

SOUTHWEST CHAPTER
AMERICAN COLLEGE OF SPORTS MEDICINE
2004 ANNUAL MEETING

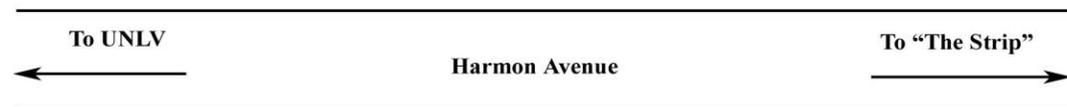
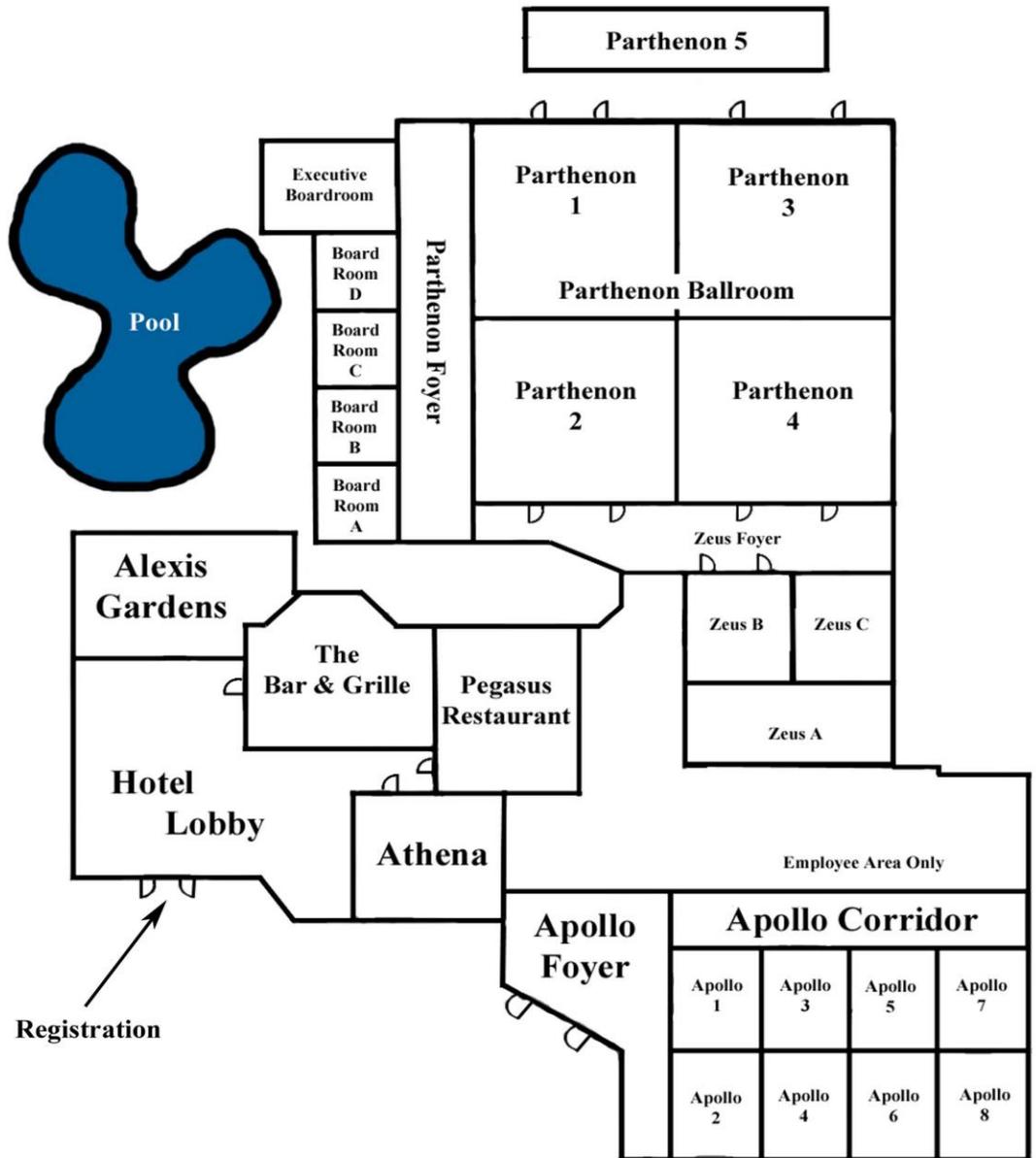


October 22-23, 2004

Alexis Park Resort
Las Vegas, Nevada

Jointly sponsored by the American College of Sports Medicine
and the Southwest Chapter of the American College of Sports Medicine

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Welcome to the

24th Annual Meeting

of the

Southwest Regional Chapter

of the

**AMERICAN COLLEGE
of SPORTS MEDICINE _{SM}**

October 22-23, 2004

**Alexis Park Resort
Las Vegas, Nevada**

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FRIDAY, 22 OCTOBER 2004, continued

Symposium # 1 **1:00 pm – 3:00 pm** **Parthenon 1**

Skeletal Muscle Aerobic Metabolism: From the Tissue to the Mitochondrion

Moderator: Wayne T. Willis, Ph.D., FACSM, ASU, Tempe, AZ

- 1:00 – 1:40 *Muscle VO₂ On-Kinetics: Insights from Whole Muscle Studies*
L. Bruce Gladden, Ph. D., FACSM, Auburn University, Auburn, AL
- 1:40 – 2:20 *Control of oxygen uptake on-kinetics in single myocytes*
Mike Hogan, Ph.D., FACSM, UCSD, San Diego, CA
- 2:20 – 3:00 *Control of oxygen uptake at the mitochondrion*
Wayne T. Willis, Ph.D., FACSM, Arizona State University, Tempe, AZ

Symposium # 2 **1:00 pm – 3:00 pm** **Parthenon 2**

Optimizing Cardiovascular Health in Women - Current Science and Innovative Interventions

Moderator: Janice Thompson, Ph.D., FACSM, UNM, Albuquerque, NM

- 1:00 – 1:40 *The Diversity of Cardiovascular Disease and Risk Factors Among Women*
Janice Thompson, Ph.D., FACSM, UNM, Albuquerque, NM
- 1:40 – 2:20 *Healthy Nutritional Approaches for Women*
Jenna Bell-Wilson, Ph.D. The Ohio State University, Columbus, OH
- 2:20 – 3:00 *Exercise Interventions to Reduce Cardiovascular Disease in Women*
Sue Meadows, B.A., FAWHP, Meadows Unlimited, Fremont, CA

Applied Lecture # 1 **1:00 pm – 2:30 pm** **Zeus B & C**

Open vs. Closed Chain Exercises: Neuromuscular, Biomechanical, and Clinical Considerations

Sean Flanagan, Ph.D., CSU Northridge, Northridge, CA

FRIDAY, 22 OCTOBER 2004, continued

Poster Session # 1

1:00 pm – 3:00 pm

Parthenon 4

- (1) 1. **Predicting lactate threshold from VO₂max data.** P. A. Plato, & M. McNulty, Dept. of Human Performance, San Jose State University, San Jose, CA.
- (2) 2. **Influence of speed and stride frequency on oxygen consumption.** Dolgan, J.A., Moore, D., Zarndt, J., Mercer, J.A. FACSM, and L.A. Golding FACSM. Department of Kinesiology, University of Nevada Las Vegas, Las Vegas, NV.
- (3) 3. **Changes in vertical jump height across ten days in countermovement jumps performed by novice jumpers.** Michael E. Feltner, FACSM, Priscilla G. MacRae, FACSM, Phil G. Westphal. Biomechanics Laboratory, Pepperdine University, Malibu, CA.
- (4) 4. **Influence of stride length and running velocity on impact characteristics.** Mercer, J.A. FACSM, Bezodis, N.*, Russell, M., Purdy, A., DeLion, D. Dept of Kinesiology, UNLV, NV; *Dept of Sport and Exercise Science, University of Bath, UK.
- (5) 5. **The Contribution of Muscular Strength Capacities to Performance in Female Volleyball Players.** Mark Peterson, Brent Alvar, Dan Dodd, and Kelby Klosterman: Arizona State University, Mesa, AZ.
- (6) 6. **Metabolic and Performance Effects of Raisins Versus Sports Gel During Exercise Feedings in Cyclists.** Rezende, R.S., M. Kern and C.J. Heslin. Department of Exercise and Nutritional Sciences, San Diego State University, San Diego, CA.
- (7) 7. **EPOC following exhaustive, supramaximal cycling as an estimate of peak anaerobic power and anaerobic capacity.** Wilson, RW, RW Pettitt, C Dobson, and JE Taylor. Department of Exercise and Sport Science, University of Utah, Salt Lake City, UT.
- (8) 8. **Effects of Three Different Pre-Activity Warm-Up Methods on 100 Meter Sprint Performances in Collegiate Track Athletes.** Tompkins, C. M., & Clark, R. D. California Polytechnic State University San Luis Obispo, CA.

NOTE: Numbers in parentheses refer to abstracts on pages 18-26. Author index is on page 27.

FRIDAY, 22 OCTOBER 2004, continued

Free Communications # 1 1:00 pm – 2:00 pm

Parthenon 5

Moderator: Pat Vehrs, Ph.D., BYU, Provo, UT

- (9) 1:00 **A Description of Risk Factors for Type 2 Diabetes In Young, Urban Native American Women.** A Whyte, JL Thompson, FACSM, C Herman, V Wolfe, N Wilson, G Perez, and P Allen. Office of Native American Diabetes Programs, University of New Mexico Health Sciences Center, Albuquerque, NM.
- (10) 1:15 **Reliability of pedometer-determined free-living physical activity.** Catrine Tudor-Locke, Gwen M. Felton, Lee Burkett. Department of Exercise and Wellness, Arizona State University East, Mesa, AZ and College of Nursing, University of South Carolina, Columbia, SC.
- (11) 1:30 **Descriptive Data from a Community Risk Reduction Program--Healthy U TM.** Todd A. Astorino , Dept. of Kinesiology, CSU-San Marcos, and Wendy B. McGill, Healthy U of DelMarva Inc. CA.
- (12) 1:45 **Perception of Fitness and Fitness Testing in Adults.** Rosenberger, M., C. Cisar FACSM, P. Plato, and M. Duke. Department of Human Performance, San Jose State University, San Jose, CA.

Symposium # 3

3:30 pm – 5:30 pm

Parthenon 1

The Fattest Story Ever Told

Moderator: George A. Brooks, UC Berkeley, Berkeley, CA

- 3:30 - 4:00 *Say what you want, it's all in the methods.*
Anne Friedlander, Ph.D., FACSM, VA and Stanford, Palo Alto, CA
- 4:00 – 4:30 *Two fat players.*
Kevin Jacobs, Ph.D., University of Miami, Miami, FL
- 4:30 – 5:00 *Exercise as a means to utilize lipids: Who's telling the fat players what to do?*
Lorraine P. Turcotte, Ph.D., FACSM, USC, Los Angeles, CA
- 5:00 – 5:30 *Exercise as a means to utilize lipids: A big fat lie?*
George A. Brooks, Ph.D., FACSM, UC Berkeley, Berkeley, CA

Applied Lecture # 2

3:30 pm – 5:00 pm

Parthenon 2

Biomechanics of stretch-induced strength deficits

Duane Knudson, Ph.D., CSU Chico, Chico, CA

FRIDAY, 22 OCTOBER 2004, continued

Poster Session # 2

3:30 pm – 5:30 pm

Parthenon 4

- (13) 1. **Single Set Resistance Training increases Strength and Functional Fitness in Older Pulmonary Rehabilitation Patients.** Benton, M. J.*, W. T. Phillips FACSM* and A. M. Batterham FACSM**. *Arizona State University East, Mesa, AZ, USA; **University of Bath, Bath, UK.
- (14) 2. **Pedometer-assessed physical activity and functional fitness in older adults.** J. Mrozek, C. Tudor-Locke, L. Burkett, and W. Phillips, Department of Exercise and Science, Arizona State University East, AZ.
- (15) 3. **Single Set Resistance Training Improves Strength and Mood States in Older Pulmonary Rehabilitation Patients.** Phillips, W.T., FACSM*, K. Garrett*, M.J. Benton,* and A.M. Batterham, FACSM**. *Arizona State University East, Mesa, AZ, USA; **University of Bath, Bath, UK.
- (16) 4. **Do differences in electrode placement on a muscle affect study outcome?** Bezodis, N.E.¹, DeLion, D.², Zachry, T.² and Mercer, J.A.² FACSM. ¹ - Dept of Sport and Exercise Science, University of Bath, UK, ² - Dept of Kinesiology, UNLV, NV.
- (17) 5. **The metabolic cost of walking versus running.** C. Morris, B.M. Untalan, J.R. Coast, FACSM. Department of Exercise Science, Northern Arizona University, Flagstaff, AZ.
- (18) 6. **Heart rate reserve-ventilatory reserve: an accurate alternative for estimating VO₂.** Pettitt, RW; JD Symons, FACSM; PA Eisenman, FACSM, JE Taylor; RW Wilson; AT White, FACSM. Human Performance Research Laboratory, University of Utah, Salt Lake City, UT.
- (19) 7. **Vocal Cord Dysfunction masquerading as asthma.** Gregory Tardie, Ph.D., MAJ Alexander S. Niven, M.D., COL Idelle M. Weisman, M.D. Human Performance Laboratory, William Beaumont Army Medical Center, El Paso, TX.
- (20) 8. **Non-linear Relationships between Central Cardiovascular Variables and VO₂ during Incremental Cycling Exercise in Endurance-trained Individuals.** Vella, C.A. and Robergs, R.A. University of New Mexico, Albuquerque, NM.

FRIDAY, 22 OCTOBER 2004, continued

Free Communications # 2

Student Research Competition 3:30 pm – 5:00 pm Zeus B

Moderator: Ben B. Yaspelkis III, Ph.D., FACSM, California State University Northridge

- (21) 3:30 **Vasoconstrictor responses of rat soleus feed arteries following short-term exercise training.** Achanti, S. and J.L. Jasperse. Department of Sports Medicine, Pepperdine University, Malibu, CA.
- (22) 3:45 **Effects of a Creatine-, Ribose-, and Protein-Containing Drink Combined With Ten Weeks of Resistance Training On Body Composition, Strength, and Anaerobic Performance.** T.W. Beck, T.J. Housh, FACSM, G.O. Johnson, FACSM, J.W. Coburn, and M.H. Malek. University of Nebraska-Lincoln. Lincoln, NE.
- (23) 4:00 **High fat feeding impairs the activation of components of the novel insulin signaling cascade in rodent skeletal muscle.** J.R. Bernard, H.J. Herr, D.A. Rivas, A.M. Crain, A.D. Krisan, D.W. Reeder and B.B. Yaspelkis III FACSM, Department of Kinesiology, California State University, Northridge, CA.
- (24) 4:15 **A Comparison of Lower Leg Running Kinematics between Normal Gravity and Weightlessness.** ^(1,4) W. B. Edwards, ⁽²⁾ J. DeWitt, ⁽³⁾ G. Schaffner, ⁽¹⁾ A. Hreljac, ⁽⁵⁾ R. D. Hagan. ⁽¹⁾ CSU, Sacramento, ⁽²⁾ Bergila Engineering, ⁽³⁾ Wyle Life Sciences, ⁽⁴⁾ LZ Technology, ⁽⁵⁾ NASA JSC.
- (25) 4:30 **PI3K but not PKB/Akt inhibition prevents the insulin-induced effects on LCFA uptake and oxidation.** K. R. Kelly¹, M. T. Cheng¹, C. K. Sung² and L. P. Turcotte¹. ¹ Department of Kinesiology, University of Southern California, Los Angeles. ² Department of Physiology & Biophysics, University of Southern California, Los Angeles, CA.
- (26) 4:45 **Bone mineral accrual and physical activity in Asian and Hispanic middle school girls.** L. Tindle. Dept. of Exercise Science, University of California, Davis, CA.

Clinical Lecture

3:30 pm – 4:30 pm

Parthenon 5

Understanding Dyslipidemia: Treatment in the active patient

Rob Herb, Ph.D., Astrazeneca

SATURDAY, 23 OCTOBER 2004

Registration	7:30 am - 11:00 am	Parthenon Foyer
Student Breakfast Career Exchange	7:30 am – 9:00 am	Alexis Garden
Exhibits	8:00 am – 11:00 am	Parthenon 4
Panel Discussion	9:00 am – 10:30 am	Zeus A

Job Opportunities in Exercise Science

Moderator: Gabe Shaibi, University of Southern California

Sue Meadows, B.A., FAWHP Meadows Unlimited, Fremont, CA
Patricia Eisenman, Ph.D., College of Health, University of Utah, SLC, UT
Dave Arnall, Ph.D., P.T., Northern Arizona University, Flagstaff, AZ
Kristen Fisher, M.A., *fit* ONE Athletic Club, Chico, CA
Mary Seefeldt, M.S., YMCA of Southern Nevada, Las Vegas, NV
Kathleen Muras, M.S., Stead Health & Fitness, Mt San Antonio College, Pomona, CA
Janet Schumacher, M.S., Area Manger, Health Fitness Corporation, San Jose, CA

Symposium # 4	9:30 am – 11:30 am	Zeus B
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Clinical Exercise Physiology

Moderator: Scott O. Roberts, Ph.D., FACSM, CSU Chico, Chico, CA

- 9:30 – 10:10 ***Current Trends in Exercise Testing***
Scott O. Roberts, Ph.D., FACSM, CSU Chico, Chico, CA
- 10:10 – 10:50 ***Predicting Morbidity and Mortality from Exercise Testing***
Jonathon Myers, Ph.D., VAM Cardiology, Palo Alto, CA
- 10:50 – 11:30 ***Better Decisions Through Science: Exercise Testing***
Vic Froelicher, M.D., PAVAMC/Cardiology, Stanford, Palo Alto, CA

Panel Discussion Sponsors, Thank You!!



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Mary Seefeldt, M.S.

Mt. San Antonio College
Kathleen Muras, M.S.
Cardiac Rehabilitation

Saturday, 23 October, continued

Poster Session # 3

9:00 am – 11:00

Parthenon 4

- (27) 1. **Walking Among White, Black, and Hispanic Men and Women in the US: Results From a National Survey, 2002-2003.** JP Reis¹, CA Macera¹ FACSM, BE Ainsworth¹ FACSM, DA Jones²; ¹San Diego State University and the ²Centers for Disease Control and Prevention, CA.
- (28) 2. **The effect of internal versus external focus of attention on EMG activity during basketball free throws.** Zachry, T.L.¹, Wulf, G.¹, Mercer, J.A.¹, Bezodis, N.², DeLion, D.¹. ¹Department of Kinesiology, University of Nevada, Las Vegas, Las Vegas, NV. ²Department of Sport and Exercise Science, University of Bath, Bath, UK.
- (29) 3. **Pedometer reliability under controlled and free-living conditions.** Hipke, J.L. and C. Tudor-Locke FACSM. Department of Exercise and Wellness, Arizona State University East, Mesa, AZ.
- (30) 4. **Effect of signs encouraging stair climbing on behavior of students in a university residence hall.** B. Schmitz, L. Marrs, and P. Entin, Department of Exercise Science, Northern Arizona University, Flagstaff, AZ.
- (31) 5. **Explanation of variance in VO₂max for trained and untrained male subjects.** Zhou, B., M.P. Ernst, and Y.T. Wang FACSM. Department of Kinesiology and Recreation, California State University; Department of Physical Therapy, Georgia State University.
- (32) 6. **Evaluation of McDonald's™ Go Active™ pedometers.** White, SB; Hipke, JL; Tudor-Locke, C. Department of Exercise and Wellness, Arizona State University, Mesa, AZ.
- (33) 7. **The effects of stability ball training on spinal stability in those who work in sedentary occupations.** Carter, J., Beam, W., McMahan, S., and Barr, M. Department of Kinesiology and Health Promotion, California State University Fullerton, Fullerton, CA.
- (34) 8. **Effect of history of migraine or headache treatment on cognitive function and symptom reporting following sports concussion.** Allison Lowe^{1,2}, Priscilla MacRae, Ph.D.¹, Jamie Stump, Ph.D.², Mark Lovell, Ph.D.², Michael Collins, Ph.D.² [¹ Pepperdine University, Malibu, CA; ² University of Pittsburgh Medical Center, Pittsburgh, PA].

SATURDAY, 23 OCTOBER 2004, continued

General Session # 2 11:30 – 1:15 Parthenon 1 & 2

Moderator: J. Richard Coast, Ph.D., FACSM, President, SWACSM
Northern Arizona University, Flagstaff, AZ

Lunch Included with Registration

Student Awards
Recognition of Host School
California State University, Chico
Business Meeting

Special Presentation *How animal athletes can impact clinical interventions*
Stan Lindstedt, Ph.D.
Regents' Professor of Biology
Northern Arizona University, Flagstaff, AZ

Pharmacia/Pfizer Lecture 1:30 pm – 3:30 pm Zeus B

Treating the Weekend Warrior: Knee

Sandy Hoffman, M.D., FACSM
Team Physician
Idaho State University
Pocatello, ID

Gatorade Lecture 2:00 pm – 3:00 pm Parthenon 4

Exercise-induced Cardioprotection

Scott Powers, Ph.D., FACSM, University of Florida, Gainesville, FL

Applied Lecture # 3 2:00 pm – 3:20 pm Zeus A

Another Fad Diet

Jenna Bell-Wilson, Ph.D., The Ohio State University, Columbus, OH

SATURDAY, 23 OCTOBER 2004, continued

Symposium # 5 3:30 pm – 5:30 pm Parthenon 4

Developing Power for Sport

Moderator: Thomas D. Fahey, Ed.D., CSU Chico, Chico, CA

- 3:30 - 4:10 *Developing the Power Athlete: Theory and Practice*
Thomas D. Fahey, Ed.D., CSU Chico, Chico, CA
- 4:10 – 4:50 *Body Composition and the Power Athlete: Tools you can Use*
Frank Katch, Ph.D., U. Mass (retired), Santa Barbara, CA
- 4:50 – 5:30 *What it takes to be an Olympian in a Power Sport*
John Powell, Four-time Olympian, Las Vegas, NV

Symposium # 6 3:30 pm – 5:30 pm Zeus A

Physical Activity, Nutritional Factors and Bone Health

Moderator: Marta van Loan, Ph.D., USDA, Davis, CA

- 3:30 – 4:10 *Interactions Between Genetics, Hormones, Activity and Bone*
S. Victoria Jaque, Ph.D., CSU Northridge, Northridge, CA
- 4:10 – 4:50 *Bone health in female athletes: Relationship to the female athlete triad*
Jeanne Nichols, Ph.D., SDSU, San Diego, CA
- 4:50 – 5:30 *Potential Benefits of Isoflavones on Bone*
Marta van Loan, Ph.D., FACSM, USDA, Davis, CA

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2004 SWACSM

Annual Meeting

ABSTRACTS

Free Communications & Posters

Poster Session # 1, Friday 1:00 PM

1

PREDICTING LACTATE THRESHOLD FROM VO₂ MAX DATA

P. A. Plato, & M. McNulty, Dept. of Human Performance, San Jose State University, San Jose, CA

Lactate threshold (LT) is an important reference point for endurance athletes to set training intensities. Ventilatory threshold (VT) has been used as a noninvasive estimate of LT, but appears to underestimate training intensity for many athletes, who are often able to train at intensities above VT for prolonged periods. Determination of LT can be time-consuming and invasive. Methods: To determine whether data obtained during a noninvasive VO₂ max test could be used to more accurately predict LT, 9 trained cyclists (6 men, 3 women, 35 ± 2 yrs) performed a maximal graded exercise test on a bicycle ergometer to measure max VO₂ and heart rate at the ventilatory threshold (HRVT). A Medgraphics CPX-D metabolic cart and 12-lead electrocardiogram were used to collect metabolic data and monitor heart rate and rhythm. Ventilatory threshold was determined using the V-slope method. Cyclists returned to the laboratory on a different day to perform a lactate threshold test, consisting of 8 minute stages at power outputs below, at, and above the VT. Steady-state heart rates were measured during each 8 minute stage, and a fingerstick blood sample was obtained during the last minute of each stage to measure blood lactate using the Accusport blood lactate analyzer. The heart rate associated with the LT (HRLT) was determined using the D-max method (Cheng et al., 1992). Results: Using stepwise regression, only HRVT (151 ± 4 bpm) contributed to the prediction of the independent variable, HRLT (158 ± 5 bpm), and accounted for 68% of the variance in HRLT ($r = 0.82$, $p < 0.01$). Conclusion: It appears that the HRVT, determined during a maximal graded exercise test using the V-slope method, can be adjusted for a more accurate LT estimation.

3

CHANGES IN VERTICAL JUMP HEIGHT ACROSS TEN DAYS IN COUNTERMOVEMENT JUMPS PERFORMED BY NOVICE JUMPERS

Michael E. Feltner, FACSM, Priscilla G. MacRae, FACSM, Phil G. Westphal. Biomechanics Laboratory, Pepperdine University, Malibu, CA

Practice is requisite for improvement in motor skill performance; however, little is known about the time course of changes in motor skill performance with practice. The purpose was to investigate the time course of changes in jump height, vertical force application, and impulse duration during countermovement jumps. Twelve novice (mean Day 1 jump height = 19.8cm) college-age subjects performed 10 jumps daily for eight consecutive days from two Kistler force plates. Following each jump, performance feedback (jump height) and encouragement were given to obtain maximum efforts. Jump height, average vertical ground reaction force (VGRF), and duration of the takeoff phase (t-TO) were determined for each trial. Separate 8x10 repeated measures ANOVAs (Days x Trials) were used to analyze the data. Jump height increased across Days ($F=4.24$, $p < 0.01$) and post hoc analysis (pair-wise t-tests) indicated jump height on Days 2 through 8 significantly ($p < 0.05$) differed from Day 1 (average increase 7.2%). Average VGRF and t-TO exhibited a main effect for Trials ($F=2.34$, $p=0.02$ and $F=2.95$, $p < 0.01$, respectively). Post hoc analysis indicated that normalized average VGRF was smaller in Trials 5-8 relative to Trial 1. Post hoc analysis also revealed that average values of t-TO increased in Trials 4-8 relative to Trial 1. No Day by Trial interactions were present for any variable. Significant increases in jump height occurred during the first 24 hours of the study, but no further increases in jump height occurred. As average VGRF and t-TO did not change across Days, a common mechanism for increased jump height was not present. The results suggest the subjects adapted differently across Days to improve jump performance. The increases in t-TO and decreases in average VGRF across Trials indicates the subjects consistently altered their jumping mechanics within each Day, but these mechanical alterations did not improve jump height after Day 2.

2

INFLUENCE OF SPEED AND STRIDE FREQUENCY ON OXYGEN CONSUMPTION

Dolgan, J.A., Moore, D., Zarndt, J., Mercer, J.A. FACSM, and L.A. Goding FACSM

Department of Kinesiology, University of Nevada Las Vegas, Las Vegas, Nevada

Changes in stride frequency (SF) and running speed influence rate of oxygen consumption (VO₂). However, it is not clear how the interaction between running speed and SF influences VO₂. PURPOSE Investigate the interaction between speed and stride frequency on VO₂. METHODS Collegiate level runners (n=6) performed 3 x 15-minute treadmill runs (5 minutes at each speed: 3.13, 3.58 and 4.02 m/s). For condition 1, subjects ran each speed at a preferred stride frequency (PSF) with condition 2 and 3 15% faster and slower, respectively. Data for the 15-min runs were plotted across time and fit with a linear line (least squares methods). VO₂ data for each speed were identified by recording a discrete VO₂ value from the line of best fit corresponding to the last minute of the speed condition and analyzed using a 3 x 3 (speed x SF) RM ANOVA with post-hoc testing (VO₂ at each speed between conditions). RESULTS VO₂ was influenced by the interaction of SF and speed ($p < 0.05$). VO₂ for PSF was less than during -15% PSF for speeds 1 and 2 ($p < 0.05$); -15%PSF 3.13 m/s: 38.7 ± 3.8 ml/kg/min, 3.58 m/s: 41.0 ± 3.9 ml/kg/min, 4.02 m/s: 43.4 ± 4.3 ml/kg/min; PSF 3.13 m/s: 34.0 ± 2.9, 3.58 m/s: 38.4 ± 3.6, 4.02 m/s: 42.9 ± 4.3 ml/kg/min; +15%PSF 3.13 m/s: 35.2 ± 4.5 ml/kg/min, 3.58 m/s: 39.1 ± 4.4 ml/kg/min, 4.02 m/s: 42.9 ± 4.6 ml/kg/min). All other comparisons of VO₂ between PSF and +/- PSFs at all speeds were not significant. CONCLUSIONS Changes in SF had a greater influence on VO₂ during slower speeds than during faster speeds.

4

INFLUENCE OF STRIDE LENGTH AND RUNNING VELOCITY ON IMPACT CHARACTERISTICS.

Mercer, J.A. FACSM, Bezodis, N.*, Russell, M., Purdy, A., DeLion, D. Dept of Kinesiology, UNLV, NV; *Dept of Sport and Exercise Science, University of Bath, UK

There is a wealth of research on the influence of stride length as well as running velocity on ground reaction force impact characteristics. However, there is a need for studies investigating any potential interaction between these parameters. PURPOSE To investigate the influence of stride length and running velocity on impact characteristics. METHODS Volunteers (n=6 males; 74 ± 9.5 kg; 1.7 ± 0.1 m; 26 ± 4.0 yo) completed a total of 30-40 trials of overground running at a variety of speeds. For the first half the trials, stride length (SL) was allowed to vary naturally (no instructions; preferred stride length, PSL) while during the last half SL was constrained at 2.5 m (SL2.5) by foot contact targets placed on the floor. Ground reaction forces were recorded at 1080 Hz and normalized to body weight. Resultant impact force (Fr) its direction (Theta) was recorded for each running trial and scatter plots generated plotting each parameter against running velocity. Linear lines of best fit were calculated and the slopes recorded for analysis. The slopes were compared between conditions using paired t-tests. RESULTS The slope of the Fr-velocity relationship was greater during PSL (0.186 ± 0.17 BW per m/s) than during SL2.5 (0.001 ± 0.13 BW per m/s) ($p < 0.05$). The slope of the Theta-velocity relationship was not different during PSL (1.00 ± 1.5 deg per m/s) and SL2.5 (0.41 ± 2.3 deg per m/s) ($p > 0.05$). CONCLUSION Stride length was an important factor determining impact force magnitude but did not influence the relationship between the direction of Fr and running velocity. It seems that lower extremity posture determines impact magnitude but direction of force application is strongly related to running velocity (vs. stride length).

Poster Session # 1, Friday 1:00 PM, continued

5

The Contribution of Muscular Strength Capacities to Performance in Female Volleyball Players.

Mark Peterson, Brent Alvar, Dan Dodd, and Kelby Klosterman: Arizona State University, Mesa, Arizona

The purpose of this investigation was to examine upper and lower-body muscular force production among collegiate-level female athletes, and to extrapolate the relative contribution of each to several fundamental performance measures. Methods: Sixteen female college volleyball players were tested to determine (1) Absolute and Relative Lower-Body Muscular Strength (1RM Squat & 1RM/body mass), (2) Absolute and Relative Upper-Body Muscular Strength (1RM Bench Press & 1RM/body mass), (3) Counter-movement vertical jump height, (4) Sprint Acceleration (yd/s²), (5) Sprint Velocity (yd/s), and (6) Volleyball Serve Speed (standard radar gun: mph). Analyses were performed using Pearson *r* to examine these relationships. Results: Significant, strong linear relationships were indicated between lower-body relative muscular strength and vertical jump height ($p < .01$, $r = .641$), sprint acceleration ($p < .01$, $r = .818$), and sprint velocity ($p < .01$, $r = .730$), as opposed to a weaker relationship with absolute 1RM squat strength and vertical jump, and a non-significant correlations with measures of sprint performance. Conversely, significant strong linear relationships were indicated between upper-body absolute muscular strength and serve speed ($p < .05$, $r = .593$), as opposed to a non-significant, non-linear relationship between relative upper-body strength, and serve speed. Conclusions: Relative muscular strength was more influential than absolute strength for squat performance and jumping ability. In opposition, with regard to upper body performance, absolute muscular strength was more influential than relative strength for bench press, and volleyball serve speed. Discussion: Current correlation data provide a quantified look at the interaction between muscular strength levels among collegiate female volleyball players, and transfer relationships to several athletic-specific performance measures.

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EPOC following exhaustive, supramaximal cycling as an estimate of peak anaerobic power and anaerobic capacity

Wilson, RW, RW Pettitt, C Dobson, and JE Taylor

Department of Exercise and Sport Science, University of Utah, Salt Lake City, Utah Purpose: Although there are a variety of tests that evaluate peak anaerobic power (Wingate anaerobic power test) and anaerobic capacity (maximally accumulated oxygen deficit), there are no tests that provide estimates of both. It is hypothesized that excess post exercise oxygen consumption (EPOC) following exhaustive supramaximal exercise may be used to estimate both peak anaerobic power and anaerobic capacity. The purpose of this study was to determine the degree of association between the maximally accumulated oxygen deficit (MAOD) and total EPOC as well as 10-sec EPOC and 5-sec peak power (PP5) from the Wingate anaerobic power test. Methods: Seven healthy females and six healthy males with a wide range of fitness levels performed 1) a cycling VO₂ peak test, 2) six, five minute constant power output cycling bouts, 3) an MAOD test at a power output of 110% VO₂ peak, and 4) a Wingate anaerobic power test. EPOC was measured following the MAOD test. Pearson product-moment correlations were performed to determine the degree of association between total EPOC and MAOD, MAOD and PP5, 10-sec EPOC and PP5, and 15-sec EPOC and PP5. Results: There was a strong association between total EPOC vs. MAOD (.89*) and 10-sec EPOC vs. PP5 (.79*) and a weaker association between MAOD vs. PP5 (.65**) and 15-sec EPOC vs. PP5 (.56**) ($p < 0.01^*$) ($p < 0.05^{**}$). Conclusions: The results from this study indicate that EPOC following exhaustive, supramaximal cycling may be used to estimate peak anaerobic power and anaerobic capacity. This eliminates the need to perform multiple tests making the process less laborious and therefore a more investigator and subject friendly method. These results suggest the potential for further assessment of EPOC as a measure of anaerobic power and capacity following other types of exhaustive, supramaximal exercise.

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Metabolic and Performance Effects of Raisins Versus Sports Gel as During Exercise Feedings in Cyclists

Rezende, R.S., M. Kern and C.J. Heslin. Department of Exercise and Nutritional Sciences, San Diego State University, San Diego

PURPOSE: To determine the differences in metabolism and cycling performance when consuming raisins versus a commercial sports gel during a cycling bout. METHODS: Eight endurance trained cyclists reported for three randomly assigned trials in cross-over fashion. A 30-min cycle bout at 70% VO₂max and six 1-min sprints at 110% VO₂max were performed. After rest, a test meal consisting of 24 g of CHO from raisins or a sports gel, or placebo was consumed. Participants then began a 45-min bout of exercise at 70% VO₂max. The test food was ingested every 15 min of exercise. A 15-min performance ride measuring work output (kJ) was performed at the end of the 45-min bout. Blood was collected 10 min after initial food consumption and after the 45th min of exercise. RESULTS: Performance was not different ($p > 0.05$) between placebo (185.51 ± 56.54 kJ), sports gel (185.51 ± 53.37 kJ), and raisins (183.76 ± 53.85 kJ). After ingestion of sports gel, post-exercise glucose levels were significantly higher (100.02 ± 20.56 mg/dl) than after placebo (81.79 ± 22.70 mg/dl) and approached significance ($P = 0.07$) when compared to raisins (89.00 ± 14.95 mg/dl). β-hydroxybutyrate levels were higher after exercise in the placebo trial versus sports gel and raisins. Triglycerides levels increased significantly from pre-exercise values in the placebo trial (53.82 ± 16.48 to 80.65 ± 14.28 mg/dl), and tended to be ($P = 0.07$) with sports gel feeding versus raisins. Free fatty acid concentrations were higher after exercise for all trials. Post-exercise blood lactate concentrations were significantly lower during the placebo. Insulin levels were significantly lower from pre-exercise values in the placebo trial (14.00 ± 8.04 to 4.61 ± 4.21pM) and both the sports gel and raisins had significantly higher post exercise values when compared to placebo (4.61 ± 4.21, 13.84 ± 6.21, 23.49 ± 20.94 for placebo, gel, and raisin respectively). CONCLUSION: Overall, feeding CHO-rich foods every 15 min during exercise positively influences metabolism. No benefits to performance were detected.

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Effects of Three Different Pre-Activity Warm-Up Methods on 100 Meter Sprint Performances in Collegiate Track Athletes

Tompkins, C. M., & Clark, R. D. California Polytechnic State University San Luis Obispo, CA

Most athletes, coaches, and trainers incorporate some form of pre-activity warm-up into their training routines before participation in physically demanding activities. One of the more frequently used pre-activity exercises is passive stretching. However, in certain settings research has shown that passive stretching can be detrimental to performance in events such as distance running (e.g., Craib et al., 1996; Gleim et al., 1990; Jones, 2002). Furthermore, when examining sprinting, only one study involving recreational runners has suggested that stretching is detrimental to sprint performance (De Vries, 1962). Therefore, the purpose of this study was to examine the acute effects of three different warm-up methods prior to running a 100 meter sprint. These methods included passive stretching, dynamic resistance warm-up, and specific warm-up. Three male and two female intercollegiate athlete sprinters performed one 100 meter sprint with maximum effort after each warm-up on three separate days. A performance pack connected to five photo relay sensors positioned perpendicular to the direction of travel along the 100 meter runway was used to collect elapsed time for five separate segments (0-20 meters, 20-40 meters, 40-60 meters, 60-80 meters and 80-100 meters). The elapsed time was used to calculate velocity and acceleration for each segment including the entire 100 meter distance. Analysis by a one-way ANOVA found no significant difference between the three warm-up methods when comparing total mean times ($F = .50$, $p = .6482$), total mean velocities ($F = .48$, $p = .66$), and total mean accelerations ($F = .41$, $p = .70$). Although the findings failed to reach significance, there was a trend indicating that warm-up method did influence sprint performance. In particular, sprinting after the specific warm-up showed greater performance in mean total times and velocity (for the entire 100 meter distance and 20 meter segments) compared to sprinting after the dynamic resistance warm-up and the passive stretching warm-up.

Free Communications # 1, Friday 1:00 PM – 2:00 PM

9

A DESCRIPTION OF RISK FACTORS FOR TYPE 2 DIABETES IN YOUNG, URBAN NATIVE AMERICAN WOMEN.

A Whyte, J.L. Thompson, FACSM, C Herman, V Wolfe, N Wilson, G Perez, and P Allen. Office of Native American Diabetes Programs, University of New Mexico Health Sciences Center, Albuquerque, NM
Introduction: The prevalence of type 2 diabetes among Native Americans is two to five times higher than for non-Hispanic Whites. Diabetes-related complications and mortality rates are also higher. Despite these alarming disparities, there is a lack of culturally tailored programs to prevent diabetes among Native Americans. The purpose of this study is to describe the baseline fitness levels and metabolic profiles of Native American women participating in a culturally tailored lifestyle intervention.
Methods: 200 urban Native American women (aged 18-40 yrs) without diabetes were recruited. Measures were conducted at baseline and 6, 12, and 18 months. Only baseline data are reported here. Measurements included fasting glucose (FG), insulin resistance (HOMA), lipids, body composition (height, weight, BMI, %fat using bioelectrical impedance), predicted VO₂ peak (sub maximal bike test), and self-reported physical activity (TLA).
Results: Mean±SD for age, height, weight, FG, and BMI of the total group were 29.3±6.6 yr, 162.1±5.6 cm, 77.2±17.38 kg, 93.2±8.6 mg/dL, and 29.4±6.3 kg/m² respectively. About 13% had FG values in the pre-diabetes range. Lipid profiles were normal (TChol 168.3±28.4 mg/dL, Trig 129.3±56.3 mg/dL, HDL 49.7±12.0mg/dL, LDL 92.8±22.9mg/dL). Following baseline, participants were randomized into intervention or delayed intervention groups statistically equivalent in fitness and metabolic profiles:

Groups	BMI (kg/m ²)	VO ₂ peak	TLA (min/wk)	% Body Fat	HOMA
Delayed (n=99)	29.2 ± 6.7	26.8 ± 6.3	372 ± 384	40.8 ± 6.6	3.4 ± 2.5
Intervention (n=101)	29.5 ± 5.9	28.0 ± 6.6	306 ± 288	41.6 ± 6.3	3.3 ± 2.8

Conclusions: These data illustrate that young urban Native American women have high risk for type 2 diabetes based on low fitness levels, high %body fat, and high insulin resistance. However, lipid profiles are normal and self-reported physical activity levels exceed the U.S. Surgeon General's minimum recommendations.

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DESCRIPTIVE DATA FROM A COMMUNITY RISK REDUCTION PROGRAM--Healthy U TM

Todd A. Astorino, Dept. of Kinesiology, CSU-San Marcos, and Wendy B. McGill, Healthy U of DelMarva Inc.

The primary aim of this study was to examine survey data from participants in a community-wide coalition aiming to reduce chronic disease risk and enhance lifestyle modification. Subjects were recruited through local media outlets including television, billboards, and newspapers. Ultimately, 5,876 adult men and women (mean age equal to 44.27 + 9.09 yr, respectively) residing in the Eastern Shore of Maryland enrolled in the program from January 27, 2003 to April 30, 2003. Incentives including a new car and monetary awards were offered to enhance participation. To be eligible, participants were required to fill out a survey and have their height, weight, and waist-to-hip ratio (WHR) measured by trained technicians. During the year, participants had the option of taking part in events including cooking demonstrations, exercise classes, speaking engagements, and other activities to increase their knowledge and awareness of healthy behavior. Mean BMI (29.73 + 7.38 kg.m²), waist circumference (37.15 + 6.85 in), and WHR (0.84 + 0.09) were higher than healthy values, suggesting these individuals face enhanced risk for chronic disease. Intake of fruits and vegetables was low, and diets moderate or high in fat were quite prevalent (70 % of participants). These data confirm the rather unhealthy lifestyle followed by the primarily indigent population of the Eastern Shore of Maryland, and warrant future intervention into enhancing quality of life and reducing disease risk in this population.

10

PEDOMETER RELIABILITY UNDER CONTROLLED AND FREE-LIVING CONDITIONS

Hipke, J.L. and C. Tudor-Locke FACSM. Department of Exercise and Wellness, Arizona State University East, Mesa, Arizona

Purpose: The purposes of these studies were to further evaluate the Yamax pedometer under both controlled and free-living conditions.
Methods: Two studies were conducted to evaluate: 1) test-retest reliability and intra-model reliability of 40 Yamax SW-200 pedometers during two bouts of treadmill walking at 80 m•min⁻¹ (Study 1), and 2) intra-model reliability during a free-living condition (Study 2). Observed steps taken served as the criterion standard in Study 1, and the ActiGraph accelerometer (formerly the CSA) served in Study 2. Results: No statistically significant differences in absolute percent error were noted between BMI categories (split on 30 kgxm⁻²) in either study. Multiple analyses indicated excellent test-retest reliability (Wilcoxon Signed Ranks test Z = -1.505, p = 0.132; Spearman's rho correlation r = 0.826, p = 0.000; Chronbach's a=0.935) and good intra-model reliability (bout 1 a= 0.759, bout 2 a = 0.785) in Study 1. Excellent intra-model reliability was achieved in Study 2 (a=0.938). Conclusion: Researchers and practitioners can use these data to confidently plan for objective assessment using this practical measurement approach.

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PERCEPTION OF FITNESS AND FITNESS TESTING IN ADULTS

Rosenberger, M., C. Cisar FACSM, P. Plato, and M. Duke. Department of Human Performance, San Jose State University, San Jose, CA

Increased disease risk is associated with low cardiovascular fitness levels and obesity and low muscular fitness and flexibility can reduce mobility and limit daily activities. Adults are rarely fitness tested to assess these risks unless it is part of military training or heart disease diagnosis. Literature on perception of fitness has assessed many ways of predicting fitness, but the results do not agree on the accuracy of fitness perception and no studies have evaluated a complete fitness model which includes body composition. This study asked subjects to predict their fitness measurements in four components of fitness and overall fitness using a five part semantic scale. Participant fitness was then evaluated with a Cooper 12-minute run test, a seven-site skinfold test, a push-up test to exhaustion, a one-minute partial curl-up test, and a modified sit-and-reach test. The results of the study found that subjects (N=58) overestimated cardiovascular fitness (p<.01) and flexibility (p<.01) while underestimating percent body fat (p<.05) and muscular fitness (p<.01). Furthermore, obese subjects had an inaccurate perception of body composition (p<.01), while non-obese subjects accurately predicted their body composition. Average overall fitness was perceived to be higher than any of the fitness component perceptions, suggesting it was not predicted based on the four fitness components. Also, a gender difference in the accuracy in perceived fitness was evident. Men (N=12) had more accurate perceptions than women (N=46) in this sample. Fitness testing is recommended as a useful tool since perception of fitness is not a good measure of physical fitness. Emphasis in fitness testing should be placed on cardiovascular fitness and body composition because of the higher risks associated with low fitness, and the tendency for the at risk population to have an inaccurate fitness perception.

Poster Session # 2, Friday 3:30 PM

13

SINGLE SET RESISTANCE TRAINING INCREASES STRENGTH AND FUNCTIONAL FITNESS IN OLDER PULMONARY REHABILITATION PATIENTS

Benton, M. J.*, W. T. Phillips FACSM* and A. M. Batterham FACSM**
*Arizona State University East, Mesa, AZ, USA; **University of Bath, Bath, UK
Background: Resistance training (RT) in frail older adults has been shown to improve Functional Fitness – the ability to perform activities of daily living. However the impact of RT on pulmonary rehabilitation (PR) which primarily involves endurance training has not been widely investigated.

Purpose: To evaluate the effect of traditional PR vs traditional PR plus RT on strength and functional fitness outcomes in COPD patients.
Methods: Twenty COPD patients were recruited from a hospital-based PR program which met twice a week for 8 weeks. Following baseline assessment, participants were randomized to either (i) traditional PR (ET: n = 10; mean age = 71.0 ± 3.7yrs) or (ii) traditional PR plus RT (RT: n = 10; mean age = 69.9 ± 6.3yrs). The RT component consisted of one set of 8-10 repetitions of five exercises (incline chest press, seated leg press, lateral pulldown, cable triceps pushdown, and dumbbell biceps curl). Initial training resistance was set at 50% of 1 repetition max (1RM) with load increases following successful completion of 10 repetitions.

Results: Chest Press (p=.005) and Leg Press (p = .004) both increased for RT vs ET. Functional Fitness measures also increased for RT vs ET in Lift and Reach (6.3 vs 2.6 reps, p = .027). Chair Stands (2.5 vs 0.9 reps), Up and Go (-0.9 vs -0.1 sec) and 6 minute walk (223 vs 205 yds) also increased though did not reach significance.

Conclusions: In this group of older COPD patients, the traditional pulmonary rehabilitation program had little effect on strength and functional fitness. However the concurrent addition of single-set progressive resistance training produced significant and meaningful gains in both strength and functional fitness outcome measures. Longer term studies with greater numbers of participants should be conducted to further elucidate the impact of incorporating RT into traditional PR.

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Single Set Resistance Training Improves Strength and Mood States in Older Pulmonary Rehabilitation Patients

Phillips, W.T., FACSM*, K. Garrett*, M.J. Benton,* and A.M. Batterham, FACSM**

*Arizona State University East, Mesa, AZ, USA; **University of Bath, Bath, UK

**Dept of Sport and Exercise Science, University of Bath, Bath, UK
Background: UK Elderly patients diagnosed with chronic obstructive pulmonary disease (COPD) typically experience a higher prevalence of mental disorders than those without this condition. Resistance training (RT) has been reported as improving aspects of psychological well-being in older adults, however its impact in pulmonary rehabilitation (PR) has been little investigated.

Purpose: To investigate the effect of traditional PR vs traditional PR plus RT on mood states in patients with COPD.

Methods: Fifteen COPD patients were recruited from a hospital-based PR program which met twice a week for 8 weeks. Following baseline assessment, participants were randomized to either (i) traditional PR (TPR: n = 7; mean age = 72.6 ± 6.9yrs) or (ii) traditional PR plus RT (RPR: n = 9; mean age = 70.6 ± 2.9yrs). The RT component consisted of one set of 8-10 repetitions of five exercises (incline chest press, seated leg press, lateral pulldown, cable triceps pushdown, and dumbbell biceps curl). Initial training resistance was set at 50% of 1 repetition max (1RM) with load increases following successful completion of 10 repetitions.

Results: For strength, Chest Press (p=.007) and Leg Press (p = .002) both increased in RPR vs TPR. For mood states, Tension-Anxiety (p = .029) and Vigor-Activity (p = .016) both improved in RPR vs TPR. Total Mood Disturbance (p = .09) also improved but did not quite reach significance.

Conclusions: In this group of older patients, the traditional COPD rehabilitation program had little effect on strength and mood states. However the concurrent addition of single-set progressive resistance training produced significant and meaningful gains in both strength and mood states. Longer term studies with greater numbers of participants should be conducted to further elucidate the potential contribution of RT to psychological health outcomes in PR programs.

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PEDOMETER-ASSESSED PHYSICAL ACTIVITY AND FUNCTIONAL FITNESS IN OLDER ADULTS

J. Mrozek, C. Tudor-Locke, L. Burkett, and W. Phillips, Department of Exercise and Science, Arizona State University East

Purpose: To determine the relationship between pedometer-assessed physical activity and functional fitness measured by the Senior Fitness Test (SFT) in community-dwelling older adults. Methods: A convenience sample of 84 (10 males, 74 females) healthy, community-dwelling older adults (age 75.5 ± 6.4 yr, BMI 25.7 ± 4.1 kg/m²) participated in this study. The Yamax Digiwalker® SW-200 pedometer (Yamax Corporation, Tokyo, Japan) and a physical activity log were used to self-monitor total daily physical activity for 8 consecutive days, including two weekend days. The Senior Fitness Test (SFT) was administered to measure functional fitness of all participants. The SFT contains six exercises designed to assess lower and upper body strength, aerobic endurance, upper and lower body flexibility, motor ability, and dynamic balance. Age- and sex-specific Z-scores were computed according to existing SFT normative data. Both raw scores and Z-scores were compared to mean pedometer-determined steps/day. Results: Significant Spearman correlations were observed between mean pedometer-determined steps/day and raw scores from: 1) sit-and-reach (r = .247, p = .028), 2) back scratch (r = .359, p = .001), 3) 8-foot up-and-go (r = -.449, p = .000), and 4) 6-minute walk test (r = .492, p = .000). Significant Spearman correlations were also observed between mean pedometer-determined steps/day and z-scores from: 1) back scratch (r = .255, p = .023), 2) 8-foot up-and-go (r = -.335, p = .003), 3) 6-minute walk test (r = .325, p = .003), and 4) total functional fitness score (r = .234, p = .038). Conclusions: This study found a significant relationship (specifically Spearman rank order correlations) between pedometer-assessed physical activity and measures of functional fitness in this convenience sample of community-dwelling older adults. Subsequent research is required to identify minimum levels of functional fitness associated with maintaining independence in older adults.

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Do differences in electrode placement on a muscle affect study outcome?

Bezodis, N.E.1, DeLion, D.2, Zachry, T.2 and Mercer, J.A.2 FACSM.

1 - Dept of Sport and Exercise Science, University of Bath, UK, 2 - Dept of Kinesiology, UNLV, NV.

EMG electrode placement is seen as critical in experimental methodology due to influencing signal magnitude (De Luca, 1997; Hermens et al., 2000), however, there is a dearth of research regarding whether electrode placement affects study outcome. PURPOSE Investigate the effect of electrode placement on study results. METHODS Ten subjects (6 males, 4 females) were instrumented with three pairs of electrodes (1000 Hz) placed above the belly of the biceps, with the central (lead 2) electrodes placed first, then the lateral (lead 1) and medial (lead 3) electrodes placed directly adjacent to lead 2 (25 mm center to center from lead 2). An electrogoniometer (1000 Hz) was used to record elbow angle. Each subject performed a maximal isometric contraction (MVC), followed by three isotonic sets of five bicep curls. Condition 1 (C1) used a weight the individual subject could curl no more than 10 times, with condition 2 (C2) being 80% and condition 3 (C3) 50% of this weight. Three complete contractions (start of second to completion of fourth) were extracted for analysis. Dependent variables (DVs) were average rectified EMG (AREMG) and root mean square EMG (RMSEMG) and were normalized to MVC. For each lead, a repeated measures ANOVA was used to compare each DV across conditions (3 levels). RESULTS Across all leads, AREMG and RMSEMG were both significantly different (p < 0.05) across intensities. CONCLUSIONS For this study investigating isotonic biceps contraction, results suggest that slight variations in electrode placement did not affect study outcome. Being a relatively large fusiform muscle, the belly of the biceps is easy to identify, and these findings may not be repeatable on other muscles, or when there is a more subtle difference between conditions.

Poster Session # 2, Friday 3:30 PM, continued

17

THE METABOLIC COST OF WALKING VERSUS RUNNING

C. Morris, B.M. Untalan, J.R. Coast, FACSM. Department of Exercise Science, Northern Arizona University, Flagstaff, AZ
Though a simple concept, there seems to be much disagreement over the metabolic cost of walking vs running. Walker et al. (1999) describe a 0% difference between the cost of walking and running at certain speeds for adolescents. The American College of Sports Medicine (2000) equation shows an approximately 30-50% difference between the cost of walking and running a specific distance, and Farley and McMahon (1992) report a 100% difference between the cost of walking versus running, with running costing twice as much energy as walking per unit body weight per distance. The purpose of this study was to determine if there is indeed a significant difference between the metabolic cost of walking and running. 9 healthy subjects aged 19-50, volunteered to complete walking and running tests on a treadmill. Each subject walked for 5 minutes at each speed of 2, 3, 4, and 4.5 miles/hr and ran for 5 minutes at each speed of 4, 5, 6, and 7 miles/hr. During the last 1.5 minutes at each speed, VO₂ and VCO₂ were recorded. From this data, the respiratory exchange ratio (RER) and metabolic cost (in kcal/kg/mile) were calculated. A one way repeated measures analysis of variance showed that there is a significant difference between the metabolic costs of walking and running ($p < 0.001$). Running energy expenditure was approximately 20% greater than that of walking, when expressed in kcal/kg/mile. From this data, we conclude that the ACSM equations for energy expenditure are closest in showing the difference in energy expenditure of walking versus running.

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Vocal Cord Dysfunction Masquerading as Asthma

Gregory Tardie, Ph.D., MAJ Alexander S. Niven, M.D., COL Idelle M. Weisman, M.D. Human Performance Laboratory, William Beaumont Army Medical Center, El Paso, TX. HISTORY: A 39-year-old Caucasian active duty military female presented with cyanosis and unexplained dyspnea; with "golf ball" sensation in the throat during vigorous exercise. She also reports prominent inspiratory stridor. Patient is a lifelong non-smoker with a weakly positive methacholine challenge test, unresponsive to maximal asthma therapy. Referred for cardiopulmonary exercise testing to rule out vocal cord dysfunction. MEDICATIONS: Synthroid 0.1mg, Albuterol 90mcg prn, Advair 500/50mcg, Singulair 10mg, Allegra 60mg.
PHYSICAL EXAMINATION: Ht. 63 in., Wt. 139 lbs. Normal vital signs and physical examination with no evidence of lymphadenopathy, focal bony tenderness, neurologic findings, extremity clubbing or edema.
DIAGNOSIS: High clinical suspicion for vocal cord dysfunction based on new clinical history
TESTS: Spirometry: FVC 4.35 (121%), FEV₁ 3.62 (123%), FEV₁/FVC 83, DLCO 24.9 (106%).
Lung Volumes: TLC 5.88 (120%), FRC 3.24 (136%).
15 Watt Incremental Exercise Test: Peak workload of 165 watts. Supra-normal VO₂=37.6 ml/kg/min (136%). Normal Δ VO₂ to Δ work rate relationship (11.7). Normal ECG, heart rate and blood pressure responses. Normal anaerobic threshold = 1.175L (57%). Normal ventilatory reserve (VE/MVV) at peak exercise (115.3/161=71%). Normal Ventilatory Equivalents VE/VCO₂ (34@AT), VE/VO₂; and ventilatory rate (47). No reduction in inspiratory capacity to indicate dynamic hyperinflation. No significant arterial desaturation (~ 3%) SpO₂ (94% Peak) during exercise.
Post-Exercise Laryngoscopy: Mildly positive for paradoxical inspiratory adduction of the vocal cords.
INTERPRETATION: Normal cardiopulmonary exercise test. Paradoxical inspiratory adduction of vocal cords consistent with a diagnosis of VCD.
RECOMMENDATIONS: Optimize medications, Speech therapy consult.

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Heart rate reserve-ventilatory reserve: an accurate alternative for estimating VO₂

Pettitt, RW; JD Symons, FACSM; PA Eisenman, FACSM, JE Taylor; RW Wilson; AT White, FACSM. Human Performance Research Laboratory, University of Utah, Salt Lake City, UT.
Power output equations underestimate oxygen uptake (VO₂) during heavy exercise, i.e., >ventilatory threshold (VT), because of the VO₂ slow component. Use of heart rate (HR) to estimate VO₂ may provide a viable alternative. Numerous investigators have concluded the HR reserve-VO₂ reserve (HRR-VO₂R) provides overestimates of VO₂. We compared the validity of the HRR-VO₂R model for estimating VO₂ with a dual component estimate model generating HR and VO₂ reserves < and >VT (HRR-VTR model). On two separate days, subjects (N = 14; VO₂max range: 30 to 75 mL/kg/min) completed 6-min cycling bouts equaling 70, 85, and 100% power at VT (WVT) and at intensities equaling 0.15 (power at VO₂max; Wpeak - WVT) + WVT (15% above) and 0.30 (Wpeak - WVT) + WVT (30% above). A second bout at 15% above (Bout 2-15% above) following a 3-min interbout recovery was performed. VO₂ values (15-s average) from actual and estimates were summed (6-min LO₂) and compared with Bland-Altman plots. For bouts evoking a VO₂ slow component, the HRR-VO₂R model yielded 6-min LO₂ (\pm 2 SD) overestimates of 2.0 (2.5), 1.9 (2.7), and 1.3 (3.3) for WVT, 15% over, and 30% over, respectively, whereas corresponding 6-min LO₂ difference values for the HRR-VTR model were -0.42 (1.6), -0.23 (1.1), and -0.55 (1.8), respectively. For Bout 2-15% above, the 6-min LO₂ difference for the HRR-VO₂R model was 1.8 (2.9) whereas the difference for the HRR-VTR model was 0.17 (1.4). Pearson product moment correlations of 6-min LO₂ difference values vs. VO₂max ranged .05 to .36, indicating fitness level did not systematically affect VO₂ estimates. Analysis of variance revealed no significant ($P > .95$) sex X estimate model interaction indicating sex did not systematically affect VO₂ estimates. The HRR-VTR model is advocated as accurate alternative for estimating VO₂.

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Non-linear Relationships between Central Cardiovascular Variables and VO₂ during Incremental Cycling Exercise in Endurance-trained Individuals

Vella, C.A. and Robergs, R.A. University of New Mexico, Albuquerque
Examining the relationships between central cardiovascular variables and oxygen uptake (VO₂) during incremental exercise is fundamental to the study of exercise physiology. Maximal aerobic capacity (VO₂ max) is largely determined by the ability of the cardiorespiratory system to deliver oxygen to metabolically active tissues. For some time, cardiac output has been recognized as the main limiting factor to VO₂ max in normal, healthy individuals. However, little is known about the relationship between cardiac output and VO₂ during incremental exercise to VO₂ max. The purpose of this study was to examine the relationships between the central cardiovascular variables (cardiac output and stroke volume) and VO₂ during incremental cycle exercise to VO₂ max. Twenty-one moderately to highly trained males (n = 19) and females (n = 2) participated in the study. A baseline cycle ramp exercise test to fatigue was performed to measure VO₂ max. Following the initial VO₂ max test, cardiac output was indirectly measured using the carbon dioxide rebreathing technique at rest and three times during each of four exercise trials (2 submaximal tests to 90% VO₂ max and 2 maximal tests). Stroke volume and arteriovenous oxygen difference were calculated using standard equations. Significant non-linear relationships were found between all central cardiovascular variables and VO₂ ($p < 0.01$). A plateau in cardiac output at VO₂ max was identified in three subjects. Stroke volume plateaued at an average of 37.0 \pm 12.5% of VO₂ max in 18 subjects, decreased at maximal exercise in one subject, and increased progressively to VO₂ max in three subjects. The arteriovenous oxygen difference progressively increased to VO₂ max in 17 subjects and revealed a plateau response in four subjects. Our data suggest that there is a significant non-linear relationship between the central cardiovascular variables and VO₂ during incremental exercise to VO₂ max.

Free Communications # 2, Student Research Competition, Friday 3:30 PM

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Vasoconstrictor responses of rat soleus feed arteries following short-term exercise training

Achanti, S. and J.L. Jasperse. Department of Sports Medicine, Pepperdine University, Malibu, CA 90263

In some vascular beds (e.g. coronary), evidence indicates that short-term exercise training results in vasomotor adaptations unobserved in long-term training (JAP 94:234-244, 2003). We previously reported that long-term training does not alter vasomotor responses in rat soleus feed arteries (SFA) (JAP 86:441-449, 1999). The purpose of this study was to determine whether short-term training alters vasoconstrictor responses in SFA. Male Sprague-Dawley rats ran on a motorized treadmill four weeks (32 m/min, 10% grade, 60 min/d, 5 d/wk) (ExTr: n=8) or were confined to cages for the same period (SED: n=8). SFA were isolated and cannulated with two glass micropipettes for in vitro videomicroscopic observation, and pressurized at 90 cmH₂O. Responses to phenylephrine (PE), isosmotic potassium chloride (KCl), and changes in intraluminal pressure (myogenic response) were measured. Vasoconstrictor responses to the alpha-1 receptor agonist PE (10-9M – 10-4M) were not different between groups (ANOVA) (Max constriction SED: 61.9±2.9% vs. ExTr: 60.2±4.1%). With respect to KCl, both groups had similar responses to high dose (80 mM) KCl (SED: 50.8±5.1% vs. ExTr: 44.1±4.8% constriction), but significantly different responses to low dose (20 mM) KCl. SFA from SED constricted (24.9±6.0%), but SFA from ExTr dilated (38.7±9.3%) to low dose KCl. SFA from both groups maintained constant diameter in response to pressures ranging from 30 to 130 cmH₂O, and myogenic responses were not different between groups. These data indicate that SFA vasomotor responses to a receptor-dependent constrictor (PE), to direct smooth muscle depolarization via high dose KCl, and to a mechanical stimulus (myogenic) were not altered by short-term exercise training. However, responses to low dose KCl were altered in that SFA from SED constricted while SFA from ExTr dilated. Because potassium is a putative metabolic vasodilator, this mechanism may contribute to the increased soleus blood flow observed in trained animals.

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HIGH FAT FEEDING IMPAIRS THE ACTIVATION OF COMPONENTS OF THE NOVEL INSULIN SIGNALING CASCADE IN RODENT SKELETAL MUSCLE

J.R. BERNARD, H.J. HERR, D.A. RIVAS, A.M. CRAIN, A.D. KRISAN, D.W. REEDER AND B.B. YASPELKIS III FACSM, Department of Kinesiology, California State University, Northridge, CA 91330

It has recently been suggested that in insulin sensitive tissues the activation of the "classical" insulin-stimulated PI 3-kinase dependent pathway alone cannot fully account for insulin-stimulated glucose transport and GLUT4 translocation. Recent investigations using cell lines have identified a PI 3-kinase independent or "novel" insulin signaling pathway that is also activated by insulin and contributes to GLUT4 translocation. However, it is unclear whether the novel insulin cascade is present and responsive to insulin in skeletal muscle, and whether high fat feeding impairs insulin-stimulated activation of the novel insulin signaling cascade in skeletal muscle. Thirty-two male Sprague-Dawley rats were randomly assigned to either control (CON, n=16) or high fat-fed (HF, n=16) dietary groups. Following a 12 week dietary period, animals were subjected to hind limb perfusions in the presence (n=8/group) or absence (n=8/group) of insulin. High fat feeding reduced rates of insulin-stimulated skeletal muscle PI 3-kinase activity and 3-MG transport. In plasma membrane fractions prepared from perfused skeletal muscle it was found that neither the high fat diet nor insulin altered the insulin receptor (IR) beta subunit protein concentration, or the plasma membrane content of the novel insulin signaling cascade components APS, c-Cbl, CAP, or TC10 protein concentration. Additionally, while APS, c-Cbl, CAP and TC10 mRNA was present in the skeletal muscles, no differences in the mRNA existed among experimental groups. However, despite insulin-stimulated IR beta subunit tyrosine phosphorylation being unaffected by high fat feeding, skeletal muscle plasma membrane c-Cbl tyrosine phosphorylation, the kinase activity of IR eta towards APS and GLUT4 protein concentration were significantly reduced in the high fat-fed animals. These findings suggest that in skeletal muscle the novel insulin signaling cascade is present, activated by insulin and that components of the novel insulin signaling cascade are impaired by high fat feeding in rodent skeletal muscle.

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Effects of a Creatine-, Ribose-, and Protein-Containing Drink Combined With Ten Weeks of Resistance Training On Body Composition, Strength, and Anaerobic Performance

T.W. Beck, T.J. Housh, FACSM, G.O. Johnson, FACSM, J.W. Coburn, and M.H. Malek. University of Nebraska-Lincoln. Lincoln, NE. (Sponsor: T.J. Housh, FACSM)

The purpose of this study was to examine the effects of a creatine-, ribose-, and protein-containing drink vs. carbohydrate placebo on body composition, strength, muscular endurance, and anaerobic performance before and after ten weeks of resistance training. Fifty-one males (mean ± SD age = 21.8 ± 2.9 yrs) performed two, 30-sec Wingate Anaerobic Tests for determination of anaerobic power (AP) and anaerobic capacity (AC), underwater weighing for percent body fat (%fat) and fat-free mass (FFM), and tests of one-repetition maximum (1-RM) dynamic constant external resistance (DCER) strength and muscular endurance (END); number of repetitions performed with 80% of 1-RM on the bilateral leg extension (LE) and free-weight bench press (BP) exercises. The testing was conducted before (PRE) and after (POST) ten weeks of resistance training (3 sets of 10 repetitions with 80% of the subject's 1-RM performed three times per week) on the LE and BP exercises. The subjects were randomly assigned to either the test drink (TEST) or the placebo (PLAC). Body weight (BW), FFM, LE 1-RM, LE END, BP 1-RM, and BP END increased (p < 0.05), while %fat decreased (p < 0.05) from PRE to POST. The training-induced changes in BW, FFM, LE 1-RM, LE END, BP 1-RM, and BP END were the same for both the TEST and PLAC groups. AP and AC increased for the TEST group, but not for the PLAC group. The same results were obtained when training-induced changes in LE 1-RM, LE END, BP 1-RM, BP END, AP, and AC were covaried for BW. These findings suggested that the creatine-, ribose-, and protein-containing drink did not provide additional benefits to carbohydrates alone for eliciting changes in body composition, strength, and muscular endurance following a 10-week resistance training period. The drink did, however, enhance anaerobic performance, while the carbohydrate placebo did not.

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A Comparison of Lower Leg Running Kinematics between Normal Gravity and Weightlessness

(1,4) W. Brent Edwards, (2) John DeWitt, (3) Grant Schaffner, (1) Alan Hreljac, (5) R. Donald Hagan

(1) CSU, Sacramento, (2) Bergila Engineering, (3) Wyle Life Sciences, (4) LZ Technology, (5) NASA JSC

Crewmembers aboard the International Space Station use treadmill locomotion as a countermeasure to musculoskeletal deconditioning. Differences in locomotion kinematics between normal gravity (1-G) and weightlessness (0-G) may contribute to the bone loss (Vico, 2000) and muscle atrophy (LeBlanc, 2000) associated with space flight. PURPOSE: To compare stride frequency and lower leg kinematics between running in 1-G and 0-G. METHODS: Four subjects (28.0 ± 5.6yrs, 170.2 ± 8.6cm, 74.5 ± 14.0kg) ran on a motorized treadmill at 3.13m/s during 0-G aboard the KC-135 aircraft and in 1-G. During 0-G, subjects wore a waist and shoulder harness attached to an external load (EL) that tethered the subject to the treadmill. Prior to running, the EL was adjusted to apply 100% bodyweight (BW) while standing still. Load cells were used to measure EL during running; stride frequency and peak instantaneous knee/ankle flexion and extension angular displacements/velocities were calculated using a 3D motion capture system. Data were collected from at least four strides during two trials at each condition. Repeated measure ANOVAs were used to determine significant differences between trials and gravitational conditions, and Tukey post-hoc tests were used to delineate interactions (p<.05). RESULTS: EL during 0-G varied throughout each stride (91.3 ± 9.3% BW) with the greatest deviations occurring at midstance and midflight. There were no differences in stride frequency, ankle angular kinematics, or knee angular displacements. However, knee flexion and extension angular velocities were greater during 1-G (diff = 71.2 ± 33.1°/s and 136.0 ± 28.3°/s, respectively). CONCLUSION: These data suggest that knee kinematics while running in 0-G are different than 1-G when external loads are near 100% BW. The reductions in knee angular velocities during 0-G may be a result of decreased knee musculature activity, which could contribute to the observed musculoskeletal deconditioning.

Free Communications # 2, Student Research Competition, Friday 3:30 PM

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PI3K but not PKB/Akt inhibition prevents the insulin-induced effects on LCFA uptake and oxidation

Karen R. Kelly¹, Melanie T. Cheng¹, Chin K. Sung² and Lorraine P. Turcotte¹

¹ Department of Kinesiology, University of Southern California, Los Angeles ² Department of Physiology & Biophysics, University of Southern California, Los Angeles. Insulin (I) is important in the regulation of muscle metabolism. However, its role in the regulation of muscle long chain fatty acid (LCFA) metabolism, independent of glucose, is not clear. To determine whether insulin regulates LCFA uptake and oxidation independently of glucose and if so, whether insulin acts via the PI3K-PKB/Akt signaling pathway, L6 myotubes were incubated, without glucose, in the presence or absence of I (100 nM, or 0.1, 1, 10, 100, 1000 nM for insulin curve), and either the PI3K inhibitor wortmannin (50 nM) or the PKB/Akt inhibitor (10 μM) for 30 min and LCFA uptake was measured via incubation with [1-¹⁴C]palmitate. Basal LCFA uptake was found to increase linearly with time, from 1 to 60 min of incubation. LCFA uptake increased in the presence of insulin and was maximal at 1 nM. Insulin (100 nM) significantly (P<0.05) increased LCFA uptake (C:671.8±32.4 vs. I:743.2±17.0 nmol/g x min) and triacylglyceride (TG) synthesis (C:64.6±10.5 vs. I:98.1±9.0 nmol/g x min⁻¹) and significantly (P<0.05) decreased LCFA oxidation (C:75.6±3.5 vs. I:38.7±9.5 nmol/g x min). Wortmannin prevented the insulin-induced increase in LCFA uptake and decrease in LCFA oxidation but neither variable was affected by PKB/Akt inhibition. Insulin-induced TG synthesis was unaffected by either PI3K or PKB/Akt inhibition. These results provide evidence for a direct effect of insulin on LCFA metabolism in muscle cells and suggest that the insulin effects on LCFA uptake and oxidation occur via the PI3K pathway but not via the downstream signaling molecule PKB/Akt.

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Bone mineral accrual and physical activity in Asian and Hispanic middle school girls

L. Tindle. Dept. of Exercise Science, University of California, Davis
PURPOSE: The purpose of this study was to examine the relationship between physical activity and bone accrual in middle school aged Asian and Hispanic girls. METHODS: 145 girls (mean age 11.7±0.42 years, 72 Asian and 73 Hispanic) participated in the study. Dual energy x-ray absorptiometry (DXA) was used to measure body composition, and total body, total femur, femoral neck, and lumbar spine (L1-L4) bone mineral density (BMD) and bone mineral content (BMC). Height and weight were also measured. Physical activity (PA) was assessed by questionnaire. Each measurement was performed at baseline and one year later. RESULTS: Hispanic girls were significantly (p<0.05) taller and heavier than Asian girls and had significantly greater percent body fat, BMC at all sites and BMD at all sites, except the lumbar spine, than Asian girls. Height, weight, BMC and BMD at all sites significantly (p<0.05) increased from baseline to one-year in both ethnicities. There was no significant difference in the percent change of any bone measurement between the two ethnicities. There was no significant change in PA from baseline to one-year. No significant differences were found in the total minutes/year of PA between ethnicities. Low but significant correlations were found between PA and total body, total femur, and femoral neck BMC and BMD, and lumbar spine BMD at one-year (r = 0.144 - 0.267, p<0.05). No significant correlations were found between PA and percent change in BMC or BMD at any site. CONCLUSIONS: These data suggest that PA of Asian and Hispanic girls does not decline during middle school. Also, Hispanic girls are larger and have greater bone mass and density than Asian girls, but BMC and BMD bone accrual are not different. Finally, PA was associated with BMC and BMD, but not the rate of accrual.

Support was provided by USDA-IFAFS Grant# 00-52102-9696

Poster Session # 3, Saturday, 9:00 AM

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Walking Among White, Black, and Hispanic Men and Women in the US: Results From a National Survey, 2002-2003

JP Reis¹, CA Macera¹ FACSM, BE Ainsworth¹ FACSM, DA Jones²; ¹San Diego State University and the ²Centers for Disease Control and Prevention

Due in part to its unnecessary need for expensive equipment, walking is the most widely promoted form of PA, especially among those demographic segments of the population who are typically sedentary (e.g., racial/ethnic minorities). Despite the popularity of walking, national health surveillance systems lack specific survey items that measure walking and therefore national estimates are lacking. Purpose: To provide national estimates of walking among non-Hispanic White, non-Hispanic Black, and Hispanic men and women in the US. Methods: Participants were respondents to the National PA and Weight Loss Survey, a national telephone health survey conducted from 2002-2003. Of a total of 11,211 completed interviews, 10,484 respondents (4370 men, 6114 women) provided complete information regarding their usual frequency and duration (in bouts of > 10 min) of walking within domains of exercise, transportation, or occupation and their racial/ethnic heritage. Respondents were classified according to whether they reported walking 5+ days per week for at least 30 minutes per day (regular walker) or no walking activity (non-walker). Results: Overall, the prevalence of regular walking was 48.3%, 46.8%, and 52.4% among White, Black, and Hispanic men and 44.2%, 39.4%, and 44.7% among women. Non-walking was 16.5%, 17.5%, 13.3% among men and 15.0%, 16.2%, 15.5% among women. Among both men and women regular walking decreased and non-walking increased with advancing age. Walking trends differed by educational attainment and income level. Conclusion: Walking with a frequency and duration sufficient to meet public health recommendations for moderate PA varied from 39% among Black women to 52% among Hispanic men. These data further confirm the popularity of walking with approximately 15% of men and women not walking for at least ten minutes per week. The addition of questions to national surveys that assess the frequency and duration of walking may be justified in order to further document patterns of PA in the US. Supported by CDC Cooperative Agreement, SIP 20-01, U48/CCU409664.

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The effect of internal versus external focus of attention on EMG activity during basketball free throws

Zachry, T.L.1, Wulf, G.1, Mercer, J.A.1, Bezodis, N.2, DeLion, D.1

¹Department of Kinesiology, University of Nevada, Las Vegas, Las Vegas, NV
²Department of Sport and Exercise Science, University of Bath, Bath, UK
It has been demonstrated that focusing on the effect of a movement (external focus of attention) is more beneficial to performance and learning than focusing on the movement itself (internal focus--for a review, see Wulf and Prinz, *Psychonomic Bulletin and Review*, 8, 2001). It has also been shown that muscle EMG activity was significantly less (i.e., more economical) under external focus conditions during bicep curls (Vance, Wulf, Töllner, McNevin, & Mercer, in press). However, there is currently no data on EMG activity in a complex, goal-oriented motor skill. PURPOSE Determine the effects of focus of attention on the muscle electromyographic (EMG) activity patterns of the biceps- and triceps brachii, deltoid, and wrist flexors during basketball free-throw shooting. METHODS All participants performed 2 sets of 10 free throws under both internal (focus on wrist motion) and external focus conditions (focus on hoop). Electrodes were placed above the biceps brachii, triceps brachii (long head), flexor carpi radialis, and medial deltoid of the shooting arm. Dependent variables were root-mean-square rectified EMG for each muscle. RESULTS There was reduced EMG activity under the external focus compared to the internal focus condition for flexor carpi radialis, biceps brachii, and triceps brachii, but not for deltoid. CONCLUSIONS The findings provide support for the view that an external focus of attention results in a more automatic type of control and greater movement economy than an internal focus.

Poster Session # 3, Saturday 9:00 AM, continued

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PEDOMETER RELIABILITY UNDER CONTROLLED AND FREE-LIVING CONDITIONS

Hipke, J.L. and C. Tudor-Locke FACSM. Department of Exercise and Wellness, Arizona State University East, Mesa, Arizona

Purpose: The purposes of these studies were to further evaluate the Yamax pedometer under both controlled and free-living conditions.

Methods: Two studies were conducted to evaluate: 1) test-retest reliability and intra-model reliability of 40 Yamax SW-200 pedometers during two bouts of treadmill walking at 80 m•min⁻¹ (Study 1), and 2) intra-model reliability during a free-living condition (Study 2). Observed steps taken served as the criterion standard in Study 1, and the ActiGraph accelerometer (formerly the CSA) served in Study 2. Results: No statistically significant differences in absolute percent error were noted between BMI categories (split on 30 kgxm⁻²) in either study. Multiple analyses indicated excellent test-retest reliability (Wilcoxon Signed Ranks test $Z = -1.505$, $p = 0.132$; Spearman's rho correlation $r = 0.826$, $p = 0.000$; Chronbach's $\alpha = 0.935$) and good intra-model reliability (bout 1 $\alpha = 0.759$, bout 2 $\alpha = 0.785$) in Study 1. Excellent intra-model reliability was achieved in Study 2 ($\alpha = 0.938$). Conclusion: Researchers and practitioners can use these data to confidently plan for objective assessment using this practical measurement approach.

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EXPLANATION OF VARIANCE IN VO₂max FOR TRAINED AND UNTRAINED MALE SUBJECTS

Zhou, B., M.P. Ernst, and Y.T. Wang FACSM. Department of Kinesiology and Recreation, California State University; Department of Physical Therapy, Georgia State University

To identify the variables that best explained the variance in VO₂max for untrained and trained males, ten college students (untrained = UT) and ten collegiate distance runners (trained = TR) were recruited and volunteered to participate in this study. VO₂max, Qmax, and HRmax were measured during a graded exercise test. No differences existed in HRmax and a-vO₂ diffmax between the two groups. TR had the greater values for VO₂max (72.1 vs. 48.9 ml/kg/min, $p < 0.01$), Qmax (26.3 vs. 21.3 L/min, $p < 0.01$), and SVmax (145.0 vs. 127.9 ml/beat, $p < 0.01$). VO₂max was not correlated to Qmax, SVmax, a-vO₂ diffmax, HRmax, and body mass for UT, but positively correlated to Qmax, a-vO₂ diffmax, negatively correlated to HRmax and body mass for TR. Further analysis yielded a model for TR; VO₂max = 1.245 a-vO₂ diffmax + 0.769 Qmax - 0.603 Wt. - 0.0004 (R = 0.99, R² = 0.98, SEE = 0.12, $p < 0.01$). To compare trained with untrained, the larger VO₂max in the TR was due to larger values in Qmax and SVmax. Using the correlation and regression approaches, both the a-vO₂ diffmax and Qmax were critical for VO₂max in TR. According to the model, VO₂max was best predicted by a-vO₂ diffmax, Qmax, and body mass in the TR. Of the three, the a-vO₂ diffmax had greatest contribution to VO₂max in TR. In addition, the regression model with both trained and untrained subjects demonstrated that VO₂max = - 0.603 Wt. + 0.457 a-vO₂ diffmax (R = 0.77, R² = 0.60, SEE = 0.65, $p < 0.01$), which confirmed that the peripheral factors played a dominant role for the variance of VO₂max in male subjects.

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EFFECT OF SIGNS ENCOURAGING STAIR CLIMBING ON BEHAVIOR OF STUDENTS IN A UNIVERSITY RESIDENCE HALL

B. Schmitz, L. Marrs, and P. Entin, Department of Exercise Science, Northern Arizona University, Flagstaff, AZ

Prior work has demonstrated that signs encouraging stair climbing can induce more individuals to use the stairs in locations such as public malls. We hypothesized that signs can increase the frequency of stair climbing among university dorm residents. We compared the number of individuals per hour using the stairs versus the elevator in two residence halls of Northern Arizona University. Observations were made on Monday, Wednesday, and Friday for two one hour periods each day. Following a 2 week baseline period, four different signs were used: In one dorm, a black and white sign reading "Floors four and below, please be courteous and use the stairs," was used for 2 weeks, then following a 8 week washout period, the sign color was changed to neon green for 2 weeks. Similarly, in the second dorm, a black and white sign reading "Have you thought about taking the stairs today?" was used, followed by a black and white sign reading "Please be courteous and use the stairs." During the baseline period, ~12% of males and ~24% of females took the stairs. No significant positive changes in stair climbing frequency occurred in any of the intervention conditions. Researchers observed hostile verbal responses to the signs, and signs were often vandalized. Conclusion: In contrast to our hypothesis, signs encouraging stair climbing had no positive impact on stair climbing in a University dormitory. Further research must be conducted to determine an effective means of behavior modification for this population.

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Evaluation of McDonald's™ Go Active™ pedometers

White, SB; Hipke, JL; Tudor-Locke, C. Department of Exercise and Wellness, Arizona State University, Mesa, AZ

Purpose: The purpose of this study was to evaluate the measurement attributes (i.e., validity and reliability) of McDonald's™ Go Active™ pedometers (GA). Methods: Twenty GA pedometers were tested on six participants ($n=3 < 30$ BMI, $n=3 > 30$ BMI). In Study 1, participants walked 20 steps at normal pace and GA pedometer-detected steps were recorded. In Study 2, four GA pedometers and one Yamax SW-200 pedometer were worn concurrently during two repeated 5-min bouts of treadmill walking at 80 m•min⁻¹. The criterion standard was observed steps taken. In Study 3, the same instruments were worn in addition to the criterion MTI ActiGraph accelerometer (formerly known as the CSA) to evaluate performance during 24-hr of free-living. In the latter two studies validity was evaluated as absolute percent error (APE), calculated as the absolute (i.e., directionless) value of $([GA \text{ steps} - \text{criterion steps}] / \text{criterion steps} * 100)$. Test retest and intramodel reliability were also evaluated. Since data were skewed, analysis was nonparametric. Results: There were no statistically significant differences in error between BMI groups in any of the studies. Forty-five percent of GA pedometers failed the 20-step test ($> 5\%$ error). In Study 2, the median GA APE was 10.9% ($\alpha = .973$) compared to 0.5% for the Yamax ($\alpha = .954$); Wilcoxon test of significance ($p = .000$). Intramodel reliability of GA pedometers in Study 2 was $\alpha = .972$. GA median APE in Study 3 was 37.4% compared to the Yamax 24.0%; Wilcoxon test of significance ($p = .000$). Intramodel reliability was $\alpha = .815$. Conclusion: Test retest and intramodel reliability for the GA is high but validity is significantly less than expected of research-quality pedometers under controlled and free-living conditions.

Poster Session # 3, Saturday 9:00 AM, continued

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THE EFFECTS OF STABILITY BALL TRAINING ON SPINAL STABILITY IN THOSE WHO WORK IN SEDENTARY OCCUPATIONS

Carter, J., Beam, W., McMahan, S., and Barr, M. Department of Kinesiology and Health Promotion, California State University Fullerton, Fullerton.

INTRODUCTION: Many people who work in sedentary occupations are at risk for developing back pain that can be brought on by poor posture which can contribute to spinal instability. Stability ball training is a popular form of exercise that is believed to help improve spinal stability and could prove to be a valuable form of exercise for the prevention of back pain in this population. However, there is little research that examines the efficacy of this method of training. **PURPOSE:** To test the effect of stability ball training in increasing spinal stability as measured by the static back endurance and side bridge tests in this population. A second purpose was to examine the effect of stabilization techniques believed to enhance spinal stability. **METHODS:** Twenty participants were randomly assigned to an experimental group (n = 10) or a control group (n = 10). There were a total of eight women and twelve men who volunteered to participate. The mean age was 38. The experimental group performed stability ball exercises for 30 min. twice per week for 10 weeks. The participants performed exercises aimed at keeping the spine in a neutral position and included gradual progressions in intensity for the bridge, dying bug, plank, and quadruped exercises. Stabilization techniques were introduced to the experimental group during the first week of exercise training. ANOVA was used to test for differences in spinal stability between the groups at weeks one, three and thirteen. **RESULTS:** The experimental group improved significantly ($p < .05$) on the static back endurance test from week 1 (149.3 ± 72.3 s) to week 13 (194.6 ± 56.7 s), while the control group decreased on the same variable. The experimental group (71.3 ± 59.7 s) exceeded the control group (51.6 ± 35.9 s) at week 13 on the side bridge test as well, however the difference was not statistically significant. No significant improvements were found as a result of learning the stabilization techniques. **CONCLUSION:** Stability ball training appears to provide some improvement in spinal stability in this population.

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EFFECT OF HISTORY OF MIGRAINE OR HEADACHE TREATMENT ON COGNITIVE FUNCTION AND SYMPTOM REPORTING FOLLOWING SPORTS CONCUSSION

Allison Lowe^{1,2}, Priscilla MacRae, Ph.D.¹, Jamie Stump, Ph.D.², Mark Lovell, Ph.D.², Michael Collins, Ph.D.² [1 Pepperdine University, Malibu, CA; 2 University of Pittsburgh Medical Center, Pittsburgh, PA]

Managing sports-related concussion is a growing issue in the sports medicine community given that approximately 50,000 to 300,000 athletes sustain concussions yearly. Currently, the decision to return an athlete to play after concussion is based largely on symptom status and cognitive performance. Ideally, athletes should not be permitted to return to sport until they have demonstrated cognitive functioning corresponding with pre-injury levels, and they are symptom free at rest and following exertion. **OBJECTIVE:** The objective of this study was to compare post-injury cognitive functioning and symptom status of concussed athletes endorsing history of treatment for headaches (HT) or migraines (MT) to athletes who did not endorse history of treatment (non-HT/MT). **METHOD:** Study extracted available data from neurocognitive testing of 300 concussed athletes (51 HT, 31 MT) for analysis. All athletes participated in pre-season baseline testing, and post-concussion data was collected within 7 days following injury. ImPACT, a computer-based neuropsychological test battery measuring cognitive functioning and symptom status, was administered to athletes. ImPACT yields composite scores measuring verbal memory, visual memory, processing speed, and reaction time. **RESULTS:** ANCOVA revealed significant differences in post-injury symptom status and cognitive performance between HT/MT and non-HT/MT participants when accounting for baseline cognitive scores and symptom status. The HT ($F=3.649$, $p=.029$) and MT ($F=3.811$, $p=.025$) populations demonstrated significantly poorer post-injury outcomes compared to the non-HT/MT group. Additionally, both HT and MT groups showed significant decreases ($ps < .005$) in all composite scores measuring cognitive functioning when compared to the non-HT/MT group. **DISCUSSION:** Results indicate athletes with history of headache or migraine treatment who sustain sports-related concussion exhibit significantly decreased cognitive functioning and increased symptom reporting compared to concussed individuals not endorsing treatment for such problems.

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