SOUTHWEST CHAPTER

AMERICAN COLLEGE OF SPORTS MEDICINE

2006 ANNUAL MEETING

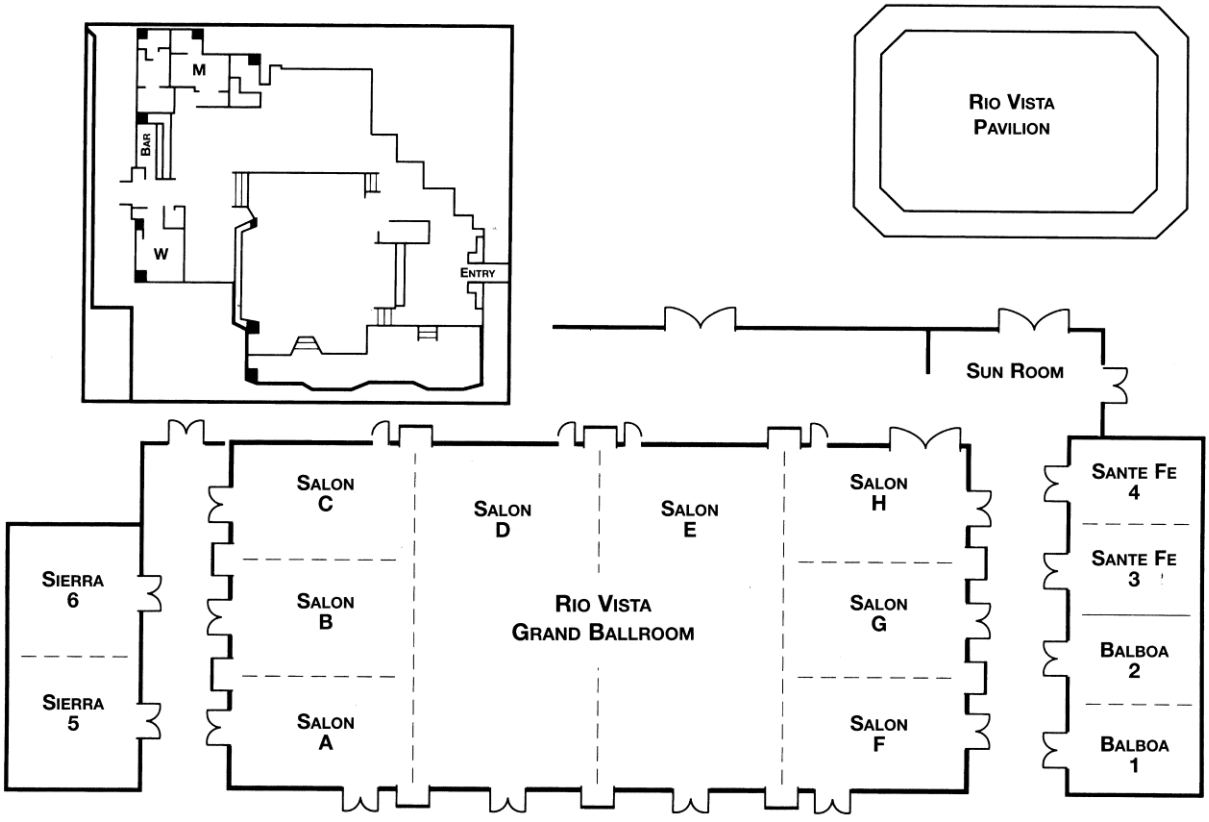
November 10-11, 2006

Marriott Mission Valley
San Diego, California

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

Marriott Mission Valley

Meeting and Banquet Facilities



Welcome to the

26th Annual Meeting

of the

Southwest Regional Chapter

of the

AMERICAN COLLEGE of SPORTS MEDICINE SM

November 10-11, 2006

Marriott Mission Valley
San Diego, California

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

Exhibitors and Sponsors – Thank you!!!

Parvo Medics, Inc.
(www.parvo.com)

Vacumed
(www.vacumed.com)

Futrex, Inc.
(www.futrex.com)

Deep Muscle Stimulation, Inc.

Life Fitness Academy

COSMED USA, Inc.

The American College of Sports Medicine
(www.acsm.org)

FRIDAY, 10 NOVEMBER 2006

Registration **Rio Vista Grand Ballroom Foyer** **7:30 am – 4:00 pm**

Concurrent Colloquia **8:00 am – 9:20 am**

1. ***Sports Injuries and Emergencies: Preparedness, Diagnosis, and Treatment*** **Salon A**
   Sandra Hoffman, M.D., FACSM, Idaho State University

2. ***Recommendation for Processing Breath-by-Breath Data from Indirect Caliorimetry*** **Salon B**
   Robert Robergs, Ph.D., University of New Mexico

3. ***Exercise and Diabetes: What are the Scientific Outcomes and Recommendations*** **Sierra 5**
   Larry Verity, Ph.D., FACSM, San Diego State University

4. ***Cytoskeletal Protein and Gene Responses to Muscle Contraction*** **Sierra 6**
   Allen Parcells, Ph.D., Brigham Young University

5. ***Strength and Conditioning: A Professional's Perspective*** **Salon C**
   Jim Malone, Head Strength and Conditioning Coach, San Diego Padres

General Session **10:00 am – 11:30 am** **Salon D/E**

Moderator: Pam Swan, Ph.D., President, SWACSM
Arizona State University Polytechnic

SWACSM Recognition Award

Preview of Meeting: Pam Swan, Ph.D.

D.B. Dill Lecture

Lipids, Lipoproteins, and Exercise
J. Larry Durstine, Ph.D., FACSM
President, ACSM
University of South Carolina

LUNCH **11:30 AM - 1:00 PM**

FRIDAY, 10 NOVEMBER 2006, continued

Symposium **1:15 pm – 2:45 pm** **Salon E**

Cycling Performance: How Did Lance Do It?

Moderator: Felicia Greer, Ph.D., California State University - Fresno

1:15 – 1:45 ***Biomechanical Aspects of Cycling Performance***
Jim Martin, Ph. D., University of Utah

1:45 – 2:15 ***Physiological Optimization of Cycling Performance***
J. Richard Coast, Ph.D., FACSM, Northern Arizona University

2:15 – 2:45 ***Nutritional Concerns for Optimal Cycling Performance***
Felicia Greer, Ph.D., California State University - Fresno

Symposium **1:15 pm – 2:45 pm** **Salon A/B**

Evidence-based Exercise Guidelines

Moderator: Scott Roberts, Ph.D., California State University - Chico

1:15 – 1:35 ***Evidence-based Exercise Guidelines***
Scott Roberts, Ph.D., California State University - Chico

1:35 – 1:55 ***Historical Perspective of ACSM Guidelines on Exercise Testing and Prescription***
Larry Durstine, Ph.D., FACSM, University of South Carolina

1:55 – 2:15 ***The Evidence-based Medical Model***
Paul Shekelle, Ph.D., RAND Corporation

2:15 – 2:35 ***Medicine is Being Driven by Evidence-based Guidelines and Outcomes***
Suraj Achar, M.D., University of California – San Diego

Colloquium **1:30 pm – 2:45 pm** **Sierra 5/6**

Functional Strength Training: Beyond the Hype

Sean Flanagan, Ph.D., ATC, CSCS, California State University - Northridge

FRIDAY, 10 NOVEMBER 2006, continued

Colloquium **1:30 pm – 2:45 pm** **Salon D**

Nutrient Timing and Selection: Important Considerations for Exercise Recovery and Training Adaptation

John L. Ivy, Ph.D., FACSM, University of Texas

Free Communications
Student Research Award **3:00 pm – 4:30 pm** **Salon A/B**

Moderator: Steven Hawkins, Ph.D., FACSM, California State University – Los Angeles

3:00 **Effect of Pedaling Technique on Muscle Activity and Cycling Efficiency.** Cannon, D.T., F.W. Kolkhorst, FACSM, D.J. Cipriani, and Fred W. Kasch. Exercise Physiology Laboratory, Department of Exercise and Nutritional Sciences, San Diego State University, San Diego CA

3:15 **Acute Myogenic Responses to Resistance Exercise Are Influenced by Exercise.** Micah J. Drummond[*], Robert K. Conlee[*], Gary W. Mack[*], Sterling Sudweeks[**], G. Bruce Schaalje[***], and Allen C. Parcell[*]. [*]Department of Exercise Sciences, Human Performance Research Center, [**]Department of Physiology and Developmental Biology and [***]Department of Statistics, Brigham Young University, Provo, Utah

3:30 **Influence of Different Recovery Modalities on Post-exercise Cardiovascular Dynamics.** Areum Kim, C. Matthew Lee. Department of Kinesiology, San Francisco State University, San Francisco, CA

3:45 **The Role of Muscle Damage in Muscle Remodeling: No Pain, No Gain?** Flann, KL., Lindstedt, SL., LaStayo, PC. Biology Department, Northern Arizona University

4:00 **Systemic Hypertension Exists in Mice with Diet-induced Obesity and Vascular Insulin Resistance, but Mice with Vascular Insulin Resistance *per se* are Normotensive.** McMillin, S. and Symons, J.D. FACSM. University of Utah, College of Health and School of Medicine

4:15 **Supine Treadmill Exercise in Lower Body Negative Pressure Combined with Resistive Exercise Counteracts Bone Loss, Reduced Aerobic Upright Exercise Capacity and Reduced Muscle Strength Associated with 60 days Bed Rest in Women.** [1,2]Meuche S; [3]Schneider SM; [4]Lee SMC; [1]Macias BR; [5]Smith SM; [6]Watenpaugh DE; [1]Hargens AR (FACSM). [1]University of California, San Diego-Department of Orthopaedic Surgery; [2]Charité-Universitaetsmedizin Berlin - Center for Space Medicine Berlin (ZWMB), Germany; [3]University of New Mexico, Albuquerque, NM; [4]Wyle Life Sciences, Houston, TX; [5]NASA Johnson Space Center, Houston, TX; [6]Sleep Consultant, Inc, Fort Worth, TX

FRIDAY, 10 NOVEMBER 2006, continued

Symposium **3:00 pm – 4:30 pm** **Salon D**

Intracellular Calcium Handling and Muscle Fatigue: Insights from Isolated Single Skeletal Muscle Fibers

Moderator: Mike Hogan, Ph.D., FACSM, University of California – San Diego

3:00 – 3:30 ***Basic Mechanisms of Muscle Fatigue***
Mike Hogan, Ph. D., FACSM, University of California – San Diego

3:30 – 4:00 ***Influence of Oxygenation***
Mike Hogan, Ph.D., University of California – San Diego

4:00 – 4:30 ***Influence of Metabolic Factors***
Brandon Walsh, Ph.D., University of California – San Diego

Symposium **3:00 pm – 4:30 pm** **Sierra 5/6**

Therapeutic Exercise

Moderator: Michael LaCourse, Ph.D., California State University – Long Beach

3:00 – 3:30 ***Effects of Exercise on Peripheral Vascular Complications***
Steve Figoni, Ph.D., West Los Angeles VA Medical Center

3:30 – 4:00 ***Mental Practice and Brain Plasticity in Spinal Cord Injury***
Michael LaCourse, Ph.D., California State University – Long Beach

4:00 – 4:30 ***Physical Capacity Testing, Occupational Rehabilitation, and Work Reconditioning***
Dan Jones, Ph.D., California State University – Long Beach

Colloquium **3:00 pm – 4:30 pm** **Salon E**

Making Sense of Physical Activity Recommendations for Health and Fitness

Barbara Ainsworth, Ph.D., FACSM, Arizona State University Polytechnic

Meet the Professors **4:45 pm – 5:30 pm** **Sun Room**

Poster Presentations **4:45 -7:00 PM** **Rio Vista Pavilion**

SOCIAL EVENT

No Host Wine/ Cheese Reception
Silent Auction

SATURDAY, 11 NOVEMBER 2006

Registration **Rio Vista Grand Ballroom Foyer** **7:30 am - 11:00 am**

Panel Discussion **8:00 am – 9:30 am** **Balboa 1/2**

Future Trends in Employment Opportunities in Exercise and Complementary Health Services for Current (and Future) Exercise Physiologists

Moderator: Erik Durak, M.Sc., President, Medical Health and Fitness – The Cancer Wellness Company, and University of California – Santa Barbara

Beth Shaw, President and CEO, Yoga Fit, Inc., Santa Monica, CA

Kelly Lynch, M.S., ACSM-HFI, President, Pro-Vention Plus Injury Prevention and Wellness Corporation, San Francisco, CA

Symposium **8:00 am – 9:30 am** **Sierra 5/6**

Does Chronic Exercise Alter Aging

Moderator: Steven Hawkins, Ph.D., FACSM, California State University, Los Angeles

8:00 – 8:30 ***Historical Perspective on Chronic Exercise and Aging***
Bob Wiswell, Ph.D., University of Southern California

8:30 – 9:00 ***Physical Performance in Older Chronic Exercisers***
Steven Hawkins, Ph.D., FACSM, California State University – Los Angeles

9:00 – 9:30 ***Health in Older Chronic Exercisers***
E. Todd Schroeder, Ph.D., University of Southern California

Symposium **8:00 am – 9:30 am** **Santa Fe 3/4**

Citius, Altius, Fortius: Biomechanics of Running, Jumping, and Throwing

Moderator: Michele LeBlanc, Ph.D., California Lutheran University

8:00 – 8:30 ***Citius: The Biomechanics of Running Faster***
John Mercer, Ph.D., FACSM, University of Nevada, Las Vegas

8:30 – 9:00 ***Altius: The Biomechanics of Jumping for Maximum Height***
Michael Feltner, Ph.D., FACSM, Pepperdine University

9:00 – 9:30 ***Fortius: The Biomechanics of High Velocity Throws***
Michele LeBlanc, Ph.D., California Lutheran University

Symposium **8:00 am – 9:30 am** **Salon F/G**

Current Issues in Sports Nutrition

Moderator: Laura Kruskall, Ph.D., R.D., FACSM, University of Nevada, Las Vegas

8:00 – 8:30 ***All That Glitters is Not Gold: Supplement Facts and Fallacy***
Laura Kruskall, Ph.D., R.D., FACSM, University of Nevada, Las Vegas

8:30 – 9:00 ***High Carb or High Protein: Effects on Body Composition***
Marta Van Loan, Ph.D., FACSM, USDA Western Human Nutrition Research Center, Davis, CA

9:00 – 9:30 ***Optimal Nutrition to Prevent Overtraining Syndrome***
Kristine Clark, Ph.D., R.D., FACSM, Pennsylvania State University

Symposium **9:45 am – 11:15 am** **Sierra 5/6**

Promoting Physical Activity in Youth: Evidenced-based Approaches

Moderator: James Sallis, Ph.D., FACSM, San Diego State University

9:45 – 10:15 ***Multiple School-based Approaches for Promoting Youth Physical Activity***
Thomas McKenzie, Ph.D., San Diego State University

10:15 – 10:45 ***Promoting Physical Activity Among Latino Youth***
Karen Coleman, Ph.D., San Diego State University

10:45 – 11:15 ***Built Environment Changes to Promote Youth Physical Activity***
James Sallis, Ph.D., FACSM, San Diego State University

Colloquium **9:45 am – 11:00 am** **Salon F/G**

Gatorade Sports Science Institute Special Session

Controversies About Fluid Replacement During Exercise

Robert Murray, Ph.D., FACSM, Gatorade Sports Science Institute

Colloquium **9:45 am – 11:00 am** **Balboa 1/2**

Born to Run: Experimental Evolution of Voluntary Activity Levels in Mice

Theodore Garland, Ph.D., University of California - Riverside

SATURDAY, 11 NOVEMBER 2006, continued

Symposium **9:45 am – 11:15 am** **Santa Fe 3/4**

Strength Training

Moderator: Lee E. Brown, Ed.D., CSCS*D, FACSM, California State University - Fullerton

9:45 – 10:15 *Neuromuscular Adaptations to High Speed Exercise*
Lee E. Brown, Ed.D., CSCS*D, FACSM, California State University - Fullerton

10:15 – 10:45 *Non-Invasive Measures of Muscle Performance*
Jared Coburn, Ph.D., CSCS, California State University – Fullerton

10:45 – 11:15 *Muscle Remodeling in the Rehabilitation Paradigm*
Steve Zinder, Ph.D., ATC, California State University – Fullerton

General Session and Luncheon **11:30 – 1:30** **Salon A/B/C/D/E**

Moderator: Pam Swan, Ph.D., President, SWACSM
Arizona State University - Polytechnic

Student Awards
Recognition of Host School: San Diego State University
Business Meeting

Founders Lecture

Physical Activity, Health, and Obesity: The Scientific Basis for the Current Guidelines
William Haskell, Ph.D., FACSM
Stanford Prevention Research Center
Stanford University, School of Medicine

SOUTHWEST ACSM RECOGNITION AWARD

1982	D.B. Dill
1983	Albert Behnke
1984	Steve Horvath
1985	Fred Kasch
1986	John Boyer
1987	Herbert de Vries
1988	Charles Tipton
1989	G. Lawrence Rarick
1990	Lawrence Morehouse
1991	William Haskell
1992	Ralph Paffenbarger
1993	Franklin Henry
1994	George Brooks
1995	James Skinner
1996	Christine Wells
1997	Lawrence Golding
1998	Ken Baldwin
1999	Robert Conlee
2000	Gail Butterfield
2001	R. James Barnard
2002	Gene Adams
2003	Vivian Heyward
2004	Fred Roby
2005	Marta Van Loan
2006	Jack Wilmore

Southwest Regional Chapter of the
AMERICAN COLLEGE of SPORTS MEDICINE
2006 Administrative Council Members

Past President	John L. Azevedo, Jr., Ph.D.
President	Pamela Swan, Ph.D., FACSM
President-Elect	Ben B. Yaspelkis, III, Ph.D., FACSM
Executive Director	John C. Young, Ph.D., FACSM
Member-at-Large (Abstracts)	Steven A. Hawkins, Ph.D., FACSM
Member-at-Large (Public Relations)	Len Kravitz, Ph.D.
Member-at-Large (Meeting Administration)	Pat Vehrs, Ph.D., FACSM
Regional Chapter Representative	Marialice Kern, Ph.D., FACSM
Student Representative	Haim Mamane
Finance Chair	David Arnall, Ph.D., FACSM
Newsletter Editor	J. Richard Coast, Ph.D., FACSM.
Founders	Gene Adams, Ph.D., FACSM Robert Conlee, Ph.D., FACSM Robert Bielen, M.D. Janet Lunn, M.A. James McIlwain, M.S. Marge Murphy, Ph.D. Gary Adams, Ph.D. (deceased)

2006 SWACSM

Annual Meeting

ABSTRACTS

Free Communications & Posters

FREE COMMUNICATIONS – STUDENT RESEARCH AWARD

1

EFFECT OF PEDALING TECHNIQUE ON MUSCLE ACTIVITY AND CYCLING EFFICIENCY

Cannon, D.T., F.W. Kolkhorst, FACSM, D.J. Cipriani
Fred W. Kasch Exercise Physiology Laboratory, Department of Exercise and Nutritional Sciences, San Diego State University, San Diego CA

The purpose of this study was to examine the acute effect of talocrural joint position on muscle activity and gross mechanical efficiency (GE). Eleven trained cyclists participated in three randomized 6-min cycling bouts at ~80% of maximal aerobic capacity on an electromagnetically braked cycle ergometer while oxygen consumption and muscle electrical activity (EMG) were monitored during the subject's self-selected pedaling technique (control) and while using a dorsi- and plantarflexed pedaling technique. The mean differences in range of motion of the dorsi- and plantarflexed technique from the control position were 7.1 ± 4.4° and 6.9 ± 5.4°, respectively. Gastrocnemius activity was higher with the dorsiflexion technique than when using the self-selected control position (33.2 ± 13.0 and 24.2 ± 8.4 μV · s, respectively; $P < 0.05$). Moreover, GE was 2.6% lower while riding with the dorsiflexion technique than the control position (19.0 ± 1.2% and 19.5 ± 1.3%, respectively; $P < 0.05$). The data suggested that introducing more dorsiflexion into the pedal stroke of a trained cyclist increases muscle activity of the gastrocnemius lateralis and decreased GE when compared to the self selected pedaling technique. Although small, the decreased in GE associated with using the dorsiflexed technique may be clinically significant to performance in endurance cycling events.

2

ACUTE MYOGENIC RESPONSES TO RESISTANCE EXERCISE ARE INFLUENCED BY EXERCISE

Micah J. Drummond[*], Robert K. Conlee[*], Gary W. Mack[*], Sterling Sudweeks[**], G. Bruce Schaalje[***], and Allen C. Parcell[*]
Department of Exercise Sciences, Human Performance Research Center, [**]Department of Physiology and Developmental Biology and [**]Department of Statistics, Brigham Young University, Provo, Utah

This study examined the acute impact of two different volumes of resistance exercise on myogenic regulatory factors, myoD and myogenin, and a downstream target protein, desmin, in red (RQ) and white quadriceps (WQ) muscle in rodents. Rodents performed 10 sets (LV) or 20 sets (HV) of 10 contractions at 75% 1RM. Animals were sacrificed 6, 12, 24 and 48 h post exercise and the protein and mRNA responses of myogenin, myoD and desmin were measured. Myogenin protein and myogenin and myoD mRNA responses were significantly ($P < 0.05$) elevated ~200-300% above CON after 6-12 h of recovery with LV and HV resistance exercise in RQ. Desmin mRNA also increased ($P < 0.05$) ~70% from 6-48 h, but the protein decreased. HV resistance exercise delayed myogenin protein responses (12 h vs 6 h), elevated myogenin mRNA expression longer and decreased desmin protein more quickly (6 h vs 12 h) in RQ compared to LV. MyoD protein showed a slight decrease ($P < 0.05$) from 6-24 h in RQ with LV but not HV resistance exercise. There were no changes in WQ for any of the measured variables in response to resistance exercise. The primary finding of this study is that there was not a dose protein and mRNA response to our treatments as hypothesized but instead protein expression was activated at different time points for myogenin and desmin with HV resistance exercise. We suggest that the severity of the protocol inhibited satellite cell differentiation (represented by a delay in myogenin protein increase) and caused rapid and persistent modifications of the cytoskeleton. The results also demonstrate that the current resistance exercise model was able to elicit changes in skeletal muscle markers (mRNA and protein) related to functional adaptations in RQ but not WQ.

3

INFLUENCE OF DIFFERENT RECOVERY MODALITIES ON POST-EXERCISE CARDIOVASCULAR DYNAMICS

Areum Kim, C. Matthew Lee
Department of Kinesiology, San Francisco State University, San Francisco, CA

Purpose: 1) To determine the relative roles of central command (CC) and the skeletal muscle pump (SMP) in regulating heart rate (HR) and blood pressure (BP) following a bout of vigorous exercise and 2) to examine the effect of different recovery modalities on the incidence of postexercise hypotension (PEH). **Methods:** Following 10 minutes of rest (PRE), 10 participants performed 30 minutes of cycling exercise at 70% HRreserve. This was followed by a 10-minute recovery period consisting of 1) active exercise (AE; CC and SMP are active), 2) passive exercise (PE; only SMP is active), or 3) inactive recovery (IA; neither are active). This was followed by a subsequent 50-minute period of seated rest. For the initial 10 minutes of recovery, HR, systolic, and diastolic BP (SBP and DBP) were reported as 1-minute averages and were reported as 5-min averages over the 50-minute recovery period. A 3 X 11 repeated measures ANOVA was used to examine HR and BP between trials during the initial 10 minutes of recovery and the subsequent 50-minute recovery period. **Results:** Regarding the initial 10 minutes of recovery, there were significant interactions such that SBP and HR were greater in AE compared to the other trials. For DBP, there was a main effect of time that it was below PRE at minute 2. For the subsequent 50 minutes, there were main effects of Time on SBP and HR such that SBP was below PRE for 20-50 minutes postexercise and HR was lower than PRE for 35-60 minutes postexercise. There was an interaction on DBP such that it was greater during IA compared to PE at minutes 15-20 of recovery and lower than PRE for 20-55 minutes postexercise during PE. **Conclusion:** These findings suggest that CC is more active in regulating HR and BP during the initial 10 minutes of recovery following vigorous exercise. PEH was noted with both SBP and DBP and occurred between 20-55 minutes post-exercise. However, PEH was only modality-dependent with DBP.

4

THE ROLE OF MUSCLE DAMAGE IN MUSCLE REMODELING: NO PAIN, NO GAIN?

Flann, KL., Lindstedt, SL., LaStayo, PC
Biology Department, Northern Arizona University

Skeletal muscle is a dynamic tissue that responds adaptively to both the nature and intensity of muscle use. This study tested the hypothesis that a damaging bout of exercise is pre-requisite for muscle hypertrophy. Although this hypothesis has been widely accepted, there is surprisingly scant evidence that muscle damage, accompanied by an inflammatory response, is a necessary precursor to muscle hypertrophy. Subjects were divided into two experimental populations: (PT) pre-trained (n=7) and (NA) naïve (n=7). Detectable muscle damage was avoided in the pre-trained group by a 3 week gradual "ramp-up" program before both groups were subjected to an 8 week high force eccentric cycle ergometry program (20min, 3x/week). Work totals throughout the 11 week session were the same for both groups. The naïve group experienced damage, whereas the pre-trained group did not, as indicated by: >5 times higher plasma CK levels and self reporting of perceived soreness and exertion. RT-PCR analysis revealed increases in levels of growth factors, IGF-1Ea and MGF, in both groups. The observed increase in mean cross sectional area (and total muscle volume) was significant for both groups ($p<0.01$) but not different between groups (NA=7.5% and PT=6.5%). Strength increases were also observed for all subjects in the study (PT=25% and NA=26% improvement) again, no significant difference was found between the groups. Independent of any initial muscle damage, muscle volume increases and quadriceps strength increases were found to be the same for both groups indicating that a damaging bout may not be a pre-requisite to muscle hypertrophy.

FREE COMMUNICATIONS – STUDENT RESEARCH AWARD

5

SYSTEMIC HYPERTENSION EXISTS IN MICE WITH DIET-INDUCED OBESITY AND VASCULAR INSULIN RESISTANCE, BUT MICE WITH VASCULAR INSULIN RESISTANCE *PER SE* ARE NORMOTENSIVE

McMillin, S. and Symons, J.D. FACSM
University of Utah, College of Health and School of Medicine

When insulin binds to its receptor in the vasculature the PI3K/Akt and MAPK pathways are activated. Akt signaling leads to endothelial nitric oxide (NO) synthase (eNOS) phosphorylation, NO production, and vasodilation. MAPK signaling via ERK 1/2 leads to vasoconstriction. To determine whether vascular insulin resistance contributes to hypertension, we assessed metabolic characteristics, arterial pressure (MAP), and arterial insulin signaling in mice fed standard chow containing 10% (Con) or 45% fat (HF) for 10 weeks. Glucose intolerance, obesity, and hypertension developed in HF vs. Con mice (all $p<0.05$). Compared to saline (i.e., basal conditions), insulin stimulation increased ($p<0.05$) phospho (p)-Akt/total (t) -Akt, p-ERK/t-ERK, and p-eNOS/t-eNOS in aortae from Con mice. In HF animals, insulin increased p-ERK/t-ERK ($p<0.05$), but p-Akt/t-Akt was blunted. Importantly, both basal and insulin-stimulated p-eNOS/t-eNOS were absent ($p<0.05$) in aortae from HF animals. Thus, HF mice possess metabolic abnormalities, impaired vascular insulin signaling, and are hypertensive. To assess the contribution to hypertension from impaired vascular insulin signaling *per se* we used insulin receptor null mice (*TTr-IR*$^{-/-}$ mice) that do not possess metabolic abnormalities and are normotensive vs. their wild-type (WT) littermates. Predictably, insulin did not increase p-Akt/t-Akt or p-ERK/t-ERK in *TTr-IR*$^{-/-}$ vs. WT mice. In contrast to HF mice, basal p-eNOS/t-eNOS was present in *TTr-IR*$^{-/-}$ animals. Thus, impaired insulin signaling via Akt in the vasculature is not sufficient to evoke hypertension. Instead, data from HF mice suggest that systemic metabolic disturbances might reduce basal p-eNOS to an extent that evokes systemic hypertension.

6

SUPINE TREADMILL EXERCISE IN LOWER BODY NEGATIVE PRESSURE COMBINED WITH RESISTIVE EXERCISE COUNTERACTS BONE LOSS, REDUCED AEROBIC UPRIGHT EXERCISE CAPACITY AND REDUCED MUSCLE STRENGTH ASSOCIATED WITH 60 DAYS BED REST IN WOMEN

[1,2]Meuche S; [3]Schneider SM; [4]Lee SMC; [1]Macias BR; [5]Smith SM; [6]Watenpaugh DE; [1]Hargens AR (FACSM)
[1]University of California, San Diego-Department of Orthopaedic Surgery; [2]Charité-Universitaetsmedizin Berlin - Center for Space Medicine Berlin (ZWMB), Germany; [3]University of New Mexico, Albuquerque, NM; [4]Wyle Life Sciences, Houston, TX; [5]NASA Johnson Space Center, Houston, TX; [6]Sleep Consultant, Inc, Fort Worth, TX

Long-term exposure to weightlessness leads to cardiovascular and musculoskeletal deconditioning. In this report, the effectiveness of combined supine treadmill exercise in a lower body negative pressure chamber (LBNPex) and flywheel resistive exercise (Rex) countermeasures was determined to prevent bone loss, reduced aerobic upright exercise capacity and reduced muscle strength. We hypothesized that exercise subjects would show less decrease in bone mineral density (BMD), peak oxygen consumption (VO_2pk) and knee extensor strength (KES) than control subjects. Sixteen healthy female subjects participated in a 60-d 6° head-down tilt bed rest (BR) study after providing written informed consent. Subjects were assigned to one of two groups: a non- exercising control group CON or an exercise group EX performing LBNPex 2-4 d/wk and Rex every 3rd-d. VO_2pk was measured with a maximal, graded, upright treadmill test performed pre-BR and on 3-d after BR. BMD was assessed before and 3-d after BR. Isokinetic KES was measured before and 5-d after BR. Two-way repeated measures ANOVA were performed. Statistical significance was set at $p<0.05$. CON experienced a significant decrease in BMD in the trochanter (PRE: 0.670±0.045; POST: 0.646±0.352 g·cm^{-2}) and in the whole hip (PRE=0.894±0.059; POST: 0.858±0.057 g·cm^{-2}). BMD also decreased significantly in EX in the trochanter (PRE: 0.753±0.0617; POST: 0.741±0.061 g·cm^{-2}) and whole hip (PRE: 0.954±0.067; POST: 0.935±0.069 g·cm^{-2}). BMD losses were significantly less in EX than in CON subjects. VO_2pk was significantly decreased in the CON after BR (PRE: 38.0±4.8; POST: 29.9±4.2 ml·kg^{-1}·min^{-1}), but not in the EX (PRE: 39.0±2.0; POST: 37.8±1.9 ml·kg^{-1}·min^{-1}). KES was significantly reduced by 30% in Con (PRE: 113±12; POST: 78±8 N-m), but was not different in EX (PRE: 126±25; POST: 115±25 N-m). The combination LBNPex and Rex during 60-d BR protects against cardiovascular and musculoskeletal deconditioning and may be efficacious countermeasure for prolonged space flight.

POSTER PRESENTATIONS

1. AN INTERVENTION TO IMPROVE PHYSICAL ACTIVITY ADHERENCE AMONG WORKSITE DROP-OUTS

Teresa L. Abraham, M.S., William J. Stone Ed.D., Lee N. Burkett, Ph.D.
Department of Exercise & Wellness, Arizona Sate University

Only 25% of adults are sufficiently active to gain health benefits of physical activity (PA). Lack of adherence contributes to this because typically 50% of exercisers drop out within the first 6 months. This study sought to improve PA adherence among drop-outs at three worksites. Participants were solicited in two ways: 1) Drop-outs from two corporate fitness/wellness centers were sent e-mail invitations; and 2) Drop-outs were invited to participate through a university employee online newsletter. Investigators met participants for an interactive consultation, structured on the stages of change and processes of change model addressing: 1) preparation, 2) action, and 3) maintenance. The session focused on participant: behavioral intentions, commitment, goals, objectives, and perceived barriers. Strategies for overcoming barriers and avoiding or preventing relapse were emphasized. The result was an individually tailored intervention with options for either: a lifestyle activity model, a supervised fitness center program, or a combination of both. Subjects attended relapse prevention meetings at 6 and 18 weeks, and one corporate group received periodic e-mail prompts. Participants reported stage of exercise behavior (SOEB) and PA mode, duration, and frequency at pre-intervention. At the conclusion of the study, there were N=10 at each corporate site and N=12 at the university site (total N=32). At 9 months, 75% (N=24) of the participants adhered (stage 3 or above). ANOVA revealed no statistically significant differences in adherence associated with receiving electronic prompts. From 3 months on there were significant differences (p=<.000) between the adherers and drop-outs on SOEB. Repeated measures ANOVA yielded significant time effects (p<.000) for both adherers and drop-outs on SOEB (effect size=46, power=.90). The average adherer progressed from the preparation to action stage, while drop-outs regressed from preparation to pre-contemplation (inactivity). A pre-program behavioral skills consultation is a promising strategy to improve adherence.

3. EFFECT OF ACUTE CAFFEINE INGESTION ON ONE-REPETITION MAXIMUM MUSCULAR STRENGTH

Todd A. Astorino, Riana L. Rohmann, and Sondra Kelly
Department of Kinesiology, California State University—San Marcos

Multiple studies corroborate the ergogenic properties of caffeine (CAF) for endurance performance, yet fewer investigations have documented the efficacy of acute CAF intake in short-term, anaerobic exercise. The aim of the study was to determine the ergogenic potential of CAF during maximal strength testing. Nine experienced resistance-trained men (age = 23.22 ± 3.87 yr) ingested CAF (6 mg/kg) or placebo (PL) 1 h pre-exercise in a randomized, double-blind design. They refrained from CAF intake and strenuous exercise 48 and 24 h pre-visit. Initially, resting heart rate and blood pressure were obtained. After a standardized warm-up, one-repetition maximum (1-RM) testing on the bench press (BP) and leg press (LP) ensued. Upon determination of 1-RM, a load equivalent to 60 % 1-RM was placed on the bar, and the subject completed repetitions to failure. A trend ($p = 0.067$) was shown for superior 1-RM BP with CAF (286.67 ± 50.06 lb) versus PL (281.67 ± 47.83 lb), yet no difference ($p = 0.30$) was observed in 1-RM LP between CAF (996.67 ± 173.71 lb) and PL (962.22 ± 210.05 lb). Number of LP repetitions and weight at 60 %1-RM were unchanged ($p > 0.05$) with CAF versus PL, yet in the BP, significantly ($p < 0.05$) higher weight and repetitions were demonstrated with CAF (172.22 ± 29.80 lb and 17.89 ± 4.70 repetitions) versus PL (168.33 ± 28.61 lb and 16.56 ± 3.78 repetitions). No differences ($p > 0.05$) in RPE were evident after fatiguing BP exercise, yet it was significantly lower ($p < 0.05$) with CAF (8.89 ± 0.78) compared to PL (9.44 ± 0.88) in LP. These preliminary data suggest a small ergogenic effect of CAF on muscular strength and endurance, but more conclusive recommendations require a larger sample size.

2. THE EFFECT OF SHORT-TERM SQUAT VS DEPTH JUMP TRAINING ON VERTICAL JUMP

KL Bebernes, LE Brown FACSM, JW Coburn, B Beam, SM Zinder
Human Performance Laboratory. California State University, Fullerton. Fullerton, CA

A wide variety of sports rely on training techniques to enhance an athlete's power output. Vertical jump is a reliable way to test for power; therefore the purpose of this study was to determine the effectiveness of a short-term squat (S) training program or a depth jump (DJ) training program on vertical jump performance and one repetition maximum (1RM) strength. 30 male (n=16) and female (n=14) university students (age 24.03 ± 4.67 years, height 67.14 ± 3.38 cm, weight 169.40 ± 33.63 lb) were assigned to three groups: S, DJ or control (C). The subjects in the intervention groups participated in periodized training three days a week for a total of six weeks whereas the control group did not train. Vertical jump height, 1RM and ground reaction force (GRF) were tested before and after training and the alpha level was set at 0.05. Three way ANOVA analysis of variance results demonstrated a significant ($p = 0.007$) increase in 1RM for the squat group of 15.05% (pre=254 ± 73.09; post=299 ± 81.73lb). Vertical jump increased in all three groups (DJ pre=19.85 ± 4.33 to 20.75 ± 4.30; S pre=20.55 ± 4.44 to 22.2 ± 4.11; C pre=19.43 ± 4.6 to 20.5 ± 4.56) but not significantly different from one another. GRF did not change from pre to post in any group. The primary results of this experiment indicate that vertical jump was not significantly improved with short-term plyometric or squat training using the design and volume in this study. However, a six-week periodized squat training program did increase 1RM strength. Strength coaches may have to design programs with greater volume or longer duration to elicit significant improvements in vertical jump.

4. EFFECT OF CHANGE IN RUNNING SPEEDS ON SHOCK ATTENUATION AMONG CHILDREN

Kunal Bhanot, John A. Mercer, FACSM, Janet S. Dufek, FACSM, Julia A. Freedman, Anthony J. House, Janet R. Griffin
University of Nevada Las Vegas, Las Vegas, NV

Shock attenuation (SA) is the process by which the impact shock caused by the collision between the foot and ground is reduced (Mercer et al., 2002, European J Applied Physiol). In adult runners, SA increases with increases in speed; however, there are no SA data on children runners. It has been hypothesized that impact characteristics are a factor related to overuse running injuries (Hreljac, 2003, MSSE). With children being involved with age-group sports that incorporate running, it is important to understand how children manage impact. **Purpose:** To examine SA characteristics for children running on treadmill at different speeds. **Methods:** Physically active children (n=4; 11±1.0yrs; 48±12.1kg, 149±4.2cm), free from any current or previous lower extremity injury, were asked to run at 3 different speeds which included preferred (speed at which subjects can run for 15 min comfortably), 0.5 m/s faster and 0.5 m/s slower than preferred running speed for 30 seconds. Accelerometers (1008Hz) were secured to the anterior-medial region of the distal aspect of right tibia and at the frontal region of the head. Ten right footfalls per subject-condition were evaluated. Peak impact accelerations for the leg (LgPk) and head (HdPk) were recorded and SA calculated in the time domain using the formula: SA=[1-(HdPk/ LgPk)]*100. Stride length (SL) was calculated using the leg accelerometer profile. A repeated measures ANOVA was used to compare each dependent variable (i.e., SA, SL) across speeds. **Results:** SA was different ($p<0.05$) between the faster (69±4.4%) and the slower (61±7.5%) speeds. However, it was not different ($p>0.05$) between preferred (67±4.5%), slow (61±7.5%) and fast (69±4.4%) speeds. SL was different ($p<0.05$) between all the speeds. **Conclusion:** Based on these preliminary data, it appears that SA and SL increase with speed for children runners. However, the lack of change in SA between the slow and preferred speed was not expected.

5. PHYSIOLOGICAL EFFECTS OF A FIVE SECOND TASER EXPOSURE

Katie Bouton[1], Gary M. Vilke[2], Theodore C. Chan[2], Christian Sloane[2], Saul Levine[2], Tom S. Neuman[2], Susan S. Levy[1], Fred W. Kolkhorst[1,3], FASCM
[1]Department of Exercise and Nutritional Sciences, San Diego State University, San Diego, CA, [2]Department of Emergency Medicine, Medical Center, University of California, San Diego, CA, [3]San Diego State Heart Institute, San Diego State University, San Diego, CA

The Taser X26 has gained popularity by law enforcement agencies as a less lethal weapon. However, there have been a number of unexplained sudden deaths of suspects following Taser exposure. The purpose of this study was to examine the effects of a single Taser exposure on markers of physiological stress. Cardiorespiratory and blood markers were followed before and for 60 min after a 5 s Taser exposure on 21 men and women law enforcement officer volunteers. Data were analyzed using RM ANOVA.

	baseline	*1 min*	*10 min*	*30 min*	*60 min*
VE ($L \cdot min^{-1}$)	15.9 ± 4.2	26.5 ± 7.8*	17.9 ± 4.2	16.0 ± 5.7	15.3 ± 4.1
Tidal volume ($L \cdot breath^{-1}$)	0.87 ± 0.26	1.26 ± 0.60*	0.91 ± 0.27	0.90 ± 0.36	0.84 ± 0.27
Respiratory rate ($breaths \cdot min^{-1}$)	18.8 ± 4.1	22.9 ± 5.3*	20.5 ± 4.6	18.7 ± 4.5	18.6 ± 3.7
$PETCO_2$ (mm Hg)	33.5 ± 2.9	34.5 ± 4.4	33.5 ± 3.0	32.8 ± 2.6	33.1 ± 2.0
pH	7.43 ± 0.03	7.41 ± 0.03*	7.43 ± 0.03	7.43 ± 0.02	7.43 ± 0.03
Bicarbonate ($mEq \cdot L^{-1}$)	24.1 ± 2.2	22.8 ± 2.0*	23.1 ± 1.7*	24.2± 1.7	24.0 ± 1.5
Lactate ($mmol \cdot L^{-1}$)	1.38 ± 0.45	2.80 ± 0.81*	2.45 ± 0.62*	1.45 ± 0.56	1.39 ± 0.49

*Different from baseline ($P < 0.05$)
Note: N = 18 for blood pH, bicarbonate, and lactate.
There was a statistically significant increase from baseline for VE, TV, and RR at 1-min post-Taser exposure, which returned to baseline levels at 10 min. There were also statistically significant changes from baseline in blood pH, bicarbonate, and lactate at 1 and 10 min post-Taser exposure that returned to baseline at 30 min. Based on these markers of stress, a 5 s Taser exposure does not appear to cause clinically significant physiological changes.

7. A MAXIMAL GRADED EXERCISE TEST TO ACCURATELY PREDICT VO2max IN 18-65 YEAR-OLD ADULTS

George, J. D., FACSM, D. I. Bradshaw, A. Hyde, M. J. LaMonte, P. R. Vehrs, FACSM, R. L. Hager, F. G. Yanowitz
Department of Exercise Sciences, Brigham Young University, Provo UT

The purpose of this study was to develop an age-generalized regression model to predict maximal oxygen uptake (VO_{2max}) based on a maximal treadmill graded exercise test (GXT; George, 1996). Participants (N = 100), ages 18–65 years, reached a maximal level of exertion (mean ± SD; HR_{max} = 185.2 ± 12.4 bpm; RER_{max} = 1.18 ± 0.05; RPE_{max} = 19.1 ± 0.7) during the GXT to assess VO_{2max} (mean ± SD; 40.24 ± 9.11 $mL \cdot kg^{-1} \cdot min^{-1}$). Multiple linear regression generated the following prediction equation (R = .94, SEE = 3.18 $mL \cdot kg^{-1} \cdot min^{-1}$, %SEE = 7.9): VO_{2max} ($mL \cdot kg^{-1} \cdot min^{-1}$) = 13.160 + (3.314 x gender; females = 0, males = 1) – (0.131 x age) – (0.334 x BMI) + (5.177 x treadmill speed; mph) + (1.315 x treadmill grade; %). Cross validation using PRESS (predicted residual sum of squares) statistics revealed minimal shrinkage (R_p = .93 and SEE_p = 3.40 $mL \cdot kg^{-1} \cdot min^{-1}$); consequently, this model should provide acceptable accuracy when it is applied to independent samples of comparable adults. Standardized β-weights indicate that treadmill speed (0.583) was the most effective at predicting VO_{2max} followed by treadmill grade (0.356), age (-0.197), gender (0.183), and BMI (-0.148). This study provides a relatively accurate regression model to predict VO_{2max} in relatively fit men and women, ages 18–65 years, based on maximal exercise (treadmill speed and grade), biometric (BMI), and demographic (age and gender) data.

6. THE USE OF INTERACTIVE VIDEO GAMES FOR EXERCISE IN CHILDREN

A.M. Brandt, B.L. Haddock, L.D. Wilkin, H. So
Department of Kinesiology, California State University San Bernardino

Childhood obesity has become a growing public health concern, with 31% of children age 6-19 being overweight or at risk for overweight. This project was designed to determine if playing interactive video games that required full body movement would elicit a heart rate (HR) that would fall within the subjects training zone, according to ACSM standards (50-85% of HRR and/or 70-94% of MHR). Fourteen children, age six to fourteen, were tested on the Jackie Chan Fitness Studio. Each child attended an initial familiarization session where they were taught how to play the various games and were introduced to the HR monitor. The children then attended a data collection appointment. After recording height and weight, a Polar HR monitor was placed on each child. Ten minutes of resting data was recorded while the subjects watched a cartoon. The subjects were then allowed to play any of the games within the Jackie Chan Fitness Studio for thirty minutes. Subjects were allowed to rest as desired. The average HR while watching the cartoon was 86.06 ± 2.95 b/min. If using the HRR method (HR while watching the cartoon was considered RHR for this analysis), subjects spent an average of 13.71 ± 1.47 minutes in their training zone, with a range of 6-25 minutes. If using the percentage of MHR method, subjects spent an average of 15.29 ± 1.78 minutes in their training zone, with a range of 7-28 minutes. Given free reign to play any of the games desired, at any intensity desired, the subjects spent, on average, almost half of their time at a level that would be considered appropriate to exercise. Therefore, this type of interactive video game might be a good alternative type of exercise for children who are less interested in more traditional forms of exercise.

8. BRANCHED-CHAIN AMINO ACIDS AND MUSCLE DAMAGE AFTER CONSECUTIVE EXERCISE BOUTS

Gretchen A. Casazza [1], Rebecca A. Skillen [1], Marlia Braun [1], Massimo Testa [1], Elizabeth A. Applegate[2], FACSM and Eric A. Heiden[3]
[1]Sports Performance Laboratory, University of California, Davis, Medical Center Sports Medicine Program, Sacramento, CA, [2] University of California, Davis, Department of Nutrition, Davis, CA, [3] University of California Davis Medical Center Department of Orthopaedics, Sacramento, CA

Purpose: To determine if two weeks of isocaloric supplementation of a carbohydrate (CHO) plus branched-chain amino acid (BCAA) versus a CHO-only beverage could improve cycling performance by reducing muscle damage and fatigue after consecutive day exercise bouts. **Methods:** Twelve male athletes (28.5 ± 2.1 yrs) cycled at 75% VO_2peak for 90 min followed by a ride to exhaustion at 85% VO_2peak, before (T1) and on 2 consecutive days (T2 and T3) after 2 weeks of supplementation. Supplements were randomly assigned and double blinded, and consisted of 3.6% CHO plus 0.8% BCAA or 4.6% CHO only, beverages. **Results:** There were no differences in rate of perceived exertion, muscle soreness, oxygen consumption, respiratory exchange ratio, or blood glucose concentrations between the two treatments for any of the exercise bouts. The ratio of free tryptophan/BCAA, indicating less central fatigue, was lower during exercise with BCAA treatment. Plasma creatine kinase was lower ($p < 0.05$) (214.0 ± 13.5 vs. 485.9 ± 191.4 U/L immediately post, 213.9 ± 13.1 vs. 492.0 ± 199.4 U/L 5 hours post, and 194.9 ± 17.9 vs. 405.9 ± 166.6 U/L 24 hours post exercise in BCAA and CHO respectively) in T3 with BCAA compared to CHO only. Time to exhaustion and vertical jump decreased to a lesser extent in T3 with BCAA versus CHO only. Total fatigue score and mood disturbance were also lower with BCAA treatment in T3. **Conclusion:** The consumption of carbohydrate plus branched chain amino acids during consecutive day exercise bouts of approximately 2 hours when exercising in a fed state, with sufficient glycogen, and in normal environmental conditions: 1) reduced muscle damage, as indicated by a lower plasma creatine kinase levels 2) decreased fatigue and 3) maintained exercise performance compared to consuming carbohydrate alone.
Supported by a grant from Otsuka Pharmaceutical Co., Ltd.

9. EXPERT NOVICE DIFFERENCES IN PEDALING EFFECTIVENESS DURING SUB-MAXIMAL CYCLE ERGOMETRY

Clark, R. D., A. Hongo, M. Chapman, K. Lagana and S. Montgomery
Dept of Kinesiology California Polytechnic State University San Luis Obispo CA

When considering the ability to transfer muscular force to forward motion of the bicycle/rider system, mechanical power is an important measure of performance. Furthermore, the application of force through the crank during the pedaling cycle is also considered to be an important determinant in transferring power to the drivetrain. The purpose of this study was to examine differences in pedaling effectiveness between expert and novice bicycle road racers. Six expert cyclists (mean age 40.15, SD 4.6 yrs) were compared to six novice cyclists (mean age 33.2, SD 6.2 yrs) during one 15 minute bout on a Velotron Cycle Ergometer. Expert Cyclists were characterized as either USCF road racers with at least a Category 3 rating, or Collegiate racers at the "A" level. Novices were participants with less than 2 years of racing experience. During a 10 minute warm-up phase, all participants were instructed to reach an exercise intensity level of 11-12 (fairly light) on a rating of perceived exertion scale (RPE). At 10 minutes into the test, Power output in Watts and Spinscan values (avg torque/peak torque x100) were recorded before beginning the next phase of the test. All participants were then instructed to gradually increase their exercise intensity to 15 RPE (moderately hard) and power and Spinscan measures were taken again at 15 minutes into the test session. Results: Mean power measures failed to reach significance at the 11-12 RPE ($p=0.16$), but were significantly different at the 15 RPE ($p<.0001$). Spinscan measures were significantly different at 11-12 RPE ($p<0.05$), but failed to reach significance at 15 RPE ($p=0.48$). These findings indicate that experts produce greater power at higher exercise intensity levels, but that their method of applying force is not significantly different than novices.

11. THE EFFECTS OF A MULTI-FACETED EXERCISE PROGRAM ON COGNITIVE AND PHYSICAL FUNCTION IN COMMUNITY DWELLING OLDER ADULTS

Cooper, S.L., P.G. MacRae, FACSM, K. Linehan, E. Klodt, K. Bloom, J. Hall, M. Fitzgerald, R. Chandhoke, J. Yoon, and K.L. Francis
Department of Sports Medicine, Pepperdine University, Malibu, CA

Normal aging is a gradual process often associated with a decline in physical and cognitive function (Spirduso, Francis, & MacRae, 2005). The concept of successful aging suggests that individuals can maintain function by participating in physical and mental exercise programs. The purpose of this study was to examine the effect of a multi-faceted exercise program on physical and cognitive function. Healthy community-dwelling adults, over 60 years of age, were recruited from churches in the Los Angeles area. Over forty individuals express interest in the study, but only 20 (mean age 74.5 years) met the inclusionary/exclusionary criteria and were randomly assigned to an exercise (EXERCISE) or discussion control (DC) group; both groups included a faith-based component. All participants completed a battery of cognitive and physical function assessments prior to and following their 8-week program. The EXERCISE participants met for two, 90-minute sessions/wk and performed resistance training, aerobic exercise (dancing and walking), and flexibility training. The DC participants met for one, 90-minute session/wk and completed readings and discussions on vocation. Sixteen of 20 participants (8 per group) finished the study (mean age was 74.6 and 72.6 respectively for EXERCISE and DC). EXERCISE and DC participants' attended 96% and 86% of the sessions, respectively. Two-way ANOVA for repeated measures was performed on each dependent measure. The EXERCISE group exhibited greater improvements, than the DC group, in cognition (35% vs. 0%), depression (80% vs. 25%), lower body strength (12.5% vs. 1.0%), and walking endurance (18.8% vs. 0%). However, these differences were not statistically significant, perhaps because the power to detect a difference was low due to the small number of participants. These results suggest that healthy older adults successfully adhered to a multi-faceted exercise program but a larger numbers of participants are needed to determine the effectiveness of exercise on cognition and physical function.

10. EXERCISE, APOE GENOTYPE, AND COGNITIVE FUNCTION: MEG ANALYSIS OF ATTENTION AND CORTICAL ACTIVATION IN THE MIDDLE-AGED

S. Deeny[1], J. Zimmerman, D. Poeppel, S. Roth, J. Brandauer, & B. Hatfield, FACSM
Department of Kinesiology, University of Maryland, College Park.
[1]Institute for Brain Aging & Dementia, UC Irvine

Exercise is known to protect and enhance cognitive function in normal aging through increased blood flow and upregulation of neurotrophic factors in the brain. Recent studies suggest that the regions of the brain which undergo the most significant age-related decline also exhibit the greatest protective benefit from exercise. The current study employs magnetoencephalogram (MEG) to examine cortical function in middle-aged men and women during a spatial attention task. Apolipoprotein E (APOE) genotype was also considered because the e4 allele is a known genetic risk factor for Alzheimer's Disease (AD). All participants were 50-70 years of age, exhibited normal cognitive function, and ranged from sedentary to highly physically active as measured by the Yale Physical Activity Survey. 23 ideal participants were selected for MEG imaging from a larger group of 75 participants, who were screened for physical activity, neurocognitive function, APOE genotype, and medical history. Continuous MEG was collected during performance on the Ericksen flanker task, an attention task known to challenge the frontal and parietal regions. The task consists of a series of arrows presented visually, either congruent (<<<<<) or incongruent (<<><<), and the subject is instructed to press a button corresponding to the direction of the middle arrow. Results revealed that highly physically active participants, regardless of genotype, exhibited significantly greater cortical activation during the incongruent condition in the right frontal ($F(1,18)=6.55$; $p=.020$) and right temporal ($F(1,18)=5.90$; $p=.026$) regions. A similar non-significant trend emerged in the parietal regions. An interaction with genotype approached significance ($p=.078$) in the right temporal region where low-active e4 carriers exhibited the lowest amplitude activation. The results are consistent with a previous fMRI study, and suggest that highly physically active participants exhibit a more efficient allocation of cortical resources during a cognitive interference task than their sedentary counterparts.

12. EFFECT OF MENSTRUAL CYCLE PHASE ON THE DETERMINATION OF BODY COMPOSITION BY AIR DISPLACEMENT PLETHYSMOGRAPHY

Del Valle, A., H. Menning, and H. S-H. MacRae
Department of Sports Medicine, Pepperdine University, Malibu, CA

Air displacement plethysmography (ADP) is sensitive to variables that affect body volume (BV), e.g., water retention, thereby leading to inaccurate body composition assessment. We hypothesized that BV measurements using ADP are influenced by menstrual cycle phase, and thus we assessed body composition in young women at two stages of their menstrual cycle using ADP. 19 women (20.5±1.3 yr, 60.5±8.7 kg, 168± 9.0 cm) participated in the study. The only exclusionary criteria were oligomenorrhea and amenorrhea. Subjects were required to keep a monthly log tracking their menstrual cycle. After a one-month pre-testing run-in to establish menstrual cycle phases, subjects were tested by ADP on day 15 of their menstrual cycle (Luteal phase; LUT), and then two days before the expected onset of menstruation (Mid-Follicular phase; MF). Comparisons between the two menstrual cycle phases were made using a student's t-test for paired samples. Significance was set at alpha 0.05. There was no significant difference between ADP measures at the LUT and MF phase of the menstrual cycle. Body density was 1.0479±0.01 g/ml and 1.0467±0.01 g/ml for LUT and MF (change in mean = -0.0012, 95% CI = -0.003 – 0.0006, $p \geq 0.05$), and % body fat was not different at the two timepoints (22.4 ± 6.4 % and 23.0 ± 6.1 % respectively; change in mean = 0.565, 95% CI -0.23 – 1.36, $p \geq 0.05$). Body composition was reliably assessed using ADP at the LUT and MF phases of the menstrual cycle (LUT vs. MF body density intraclass $r = 0.950$, 95% CI = 0.886-0.977; LUT vs. MF % body fat $r = 0.949$, 95% CI = 0.887-0.977). We conclude that ADP reliably measures body composition in young women whose body fat percentage is greater than 20% during the LUT and MF phase of the menstrual cycle.

13. ARE FEMALE HIGH SCHOOL RUNNERS FACING HEALTH RISKS? ASSOCIATIONS BETWEEN MENSTRUAL FUNCTION, BONE MINERAL DENSITY, AND PERFORMANCE

Edwards K, Nichols JF, Rauh MJ, Marshall, SJ
Exercise and Nutritional Sciences Department, San Diego State University

The purpose of this study was to examine associations between bone mineral density (BMD), menstrual status, and running performance in female high school cross-country runners. One hundred and four female cross-country runners were recruited from six high schools in southern California. Menstrual status was determined by interviewer-assisted questionnaire. Total and regional BMD was measured by DXA. Running performance was recorded as the mean pace (min/mile) of the athletes' three fastest cross- country races during the 2005 cross-country season. For purpose of analysis, running performance was categorized into tertiles. After adjusting for chronological age, gynecological age, BMI, and percent body fat, ANCOVA indicated that runners who reported menstrual irregularity (25.7%) had significantly lower BMD at all five bone sites ($p < 0.03$). Statisically significant differences across performance tertiles were found for percent body fat, weekly and summer mileage and total number of seasons competed in, but not for BMD. Runners who started training before menarche were 5.7 times (95% CI = 1.6, 20.3) more likely to be in the highest performance tertile and 8.7 times (95% CI = 1.6, 46.9) more likely to report amenorrhea. Gynecological age was also statistically significantly greater (13.9 ± 1.6 y) in runners who started training before menarche compared to those who began training after menarche (12.1 ± 0.8 y, $p < 0.001$). The findings of this study are consistent with reports among collegiate runners with low BMD and menstrual irregularity. Despite higher training volume during in- and off-season, runners with the fastest performance times had BMD values similar to those who ran fewer miles and trained less frequently.

15. THE EFFECTS OF STATIC STRETCHING, PASSIVE STRETCHING, OR RUNNING WARM-UP METHODS ON SUBMAXIMAL RUNNING ECONOMY IN TRAINED, COMPETITIVE, FEMALE DISTANCE RUNNERS

Fortino, W., Clark, R. D., and Hancock, J.
Department of Kinesiology at California Polytechnic State University, San Luis Obispo

The purpose of this study was to examine the effects of three different warm-up methods on sub-maximal running economy in trained, competitive, female distance runners. Five female distance runners at California Polytechnic State University, San Luis Obispo, ranging from 20-24 years of age (M = 21.8 years), participated in this study. The pre-activity warm-up methods included a run-only warm up, a short duration static stretching warm up, and a longer duration passive stretching warm up. Each participant completed each of the three distinct warm-up methods in random order, followed by an exercise test consisting of three sub-maximal running phases. In the first phase, the participant began at a running speed of 12.1 km/h for 10 minutes; in the second phase, the participant increased running speed to 13.7 km/h for an additional 8 minutes; in the third and final phase, the participant decreased running speed to 4.0 km/h for 5 minutes. Metabolic measurements were collected every minute for each participant for each bout of exercise. There was a typical heart rate response to exercise among all of the participants, which was demonstrated in the results with speed having a significant effect on both heart rate and VO_2 ($F = 437$, $P < 0.01$; $F = 2194$, $P < 0.01$ respectively). Mean heart rate values and mean VO_2 values were nearly identical between the three warm-up methods among all of the participants. Results indicated that there was no interaction between warm-up method and speed ($F = .17$, $P = .95$; $F = .09$, $P = .98$, respectively). A General Linear Model ANOVA indicated that warm-up method failed to produce significant differences in either heart rate or VO_2 ($F = .91$, $P = .41$; $F = .65$, $P = .53$ respectively). These findings suggest that for well trained distance runners, the type of warm-up has no effect on physiological measures of running performance, and consistent running performance can be expected regardless of the type of warm-up method performed.

14. SHOCK ATTENUATION CHARACTERISTICS IN FEMALES ACROSS THE LIFESPAN

Julia A. Freedman, Kaori Teramoto, Janet S. Dufek FACSM, Brent C. Mangus and John A. Mercer FACSM
Department of Kinesiology University of Nevada, Las Vegas

PURPOSE: The purpose of this study was to investigate shock attenuation (SA) among groups of females at three different maturation levels: pre-menarche girls (Pre), normally menstruating women (N) and post-menopausal women (PM). **METHODS:** Subjects were instrumented with accelerometers placed medially on the distal aspect of the right tibia and on the head. Subjects ran for 45 seconds on a treadmill at preferred speed and 10% faster. Peak acceleration values (1000 Hz) from the leg (LgPk) and head (HdPk) were utilized to calculate SA: SA = (1-(HdPk/LgPk))*100. SA was compared between groups (PRE, N, PM) and speeds (Preferred, 10% faster) using a mixed-model ANOVA (α=0.05). **RESULTS:** SA was not influenced by the interaction of group and speed ($p>0.05$) nor was it influenced by speed ($p>0.05$) but it was different between groups ($p<0.05$). SA was 8.4% greater for Pre vs PM ($p<0.05$) and 6.1% greater for N vs. PM ($p<0.05$). Since SA is related to speed changes (Mercer, et al., 2002, EJAP), preferred running speeds were compared between groups and it was determined that preferred running speed was similar between Pre and N but lesser for PM compared to either Pre or N (Scheffé: α=0.05). **CONCLUSION:** The difference in SA between groups is likely related to the difference in speed. However, it is not clear if the PM group ran slower than the N and Pre groups in order to manage SA or for other reasons such as physiological cost of running or maintaining balance.

	Age (years)	Mass (kg)	Height
PRE(n=12)	9±1.9	33.1±7.4	141±12.2
N(n=13)	25±4.0	63.4±8.9	163.3±4.0
PM(n=11)	57±6.2	66.7±12.6	162.7±9.1

	SA_{pref}(%)	$SA_{10\%}$(%)	Pref RS (m/s)
PRE(n=12)	75.3±9.3	76.9±7.5	2.57±1.31
N(n=13)	74.6±5.7	73.0±7.6	2.63±0.42
PM(n=11)	68.7±8.1	66.7±7.5	2.46±1.28

16. THE EFFECT OF SEX ON ISOKINETIC KNEE EXTENSION LOAD RANGE

Lisa M. Gardner, Lee E. Brown FACSM, Jared W. Coburn, Steven M. Zinder, Stephen B. Kelly, Diamond Nguyen
Human Performance Laboratory, California State University Fullerton, Fullerton, CA

Load range is the ROM spent under tension during an isokinetic activity. Length of load range is dependent upon rate of velocity development, or how quickly you are able to attain a given velocity. The purpose of this study was to examine the effect of sex on load range during isokinetic knee extensions at various speeds. Fifty seven male and sixty one female university kinesiology students (age 23.29$\pm$2.14 yrs, height 171.05$\pm$10.27 cm, weight 71.36$\pm$16.21 kg) performed 5 maximal concentric knee extension repetitions on an isokinetic dynamometer at 15 random speeds between 30 and 500 d/s. Differences between males and females were determined at each speed using ANOVA with sex as the independent variable. Males demonstrated a significantly ($p<0.05$) greater load range (degs) when compared to females at speeds of 90 d/s and greater. At slower speeds, no significant differences were seen between sexes. At 120 d/s, males exhibited a mean peak load range of 71.21 +/- 1.11 with females at 70.13 +/- 2.19. At 360 d/s, males showed a mean peak load range of 41.82 +/- 3.10 while females produced a mean of 36.02 +/- 4.79. These results demonstrate that males produce a greater load range than females at both mid-range and high speeds. In addition, as the velocity increased the difference in load range between sexes increased. This may be due to their inability to accelerate quickly. Males may also have differing amounts of fast twitch muscle fibers or differences in muscle recruitment patterns when compared to females. The fact that females may spend less time under load during a given movement means that they may be performing less total work. This may be an important consideration for strength and conditioning professionals during program design and exercise prescription.

17. HYPERHYDRATION OF HUMANS USING A HYPEROSMOLAR SODIUM SOLUTION

Alex Gex and Hal W. Goforth, Jr. (FACSM)
Kinesiology Dept., Point Loma Nazarene University, San Diego, CA 92106-2899

Hyperhydration prior to exercise performance is of potential ergogenic value to athletes.
Purpose: To determine if a drinking a hyperosmolar sodium solution (S) can produce hyperhydration in euhydrated, resting subjects, for 4h. Compare the effects of drinking water (W) with S over 4h.
Methods: Ten active males, 20.5(±1.8) yr, 182.8(±4.9) cm, 84.5 (±13.3) kg, 15.3 (±5.6)% body fat, participated in a repeated measures cross over design study. In trials separated by ≥3 days, subjects drank a standardized treatment (TV) of W or S (5 g NaCl to 1 L of Gookinaid ®), at a rate of 25% every 10 min. TV was 35 mL/L of subjects' estimated total body water (mean =1.8± 0.2L). At 0,1,2,3,4 hr, subjects emptied their bladder, gave finger-tip blood samples and completed palatability and symptoms questionnaires. Urine volume and density, hematocrit (Hct) and plasma osmolality were measured hourly. A euhydration protocol was used prior to trials. Subjects were seated during all trials except to urinate.
Results: At 4 hr, total urine volume was significantly ($p<0.01$) lower in S than W. At 4hr trial S retained a total of 604 mL (+33%) of the TV. W lost 363mL more fluid than the TV (-22%). At one-hour plasma osmolality of S was significantly ($p<0.01$) above baseline (285 mOsm/kg), W decreased significantly ($p<0.01$) to 271 mOsm/kg. At 2 hr Hct of S had decreased from 43.6 to 40.9% and remained unchanged. The 2.7 % decrease in Hct suggests that plasma volume increased 155 mL. The remaining 449 mL retained by S may have moved to the extravascular (intracellular and interstitial) compartments.
Conclusion**:** Ingesting a 97 mmol/L sodium solution produces hyperhydration in resting subjects that persists for >4 hours. Drinking an equal volume of water results in a 100% loss of fluid by 3hrs and 122% by 4 hr.

18. VIGOROUS PHYSICAL ACTIVITY AND SYMPTOMS OF DEPRESSION IN COLLEGE STUDENTS

Harbour, V., Dooley, T., and Behrens, T. K.
College of Health, Department of Health Promotion and Education, University of Utah, Salt Lake City, UT

The relationship between vigorous physical activity (VPA) and depression among college students is unclear. Therefore, the purpose of this study was to examine whether college students reporting less symptoms of depression were more physically active than those regularly depressed. The *Utah Higher Education Health Behavior Survey* was administered in 2005 to ten post-secondary institutions in the state. The survey question for VPA inquired how many days of the week students engaged in VPA to the point of "sweating" and "breathing hard" for at least 30 minutes. Depression was assessed by asking students if they recently "felt down hearted or blue" with six response options ranging from "all of the time" to "none of the time". Data were reduced and analyzed using SAS version 9.1. Outliers and subjects with missing values for the questions of interest were eliminated. Descriptive statistics and a one-way ANOVA were calculated. The final sample included 8,492 participants (male: 46.6%, n = 3,961, age = 22.2 ± 2.6 years, BMI = 24.7 ± 4.2 m/kg^2; and female: 53.4%, n = 4,531, age = 20.7 ± 2.6 years, BMI = 23.2 ± 4.41 m/kg^2). Overall, respondents reported engaging in VPA 2.7 ± 0.9 days per week. The majority (72.5%) reported feeling down-hearted or blue "little" or "none of the time". There was a linear trend in the amount of days engaged in VPA and the amount time feeling down-hearted and blue (F [5,8,133] = 10.04, $p<0.0001$). A Student Newman-Kuels *post hoc* test indicated that individuals experiencing lesser amounts of depression were more physically active than students reporting being down-hearted and blue "all of the time". These findings may be indicative of a dose response relationship between VPA and symptoms of depression in college students. Future research should investigate the specific dose response relationship between VPA and depression.

19. DIFFERENCES IN HEALTH RELATED OUTCOMES IN NINTH GRADE STUDENTS COMPLETING A SEMESTER OR YEAR LONG PHYSICAL EDUCATION COURSE

Kazanna Hames, Keith Pound, Desmond Stahl, Amy Lam, Eric McKinley, Melissa Jensen, Daryl Parker, Roberto Quintana
Human Performance Research Laboratory, California State University, Sacramento

The State of California requires 400 min of physical education (PE) per 10 days of instruction over one school year for high school students. Each high school can vary on how this requirement is scheduled: single semester (SS) vs two semesters (TS). Limited data is available concerning how these different schedules affect health related outcomes. **PURPOSE**: To describe the effects of SS vs TS 9th grade PE programs on students' body composition, blood pressure, and physical activity levels. **METHODS**: 458 students participated in a SS PE (n=240) or a TS PE (n=218) course (14.22 ± 0.55 yrs, 47.5% female, 52.5% male). The following tests were administered at the beginning and end of each PE course. Height and weight were measured to determine BMI. Blood pressure (BP) was measured by auscultation on two separate occasions. Physical activity was assessed using the PDAR questionnaire. **RESULTS**: SS PE course in comparison to TS PE had a decrease incidence of at risk for overweight (-2.15% vs +3.44%) and overweight (-2.26% vs +1.75%) students. Incidence of students classified as having high normal BP decreased in both groups by -2.65 vs -0.6 % and those considered hypertensive decreased by -2.74% vs -2.2% for SS PE and TS PE, respectively. The average energy expended outside of school decreased by 0.17 Kcal/kg/hr for SS PE and increased by 0.10 Kcal/kg/hr for TS PE. **CONCLUSION**: This preliminary descriptive study indicates that an intensive SS PE could have greater effects on BMI and BP parameters than a TS PE. The differences in outcomes may be due to the greater number of minutes required by a SS PE course and possibly indicates that current state requirements for PE maybe inadequate to affect health related outcomes. Further controlled studies are needed to confirm our preliminary descriptive findings.

20. PHYSICAL ACTIVITY COUNSELING (PAC): A STANDARDIZED HEALTH BEHAVIOR CHANGE MODALITY TO INCREASE PHYSICAL ACTIVITY BEHAVIOR

Havenar, J.M.
Department of Exercise and Wellness, Arizona State University

Client-centered interventions inclusive of motivational interviewing techniques have shown promise as a means of procuring increases in physical activity behavior; however conclusions regarding the efficacy of individual intervention components are limited by clinical heterogeneity, lack of content description and atheoretical techniques. Recent literature has evidenced the Social Determination Theory (SDT) constructs of autonomy, relatedness and competence as mediators of intrinsic motivation, a necessary component of sustained behavior change. Forty adults were randomly assigned to either the treatment (PAC) group (n = 20), or a Physical Activity Information (PAI) comparison control group (n = 20). All subjects received three face-to-face counseling sessions, four emails and four phone calls over the span of 12 weeks. The PAC group received client-centered and motivational interviewing techniques such as active listening and eliciting client change talk to foster intrinsic motivation and self-motivation. The PAI group was provided general health information published by the American College of Sports Medicine. Physical activity was measured via stage of change, the seven day physical activity recall interview and pedometry. The Health-Care, Self-Determination Theory Questionnaire Packet (HCSDT) assessed autonomy, relatedness and competence. Average weekly physical activity minutes and energy expenditure (MET-min) increased for both groups by week twelve. These findings suggest that continued assessment of physical activity beyond three months to allow comparison of attrition rates between groups is needed to determine the effectiveness of the PAC intervention. Additionally, follow up measurements will provide insight regarding the potential mediating effects of competence, autonomy and relatedness on physical activity behavior.

21. EFFECT OF HYDRATION STATE ON PERFORMANCE, METABOLISM, AND ENDOCRINE RESPONSES TO RESISTANCE EXERCISE

Judelson, D.A.[1,2], C. M. Maresh[2] FACSM, M.J. Farrell[2], L.M. Yamamoto[2], L.E. Armstrong[2] FACSM, W.J. Kraemer[2] FACSM, J.S. Volek[2], B.A. Spiering[2], D.J. Casa[2] FACSM, and J.M. Anderson[2] FACSM
[1] Department of Kinesiology, California State University Fullerton, Fullerton, CA.; [2] Human Performance Laboratory, Department of Kinesiology, University of Connecticut, Storrs, CT

Only a small conflicting body of literature examines the effect of hypohydration on maximal strength and power; almost none documents the influence of hypohydration on typical resistance exercise. The purpose of this study was to examine the effect of hydration state on the performance, metabolism, and hormonal responses to resistance exercise. Seven healthy resistance-trained males (age = 23 ± 4 y, body mass = 87.8 ± 6.8 kg, body fat = 11.5 ± 5.2%) completed three identical resistance exercise bouts in different hydration states: euhydrated (EU), hypohydrated by ~2.5% body mass (HY25), and hypohydrated by ~5.0% body mass (HY50). Investigators manipulated hydration status via controlled water deprivation, exercise-heat stress, and fluid intake. Cortisol, epinephrine, norepinephrine, testosterone, growth hormone, IGF-1, insulin, glucose, lactate, glycerol, and free fatty acids were measured during euhydrated rest, immediately preceding resistance exercise, immediately post-exercise, and during 60 minutes of recovery. Body mass decreased 0.2 ± 0.4%, 2.4 ± 0.4%, and 4.8 ± 0.4% during EU, HY25, and HY50, respectively. No significant differences existed among trials in vertical jump height, peak lower body power, peak lower body force, or central activation, but hypohydration decreased the total work completed during the first three sets of resistance exercise. Hypohydration had little demonstrable effect on the anabolic endocrine response to exercise, but significantly increased the exercise-induced stress hormonal response, stimulating an influx of metabolic substrates and regulatory hormones into the circulation. These novel data indicate that body water status is an important consideration in the goal of acutely maximizing and chronically increasing resistance exercise performance.

23. THE EFFECT OF SINGLE VS. MULTIPLE SETS ON STRENGTH

Stephen B. Kelly, Lee E. Brown FACSM, Jared W. Coburn, Steven M. Zinder, Lisa M. Gardner, and Diamond Nguyen
Department of Kinesiology, California State University, Fullerton

Research is divided on whether performing resistance training with a single set per training session is as effective for increasing strength as training with multiple sets. The purpose of this study was to determine the effect of single sets versus multiple sets on strength. Forty subjects were randomly assigned into one of three groups: control (C; n=8), single set (SS; n=14), or multiple sets (MS; n=18) to perform 8 maximal knee extensions at 60 d/s on an Biodex System 3 isokinetic dynamometer twice a week for eight weeks. The SS group performed one set while the MS group performed three sets. All groups were pre, mid (4 weeks), and post-tested at 60 d/s. Strength was expressed as peak torque (PT). A 3x3x2 (time x group x sex) mixed factor repeated measures ANOVA revealed no interaction involving sex but there was an interaction of group by time. The MS group exhibited a significant ($p < 0.05$) increase in PT (Pre= 171.39 $\pm$ 61.98 Nm; Mid=193.08 $\pm$ 66.23 Nm) between the pre-test and the mid-test while the SS (Pre= 163.45 $\pm$ 56.37 Nm; Mid= 172.60 $\pm$ 61.78 Nm) and C groups (Pre= 135.997 $\pm$ 54.31 Nm; Mid= 127.66 $\pm$ 53.12 Nm) did not change. Strength did not change between the mid-test and the post-test for any group. It was concluded that performing three sets of isokinetic knee extensions was more effective than performing a single set for increasing peak torque. These results seem to indicate that for increasing strength, performing multiple sets is superior to performing a single set of resistance exercise.

22. COMPARISON OF SKINFOLD THICKNESS MEASURES WITH ULTRASOUND IMAGING TO DETERMINE BODY COMPOSITION

Lyon, J., R. Drew, and H. S-H. MacRae
Department of Sports Medicine, Pepperdine University, Malibu, CA 90263

Skinfold thickness (SF) measures obtained with calipers for determination of body composition (BC) are accurate when performed by trained technicians. Ultrasound imaging (US) is routinely used in a variety of clinical settings, and when used to assess BC, is highly correlated with X-ray computed tomography, an expensive and high radiation dose procedure which limits its use for regular BC measurements. The objective of this study was to assess BC via calipers, and to compare those measures with BC obtained by US (BX2000, IntelaMetrix, CA). 24 women athletes (20±4.1 yr, 60±7.9 kg, 167±7.0 cm) and 15 male athletes (22±8.7 yr, 76±8.6 kg, 178±5.1 cm) partipated in the study. Following random assignment to either SF or ultrasound measures (BX), SF was measured in duplicate at seven sites by trained technicians (TEM 0.226±0.1 mm), and by BX. Comparisons between methods were made using intraclass correlation (ICC). BX measures were highly correlated with SF. Sum of SF and BX respectively for women was 94.8±22.7 mm and 94.5±20.4 mm (Δ mean = -0.87, 95% CI = -4.08 – 2.34), and for men was 77±6.9 mm and 76.3±6.5 mm (Δ mean = -0.70, 95% CI = -2.33 – 2.94). % body fat for SF and BX respectively for women was 13.6±3.4% and 13.6±3.2% (Δ mean = -0.10, 95% CI -0.58 – 0.37), and for men was 10.7±4.2 % and 10.6±4.1 % (Δ mean = -0.10, 95% CI -0.35 – 0.14). ICC for sum of skinfolds for women was 0.947 (95% CI = 0.868-0.979), and for men was 0.991 (95% CI = 0.977-0.966). ICC for % body fat for women was 0.950 (95% CI = 0.876-0.980), and for men was 0.991 (95% CI = 0.978-0.997). We conclude that US using the BX2000 reliably measures body composition in young athletic men and women whose body fat percentage is low.

24. UPPER AND LOWER BODY BILATERAL DEFICIT DURING ISOTONIC, MULTI-JOINT MOVEMENTS

Magpantay, L.D. and S.P. Flanagan
Department of Kinesiology, California State University, Northridge

The bilateral deficit (BLD) occurs when the sum of unilateral forces generated by a pair of muscles is greater than the forces generated by the same pair during bilateral efforts. The purpose of this study was to: establish the existence of the BLD during isotonic multi-joint movements, ascertain if the BLD is the result of limb dominance, and determine if the magnitude of the BLD is affected by body region. Twelve volunteers (men = 7; women = 5), recruited from a university activity class, performed maximal bench press and leg press strength tests unilaterally (left and right side separately) and bilaterally (both sides simultaneously). A BLD was present if the sum of the unilateral tests was greater than the bilateral tests. The magnitude of the difference between tests were normalized to compare upper and lower body BLD. Comparisons between the sum of the unilateral and bilateral tests, the right and left side, and the upper and lower body were made using paired t-tests (α = 0.05). The sum of unilateral tests was significantly higher than the bilateral test for the lower body ($p = 0.001$), but there were no significant differences between tests for the upper body ($p = 0.782$). The lower body BLD was significantly greater than the upper body BLD ($p = 0.029$). There were no significant differences between the right and the left side for either the upper ($p = 0.339$) or lower body ($p = 0.221$). These results indicate that the BLD: 1) is not a result of one limb being stronger than the other, suggesting involvement of the central nervous system; and 2) is body-region specific, which may be due to larger muscle mass associated with the lower body. The BLD is likely due to a combination of central and peripheral factors that require further investigation.

25. DOES GENDER AFFECT COMPLIANCE WITH A COLLEGATE VARSITY STRENGTH AND CONDITIONING PROGRAM?

Zachary Margolis, Cody Hodgeson, and Pauline Entin
Department of Biological Sciences, Northern Arizona University

A college athlete's compliance with his or her assigned strength and conditioning program is essential to achieving the program goals. Based on observations that female college students are more adherent than males to other mandates such as traffic rules, we hypothesized that among varsity athletes, women are more compliant with their required strength training program than are men. To test this hypothesis, two varsity teams with both men's and women's programs (tennis, track and field) at Northern Arizona University were studied in the resistance training facility. 21 female and 14 male athletes were randomly selected and closely observed 6 times each over the course of the spring 2006 semester by two calibrated observers. Subjects were graded on a 0 to 5 scale (0 = non attendance, 5 = 100% compliant) for the completion of proper repetitions and sets, and the use of the assigned weights for the workout that day. Subjects were blinded to the observations. The mean compliance score of the female athletes was significantly greater than that of the men (mean $\pm$ SEM: 4.35 $\pm$ 0.14 versus 3.60 $\pm$ 0.28, p = 0.01). The female athletes were 100% compliant in 57% of the recorded workouts, while male athletes were 100% complaint in 45% of workouts. Male athletes were more likely to skip entire workouts than were female athletes (1.1 skips/person versus 0.2 skips/person). We conclude that female varsity athletes are more compliant with an assigned strength training program than are male varsity athletes.

27. STEPS /MINUTE CUTPOINT VALUES FOR DETERMINATION OF PERCENT OF PHYSICAL EDUCATION LESSON TIME SPENT IN MODERATE-TO-VIGOROUS PHYSICAL ACTIVITY IN 8TH GRADE STUDENTS

McClain, J.J.[1], Johnson, T.G. [2], Brusseau Jr., T.A.[2], Washington, T.L.[1], Tudor-Locke, C.[1], Darst, P.W. [2]
[1]Walking Research Laboratory, Department of Exercise and Wellness, Arizona State University, Mesa, Arizona; [2]Department of Physical Education, Arizona State University, Mesa, Arizona

Observational research has determined mean pedometer steps/minute cutpoints for quantifying percent of physical education lesson time (%_PELT) that elementary students spend in moderate-to-vigorous physical activity (MVPA). Accelerometry is another commonly used method for objectively determining time in MVPA. In order to facilitate comparisons between accelerometer (i.e., criterion) and pedometer (i.e., predictor) measures of physical activity (PA) intensity, this study determined 1) mean Digi-Walker SW200 pedometer (DW; Yamax Corporation, Tokyo, Japan) steps/minute cutpoints for %_PELT in MVPA utilizing criterion ActiGraph accelerometer (AG; ActiGraph LLC, Fort Walton Beach, Florida) outputs of MVPA and 2) classification agreement for %_PELT in MVPA between AG and DW determined measures of PA intensity for 8th graders. Participants (N=174, females=90, males=84) wore an AG and DW during a single PE class. Class start and stop times were recorded (i.e., allowing calculation of steps/minute) and DW steps were recorded following class. Time synchronized AG activity count outputs were exported and time in MVPA was determined based on validated thresholds. Single linear regression (i.e., independent variable= DW mean step/minute, dependent variable= AG determined %_PELT in MVPA) determined DW steps/minute cutpoints for %_PELT in MVPA. Classification agreement was calculated for AG and DW determinations of achieving or not achieving 33.3%, 40%, and 50%_PELT in MVPA. Steps/minute was a significant predictor of %_PELT in MVPA [%_PELT =-5.488+(steps/minute*.578)], adjusted R^2=0.49. Mean DW cutpoints for 33.3%, 40%, and 50%_PELT in MVPA respectively were 67.1, 78.7, and 96.0 steps/minute. Classification agreement between AG and DW methods for determining participants achieving and not achieving 33.3%, 40%, and 50%_PELT in MVPA respectively were 81.1% (kappa=.60), 85.0% (kappa=.63), and 83.4% (kappa=.29). Average values of 67.1 and 78.7 steps/minute respectively (equivalent to 33.3% and 40%_PELT in MVPA) may be used to determine %_PELT in MVPA during 8th grade PE classes. Additional research is necessary to cross-validate these values.

26. THE EFFECTS OF LEUCINE AND WHEY PROTEIN SUPPLEMENTATION ON MUSCULAR STRENGTH, ENDURANCE, AND BODY COMPOSITION DURING RESISTANCE TRAINING WITH SINGLE VS. MULTIPLE SETS

M. Mielke, T.J. Housh, FACSM, M.H. Malek, T.W. Beck, G.O. Johnson, FACSM, D. J. Housh, and R.J. Schmidt
Department of Nutrition and Health Sciences, University of Nebraska-Lincoln, Lincoln, NE

Resistance training with multiple sets, as opposed to a single set, has been shown to cause greater strength gains. Additionally, whey protein and leucine supplementation, in conjunction with resistance training, has been shown to increase strength and fat-free body weight (FFW). The purpose of this study was to test the hypothesis that single set training with leucine and whey protein supplementation would result in similar changes in body weight (BW), percent body fat (%FAT), fat weight (FW), FFW, 1-RM leg extension (L-1RM), endurance leg extension (L-END), 1-RM bench press (B-1RM), and endurance bench press (B-END) as training with multiple sets (2 sets) without supplementation. Untrained adult males (N=39, mean age $\pm$SD = 22.7 $\pm$ 2.8 years) were randomly assigned to a supplement (SUP; n=13), a placebo (PLA; n=13), or a control (CON; n=13) group. Each group performed bench press and leg extensions (SUP = 1 set and supplement; PLA = 1 set and isocaloric carbohydrate drink; CON = 2 sets and no supplement) 3 times a week at 80% of 1-RM for 8 weeks. Measurements (pre- and post- training) were analyzed with separate 3 [Group: SUP, PLA, and CON] x 2 [Time: Week 0 and 8] mixed factorial ANOVAs. The two-way mixed factorial ANOVAs resulted in no significant ($p > 0.05$) group x time interactions for any of the variables, but significant ($p<0.05$) main effects for time for L-1RM (pre = 82.5 $\pm$ 22.4kg; post = 99.2$\pm$23.2kg), L-END (pre = 12$\pm$4 reps; post = 19$\pm$7reps), B-1RM (pre = 64.7$\pm$17.8kg; post = 77$\pm$20.4kg), and B-END (pre = 7$\pm$2 reps; post = 13$\pm$4reps). There were no main effects for group. These findings indicated that single set training with supplementation and multiple set training with no supplementation resulted in similar strength, endurance, and body composition responses.

28. ELECTRON FLOW DOWN THE ELECTRON TRANSPORT CHAIN OBEYS OHM'S LAW

Erica Morley, Brian Glancy, Wayne Willis FACSM
Department of Kinesiology, Arizona State University, Tempe, Arizona

The kinetics of electron flow down the electron transport chain (ETC), from Complex I and Complex II to oxygen (O_2) were studied in rat mixed skeletal muscle mitochondria (n=7 MITO preparations). Isolated MITO were disrupted with sonication and incubated with either NADH or Succinate serving as electron donors to Complex I and Complex II, respectively. Electron flow to O_2 was continuously measured using polarography. The V_{max} of electron flow from NADH to O_2 was 7.4-fold greater than that from Succinate (711.55$\pm$49.36 vs. 95.70$\pm$5.11, all values mean$\pm$SE). We also measured the influence of driving force (voltage drop) on electron flow (current) originating from either Complex I or Complex II. In these studies, the oxidized to reduced ratios of the electron source (either NAD^+/NADH or Fumarate/Succinate) were experimentally manipulated, while the oxidation/reduction level of the $\frac{1}{2}O_2/H_2O$ couple was measured from the polarograph. In this way, the redox potential difference from electron source to sink (the voltage drop) could be precisely quantified, while the electron flow (the current) was measured as the rate of O_2 consumption. Electron flow from both Complex I and Complex II was a linear function of the redox potential difference i.e., electron flow down the ETC conformed to Ohm's Law. The force:flow relation indicated a mean conductance of 39.67 $\pm$ 2.96 millisiemens (mS) per mg MITO protein for electrons from NADH (Complex I), and 9.14 $\pm$ 0.83 mS/mg for electrons from Succinate (Complex II). The results illustrate the markedly higher catalytic potential for electrons to flow from Complex I to O_2, compared to that of Complex II. They also show that electron flow down the ETC of sonicated mitochondria conforms to Ohm's Law. ETC resistance to electron flow has profound implications regarding the impact of fuel availability on mitochondrial energy conserving and dissipating processes.

29. MODIFIABLE RISK FACTORS FOR CHRONIC DISEASE IN PACIFIC ISLANDER ADOLESCENTS AND YOUNG ADULTS

Moy, K.L., D.L. Parker, R. Quintana, and F.D. Baldini
Department of Family and Preventive Medicine, University of California, San Diego, La Jolla, CA

Aggregated health statistics for Asian and Pacific Islander populations continue to misrepresent some heterogeneous subgroups as "the healthy minority". This study's aim was to measure modifiable risk factor profiles for chronic diseases in young Pacific Islanders residing in Sacramento, California. Twenty (11M, 9F) Tongans, aged 13-23 (15.8 ± 2.9) years, self-reported tobacco use, TV watching, and current physical activity (PA) levels. Measures of body mass index (BMI), waist-to-hip ratio (WHR), and resting systolic and diastolic blood pressure (SBP and DBP) were followed by a one-mile run (OMR). As a group, this sample was classified as 'at risk of overweight', with age-specific BMI values at the 90th percentile, and current tobacco use was reported by one male. Two-tailed t-tests were performed to examine gender differences at a $p<0.05$ significance level. Males had significantly higher SBP (120 ± 13.7 mmHg) and DBP (79 ± 9.9 mmHg), with several categorized as 'high normal' or 'stage 1 hypertension', while the entire female sample exhibited 'optimal' levels of SBP (98 ± 9.7 mmHg) and DBP (61 ± 2.6 mmHg). However, mean female WHR (0.83) was 'a very high health risk' compared to a 'healthy' male WHR (0.86), and only 63% (n=5) of females met standard OMR passing times, compared to 71% (n=5) of males. Females also reported substantially lower levels of PA (26.2 ± 32.2 MET-hrs/wk) and energy expenditure (2118 ± 2509.7 kcals/wk) compared to males (52.5 ± 40.3 MET-hrs/wk and 4906 ± 5692.8 kcals/wk), although this difference was not statistically significant. Results indicate the presence of adverse health conditions in a sample of young Pacific Islanders, which elevates risk of chronic diseases and conditions in adulthood. Findings from this study contribute baseline data on the under-studied, under-represented Pacific Island population.

31. THE EFFECT OF SEX ON ISOKINETIC KNEE EXTENSION TOTAL WORK

Diamond Nguyen, Lee E. Brown FACSM, Lisa M. Gardner, Jared W. Coburn, Steven M. Zinder, Stephen B. Kelly
Human Performance Laboratory. California State University Fullerton, Fullerton, CA

Past studies have shown that males limbs are stronger and faster than females. The purpose of this study was to evaluate the differences in total work produced between males and females. There were fifty-seven male and sixty-one female participants in this study. All were university kinesiology students (age 23.29± 2.14yrs, height 171.94±10.27 cm, weight 71.36±16.21 kg). These students performed 5 maximal concentric knee extension repetitions on an isokinetic dynamometer at 15 random speeds between 30 and 500 d/s. Differences between males and females were determined at each speed using ANOVA with sex as the independent variable. The total work (joules) produced by males was significantly ($p<0.05$) greater than females at all speeds tested. At 60 d/s males produced a mean peak of 182.27 ± 43.48 compared to females 122.37± 39.55, and at 450 d/s males had a mean of 41.26 ± 17.01 compared to females 16.57 ± 12.53. Males produced total work nearly three times greater than females as the speed increased. This may be due to anthropometrical factors such as CSA. Furthermore, males may have a greater number of fast-twitch fibers and are able to recruit muscle fibers at a faster rate when compared to females. As the speed increased the distance decreased and less total work was performed. The evidence found in this study could help enhance female athletes' performance in sport activity if coaches could develop programs that help females to accelerate faster at higher speeds. Theoretically, if females' limb speed increases the distance will also increase, therefore total work performance will also be increased.

30. CAFFEINE CONSUMPTION AND BONE MINERAL DENSITY AMONG COLLEGE STUDENTS

Organist, G.L.and Almstedt, H.C.
Department of Natural Science, Loyola Marymount University

Osteoporosis is a major public health concern, leading to 1.5 million fractures each year, including 300,000 hip fractures. One of the best approaches to preventing osteoporosis is to increase peak bone mass in young adulthood. Following a healthy diet during college years could influence the development of peak bone mass. **Purpose**: The main objective of our project was to compare the bone health of college students who consumed low (<10mg/day) and high amounts of caffeine (>10mg/day). **Methods:** We recruited 30 participants (8 male, 22 female) aged 17 to 25 years (20.9 ± 1.6 yr, mean ± SD). Participants were divided into a low caffeine group (0.65 ± 1.43 mg/day, n=17) and a high caffeine group (60.85 ± 54.91 mg/day, n = 13). Bone mineral density (BMD, g/cm^2) was evaluated at the hip using dual-energy x-ray absorptiometry (DXA, Hologic Inc, Waltham, MA). Each participant completed a three-day diet record that was analyzed using Food Processor (SQL, version 9.8.1). **Results:** Groups were not statistically different in age, body mass index (BMI), physical activity (METs-hours/week), vitamin D intake or calcium intake. In an analysis of covariance, controlling for BMI, the low caffeine group had greater BMD at the femoral neck than the high caffeine group (low 0.97 ± 0.16 g/cm^2 vs. high 0.88 ± 0.13 g/cm^2, $p < 0.05$). Similar results were also found at the trochanter where the low caffeine group had greater BMD compared to the high caffeine group (low 0.82 ± 0.14 g/cm^2 vs. high 0.72 ± 0.12 g/cm^2, $p < 0.05$). **Conclusion:** In this population, college students who drank high amounts of caffeine had lower bone mineral density at the hip than those who consumed low amounts of caffeine.

32. CALCIUM TO PHOSPHORUS RATIO AND BONE MINERAL DENSITY

Podlecki, D.M. and Almstedt, H.C.
Department of Natural Science, Loyola Marymount University

There are many factors that contribute to development of bone mineral density, including family history, exercise and diet. Some research has suggested that a diet high in phosphoric acid, largely from soda consumption, in relationship to calcium intake leads to suboptimal bone development. PURPOSE: The aim of this study was to investigate the influence of calcium and phosphorus intake on bone mineral density. METHODS: Male and female subjects (ages 18-25) completed 3-day diet records which were analyzed using Food Processor (SQL, version 9.8.1). According to the recommended intakes of both calcium (1000 mg/day) and phosphorus (700 mg/day) a healthy nutrient ratio would be 1.4. Using this value we divided subjects into a high (3.18 ± 2.1, n=11) and low (1.04 ± 0.3, n=20) Bone mineral density (g/cm^2) was measured using dual-energy x-ray absorptiometry (DXA, Hologic Inc). RESULTS: Performing an analysis of covariance, controlling for body mass index, revealed no significant differences in bone mineral density at the hip, spine, or whole body according to the ratio of calcium and phosphorus intake. CONCLUSIONS: In this population, a low calcium to phosphorus ratio had no effect on bone mineral density. Soda, which contains phosphoric acid, may not be as harmful to bone development and mineral density as previously thought. Phosphoric acid is only one component of soda and further study of other components of soda and a larger sample size would be beneficial.

33. EFFECTS OF EXERCISE MODALITY ON THE PHYSIOLOGICAL RESPONSE TO EXERCISE

Diana Prince, Massimo Testa, Eric A. Heiden and Gretchen A. Casazza
Sports Performance Laboratory, Sports Medicine Program, University of California, Davis, Medical Center, Sacramento, CA

Diet modification and regular exercise remain the major treatment strategies for maintaining ideal body weight. The best mode of exercise would expend the most calories for a moderate level of exertion, while producing the least amount of muscle soreness and fatigue. **PURPOSE**: To compare different modes of exercise on energy expenditure, muscle soreness and fatigue during sub-maximal exercise. **METHODS:** On separate days, sixteen recreational male (8) (22.3 ± 1.2 yrs) and female (8) (21.6 ± 0.5 yrs) athletes performed 30 min sub-maximal tests on a treadmill (TM), recumbent bicycle (B), elliptical (E) or treadclimber (TC)). Sub-maximal exercise periods consisted of 3 consecutive 10 min exercise bouts at an RPE of 2-3, 4-5 and 6-7, respectively. Oxygen consumption (VO_2), respiratory exchange ratio (RER), rate of perceived exertion (RPE), heart rate (HR) and blood lactate concentrations were collected before, during and after exercise. Muscle fatigue was measured from a pre and post exercise vertical jump test. Muscle soreness was measured using a standardized questionnaire. **RESULTS:** The treadmill elicited significantly higher whole body muscle soreness 24 hours post exercise than the other modes. Overall subjective fatigue was not different between the modes. Muscle fatigue increased from pre to post exercise in B only. For a moderate level of exertion (RPE 3 out of 10), the treadclimber had a significantly, $p < 0.05$, higher energy expenditure than all other modes, expect for B (11.0 ± 0.5, 9.9 ± 0.5, 9.4 ± 0.7, 8.0 ± 0.4 kcal/min for TC, E, TM and B, respectively). **CONCLUSION:** At moderate levels of exertion, the recumbent bike elicited the most muscle fatigue and the lowest energy expenditure, while the treadclimber expended the most calories with no significant post exercise muscle soreness or fatigue.
Supported by a grant from the Nautilus Group

35. INJURY PATTERNS IN GIRLS' HIGH SCHOOL SOCCER

Rauh M.J., H. D. Graham, and J.F. Nichols, FACSM
Department of Exercise and Nutritional Sciences, San Diego State University, San Diego, CA

In recent decades, the participation of girls competing in interscholastic soccer has risen at a greater rate than boys. With increased participation, the number of female athletes at risk for soccer-related injuries has likely also increased. However, information describing injury patterns among girls' interscholastic soccer is limited. Thus, the purpose of this study was to describe injury patterns among girls' high school soccer. We prospectively followed 130 female athletes who participated in interscholastic soccer during the 2003-2004 sports season in San Diego, CA. Data collected included injuries and athletic exposures [AEs] (daily participation where an athlete was at risk for injury) under the San Diego State University Project SPIRIT Injury Surveillance System. Three severity injury classifications were used: minor (<8 days lost), moderate (8-21 days lost), and major (>21 days lost). Incidence rate ratios (IRR) and 95% confidence intervals (CI) were used to compare injury rates. Sixty-three injuries occurred among 130 players for an injury rate of 8.2/1,000 AEs. The injury rate was higher during games (9.9/1,000 AEs) than in practices (7.3/1000 AEs)[IRR=1.4, 95%CI: 0.8-3.0]. Most injuries were minor (5.8/1,000 AEs) followed by moderate (1.2/1,000 AEs) and major injuries (0.6/1,000 AEs). The most common body parts injured were the knee and ankle (both 2.1,000 AEs), followed by the hip (0.8/1,000 AEs). The incidence of head injuries was small (0.6/1000 AEs). The ankle and knee had the highest rates of moderate and major injuries. The rate of moderate/major injuries was higher during games (3.2/1,000 AEs) than practices (1.9/1,000 AEs) [IRR=1.7, 95%CI: 0.6-4.6]. Our findings indicate that most injuries caused girls' high school soccer players to miss ≤7 days of athletic participation, and rates were higher in games than practices. Our findings suggest that special attention and resources might be directed toward minimizing game-related injuries, and particularly ankle and knee injuries.

34. THE EFFECT OF ACUTE CAFFEINE INGESTION ON PULMONARY FUNCTION DURING MAXIMAL STRENGTH TESTING

Riana L. Rohmann, Todd A. Astorino, Sondra Kelly
Department of Kinesiology, CSU San Marcos

Many studies show benefits of caffeine on endurance exercise performance, but relatively few have examined caffeine's potential for anaerobic exercise. The purpose of this study was to describe the effects of acute caffeine intake on cardiovascular function during one-repetition maximum (1-RM) testing. Nine experienced men (age = 23.22 ± 3.86 yr) ingested a caffeine (CAF) pill (6 mg/kg) or placebo (PL) 1 hr before testing in a random, double-blind design. Subjects refrained from caffeine and exercise 48 and 24 hr prior to testing. After a five minute warm-up, 1-RM was determined on the bench press and leg press. After 1-RM assessment, a 60 % load was put on the bar and subjects performed repetitions until fatigue. Heart rate and blood pressure (BP) were taken at rest and after the warm up, bench press, and leg press. From rest to exercise, there was a significant increase in HR ($F = 123.25$, $p < 0.001$), but no effect of treatment ($F = 3.03$, $p = 0.086$). There was a significant increase in systolic BP from rest to exercise ($F = 15.18$, $p < 0.001$) and a significant effect of caffeine ($F= 12.27$, $p = 0.008$). Mean resting, warm up, bench press, and leg press SBP with caffeine were 143.77 ± 10.98, 152.11 ± 10.95, 160.66 ± 5.65, and 161.0 ± 11.13 mm Hg, respectively, compared to 132.66 ± 12.23, 147.11 ± 9.55, 150.77 ± 5.89, and 155.11 ± 9.49 mm Hg, respectively, in the PL trial. There was a significant increase in diastolic BP ($F = 8.05$, $p < 0.001$) with exercise, but no treatment effect ($F= 3.06$, $p = 0.0624$) was demonstrated. It is likely that with a larger sample size, a significant effect of caffeine on resting HR and DBP would result.

36. USE OF TIME TRIAL POSITION AFFECTS MAXIMAL BUT NOT SUB-MAXIMAL VARIABLES IN WELL-TRAINED CYCLISTS

Tim Streeper, Roberto Quintana, Daryl Parker
Department of Kinesiology and Health Science, Sacramento State University, Sacramento, California

Competitive cyclists and triathletes frequently utilize equipment that places them in an aerodynamically enhanced position on the bicycle. While the use of this equipment has repeatedly shown reductions in drag, it is unclear whether the physiological variables associated with position negatively affect power output. **PURPOSE:** To determine the differences in power output during a GXT, between the road position, and the time trial position in well-trained cyclists. **METHODS:** Nine well-trained cyclists performed a maximal exercise test in both the road position (RD) and the time trial position (TT) to determine VO_2max and peak power (Wmax). Additionally, oxygen consumption (VO_2) power (W) and heart rate (HR) at the first and second ventilatory thresholds (VT1/VT2) were determined from the test data. Inclusion criteria for participation in this study required that each subject own and regularly ride both a standard road bicycle and a specific time trial bicycle. **RESULTS:** VO_2max and peak power were greater for RD (4.8±0.3 L•min^{-1}, 433±33 W) vs. TT (4.6±0.3 L•min^{-1}, 414±32 W) ($p<0.05$). No significant differences were found for VO_2, W or HR at either VT1 (3.5±0.4 L•min^{-}1, 278±41W, 152±16 bpm) vs. (3.4±0.3 L•min^{-}1, 278±31 W, 152±13 bpm) or VT2 (4.0±0.4 L•min^{-}1, 348±33 W, 166±14 bpm) vs. (4.1±0.3 L•min^{-}1, 352±36 W, 168±12 bpm) for RD vs. TT respectively ($p>0.05$). **CONCLUSIONS:** It appears that the use of the TT position significantly reduces VO_2max and Wmax. However the TT position does not have a significant effect on the sub-maximal variables VT1 and VT2. These data suggest that the TT position may impose a neural, mechanical or O_2 delivery limitation above VT2. Additionally, the findings of this research validate the use of threshold determination in the road position during a GXT for application to training in the time trial position.

37. THE EFFECTS OF REGULAR DAILY EXERCISE ON SERUM LIPID LEVELS IN ADULT MEN – A 20-YEAR STUDY

Masaru Teramoto, Lawrence A. Golding, FACSM
Exercise Physiology Laboratory, Department of Kinesiology, University of Nevada Las Vegas, Las Vegas, NV

Healthy male adults (n = 20; Initial Age = 30-60 yrs) were studied in a 20-year longitudinal study to investigate the effects of regular daily exercise on serum lipid levels. They were university faculty members and townspeople and had no history of coronary artery disease. The subjects participated in the adult exercise research program held at the university in which they met five days a week and continued for 20 years. They were asked to attend 80% of the time, which is 4 out of the 5 days. The actual attendance rate over the 20-year period was 3.5 times per week (70%) The exercise program was 50 minutes in duration and consisted of: 10 minutes of warm-up and stretching exercises, 15 minutes of strength and muscular endurance calisthenics, 15 minutes of aerobic step exercise, and 10 minutes of swimming. The exercises class was formally led and supervised by the instructors, and attendance was taken daily. Physical fitness testing and a comprehensive blood profile were done at the beginning and end of their first year of participating in the exercise program and at the end of each of the following years. The blood variables reported in this paper were: Total Cholesterol, HDL and LDL Cholesterol, Cholesterol/HDL ratio, Triglycerides, and Apolipoprotein A-1 and B. All of these blood variables improved significantly during the study ($p < 0.05$), however the largest change occurred during the first year. The changes varied from year to year but plateaued after about 5 years then remained at their improved level. At the end of 20 years, the subjects were 20 years older, which made the changes more dramatic since most serum lipids get worse with age.

38. ACUTE EFFECTS OF HEAVY-LOAD SQUATS ON CONSECUTIVE SQUAT-JUMP PERFORMANCE

Kurt R. Weber, Lee E. Brown FACSM, Jared W. Coburn, Steven M. Zinder
Human Performance Laboratory. California State University Fullerton, Fullerton, CA

Post-activation potentiation and complex training have generated interest within the strength and conditioning community in recent years, however much of the research to date has produced confounding results. The purpose of this study was to observe the acute effects of a heavy-load back squat (85% 1-RM) condition on consecutive squat-jump performance. Twelve in-season Division I male track-and-field athletes participated in 2 randomized testing conditions: a 5-repetition back squat at 85% 1-RM (BS), and a 5-repetition squat-jump (SJ). The BS condition consisted of 7 consecutive squat-jumps (BS-PRE), followed by 5 repetitions of the back squat at 85% 1-RM, followed by another set of 7 consecutive squat-jumps (BS-POST). The SJ condition was exactly the same as the BS condition, however 5 consecutive squat-jumps replaced the 5 back squats, with 3 minutes rest between each set. BS-PRE, BS-POST, SJ-PRE, and SJ-POST were analyzed and compared for mean and peak jump height, as well as mean and peak ground reaction force (GRF). A 2 X 2 repeated measures ANOVA revealed a significant ($P<0.05$) interaction for condition by time. The BS conditions' mean and peak jump height, and peak GRF increased 5.6%, 4.5%, and 4.8%, respectively; whereas the SJ conditions' mean and peak jump height, and peak GRF decreased 3.0%, 4.4%, and 1.6% respectively. The results suggest that performing a heavy-load back squat prior to a set of consecutive squat-jumps may enhance acute performance in average and peak jump height, as well as peak GRF.

39. EFFECT OF ELECTRODE SIZE ON BIOELECTRICAL IMPEDANCE (BIA) MEASURES

Wagner, D.R.
Health, Physical Education, & Recreation Dept., Utah State University, Logan, UT

Bioelectrical impedance analysis (BIA) is a noninvasive and rapid method for evaluating body composition. The accuracy of BIA can be affected by hydration status, posture, and electrode placement. Cutting electrodes in half has become a common cost-saving practice in some labs. The purpose of this study was to determine if this practice alters BIA measures. Electrodes were applied in a tetrapolar configuration according to the manufacturer's (Quantum II, RJL Systems) guidelines with participants (15 male, 15 female; aged 22.9 ± 2.3 y; height 175.1 ± 10.7 cm; weight 78.8 ± 24.9 kg) in a supine position. Two trials, one using full-size electrodes (1" x 1"; 2.54 cm x 2.54 cm) and one with electrodes cut in half (0.5" x 1"; 1.27 cm x 2.54 cm), were administered immediately after one another in a randomized fashion. Resistance values using the whole electrode (511.9 ± 98.9 Ω) and half electrode (511.3 ± 99.2 Ω) were strongly correlated (r = 0.998) and not significantly different ($t_{29} = 0.51$, $p = .61$). Additionally, a narrow 95% CI (-1.7 to 2.8 Ω) indicated good individual precision. Subsequent estimates of total body water (TBW) and fat-free mass (FFM) from the Sun et al. (2003) equation were not significantly different (TBW: $t_{29} = -0.45$, $p = .65$; FFM: $t_{29} = -0.43$, $p = .67$) between trials. Likewise, estimates of body fat percentage were nearly identical between whole electrodes (23.4 ± 6.7%) and half electrodes (23.3 ± 6.7%). These findings suggest that cutting BIA electrodes in half will not significantly affect body composition assessments.

40. EFFECT OF ACIDEMIA ON OXYGEN UPTAKE KINETICS DURING HIGH-INTENSITY CYCLING

Karen M. Wooten and Fred W. Koklhorst, FACSM
Department of Exercise and Nutritional Sciences, San Diego State University

Previous studies have demonstrated that the mean response time (MRT) was faster for the second of two bouts of high-intensity cycling, which has been attributed to acidemia caused by the initial bout. The purpose of this study was to examine the role of acidemia on the MRTs of two bouts of high-intensity cycling that were separated by a short- or long-recovery period. On separate days, 9 well-trained, male cyclists performed two 6 min high-intensity cycling bouts separated by low-intensity cycling (30% of $\dot{V}O_{2max}$) for either 6 min or until blood pH returned to baseline levels (28.2 ± 5.8 min). Each trial was repeated twice. Blood pH was measured before each bout and throughout the long recovery period. $\dot{V}O_2$ was measured continuously via breath-by-breath analysis and the data were fit to a monoexponential non-linear regression model. For the 6-min recovery trial, MRT of the two bouts decreased from 59.6 ± 9.3 s to 46.1 ± 8.0 s ($P = 0.002$); for the long-recovery trial, MRT also decreased from 57.6 ± 10.0 s to 49.5 ± 5.6 s ($P = 0.002$). The length of recovery time did not influence the MRTs of the second bouts as they did not differ ($P = 0.475$) even though blood pH at the start of the second bout was lower for the short-recovery trial (7.36 ± 0.05 s) than the long-recovery trial (7.44 ± 0.06) ($P = 0.001$). These results indicated that acidemia may not influence the $\dot{V}O_2$ kinetics at exercise onset, which suggests that the mechanisms to explain the faster $\dot{V}O_2$ kinetics for the second bout is located in the mitochondria. However, as MRT offers only a general characterization of the $\dot{V}O_2$ response, further investigations involving higher resolution data collection and bi-exponential modeling procedures may offer more insight into the mechanistic nature of this response.

41. ASSOCIATION BETWEEN PHYSICAL ACTIVITY AND INCIDENT OSTEOPENIA IN FEMALE COLLEGE STUDENTS

Lee, CD and H Choi
Department of Exercise and Wellness, Arizona State University, Mesa, AZ

Background: Whether physical activity relates to incident osteopenia across race, gender and age groups remains less clear. **Objectives**: We investigated the association of physical activity to incident osteopenia in 121 Korean female college students, aged 18 to 34 years. **Methods**: We measured physical activity (PA) using the modified Heyward's questionnaire. PA was further classified as low, moderate, and high activity categories based on weekly energy expenditure (METs/hours/week). Bone mineral density was measured by Quantitative Ultrasonography (QUS), and was classified as normal (T-score > -0.99) and osteopenia (T-score between -1 and -2.5) by following the WHO guidelines. **Results**: After adjustment for age, physical activity was inversely associated with incident osteopenia in female college students (p for trend = 0.01). Moderately and highly active female students had 78% [(95% confidence interval (CI): 0.07, 0.65)] and 75% (95% CI: 0.08, 0.74), respectively, lower odds of having osteopenia as compared with inactive female students. We observed similar results after additional adjustment for multiple risk factors (cigarette smoking, overweight, dietary habits, and alcohol consumption) (p for trend = 0.01). Highly active female students had 78% (95% CI: 0.07, 0.70) and moderately active students had 77% (95% CI: 0.07, 0.70) lower odds of having osteopenia when compared with inactive female students. **Conclusions:** We conclude that an increased physical activity is inversely associated with lower odds of having osteopenia in Korean female college students.

43. THE RELATIONSHIP BETWEEN LEISURE PHYSICAL ACTIVITY AND LIPOPROTEIN SUB-CLASSES IN POST-MENOPAUSAL WOMEN: THE INFLUENCE OF HORMONE THERAPY

Kelley K. Pettee, Andrea M. Kriska, B.Delia Johnson, Molly B. Conroy, Rachel H. Mackey, Trevor J. Orchard, Lewis H. Kuller
Department of Epidemiology, University of Pittsburgh; Department of Exercise and Wellness, Arizona State University

After menopause, women experience increased risk of cardiovascular disease, due in part to worsening lipid profiles. An increase in physical activity (PA) levels and hormone therapy can favorably alter lipids. **PURPOSE:** To determine the association of PA and lipoprotein sub-classes in post-menopausal women on and off hormone therapy (HT). **METHODS:** Subjects for this cross-sectional analysis included 485 postmenopausal (mean age 56.9 ± 2.9 years) Caucasian and African-American women from the Woman On the Move through Activity and Nutrition (WOMAN) study. Based on self report, women were grouped as HT users or non-users. PA was collected using a validated past year, interviewer administered questionnaire. Lipoprotein sub-classes were measured with nuclear magnetic resonance (NMR) spectroscopy. Multivariate linear regression models were constructed to examine the association between PA and lipoprotein subclasses after adjustment for potential confounders. An interaction term was added to the regression models to determine HT stratification. Multivariate linear regression models and linear tests for trend were used to further explore this relationship by HT use. **RESULTS:** HT users (n=286) were significantly ($p<0.05$) younger, less likely to be African American, reported higher levels of PA large VLDL particles (VLDL-P), and medium HDL particles (HDL-P), had a larger mean HDL particle size, and lower levels of total cholesterol, LDL cholesterol (LDL-C), small HDL-P, and small VLDL-P than non users (n=196). PA was significantly associated with favorable lipoprotein and lipid levels, regardless of HT use. Some relationships were found to vary significantly by HT use. In non-users, mean HDL and LDL particle size was significantly smaller and total and small LDL particles (LDL-P) were significantly lower as activity increased. These relationships were not found in HT users. **CONCLUSIONS:** As more postmenopausal women choose to forego or discontinue HT, participation in leisure PA for reducing lipid levels is recommended.
Supported by NIH Grant: R01HL66468

42. INFLUENCE OF BICYCLE SEAT PRESSURE ON COMPRESSION OF THE PERINEUM: AN MRI ANALYSIS

Bressel, E[1]., T. Reeve[1], D. Parker[2] and J. Cronin[3]
[1]Biomechanics Laboratory, HPER Department, Utah State University, Logan, UT; [2]Cache Valley Specialty Hospital, Logan, UT; [3]Auckland University of Technology, New Zealand

It is a common belief that bicycle seat pressure compresses neurovascular tissues in the perineum and may lead to perineal and penile pathologies in male cyclists. The purpose of this study was to examine the effect bicycle seat pressure has on compression of the perineal cavernous spaces, which house the penile neurovascular tissues. A second purpose was to identify where peak cavernous compression occurs in relation to a bicycle seat. Five males were assessed for compression of the corpus spongiosum and corpora cavernosa with and without bicycle seat pressure using MRI. Seat pressure was applied using a custom loading device designed to replicate seat pressure recorded during stationary bicycling. The distance between a horizontal midline of the seat and the point of peak cavernous space compression was made on sagittal plane images. Diameter measurements of the cavernous spaces at the point of peak compression were made on coronal plane images. Results revealed that peak cavernous space compression occurred below the pubic symphysis; 40.7 (± 11.4) mm anterior to the midline of the seat. Corpus spongiosum values in the unloaded condition were 148% greater than the loaded condition ($p = 0.008$). Similarly, the left and right corpora cavernosa values for the unloaded condition were 252% and 232% greater, respectively, than the loaded condition ($p = 0.02$-0.03). Cavernous spaces that house penile arteries and nerves were compressed maximally below the pubic symphysis. Because this location of peak compression was not different between subjects, it may be a universal impingement zone that limits blood flow and neural activity to and from the penis. This information can be used to optimize seat design and thus reduce perineal injuries.

44. DELAYED GLUCOSE RESPONSE IN THE RAT MODEL: MORE EVIDENCE THAT A HIGH PROTEIN DIET ALTERS GLUCOSE KINETICS

Sanchez, R.M.[a], Young, J.C.[b] FACSM, Kruskall, L.J.[c] FACSM, Benyshek, D.C.[a]
[a] Departments of Anthropology, [b] Kinesiology, and [c] Nutrition, University of Nevada, Las Vegas

Based on previous findings that the insulin response to a 2 hour oral glucose tolerance test (OGTT) was altered in rats fed a high protein diet (Sanchez et al., 2006), the purpose of this study was to determine the effects of a high protein diet on glucose kinetics by extending the OGTT beyond 2 hours. Eight Sprague Dawley rats were fed a high protein (HP) diet (65% protein, 35% fat) and seven rats consumed a standard chow (SC) diet. An OGTT was performed at the end of the seventh week on the diet. Blood was collected by tail bleeding at 0, 15, 30, 60, 120, 150, and 180 minutes after dosing with a 2 g/kg of 50% dextrose solution. Glucose tolerance was impaired by the high protein diet (SC = 16113 ± 460 mg/dl/180 min; HP = 17728 ± 254 mg/dl/180 min; $p < 0.05$) as reflected by the area under the glucose concentration curve. In contrast, the area under the insulin concentration curve was not effected by the high protein diet (SC = 108.48 ± 15.44 ng/ml/180 min; HP = 87.99 ± 10.96 ng/ml/180 min). Peak glucose response was delayed in the high protein diet group (SC = 30 minutes at 105 ± 2 mg/dl; HP = 60 minutes at 114 ± 4 mg/dl). Body mass was significantly greater in the control group from the initial to final weighing (SC = 253 ± 4 g to 283 ± 5 g; HP = 245 ± 4 g to 258 ± 4 g; $p < 0.05$) and hemoglobin A1C was significantly lower in the high protein diet group (SC = 3.4 ± 0.1 %; HP = 3.1 ± 0.1 %; $p < 0.05$). These findings suggest that a high protein diet alters glucose kinetics as evidenced by an increased area under the glucose concentration curve and a decrease in hemoglobin A1C.

45. EFFECT OF CARBOHYDRATE SUPPLEMENTATION TYPE ON ENDURANCE CYCLING PERFORMANCE IN COMPETITIVE ATHLETES

Caitlin Campbell[1], Diana Prince[1], Marlia Braun[1], Elizabeth Applegate, FACSM [2] and Gretchen A. Casazza[1]
[1]Sports Performance Laboratory, Sports Medicine Program, University of California, Davis, CA. [2]Department of Nutrition, University of California, Davis, CA

PURPOSE: To determine the effect of carbohydrate supplementation type on endurance cycling performance. METHODS: On four separate days, seven male (35.9 ± 2.8 yrs) and seven female (33.7 ± 2.3) athletes cycled at 75% VO_2peak for 80 min followed by a 10 kilometer time trial. Subjects consumed isocaloric (CHO)(5.9% or 0.6 grams of CHO per kg, per hour) amounts of randomly assigned sport beans (SB), drink (SD), gel (SG) or water only, before, during and after exercise. Fluid intake (7 ml/kg before and after and 3.5 ml/kg every 20 min during exercise) was kept constant for all trials. Heart rate (HR), rate of perceived exertion (RPE), respiratory exchange ratio (RER) and blood glucose and lactate concentrations were collected before, during, and following exercise. RESULTS: There were no differences in HR, RPE, RER or blood lactate responses between treatments. VO_2 was higher for all the CHO groups compared to water during the time trial, but was not different between CHO types. Blood glucose concentrations were similar at rest between treatments and decreased significantly during exercise with the water trial only. Blood glucose concentrations for all CHO supplements were significantly, $p < 0.05$, higher than water during the 80 min exercise bout and during the time trial (99.8 ± 5.3 mg/dl for SB, 98.6 ± 5.4 mg/dl for SD, 105.1 ± 8.1 mg/dl for SG and 79.6 ± 5.1 mg/dl for water). There were no significant differences between CHO treatments. All 3 CHO treatments had significantly faster 10K time trials (17.3 ± 0.6 min for SB, 17.3 ± 0.7 min for SD, 17.1 ± 0.6 min for SG) versus water (17.9 ± 0.9 min). CONCLUSIONS: All carbohydrate supplementation types (sports beans, drinks or gel) were equally effective in maintaining blood glucose levels during exercise and improving exercise performance compared to water only.

47. PRELIMINARY ANALYSIS OF THE KINEMATIC COMPARISON OF RUNNING BAREFOOT AND IN THE NIKE FREE 5.0 ON A TREADMILL

Griffin, JR; Mercer, JA, FACSM; Dufek, JS, FACSM
Department of Kinesiology, University of Nevada, Las Vegas

PURPOSE: The purpose of this study was to determine if knee and ankle kinematics during running were similar when running in barefeet and while running in a shoe designed to mimic barefoot running. **METHODS:** Ten footfalls per subject-condition were evaluated kinematically using a 12-camera Vicon motion capture system (120 Hz) for 9 female runners (26.9 ± 4 yrs, 63.7 ± 5.9 kg, 168 ± 7.5 cm) at 4 times within two 8 minute conditions (barefoot and wearing test shoes) on a treadmill. Six knee and ankle variables representing impact and stance kinematics were evaluated across conditions and times. For each stance phase of a stride, knee and ankle flexion angle data were normalized to time of stance phase. A spanning set analysis was conducted using these data sets in order to determine the joint variability for each time-condition. Each dependent variable (knee, ankle kinematics, spanning sets) was analyzed using a 2 (footwear) x 4 (time) repeated measures ANOVA. **RESULTS:** There were no significant ($p > 0.05$) interactions (time x footwear) for any of the variables nor for the main effect of time, suggesting no adaptation to either condition over time. There was a significant main effect of footwear for ankle angle at contact, barefoot more plantarflexed; peak knee angle, barefoot more extended; and peak knee angular velocity, barefoot slower ($p<0.05$). There was no significant effect of footwear for knee angle at contact, timing in stance of peak knee angle or peak knee angular velocity, or the variability of the knee or ankle angles ($p>0.05$). **CONCLUSION:** There were some aspects of the kinematics that were different between the test shoes and barefoot running. However, from this analysis of the knee and ankle kinematics, it is concluded that the knee and ankle kinematics were similar during running with and without the test shoes.

46. EFFECT OF ORAL CONTRACEPTIVE USE ON EXERCISE PERFORMANCE IN ENDURANCE ATHLETES

Yunan Wu, Massimo Testa, Gina Lokna and Gretchen A. Casazza
Sports Performance Laboratory, University of California, Davis, Medical Center Sports Medicine Program, Sacramento, CA

Purpose: Oral contraceptives (OC) are widely used by female athletes, but the effects of OC on exercise performance are unclear. Therefore, the purpose of this study was to determine the effects of a triphasic OC on exercise performance in female endurance athletes using a longitudinal study design. **Methods:** Four eumenorrheic women (24.8± 1.0 years) were studied before and after 1, 2, 4 and 6 months of OC. Resting blood samples were collected for hemoglobin, hematocrit and blood lipid concentrations. Exercise testing consisted of a graded exercise test on a cycle ergometer to determine peak oxygen consumption (VO_2peak), heart rate (HR) and blood lactate concentrations. After a 30 min rest period, subjects rode to exhaustion at 90% of VO_2peak. **Results:** During the 6 months of OC treatment, there were no changes in body composition, diet composition or training hours per week. There were also no changes in hemoglobin, hematocrit, total cholesterol, triglycerides or HDL cholesterol. After 6 months of OC use there was a significant, $p < 0.05$, increase in LDL cholesterol (102.3 ± 3.8 mg/dl pre OC vs. 118.3 ± 5.5 mg/dl 6 mo OC) and a decrease in VO_2peak (47.9 ± 3.2 ml·kg-1·min-1 pre OC versus 44.4 ± 2.8 ml·kg-1·min-1at 6 month OC). Time to exhaustion was reduced, $p < 0.05$, with OC use (13.8 ± 1.2 min-pre OC, 7.1 ± 2.2 min-2 month OC, 4.7 ± 2.4 min-4 month OC and 6.2 ± 3.2 min-6 month OC, respectively). **Conclusion:** Six months of oral contraceptive intake in eumenorrheic, female athletes, resulted in a 1) 7% decrease in VO_2peak 2) and a 55% decrease in time to exhaustion at 90% of VO_2peak.

48. INTERRUPTED AND UNINTERRUPTED RESISTANCE TRAINING INCREASES BONE MINERAL DENSITY IN RATS

Brittany M. Goettsch, Margo Z. Smith, Jennifer A. O'Brien, Gregory V. Gomez, S. Victoria Jaque*, and Ken D. Sumida
Department of Biological Sciences, Chapman University; *Department of Kinesiology, California State University, Northridge

The purpose of this study was to examine the efficacy of interrupting a daily resistance training program for enhancing bone remodeling and bone mineral density (BMD) in male rats. We compared a resistance training program, previously observed to augment BMD, where the exercise was uninterrupted (i.e., continuous repetitions) against a resistance training program where the exercise was interrupted (3 times during a training day). The total volume of work performed between the two resistance training programs was equivalent by design. Twenty-four male rats were randomly divided into a Control (Con, n=8), an uninterrupted resistance trained group (UT, n=8), and an interrupted resistance trained group (IT, n=8). The UT and IT groups were conditioned to climb a vertical ladder with weights appended to their tail 3 days/week for 6 weeks. All exercised animals initially carried 30% of their body weight (BW) and progressed to 150% BW by the beginning of week 5 and maintained the training weight for the final 2 weeks of the training regimen. All animals were sacrificed 72 hours after the last training bout. Serum osteocalcin (OC), urinary deoxypyridinoline (DPD) adjusted by creatinine, and tibial BMD (using dual energy x-ray absorptiometry) were determined in all groups. OC was not significantly different between groups. In contrast, the adjusted DPD (DPD in nmol/L divided by creatinine in mmol/L) was significantly lower for both UT (81.03 ± 5.53) and IT (88.30 ± 7.29) compared to Con (128.13 ± 9.99). Left tibial BMD was significantly greater for UT (0.222 ± 0.005 g/cm^2) and IT (0.219 ± 0.003 g/cm^2) when compared to Con (0.205 ± 0.004 g/cm^2). There was no significant difference in the adjusted DPD or BMD between UT and IT. The results indicate that both resistance training programs were equally effective in implicating an osteogenic response that culminates in a significant elevation in BMD.

49. CASE STUDY: DYNAMIC TIBIAL FORCES AT VARIOUS BODY WEIGHT LEVELS USING LOWER BODY POSITIVE PRESSURE TREADMILL EXERCISE

*Macias, B R; **D'Lima, D D; **Patil S; **Steklov N; **Colwell C W; Neuschwander T B; *Meuche S; *Cutuk A; *Hargens A R
* Department of Orthopaedic Surgery, University of California, San Diego, California; **Orthopaedic Research Laboratories, Shiley Center for Orthopaedic Research & Education at Scripps Clinic, La Jolla, California

Previous studies have documented peak tibial forces during various daily activities. The objective of this study was to determine in vivo axial compressive force on the tibia, vertical ground reaction force (GRF), and knee range of motion (ROM) during precisely-controlled, body weight levels using lower body positive pressure (LBPP) treadmill exercise. A 68-kg, 83-year-old man was instrumented with a custom instrumented titanium alloy tibial prosthesis placed during total right knee replacement surgery. The subject's lower body was positioned in a LBPP chamber. Data were collected at 10%, 20%, 40%, 60%, 80%, 100% body weight (BW) at 1.5 mph and 3.0 mph. The tibial prosthesis was instrumented with a force transducer, power induction coil, microtransmitter, and antenna to calculate total force. Peak force and ROM data of the knee were determined for each gait cycle. Dynamic knee ROM was measured using an electrogoniometer placed about the center of rotation of the subject's right knee. The vertical component of the GRF was measured using calibrated, force-sensitive insoles placed in the subject's right shoe. Appropriate institutional review board approval and the patient's consent were obtained. Total axial force at the knee increased linearly as a function of BW at 1.5 mph, $y=9.8x+245$ ($R^2=.90$) and 3.0 mph, $y=12.8x+267$ ($R^2=0.98$). GRF on the right foot increased linearly as a function of BW at 1.5 mph, $y=23.1x-3$, ($R^2=.99$) and at 3.0 mph, $y=18.9x+296$, ($R^2=.94$). Knee ROM increased linearly at both 1.5 and 3.0 mph. This is the first in vivo measurement of tibial forces during LBPP exercise. Although these data are from one subject, tibial forces and ground reaction forces correlate highly and linearly as a function of BW. Therefore, LBPP exercise may enable orthopedic patients to unload their lower extremities at precise body weight levels.

50. RELIABILITY OF ENERGY EXPENDITURE DURING THE PHYSICALLY INTERACTIVE VIDEO GAME DANCE DANCE REVOLUTION®

Lyndsi Johnson, Biray Alsac, Pamela Swan
Department of Exercise and Wellness, Arizona State University, Polytechnic Campus

This study evaluated the inter-day and intra-day reliability of energy expenditure (EE) elicited during repeated bouts of Dance Dance Revolution® (DDR®), a dance simulation video game. Twenty-one participants (14 females and 7 males), mean age 24 ± 2.4 years, volunteered for the study. All participants were healthy, fit (mean estimated VO_2 = 50.3 ± 7.2 $ml.kg^{-1}min^{-1}$), and novice users of the game (≤ 10 occasions). Participants individually selected 7 songs of their preference corresponding to the "light mode" (easiest) of DDR Maxx 2®. Participation in the study included three familiarization and practice sessions and two DDR® testing sessions. Metabolic data was collected for 10 minutes of game play. A test, re-test study design was employed to explore inter-day (Trials- A_1-C_2) and intra-day (Trials A_1-B_1 or Trials B_2-C_2) differences in EE. All participants completed a total of three testing trials on two separate days, the first trial (A_1) on testing day one and the third trial (C_2) on testing day two. Day of completion of the second trial was randomly assigned (B_1 or B_2). Inter-session differences in EE were assessed between sex using a two group (sex) by three factor (trial A_1, $B_{combined}$, and C_2) repeated measures ANOVA revealing no significant difference. Further analysis of intra-day energy expenditure (trial A_1 and trial B_1, or trial B_2 and trial C_2) also revealed no significant difference ($p > .05$). Very small (≈ 0.3 $kcal.min^{-1}$) but statistically significant difference ($p = 0.021$), was detected in inter-day energy expenditure (A_1= 3.0 ± .2 $kcal.min^{-1}$ and C_2 = 2.7 ± .2 $kcal.min^{-1}$). However these trials were highly correlated ($r = 0.85$, $p = 0.001$). In summary, playing DDR® elicited very similar EE responses between sessions. Fitness professionals can confidently prescribe DDR as a viable alternative physical activity for health.

AUTHOR INDEX

MacRae	PG	11
MacRae	H S-H	12,22
Magpantay	LD	24
Malek	MH	26
Mangus	BC	14
Maresh	CM	21
Margolis	Z	25
Marshall	SJ	13
McClain	JJ	27
McKinley	E	19
Menning	H	12
Mercer	JA	4,14,47
Meuche	S	49
Mielke	M	26
Montgomery	S	9
Morley	E	28
Moy	KL	29
Neuman	TS	5
Neuschwander	TB	49
Nguyen	D	16,23,31
Nichols	JF	13,35
O'Brien	JA	48
Orchard	TJ	43
Organist	GL	30
Parker	D	19,29,36,42
Patil	S	49
Pettee	KK	43
Podlecki	DM	32
Poeppel	DI	10
Pound	K	19
Prince	D	33,45
Quintana	R	19,29,36
Rauh	MJ	13,35
Reeve	T	42
Rohmann	RL	3,34
Roth	S	10
Sanchez	RM	44
Schmidt	RJ	26
Skillen	RA	8
Sloane	C	5
Smith	MZ	48
So	H	6
Spiereing	BA	21
Stahl	D	19
Steklov	N	49
Stone	WJ	1
Streeper	T	36
Sumida	KD	48
Swan	P	50
Teramoto	K	14
Teramoto	M	37
Testa	M	8,33,46
Tudor-Locke	C	27
Vehrs	PR	7
Vilke	GM	5
Volek	JS	21
Wagner	DR	39
Washington	TL	27
Weber	KR	38
Wilkin	LD	6
Willis	W	28
Wooten	KM	40
Wu	Y	46
Yamamoto	LM	21
Yanowitz	FG	7
Yoon	J	11
Young	JC	44
Zimmerman	J	10
Zinder	SM	2,16,23,31,38