, trunk fa was correlated with BMI (r=0.59, p<0.05). Total fat was moderately correlated with BMI (r=0.39), although this was not statistically significant (p=0.19). These data, though preliminary, provide evidence of differences in measures of body composition which may have bearing on other measures tangential to the primary goal of this study which is the reduction of repetitive stress bony injury.

P47

CAN BIOELECTRICAL IMPEDANCE TRACK BODY COMPOSITION FOLLOWING RESISTANCE TRAINING COMPARED TO DEXA?

J.G.Inglis., J. Quindry, K.Brittingham, L.B. Panton, and C. E. Broeder, Browder, K.D. East TN State University – James H. Quillen College of Medicine, Johnson City, TN 37614

Previous studies have shown that bioelectrical impedance (BI) may not be an adequate method for tracking changes in body composition (BC) during an exercise program. Broeder et al., found that BIA could not accurately detect changes in BC following either resistance (RT) or endurance (ET) exercise compared to hydrostatic weighing (MSSE–1997). The present study was designed to determine if a similar discrepancy existed between BI and dual-photon X-Ray absorption (DEXA) since DEXA is fast becoming a common research assessment tool. Fifty males (Age 45.7 ± 7.9 years, Ht. 193.7 ± 32.3 cm, Wt. 88.1 ± 14.7 kg, %BF 19.0 ± 6.4, FW 22.0 ± 7.1 kg, FFW 66.1 ± 7.6 kg) volunteered to participate in a 12 week high intensity resistance training program specifically designed to enhan muscle mass and strength. Body composition was assessed using DEXA, skinfolds (SF3, SF4, and SF7 sites equations), and a supine BI impedance system. According to the DEXA, BIA, SF4 and SF7 results, %BF did not significantly change following RT despite a 22.9% gain in strength. Interestingly, DEXA did not show any training related changes in FFW while BIA, SF3, SF4, and SF7 all showed significant gains in FFW (0.310 kg, 1.0 kg, 1.4 kg,, 1.5 kg, 1.4 kg respectively). Regression analysis revealed that BI had the weakest correlations to DEXA measures both during pre and posttesting for %BF (Pre: r=0.74, SEE=3.2 kg/ Post: r=0.56, SEE=3.6 kg), FW BF (Pre: r=0.83, SEE=3.9 kg/ Post: r=0.75, SEE=4.7 kg), and FFW BF (Pre: r=0.88, SEE=10.4 kg/ Post: r=0.86, SEE=10.9 kg). The results of this study indicate that when DEXA is used as the standard BC assessment, BI does nc track changes well. In addition, because SF measurements have been shown to track changes in BC well compared to HW in most studies, these results may indicate that DEXA itself may not track changes in FFW following a resistance training program. This conclusion is supported by the fact that DEXA was significantly different from eac of the other procedures used for detecting changes in FFW following resistance training. Future studies are needed using hydrostatic weighing and measurements of body water to determine if the differences observed in this study are the results of DEXA's inability to track FFW changes following high intensity resistance training or the inability of BI and skinfolds to track these changes.

O1

ONE-WEEK STABILITY OF HEART RATE VARIABILITY DURING PHYSIOLOGICAL PERTURBATIONS

C.M. Lee, R.H. Wood, and M.A. Welsch. Department of Kinesiology, Louisiana State University, Baton Rouge, LA 70803

The purpose of this investigation was to determine the 1-week stability of heart rate variability (HRV) during physiological perturbations. Continuous EKG's were collected in 13 healthy participants (age=23±7 yr) on two visits separated by 1-week. Data were collected during: 5-min of supine rest (S1), 5-min of a 50 cm leg-lift (LEG), a second 5-min period of supine rest (S2), 5-min of 70 degree head-up tilt (TILT), and a third 5-min period of supine rest (S3). HRV was reported as the standard deviation of normal RR intervals (SDNN), and spectral power in the total (TP; 0.00-0.4 Hz), low- (LF; 0.04-0.15 Hz), and high- (HF; 0.15-0.40 Hz) frequency power ranges was derived via an FFT. The reproducibility of HRV under each condition was reported as the intraclass correlation coefficient (ICC), the coefficient of variation, and as the standard error of measurement. Additionally, repeated measures ANOVA with Scheffe's post-hoc analysis was used to examine HRV during the various conditions. TILT resulted in a decrease in mean RR interval (930±44 to 712±31 ms). Additionally, TILT resulted in reduced cardiac vagal modulation, as suggested by a reduction in SDNN (66.6±9 to 43.3±5 ms) and an increase in LF/HF (1.8±0.9 to 6.1±0.9). However, there were no differences in HRV between any of the other conditions. ICCs ranged from 0.80 to 0.99 for S1, LEG, S2, and S3, with the exception of TP during LEG (0.76) and S2 (0.70) and LF during S3 (0.79). ICC during TILT was 0.80 for SDNN, and varied from 0.40 to 0.92 for the spectral indices. These data indicate adequate reproducibility for most HRV indices under conditions of rest and LEG. Furthermore, these data confirm previous studies indicating altered sympathovagal balance of the heart during TILT. However, the lower stability of spectral parameters during TILT indicates the complexity of this cardiovascular reflex and/or methodological problems with this approach to HRV analysis.

O2

GENDER DIFFERENCES IN THE BLOOD PRESSURE RESPONSE TO INCREMENTAL RESISTANCE EXERCISE

R. Reyes, M. Welsch and R. Wood. Department of Kinesiology. Louisiana State University, Baton Rouge 70803.

The physiological differences to resistance exercise between men and women have not been adequately studied. Accordingly, the purpose of this study was to examine blood pressure (BP) responses to incremental resistance exercise in men and women. Twenty-one participants, 13 women (38.2 yrs; SD=21.8) and 8 men (38.5 yrs; SD=18.7), performed three trials of knee extension exercise at relative workloads equivalent to 20, 30, 40, 50, 60, 70, 80, 90 % of 5-RM. BP measurements were performed using a continuous non-invasive BP monitor (Colin, Model 7000). A mixed-model ANOVA was used to examine gender by workload differences in the three-trial average BP response to the resistance exercise. Alpha was set a-priori at 0.05 and corrected to 0.006 using the Bonferroni technique for multiple comparisons. The results indicated that systolic (SBP) and diastolic BP (DBP) within groups increased as a function of intensity ($p < 0.0001$). Moreover, while men and women did not differ in SBP or DBP at rest (men=127.2 ± 2.4 / 69.7 ± 2.6; women=119.9 ± 3.4 / 64.4 ± 2.3 mm Hg), there was a significant interaction such that SBP increased more dramatically in men than in women throughout the test (men=183.2 ± 8.8; women= 147.7 ± 4.7 mm Hg; $p=0.001$). In conclusion, the SBP response to resistance exercise appeared to be greater in men than in women at the same relative workload. Future investigations should examine the possible influence of gender-related differences in muscle mass and absolute strength on the SBP response to resistance exercise.

O3

A COMPARISON OF CARDIAC RESPONSES TO EXERCISE AND DOBUTAMINE STRESS AS EVALUATED BY ECHOCARDIOGRAPHY

J.A. Stewart, J.A. Doyle, B.H. Layne, J.C. Rupp, The Department of Kinesiology and Health, Georgia State University, and S.C. Frohwein, The Emory University School of Medicine, Atlanta, GA.

PURPOSE: The purpose of this study was to compare cardiac responses to two common means of inducing stress, exercise and intravenous dobutamine. METHODS: Eighteen healthy volunteers (11 male, 7 female, mean age = 31.8) completed exercise stress ergometer (ESE) and dobutamine stress echocardiography (DSE) studies on separate days. Exercise: Subjects lay on the imaging table with their feet on the pedals of a Monark 868 cycle ergometer modified for recumbent use. Resting echocardiographic (ECHO) images were digitally acquired in both the long and short axis. Exercise was performed until the subjects attained maximal heart rate response or reached target heart rates (0.85 x 220 – age). At peak exercise ECHO images were reacquired. Dobutamine: After resting images, dobutamine was infused via intravenous (IV) catheter at 10mcg/kg of body weight, and increased by 10mcg/kg every three minutes to a maximum of 50mcg/kg. ECHO images were reacquired at peak dobutamine. Digital images were evaluated on a workstation running NIH Image software. RESULTS: Heart rate (157 bpm to 119 bpm), end diastolic volume (110 ml to 86.6 ml), end systolic volume (20.8 ml to 11.1 ml), and cardiac output (13996 ml/min to 8742 ml/min) were greater with exercise than with dobutamine ($p < .01$). Differences in ventricular volumes at peak stress were due to greater LV chamber length (8.6 cm to 8.12 cm) and short axis LV diameter (2.44 cm to 1.85 cm) with exercise ($p < .001$). Ejection fraction (87.2% to 81.1%) was greater with dobutamine than withexercise stress ($p < .001$). Dobutamine also increased the velocity of myocardial contraction by 14.8% compared to exercise ($p < .001$). CONCLUSIONS: Exercise induces higher heart rates and chamber volumes at both end diastole and end systole, resulting in greater cardiac output, while dobutamine causes increases in contractility resulting in greater ejection fraction and velocity of contraction.

O4

EFFECT OF CREATINE AND CLENBUTEROL SUPPLEMENTATION ON CARDIAC MUSCLE IN ENDURANCE EXERCISED RATS

Joseph McClung, James A. Carson, J. Mark Davis, and Gregory A. Hand Laboratory of Molecular Biology, Department of Exercise Science, and School of Public Health, The University of South Carolina, Columbia , South Carolina 29225

Purpose: This study assessed the effects of chronic creatine, clenbuterol, and creatine plus clenbuterol administration combined with intense exercise training on cardiac mass in rats. Methods: Thirty-two male Sprague Dawley rats were subjected to 30 min of endurance swim training 5 days/wk for a total of 3 weeks with 2% of total body weight attached to the tail. They were randomly assigned to one of four treatment groups. Group 1 (SW) received .5 mL of saline (0.9% NaCl) injected subcutaneously and 1ml of sucrose water by intubation tube (n=8). Group 2 received (1ml/day) water creatine solution by intubation tube (C + SW, n=8); group 3 received 200ug/kg body weight clenbuterol injected subcutaneously (Cl + SW, n=8); and group 4 received creatine and clenbuterol supplementation (CCl + SW, n=8). At the conclusion of the 21-day swim exercise training period, total body weight was obtained and the heart was collected and weighed for the determination of wet weight, total DNA. Total protein and total RNA were also determined. Results: The C + SW group demonstrated a significant increase in total heart RNA concentration (1611 ug/g ± 16) when compared to the SW treatment (1492 ug/g ± 47) ($p<.05$) but displayed no significant increases in body weight, wet weight, total protein, or total DNA. Among the SW and other treatments there were no significant changes in body weight, wet weight, total protein, total RNA, or total DNA within the cardiac muscle. Conclusion: The results indicate that the combination of chronic creatine supplementation and endurance swim training results in the increase of total RNA in rat cardiac muscle, and implies an increased capacity for protein synthesis in these hearts.

O5

EFFECTS OF BRANCHED CHAIN AMINO ACIDS ON TIME TO FATIGUE IN ELITE CYCLISTS

Paul Moran, Pennington Biomedical Research Center, Baton Rouge, LA 70810

The effects of a carbohydrate drink enriched with branched chain amino acids on cycling time to fatigue was examined using 8 well trained competitive male cyclists. Subjects exercised at 70% of maximal O2 uptake (VO2 max) until fatigue (83.5 ± 6.8 min) on three occasions, 1 week apart. During exercise, the mean workload was 228 ± 5 watts with an oxygen consumption rate of 3.28 ± 0.15 l/min. After resting 20 minutes the subjects attempted to continue exercise after ingesting either 1) a carbohydrate (CHO) drink, 2) a CHO + branched chain amino acid (BCAA) drink, or 3) a CHO + essential amino acid (EAA) drink. There was no significant difference in exercise time to fatigue after experimental treatments ($p = .2651$) with subjects cycling for 27.1 ± 5.9 min. during the BCAA trial, 25.9 ± 2.8 min. after CHO, and 22.2 ± 2.2 min. after EAA. Heart rate was lower at all points during the BCAA trial ($p < 0.05$) and oxygen consumption (3.25 ± 0.14, $p = 0.1077$) tended to be lower. Respiratory exchange ratio (0.84 ± 0.013, $p = 0.9073$), ratings of perceived exertion ($p = 0.2632$), serum glucose ($p = 0.651$), FFA ($p = 0.889$), and prolactin levels ($p = 0.348$) were not different between treatments. In conclusion, a carbohydrate + BCAA drink did not prolong exercise time to fatigue in trained cyclists. The data suggest that it is inconclusive if BCAA ingestion impacts physiology during exhaustive exercise to fatigue and future studies should continue to explore the physiological consequences of BCAA ingestion to exercise responses.

O6

THE EFFECT OF CREATINE SUPPLEMENTATION ON REPEATED BOUTS OF HIGH-INTENSITY EXERCISE IN THE HEAT.

C. Papadopoulos, R. Imamura, and L. J. Brandon. Department of Kinesiology and Health, Georgia State University, Atlanta, GA 30303

The purpose of this study was to determine the effect of creatine supplementation on repetitive high-intensity exercise in a hot and humid environment. Sixteen male subjects (age: 25.8 ± .73; height: 177.2 ± 1.93; weight: 81.6 ± 4.5; %BF: 12.5 ± 1.89) performed a series of three 15-s bouts separated by three minute of passive recovery between bouts. Each subject completed the exercise protocol once in a thermoneutral environment (22°C and 45% RH) and the other time in a hot and humid environment (31°C and 75%RH). The subjects, over a period of five days, ingested either 2.3 grams per kilogram of body weight (g.kg-1) of carbohydrate (placebo group (PG); n=8) or 2 g.kg-1 of carbohydrate and 0.3 g.kg-1 of creatine (creatine group (CG); n=8) in beverage form. Blood samples were collected at rest and three minutes after the completion of the third bout via a finger-stick. Core temperature was measured at the end of each bout via a tympanic thermometer. There were no differences between peak power between the CG and PG. However, there was a significant interaction between exercise bout and supplementation for mean power. Post-hoc analysis showed a significant difference between groups for all three 15-s bouts. There were no significant differences for either peak or mean power based on environmental conditions. Based on the results of this study, creatine supplementation affects mean power of repetitive bouts of high-intensity exercise. On the other hand, creatine supplementation had no effect during high-intensity exercise in the heat. These results suggest that creatine supplementation enhances repeated bouts of high-intensity exercise, but environmental conditions and creatine supplementation do not affect intermittent high-intensity exercise.

O7

NUTRITIONAL BEHAVIORS AMONG AN ELITE GROUP OF ACADEMICALLY TALENTED MINORITY STUDENTS.

K. Rook, BA Candidate, C. Achem, BS Candidate, S.N. Pearman, III, DrPH, & J.B. Chandler, EdD. Health & Exercise Science Department, Furman University, Greenville, SC.

The purpose of this study was to examine several nutrition habits in a select group of SC high school students in a summer college preparatory program entitled 'Bridges to a Brighter Future." A total of 89 students (49 women, 40 men) completed a CDC Youth Risk Behavior Survey. More than 40% of students reported one or less servings of fruit, and 70% of students reported consuming no fruit juice on a regular basis. Approximately 60% of students reported consuming 0-1 servings of vegetables. Over 70% of participants reported consuming two or more meats each day, 95% reported consuming french fries and/or chips on a daily basis, and 65% reported consuming several high sugar foods each day. Despite the students' strong academic standing, their nutrition habits reflect similar patterns to other SC minority youth suggesting that further interventions are needed to improve the health status of even the brightest minority youth.

Funded by a grant from the Greenville Hospital System.

O8

INFLUENCE OF VASCULAR FUNCTION ON EXERCISE TOLERANCE IN HEART FAILURE

M. Alomari, T. Parish, R. Wood, D. Kalb, M. Welsch. Department of Kinesiology, Louisiana State University, Baton Rouge, Louisiana.

The clinical phase of chronic heart failure (CHF) includes a marked decline in exercise tolerance, in part, due to impaired muscle blood flow secondary to cardiac insufficiency and decreased arterial vasoreactivity. Consequently, following initiation of inotropic and vasodilator therapy many patients experience resolution of symptoms at rest. However, most patients continue to experience exertional symptoms suggesting the mechanisms for exercise intolerance are multifactorial. The purpose of this study was to examine the influence of indices of both arterial and venous functions on exercise tolerance in 13 patients with CHF (age=56±15 yrs). Non-dominant forearm blood flow (FBF), vascular resistance (FVR), venous capacitance (FVC) and venous outflow (FVO) were evaluated at rest and following 5-min. of upper arm occlusion (OCC), using strain gauge plethysmography. Exercise tolerance was measured using the maximum walking distance (MWD) achieved on a 6-min-walking test. Following OCC, FBF increased from rest (Rest:3.0±1.3 vs. OCC: 15.3±5.3 ml·100ml tissue-1·min-1; p=0.0001), whereas FVR decreased (Rest: 38.5±1.8 U vs. OCC: 7.4±2.4 U; p=0.0001). Furthermore, FVC and FVO following OCC were 1.4±0.3 and 23.5±7.4 ml·100ml tissue-1·min-1, respectively. Additionally, Pearson product moment correlation revealed relationships between indices of arterial and venous function indices after OCC and MWD (FBF r=0.57; p=0.042 and FVR r=-0.57; p=0.066, FVC r=0.66; p=0.02, FVO r=0.52; p=0.12). These data confirm previous studies indicating the importance of arterial reactivity on exercise tolerance in CHF patients. Moreover, these data suggest the importance of venous function as a contributing factor to exercise performance in CHF patients.

O9

TRAINING AND THYROID HORMONE PROFILES OF COLLEGIATE, FEMALE ROWERS DURING FALL AND WINTER TRAINING

LS Wilson, and AC Hackney FACSM. Dept. of Exercise & Sport Science, The University of North Carolina, Chapel Hill, NC 27599

This study investigated the influence of intense training on resting thyroid hormone levels (free T_3 and T_4 [fT_3, fT_4]) in female collegiate rowers throughout fall and winter training seasons. Seventeen rowers and four untrained control subjects completed four laboratory visits (every 4-5 wks) during the fall and winter training seasons (~20-wk duration). Significantly more training was performed in the fall season (wks 1-9), than during winter training (wks 10-20; including holiday vacation wks 15-17). The controls exhibited no significant changes in fT_3, fT_4, or the fT_3/fT_4 ratio. Within the rowers a group of responders (i.e., resting hormone levels decrease) and non-responders emerged. The responder rowers had significant decreases in fT_3 and the fT_3/fT_4 ratio at wk 5 and wk 10 compared to wk 1 ($p<0.05$). By wk 20 hormone levels were similar to wk 1. No changes in fT_4 or body weight were observed in any of the rowing groups. No significant differences existed in physical characteristics, training, or performance times between the responder and non-reponder rowers. The precise mechanism for lower fT_3 resting levels in some rowers is unclear, but the change may represent an increased thyroid hormone uptake by the target tissues. The findings indicate that intensive rowing training has an individualized lowering effect on resting fT_3, but the decrease does not coincide with diminished performance or symptoms of overtraining.

O11

EFFECTS OF ECCENTRIC EXERCISE ON PLASMA PROTEIN CARBONYLS AND THE RELATIONSHIP TO DOMS AND CREATINE KINASE

A.H. Goldfarb, J.Lee, R. Rescino, and K. Apperson. Dept. of Exercise & Sport Science, University of North Carolina Greensboro, Greensboro, NC 27402

The influence of an eccentric exercise on plasma protein carbonyls and the relationship of this oxidative stress marker to delayed onset of muscle soreness (DOMS) and creatine kinase was examined. Eight healthy males (26±1.5 yr) who did not resistance train performed 60 eccentric contractions (EC) using their non-dominant elbow flexors. Blood samples and muscle soreness (DOMS) were obtained prior to, immediately after, 24, 48, 72 and 96 hrs after the EC. DOMS increased significantly($p< 0.001$) 24 to 72 hrs after EC in the non-dominant arm as indicated by a repeated measures ANOVA. Plasma protein carbonyls were significantly elevated at 24 and 48 hrs after the EC ($p < 0.01$). The increase in protein carbonyls was 83% at 24hrs and 62% at 48hrs. Creatine kinase (CK) demonstrated the typical rise and peaked at 72 hrs at 1620 ± 500 IU, significantly above the resting CK value. The plasma protein carbonyl values did not correlate significantly with the CK values. In contrast, there was a significant correlation with DOMS and plasma protein carbonyls over time ($P< 0.001$) with a r squared = 0.36. The results suggest that an eccentric exercise can result in oxidative stress resulting in elevated plasma protein oxidation as indicated by protein carbonyls and that this change is linked to the soreness in the damaged muscles.

O10

PHYSIOLOGICAL EFFECTS OF 12 WEEKS OF PROGRESSIVE RESISTANCE TRAINING ON PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

Golden, J., Panton, L., Broeder, C., Browder, K., Fogle, D., Cestaro-Seifer, D., Seifer, F. ETSU & Johnson City Medical Center. Johnson City, TN 37614

Aerobic exercise training is an essential component of rehabilitation in chronic obstructive pulmonary disease (COPD). However, it has been shown to have little effect on muscle weakness and atrophy that often ocurs in this population. Resistance training has been shown to improve these decrements in healthy elderly and cardiac populations and may represent a useful addition to current aerobic programs for COPD patients. The purpose of the present study was to investigate the effects of progressive resistance training on COPD patients. Seventeen COPD patients that were enrolled in an accredited aerobic based program were randomly placed into either an aerobic group (AERO: n=8; 63±8 yr; mean±SD) or an aerobic/ resistance group (ARES: n=9; 61±7 yr). All patients had moderate to severe COPD (% predicted FEV1: AERO=39.5±32; ARES=41.9±16). During the 12-week treatment period both groups participated in the aerobic based program 2x/wk. The ARES trained an additional 2x/wk on 12 resistance machines (Cybex), performing 3 sets of 8-12 repetitions at 32 to 64% of 1-RM. Repeated measures ANOVAs and ANCOVAs were used to analyze data. Significance was accepted at $p<0.05$. After completing the 12 weeks of training, the ARES significantly increased upper (36.2%) and lower (36.5%) body strength while the AERO showed little change in upper (3.3%) and lower (9.3%) body strength. Percent body fat, by DEXA, was significantly lower in the ARES (AERO: 36.9±11.3 to 36.1±11%; ARES: 33.9±12.7 to 29.9±12.3%). Total cholesterol ($p=0.08$) and triglycerides ($p=0.06$) had a tendency to be lower in the ARES. The 12-minute walk distance significantly increased in the ARES (676±219 to 875±172 m) compared to a decrease in AERO (667±226 to 665±223 m). Measurements of all eight activities of daily living (ADL) significantly improved in the ARES while only two measurements of ADL improved in AERO. This study demonstrated that a progressive resistance training program was well tolerated and benefited outcome performance in COPD patients.

O12

NEUROMUSCULAR ADAPTATIONS TO TWOWEEKS OF MUSCLE UNLOADING

Kristin M. Will and Michael R. Deschenes. Dept. of Kinesiology, The College of William & Mary, Williamsburg, VA 23187-8795

The aim of the present investigation was to determine whether muscle unloading elicited similar morphological adaptations in neuromuscular junctions (NMJs) and muscle fibers. Twelve adult male Fischer 344 rats (~350 g) were randomly assigned to either muscle unloading, or control conditions for a period of two weeks. Muscle unloaded rats were subjected to a hindlimb suspension protocol. At the conclusion of the treatment period, all rats were euthanized and soleus muscles were dissected out, and quickly frozen at resting length. To visualize NMJs, 50μm thick longitudinal sections were stained with rhodamine conjugated _-bungarotoxin, and fluorescein labeled SV-2 antibody. Bungarotoxin and SV-2 binding are specific to post-synaptic acetylcholine receptors and pre-synaptic acetylcholine vesicles, respectively. Muscle fiber profiles (size and type) were determined with histochemical procedures performed on 10μm thick cross-sections of soleus muscles. Results indicate that the hindlimb suspension protocol failed to significantly ($P>0.05$) alter stained areas, or perimeters of pre- and post-synaptic components of NMJs. In contrast, unloading evoked significant ($P<0.05$) fiber atrophy within the same muscles. Atrophy was apparent in all fiber types identified (I, IIA, IIB/X), but was most pronounced in type I fibers (62%). No significant differences in fiber type composition were detected between control and unloaded soleus muscles. The data presented here suggest that unlike muscle fibers, the morphology of NMJs is resistant to significant unloading-induced remodeling.

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O13

NEURAL FACTORS ACCOUNT FOR UNWEIGHTING INDUCED STRENGTH DECREMENTS

J.A. Giles, R.W. McCoy, and M.R. Deschenes. Dept of Kinesiology, The College of William & Mary, Williamsburg, VA 23187-8795

Unweighting results in decreased maximal force production of the involved muscle(s). The physiological basis of this loss of strength has yet to be clearly identified. The purpose of this investigation was to determine whether neural or contractile factors were primarily responsible fo strength decrements associated with muscle unweighting. Quadriceps strength of ten untrained volunteers (20.8±1.4 yr, 174.6±8.0 cm, 77.6±26.4 kg; mean±SD) was tested before and after two weeks of unilateral limb suspension (ULLS). Peak torque was assessed at 0, 1.05, 1.57, 2.09, and 3.14 rad/sec. During the isometric action (0 rad/sec), electromyography (EMG) recordings of the vastus medialis and lateralis were collected. Our results showed that ULLS significantly ($P<0.05$) reduced peak torque of the involved knee extensors at each velocity tested except for 3.14 rad/sec The greatest strength loss was demonstrated at 0 rad/sec. During this isometric contraction, EMG activity was also significantly diminished following unweighting. However, neuromuscular efficiency (force produced/EMG activity) was the same before and after ULLS indicating that the responsiveness of muscle to neural stimulation was unaffected. These findings suggest that strength decrements incurred via unweighting are due to impaired capacity of the neural system tc activate muscle, rather than a diminution in the muscle's contractile apparatus.

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O14

ADAPTATIONS TO MUSCLE UNLOADING ARE DIFFERENT IN YOUNG ADULT AND SENESCENT MUSCLE FIBERS

W.C. Chandler, A.A. Britt, and M.R. Deschenes. Dept. of Kinesiology, The College of William & Mary, Williamsburg, VA 23187-8795

The purpose of this study was to compare morphological adaptations to unloading in weight bearing and non-weight bearing muscles in young adult, and aged animals. 16 young adult (8 mo) rats were randomly assigned to a 4 week period of hindlimb suspension or served as controls. 16 aged (22 mo) rats were similarly assigned to unloading or control conditions. Following the treatment period, rats were euthanized and non-weight bearing EDL and weight bearing soleus muscles were removed and frozen at resting length. 10 _m thick cross-sections of muscles were stained for myofibrillar ATPase activity. In the soleus, unloading resulted in significant ($P<0.05$) fiber atrophy in both young adult and aged rats. However, atrophic respnses were more pronounced in aged compared to younger soleus fibers ($P<0.05$). In younger solei, unloading failed to elicit changes in fiber type, yet in aged solei significant fiber type conversion (type I_II) was detected. In the EDLs of younger rats, no alterations in fiber size or fiber type resulted from hindlimb suspension. In contrast, unloading induced significant atrophy in the myofibers of aged EDLs. Overall, these data indicate that older muscle is more susceptible to detrimental adaptations associated with hindlimb suspension, regardless of normal activation patterns.

Supported by the Borgenicht Program for Aging Studies and Exercise Science.

O15

A KINEMATIC ANALYSIS OF A JUDO LEG SWEEP – OSOTO-GARI.

Rodney T. Imamura and Benjamin F. Johnson. Dept. of Kinesiology and Health, Georgia State University, Atlanta, GA 30303.

Twenty male judo players (10 black belt and 10 novice) executed the major outer leg reap throw, osoto-gari, with maximal effort. Each throw was recorded within the two-dimensional sagittal plane using a 60 Hz video camera. Kinematic data that best described the power of the tori's (thrower's) sweeping leg and the velocity of the uke's (recipient's) falling body were analyzed using a Peak Performance Technologies Motus system. The data from black belt and novice groups were statistically analyzed using a one-way MANOVA ($p=.05$). Evaluation of mean scores indicated that the black belt group created greater sweeping power than the novice belt group. Statistical analysis, however, found only two variables (peak angular trunk: TTRK, and ankle velocities: TANK) to be significantly different. Large TTRK values for the black belt group indicated a proficient ability to create large rotary forces on the upper body of the uke. Significantly larger differences in trunk rotation velocities of the uke by the black belt group reinforced this notion. It was thought that these differences were attributed to good upper body to upper body contact, which is considered to be an important aspect of the osoto-gari throw. Significant differences in TANK values stressed the importance of executing plantarflexion near sweep contact. The results described the highly skilled trait of using the sweeping leg as a sequential kinetic link rather than a single rigid segment.

O16

CHARACTERISTICS OF VERTICAL GROUND REACTION FORCES BEFORE AND AFTER THE WALK TO RUN TRANSITION

Li Li, Department of Kinesiology, Louisiana State University, Baton Rouge, LA 70803

Characteristics of vertical ground reaction forces for five steps before and five steps after the walk to run transition were investigated with 20 healthy subjects. After warm up, subjects performed five trials of walk to run transition as the speed of the treadmill increased constantly (Kistler Gateway treadmill with two embedded force platforms). A successful trial contained at least five walking steps prior to the transition and five running steps after the transition. Along with decreased stance duration and impulse, increased peak forces and loading rate with increased speed during both walking and running, the ratio of the second to first peak of walking decreased significantly as approaching to the walk to run transition. The decreaseof the second peak of walking is a unique transitional behavior that is different in comparison with literature where only the behaviors of walking at different constant velocity were investigated.

O17

IMPAIRED MUSCLE BALANCE IN ATHLETES FULLY REHABILITATED FROM A PRIOR HAMSTRING INJURY.

T. Hortobágyi, M. Hanley, D. Tunnel, J. Moody, and P. DeVita. Department of Exercise & Sport Science, East Carolina University, Greenville, NC 27858

We tested the hypothesis whether a muscle imbalance is present in athletes fully rehabilitated from a grade 2 unilateral hamstring injury. Conventional (concentric hamstring to concentric quadriceps force, Hc/Qc) and a newly developed (eccentric hamstring to concentric quadriceps force, "functional" He/Qc) ratios were compared between three groups of subjects. Group 1 contained athletes with a hamstring injury that occurred 8 (range 24 to 6) months prior to testing (n = 20). They were discharged from rehabilitation and had fully resumed their sport activities. Group 2 contained the same number of sprinters, hurdlers, distance runners, and football players as Group 1 but without any history of hamstring injury (n = 20). Sedentary subjects formed Group 3 (n = 20). H and Q peak forces of the involved or dominant leg were measured on a Kin-Com dynamometer at 0, 90, and 180 deg/s. Subjects in all groups revealed similar and normal Hc/Qc ratio of ~0.60. However, the "functional" He/Qc ratios in the Groups 1 and 3 were lower than He/Qc ratio in Group 2 ($p < 0.05$). These data suggest that athletes with a prior H injury may have an impaired muscle imbalance long after rehabilitation. Perhaps He/Qc compared to the widely used Hc/Qc ratio is more sensitive to detect potential muscle imbalances in athletes predisposed to hamstring injuries.

Group	0 deg/s	90 deg/s		180 deg/s	
		Hc/Qc	He/Qc	Hc/Qc	He/Qc
Group 1	55±18	55±10	62±13*	57±16	64±14*
Group 2	65±19	61±7	78±16	63±14	95±22
Group 3	61±10	57±11	41±12*	58±9	46±7*

Values are mean ±SD · 100 of H to Q ratios, * $p < 0.05$ compared Group 2

Supported by the North Carolina Institute of Injury Prevention Research Center and the LeRoy T. Walker International Human Performance Center

O18

KNEE JOINT POSITION SENSE AFFECTS FUNCTIONAL PERFORMANCE IN PATIENTS WITH KNEE OSTEOARTHRITIS

S. Beam, J. Moody, P. DeVita (FACSM), J. Garry*, T. Hortobagyi (FACSM). Biomechanics Laboratory and Deptartment of Family Medicine*, East Carolina University, Greenville, NC

Disability of patients with knee osteoarthritis (OA) is a growing public health concern. Joint position sense (JPS) and quadriceps strength are both impaired in this population. Although JPS and quadriceps strength each negatively affects function, it is unclear whether the combination of these two variables would explain more of the variability in functional impairment due to knee OA. We compared JPS, quadriceps strength, and the summed time of four functional tasks (SFT) in patients with knee OA (n=10, age=61) and healthy controls (n=12, age=49). The table shows the mean (SD) for the two groups (* $p<0.05$ OA vs H). Multiple regression analysis revealed that only 30% of the variance in functional task time was explained by JPS and quadriceps strength, and only JPS significantly contributed to the regression ($p=0.02$). A multiple regression was also performed for only stair ascent time (AT) and again JPS was the only variable that accounted for a significant portion of the variability in ascent time. These data suggest that JPS is related to impaired function, however other variables (perhaps pain) must also contribute to the declines in function evident in patients with knee OA.

	JPS (deg)	Quad. Strength (N)	SFT (s)	AT (s)
OA	26.4 ± 5.0*	932 ± 110*	39.6 ± 12*	9.6 ± 5*
Healthy	15.1 ± 1.5	1416 ± 149	30.2 ± 3	6.1 ± 1

O19

HIGH INTENSITY WARM-UP ALTERS RECTUS FEMORIS MUSCLE ACTIVITY BUT NOT KNEE JOINT ANGULAR DISPLACEMENT DURING AN INVOLUNTARY ACTIVITY

J.C. Smith, A.S. McCampbell, S.J. Kinzey, J.S. Hallam, and D.L. Cheek. Exercise Science Division, University of Mississippi, University, MS 38677

The purpose of the study was to determine the effects of a high intensity warm-up on the average DMG and peak knee joint angular displacement during the 180-ms immediately following a patelllar tendon tap. Thirteen off-season college athletes participated in an orientation session and two experimental sessions (contrrol, squat). The squat session consistec of a preparatory period of 5-sets of 1-repetition high bar parallel back squats at 90% 1RM with a 3-minute rest between each set. The control session consisted of a 25-minute rest period. EMG and displacementmeasures were taken prior to, within 1-, 5-, 10-, and 15-, and 20-minutes post treatment. All data were sampled at 1000 Hz, displacement data were processed using passive demeaning and notch filtered at 60 Hz and EMG data were lowpass filtered at 25 Hz. Due to a violation of the assumption of normality for both EMG and angular data, the processed raw data were LOG10 transformed and then analyzed using separate 2 x 6 repeated measures ANOVA's to determine differences due to session and time. Average EMG was higher at <1-, 5-, 10-, and 15-minute post during the squat when compared to the control. It wa concluded that the treatment does increase the polysynaptic neuromotor drive in the rectus femoris but does not effect peak knee joint angular displacement. These changes are due to either an increase in muscle spindle sensitivity and/or a change in motor unit recruitment of both the anterior and posterior thigh muscles.

O20

PHYSICAL ACTIVITY IN RUSSIAN CHILDREN: THE RUSSIAN LONGITUDINAL MONITORING STUDY

C. Tudor-Locke, B.E. Ainsworth, B.M. Popkin

This descriptive study presents the prevalence of school-aged (7-13 years of age) Russian children enrolled in the Russian Longitudinal Monitoring Survey (November, 1998). Physical activity data on 572 boys and 522 girls (mean age= 10.2+/-1.9), obtained through proxy-reports from parents, were analyzed to determine adherence to health-related guidelines for youth. Prevalence trends for gender (less for girls) and age (decreasing with older age groups) are consistent with previous descriptive studies. Although the proportion reporting participation in physical education classes is high (93%), the single most important source of total physical activity time for this sample is active commuting to school (specifically walking), representing 40.5% and 50.6% of total physical activity time for boys and girls, respectively. Russian children regularly engage in school physical education classes. The necessity of walking to school however, makes it an important source of total physical activity.

O21

THE INFLUENCE OF PHYSICAL ACTIVITY AND FITNESS ON FUNCTIONAL LIMITATION AMONG ADULTS WITH ARTHRITIS.

Jennifer M. Hootman, Charles G.Helmick, Caroline A. Macera, Steve N. Blair Centers for Disease Control and Prevention, Atlanta, GA Cooper Institute for Aerobics Research, Dallas, TX

Purpose: The purpose of this study was to investigate the association between physical activity, fitness and functional limitation among adults with self-reported arthritis and other chronic joint symptoms. Methods: Subjects (4,193 men, 1,205 women) were from the Aerobics Center Longitudinal Study who reported having chronic joint or muscle pain, swollen/stiff joints, arthritis or gout at a baseline examination (1987 or after) and returned a mailed follow-up survey (1990 or 1995). Physical activity and fitness were measured at baseline by questionnaire and graded exercise treadmill test respectively. Functional status was determined by questionnaire at follow-up. Participants were classified as functionally limited if they reported any difficulty with performing moderate and strenuous recreational, household, daily and personal care activities. Adjusted hazard ratios (HR) and 95% confidence intervals (CI) were calculated for men and women separately using Cox Proportional Hazards analysis. Results: After an average of 4.8 years of follow-up, 49% of men and 64% of women with arthritis reported a functional limitation. Among men, moderate (HR=0.73, 95% CI 0.61-0.88) and high (HR=0.47, 95% CI 0.40-0.57) fitness levels were associated with less functional limitation compared to low fit men. Among women, high fitness levels were associated with 37% less functional limitation at follow-up (HR=0.63, 95% CI 0.45-0.86) compared to low fit women. The most physically active men (walking, running or jogging >10 miles/week) were less likely to report functional limitations (HR=0.83, 95% CI 0.78-0.89) at follow-up. Conclusions: Physical activity in amounts to improve cardiovascular fitness may help adults with arthritis and other chronic joint symptoms avoid functional limitations associated with musculoskeletal disease.

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O22

PHYSICAL ACTIVITY PATTERNS AMONG AN ELITE GROUP OF ACADEMICALLY TALENTED MINORITY STUDENTS.

C. Achem, BS Candidate, K. Rook, BA Candidate, S.N. Pearman, III, DrPH, & J.B. Chandler, EdD. Health & Exercise Science Department, Furman University, Greenville, SC.

The purpose of this study was to examine the physical activity habits in a select group of SC high school students in a summer college preparatory program entitled 'Bridges to a Brighter Future." A total of 89 students (49 women, 40 men) participated in a battery of fitness tests and completed a CDC Youth Risk Behavior Survey. Complete sedentary behavior was reported by 20% of the students, and 23% of the students reported exercising only 1-2 days per week. Over 50% of the students reported that they had not participated in muscular strengthening activity on a regular basis, and only 33% reported significant physical activity in their physical education courses. Chronic hypertension was observed in 15% of the students. Obesity was found in 25% of women and 5% of men. One-third of the students were not able to sustain a time period on a sub-maximal stress test to be considered in a category for average or better cardiovascular health. Despite the students' strong academic standing, their physical activity habits reflect similar patterns to other SC minority youth suggesting that further interventions are needed to improve the health status of even the brightest minority youth.

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O23

EPIDEMIOLOGICAL PATTERNS OF MELANOMA – RISK FACTORS, PREVENTION AND TREATMENT ISSUES

Carley M. Howard, Furman Advantage Research Fellow, BS Candidate, Silas N. Pearman, III, DrPH, Health & Exercise Science Department, Furman University, Greenville, SC 29613

The purpose of this study was to identify patient risk factors and evaluate current criteria published by major medical associations for skin cancer detection. The design of the study was cross-sectional (mail out/mail back survey) using 298 melanoma patients from a private dermatology practice. The overall response rate was 69%. Accepted standards for detection include fair skin, freckles, a large number of moles, family history, early diagnosis, and size of lesion (>6mm). However, half of the patients did not have fair skin or freckles. In addition, almost half of the subjects reported having 1-15 moles, and only 20% reported a family history Moreover, 75% of subjects never had a full-body examination prior to diagnosis, and 31.5% of initial lesions were smaller than 6 mm. Results also indicated that the majority of patients (63%) reported consistently tanning before and after age 18. Only 6% of subjects reported dail sunscreen use, and only 2% of subjects reported using an SPF of forty-five or higher. Results were also compared for gender, skin type, and age at time of diagnosis differences by Chi-square analyses. Overall, the results confirmed existing beliefs that excessive sun exposure places one at high risk for melanoma. However, the data in this study did not always correlate with the publicized detection guidelines, suggesting that further research may be required to evaluate these standards.

Supported by a grant from the South Carolina Independent Colleges & Universities Foundation

O24

REORGANIZATION OF NEUROMUSCULAR FUNCTION DURING STAIRWAY LOCOMOTION DUE TO KNEE OSTEOARTHRITIS

P. DeVita, J. Moody, S. Beam, J. Jolla, K. Smith, J. Garry, & T. Hortobagyi. Biomechanics Laboratory, Dept. of Exercise & Sport Science, East Carolina University, Greenville, NC 27858

The debilitating effects of knee osteoarthritis (OA) reduce the quality of life by causing pain and limiting movement capabilities. Secondary effects include reduced quadriceps muscle activation and weakness. We hypothesized that such deficits cause quantitative as well as qualitative (i.e. organizational) adaptations in activities of daily living. The purpose of this study was to identify the effects of knee OA on lower extremity joint torques during stairway locomotion. Eleven knee OA (mean age: 57 yr) and 12 healthy (mean age: 49 yr) volunteers were tested. Floor reaction forces and sagittal plane kinematics were obtained during stair ascent and descent and combined with inverse dynamics to calculate hip, knee, and ankle joint torques and the sum of these (support torque). Angular impulse at each joint (area under the curve) was derived and compared between groups with T-test, $p<0.05$. While the support torque, the total limb output, was not different between groups in either movement, knee OA increased the hip extensor angular impulse 250% to offset the 25% reduced knee extensor angular impulse compared to healthy in ascent (Table). Knee OA subjects also had 63% larger flexor angular impulse at the hip compared to healthy. We conclude that knee OA caused a reorganization of the neuromuscular control strategy such that stair ascent was performed with greater effort from the hip extensors and less effort from the knee extensors while stair descent was performed with greater effort by the hip flexors.

Angular Impulse	Support	Hip	Knee	Ankle
Ascent: OA	0.78 (0.25)	0.20 (0.15) *	0.24 (0.08) *	0.45 (0.08)
Healthy	0.70 (0.14)	0.08 (0.05)	0.32 (0.10)	0.45 (0.08)
Descent: OA	0.64 (0.20)	-0.18 (0.09) *	0.27 (0.10)	0.49 (0.15)
Healthy	0.75 (0.14)	-0.11 (0.07)	0.27 (0.12)	0.53 (0.10)

All values in Nms/kg; * OA vs. Healthy, $p<0.05$

O25

EFFECTS OF 12 WEEKS OF PROGRESSIVE RESISTANCE TRAINING ON THE 12-MINUTE WALK IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD).

Quindry, J., Rhea, L., Golden, J., Panton, L., Broeder, C., Browder, K., Fogle, D., Cestaro-Seifer, D., Seifer, F. ETSU & JC Medical Center. Johnson City, TN 37614

The purpose of this study was to investigate the effects of progressive resistance training on the 12-min walk test in COPD patients. Seventeen COPD patients that were enrolled in an accredited aerobic based program were randomly placed into either an aerobic group (AERO; n=8; 63±8 yr; mean±SD) or an aerobic/resistance group (ARES; n=9; 61±7 yr). All patients had moderate to severe COPD (% predicted FEV1: AERO=39.5±32; ARES=41.9±16). Both groups participated in the aerobic based program 2x/wk for 12 weeks. ARES trained an additional 2x/wk on 12 resistance machines (Cybex), performing 3 sets of 8-12 repetitions at 32 to 64% of 1-RM. The 12-min walk test was evaluated on an 80-m oval track before and after the treatment period. During the test, subjects were stopped if oxygen saturation (SAO2) dropped below 88%. Heart rate (HR), blood pressures (BP), and SAO2 levels were monitored during the test. Peak HR, peak BP, number of stops (#ST), rating of perceived exertion (RPE), rating of perceived dypsnea (RPD), and total distance (TDIS) covered in 12 min were used as performance markers. Repeated measures ANOVAs and ANCOVAs were used to analyze data. Significance was accepted at $p<0.05$. ARES significantly increased upper (36%) and lower (36%) body strength while AERO showed little change in upper (3%) and lower (9%) body strength. TDIS significantly increased in ARES (676±219 to 875±172 m) compared to no change in AERO (667±226 to 665±223 m). Peak HR, peak SBP, peak DBP, RPE, and RPD were not different between the two groups. ARES decreased #ST from 7 to 2; AERO increased #ST from 3 to 7. The lack of change in peak HR, peak SBP, peak DBP, RPE, and RPD suggests that progressive resistance training allowed subjects to improve exercise tolerance without increasing stress on the cardiovascular system.

O26

EFFECTS OF 12 WEEKS OF PROGRESSIVE RESISTANCE TRAINING ON BONE DENSITY IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD).

King, J., Golden, J., Panton, L.B., Broeder, C.E., Browder, K.D., Fogle, D.J., Cestaro-Seifer, D.J, Seifer, F.D. ETSU & Johnson City Medical Center. Johnson City, TN 37614

The purpose of the present study was to investigate the effects of progressive resistance training on bone density in COPD patients. Seventeen COPD patients that were enrolled in an accredited aerobic based program were randomly placed into either an aerobic group (AERO; n=8; 63±8 yr; mean±SD) or an aerobic/resistance group (ARES; n=9; 61±7 yr). All patients had moderate to severe COPD (% predicted FEV1: AERO=39.5±32; ARES=41.9±16). Both groups participated in the aerobic based program 2x/wk during the 12-week treatment period. The ARES trained an additional 2x/wk on 12 resistance machines (Cybex), performing 3 sets of 8-12 repetitions at 32 to 64% of 1-RM. Bone density was evaluated by dual energy X-ray absorptiometry (DEXA; Lunar). Bone density was evaluated for the right hip, lumbar spine (L2-L4), and full body (TBD). Repeated measures ANOVAs and ANCOVAs were used to analyze data. Significance was accepted at $p<0.05$. ARES significantly increased upper (36%) and lower (36%) body strength while the AERO showed little change in upper (3%) and lower (9%) body strength. Bone density of the hip (AERO:0.858±0.161 to 0.860±0.163 g/cm2; ARES: 0.942±0.202 to 0.962±0.197 g/cm2) and spine (AERO:1.081±0.166 to 1.073±0.187 g/cm2; ARES: 1.088±0.157 to 1.088±0.166 g/cm2) did not change over the 12 weeks for either group. TBD was not significantly between groups. However, both groups significantly increased TBD as a result of training (AERO: 1.096±0.134 to 1.137±0.098 g/cm2; ARES: 1.169±0.137 to 1.218±0.184 g/cm2). The increase in TBD over the short duration of the study is questionable. More research is needed to determine the effects of progressive resistance training on bone density in this population.

O27

EFFECTS OF 2 MINUTES ACTIVE RECOVERY ON A "BOOSTER" VO_{2MAX} TEST DURING CYCLE ERGOMETRY

AM Bosak, JM Green, TR Crews, WW Peveler. Dept. of Physical Education and Recreation, Western Kentucky University, Bowling Green, KY 42101

Maximal oxygen consumption (VO_{2MAX}) tests typically end at the point of volitional exhaustion. However, previous research has shown that concluding a maximal treadmill tests with 2min active recovery and allowing subjects to exercise a second time at the workload eliciting volitional exhaustion results in significantly grater VO_{2MAX} values (1.4% mean increase). The potential effects of this testing sequence (2min recovery) on VO_{2MAX} values during cycle ergometry testing has not been evaluated. The purpose of the current study was to examine changes in VO_{2MAX} values following a 2min active recovery at the conclusion of a cycle ergometry test to volitional exhaustion. Informed consent was obtained from male (n=16) and female (n=17) subjects with varying levels of fitness. Each completed a graded cycle ergometry test at 60 revolutions per minute (rpms) increasing 30 watts per minute to volitional exhaustion (VO_{2MAX} 1). Subjects immediately completed 2min active recovery (60rpms, 30 watts) and then exercised at the final workload to volitional exhaustion a second time (VO_{2MAX} 2). VO_{2MAX} values were compared using a paired T-test. Results were considered significant at $p \leq 0.05$. The difference between VO_{2MAX} 1 (42.3±7.8 ml/kg/min) and VO_{2MAX} 2 (42.9±8.1 ml/kg/min) only approached significance ($p=0.07$). The mean change from VO_{2MAX} 1 to VO_{2MAX} 2 following2min active recovery was +1.0% with values ranging from −16.5% to +9.3%. Results suggest that 2min active recovery does not allow significantly greater VO_{2MAX} values to be achieved during cycle ergometry testing. This differs from previous results on treadmill testing. While significant differences were not exhibited by the group, increases observed in specific subjects suggest some individuals benefit from 2min active recovery. Further research is needed to determine if fitness level, cycling experience, age, or other variables may determine the parameters of this population.

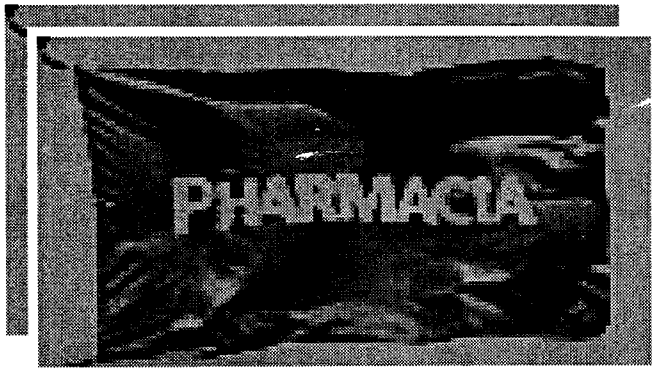
O28

VALIDITY OF THE COSMED K4b2 PORTABLE METABOLIC SYSTEM

A. Jung , J. Turner, M. Craib, D. Kaminsky, A. Arnholt, M. Shute, and D. Nieman. Department of Health, Leisure and Exercise Science, Appalachian State University, Boone, NC 28608

The purpose of this investigation was to assess the validity of the Cosmed K4b2, a portable metabolic assessment system. The K4b2 is a 1 kg unit that contains both O2 and CO2 analyzers for breath by breath analysis. Fifteen cyclists (Age 28.9+/-7.9 yrs, Height 179.8+/-5.8 cm, Weight 74.5+/-10.6 kg, Body Fat 11.3+/-7.2 %, VO2 max 54.3+/-9.3 ml.kg-1.min-1) visited the laboratory on two occasions within the space of two weeks. On each visit subjects completed three submaximal work stages of 50, 100 and 150 Watts on a Lode cycle ergometer. During half of each stage subjects were tested with either the Cosmed K4b2 or the Amatek reference (balloon collection) systems, used in random order. Expired gas samples were obtained during the last 2-min of a 5-min stage segment. After the submaximal stages, cyclists began the max-test portion of the study. Workloads started at 100 to 200 Watts and were increased by 20 Watts per minute until exhaustion. VO2 (ml.kg-1.min-1), VE (L.min-1), heart rate (bpm) and rating of perceived exertion (RPE) measures were not different across equipment at individual submaximal and at maximal workloads ($p<.05$). Respiratory exchange ratios (RER) were higher on the Cosmed K4b2 than the Amatek at submaximal workloads (+0.04, example 0.93 vs. 0.88) and lower than the Amatek at maximal workloads (-0.04) ($p<.05$). Correlations between the Cosmed K4b2 and the Amatek VO2 (ml.kg-1.min-1) data were high (range r=.79 to .94) at each submaximal and maximal workload, but were weak to moderate for the other variables (example RER range r=.14 to .77 across workloads). In conclusion, the Cosmed K4b2 measured VE (L.min-1)& VO2(ml.kg-1.min-1)accurately and therefore would be useful for field testing athletes. However, caution should be taken in using Cosmed K4b2 RER values to interpret fuel use during exercise.

Supported by funding from the ASU Human Performance Laboratory.



O29

ASSOCIATION OF THE VENTILATORY THRESHOLD WITH WORKRATE BY MEANS OF A FIXED RPE-VALUE

C.S. Katsanos, K.C. DeRuisseau, H.G. Simoes, and R.J. Moffatt. Dept. of Nutrition, Food, and Exercise Sciences, Florida State University, Tallahassee, FL 32306

The purpose of this study was twofold. First, to determine the fixed rating of perceived exertion (RPE) matched to the corresponding ventilatory threshold (VT) among individuals with a wide range of aerobic fitness, and second to assess the validity of using a fixed RPE-value to determine the workrate (WR) which corresponds to VT. Ten healthy males (age 24.8 +/-3.0 yr.) performed a cycle ergometer test to exhaustion, using a ramp protocol, for the purpose of assessing VO2max (47.6 +/-12.5 ml/kg/min; range 31.9 - 67.8 ml/kg/min). During the VO2max cycle ergometer test, subjects rated the work effort using the Borg's 15-point scale by indicating when they had reached subsequent RPE values. Individual VT values were visually determined using the ventilatory equivalent for oxygen (VE/VO2), and the individual RPE value corresponding to the WR at VT was determined. The mean for this RPE value was 14.8 +/-1.9. An RPE value of 15 was accepted and used to assess the validity of a fixed RPE in determining the WR at VT. A paired sampled t-test indicated no significant difference ($p>.05$) between mean WR values observed at VT (168 +/-55 watts) and RPE 15 (156 +/-35 watts). However, the intraclass correlation coefficient for WR values observed at VT and RPE 15 was low (ICC = 0.44). This suggests that a fixed RPE-value may not be a valid tool in determining the WR at the VT, at least when using a ramp protocol among individuals that differ largely in aerobic fitness.

O30

PHYSIOLOGICAL RESPONSES DURING RPE ESTIMATION-PRODUCTION TREADMILL EXERCISE AT 0% AND 10% INCLINE

JM Green, TR Crews, AM Bosak, W Peveler. Dept. of Physical Education and Recreation, Western Kentucky University, Bowling Green, KY 42101

Variations in treadmill incline may disrupt the agreement of exercise intensities between RPE estimation and production trials, however, this is not well understood. Male (n=13) and female (n=13) volunteers estimated F+RPE's during an exhaustive Bruce treadmill test, then produced individually prescribed RPE's (associated with 50% and 70% VO_2max) during level (0%) and inclined (10%) treadmill exercise. Heart rate (HR) and oxygen consumption (VO_2) were compared between estimation (EST), level production (LPR), and incline production (IPR) trials using separate one-way repeated measures ANOVA's (_ = 0.05). At 50% VO_2max, HR and VO_2 were not significantly different between EST and IPR but were significantly lower during LPR than IPR (Table). For 70% VO_2max, HR and VO_2 were not significantly different between EST and IPR but were significantly lower during LPR than EST and IPR. HR and VO_2 associated with RPE estimations corresponded better with HR and VO_2 at produced RPE's when production trials were performed at 10% vs. 0% incline. RPE estimations made during a Bruce treadmill protocol may require adjustments in subsequent RPE-based exercise prescriptions to achieve appropriate intensities during level treadmill exercise.

Intensity	Variable	EST	LPR	IPR
50% VO_2max	VO_2	27.1±5.6	24.3±8.8[a]	30.6±11.2
	HR	134±13	123±20[a]	139±18
70% VO_2max	VO_2	42.1±9.4	35.1±8.1*	41.1±10.2
	HR	168±9	155±17*	169±14

*$p \leq 0.05$ (LPR vs. EST and IPR) [a] $p \leq 0.05$ (LPR vs. IPR)

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