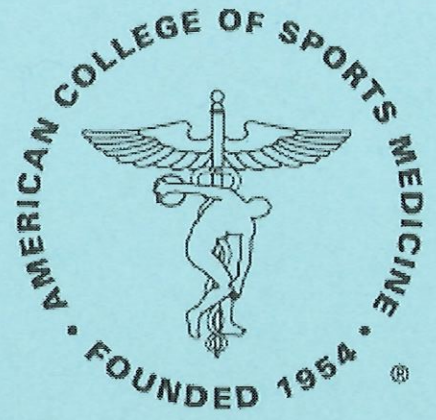

2006 Annual Meeting

Central States Chapter
of the
American College of Sports Medicine

October 19-20, 2006
Embassy Suites
Kansas City, MO

CONTENTS

2006 Central States Chapter of the American College of Sports Medicine Meeting Sponsors

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American College of Sports Medicine-
Central States Chapter Annual Meeting
Embassy Suites, Kansas City, Missouri

October 19, 2006

12 – 1	Registration	Lobby/Atrium
1 – 1:15	Joe Pujol, Ed.D., FACSM Welcome and Announcements	Morelia I
1:15 – 2:15	Raul Artal, M.D., FACSM St. Louis University School of Medicine *Exercise in Pregnancy: Should Pregnancy be a State of Confinement?* ***Sponsored by GE Healthcare***	Morelia I
2:15 – 2:30	Break	
2:30 – 3:15	Pam Hinton, Ph.D. University of Missouri *Energy Balance and Bone Turnover* Presider: Kenneth Turley, FACSM, Harding University ***Sponsored by the Midwest Dairy Council***	Morelia I
	Robert Gregory, Ph.D. University of Kansas *Biomechanics of muscular effort: effects of aging* Presider: Michael Rogers, FACSM, Wichita State University	Morelia II
3:15 – 4:00	Debra Bemben, Ph.D., FACSM University of Oklahoma *Mechanical Loading and Bone Loss in Postmenopausal Women* Presider: Kenneth Turley, FACSM, Harding University ***Sponsored by the Midwest Dairy Council***	Morelia I
	Tom Baechle, Ph.D. Creighton University *The Professional Preparation and Credentialing of Strength and Conditioning Specialists and Personal Trainers* Presider: Joel Cramer, University of Oklahoma ***Sponsored by the National Strength and Conditioning Association Certification Commission***	Morelia II
4:00 – 5:30	**Student Oral Research Presentations** Presider: Ken Turley, FACSM, President-Elect	Morelia I

(continued)

5:30 – 6:30	**Poster Session** Presider: Ken Turley, FACSM, President-Elect Poster set-up begins at 4:30 pm Presenters are to be present from 5:30 to 6:30	Vera Cruz
5:30 – 6:30	**Chapter Social**	Vera Cruz
6:45 – 8:00	Central States Administrative Council Meeting Barbara Bushman, FACSM, President	Vera Cruz

October 20, 2006

8:45 – 9:00	Joe Pujol, Ed.D., FACSM Announcements	Morelia I
9:00 – 10:00	Matt Green, Ph.D., FACSM University of Alabama *Pacing and Performance: Exploring Current Knowledge* Presider: Jeremy Patterson, Wichita State University ***Sponsored by Hans Rudolph, Inc.***	Morelia I
10:00 – 10:50	David Dzewaltowski, Ph.D. Kansas State University *Community Opportunities to Promote Physical Activity* Presider: Jeremy Barnes, Southeast Missouri State University	Morelia I
10:50 – 11:00	Break	
11:00 – 11:45	Melissa Bopp, Ph.D. Kansas State University *Promotion of Physical Activity Among the Elderly* Presider: Jeremy Barnes, Southeast Missouri State University	Morelia I
12:00 – 1:30	Lunch Janet Walberg Rankin, Ph.D., FACSM Virginia Tech University *The Best Diets for Weight Loss* ***Sponsored by Gatorade Sport Science Institute***	Vera Cruz
1:30 – 2:15	**Professional Business Meeting**	Morelia I
	Student Meeting Matt Green, Ph.D., FACSM University of Alabama *Perceived Exertion: Applications in Exercise Testing and Prescription* Presider: Michelle Gray, Student Representative	Morelia II

(continued)

2:15 – 3:45 **Evidence Based Programs to Address Childhood Obesity** Morelia I

Bryan K. Smith, PhD, CSCS
Childhood Obesity: Current Prevalence Rates.

Brianne Guilford, MA
Kansas Get Moving! A Behaviorally Based, Minimal Intervention, Physical Activity and Nutrition Program for Children

Jessica Silva, MS
Physical Activity Across the Curriculum (PAAC) – A classroom-based approach to reduce sedentary behavior in elementary school children.

Jeannine Goetz, MS, RD, LD
Promotion of Physical Activity and Healthy Snacks within YMCA After School Programs.

Bryan K. Smith, PhD, CSCS
The University of Kansas/Children's Mercy Hospital Center for Physical Activity, Nutrition, and Weight Management.
University of Kansas Energy Balance Laboratory & The Center for Physical Activity & Weight Management, Schiefelbusch Life Span Institute

Presider: Mark Langenfeld, FACSM, Southeast Missouri State University

2:15 – 3:15 Stephen Sayers, Ph.D. Morelia II
University of Missouri
Resistance Training in Older Adults: Does Velocity Matter?
Presider: Dr. Robert Gregory, University of Kansas

3:15 – 4:15 Brady Redus, Ph.D. Morelia II
Considerations for Resistance Training of Older Adults
University of Central Oklahoma
Presider: Stephen Sayers, University of Missouri

2006 CSC/ACSM Administrative Council Members

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Arkansas State Rep.	Vacant
Student Rep.	Michelle Gray, University of Arkansas Department of Health Science, Kinesiology, Recreation, and Dance HPER Building Fayetteville, AR, 72701 rgray@uark.edu

LEARNING OBJECTIVES

Intended Audience
ACSM members, students and professionals interested in the field of sports medicine and exercise science.

Learning Objectives
At the conclusion of this activity, participants should be able to:

- Recognize contemporary controversial issues related to sports medicine, exercise science, and health promotion
- Identify new approaches to, and perspectives on, problems in exercise science, sports medicine, and health promotion through interaction among scientists and clinicians in related fields.
- Recognize the importance of research in understanding problems related to physical inactivity.

Statement of Need
A need for this annual program has been determined by CSC/ACSM Board Members as well as evaluations from previous annual meetings.

CEC Credit
The American College of Sports Medicine's Professional Education Committee certifies that this Continuing Education offering meets the criteria for 12.0 credit hours of ACSM Continuing Education Credit. Individuals who wish to receive CEU's must complete an attendance verification form and send it to the National Office along with the appropriate fee ($15.00 ACSM members and $20.00 for non-members).

DOCTORAL STUDENT RESEARCH AWARD WINNER

Free Communication/Slide – October 19, 4:00-4:15 pm

EFFECTS OF A HIGH-FAT MEAL ON PULMONARY FUNCTION IN HEALTHY SUBJECTS

S.K. Rosenkranz, D.K. Townsend, S.E. Steffens, J. Wright, and C.A. Harms, FACSM.
Department of Kinesiology, Kansas State University, Manhattan, KS

Obesity has important health consequences, including being a risk factor for heart disease, diabetes, and cancer. A high-fat diet is known to contribute to obesity. To date, little is known regarding the effect of a high-fat diet on pulmonary function, despite the dramatic increase in the prevalence of respiratory ailments (e.g., asthma). **PURPOSE:** The purpose of our study was to determine whether a high-fat meal (HFM) would increase airway inflammation and decrease pulmonary function in healthy subjects. **METHODS:** Pulmonary function tests (PFT)(forced expiratory flow in 1-sec, forced vital capacity, forced expiratory flow at 25-75% of vital capacity) and exhaled nitric oxide (eNO; a marker of airway inflammation) were performed in 20 healthy (10 men, 10 women), non-asthmatic sedentary subjects (age 21.9±0.4 yrs) prior to and 2 hours following a HFM (1 gm fat/1 kg body weight; 74.2±4.1 gms of fat). Total cholesterol, triglycerides, and C-reactive protein (CRP; systemic inflammation) were also determined via a venous blood sample pre and post HFM. Body composition was measured via Dual Energy X-ray Absorptiometry. **RESULTS:** The HFM significantly increased total cholesterol by 4±1%, and triglycerides by 93±3%. Exhaled NO also increased ($P<0.05$) due to the HFM by 19±1% (pre: 17.2±1.6 ppb; post: 20.6±1.7 ppb). Baseline and post HFM, eNO and triglycerides were significantly related ($r= 0.82, 0.72$ respectively). Despite the increased eNO, PFT or CRP did not change ($P>0.05$) with the HFM. **CONCLUSIONS:** These results demonstrate for the first time that a high-fat meal, which leads to significant increases in total cholesterol and especially triglycerides, increases airway inflammation. This suggests that a high-fat diet, in addition to other health consequences, may also contribute to chronic inflammatory diseases of the airway and lung.

DOCTORAL STUDENT RESEARCH RUNNER-UP

Free Communication/Slide – October 19, 4:15-4:30 pm

EFFECTS OF FATIGUE AND TRAINING STATUS ON TORQUE AND VOLUNTARY ACTIVATION OF THE TRICEPS SURAE

M.J. Hartman, J.T. Cramer, E.D. Ryan, and M.G. Bemben, FACSM.
Department of Health and Exercise Science, University of Oklahoma, Norman, OK 73019;
email: michael.hartman@ou.edu

PURPOSE: This study compared the effects of fatigue of the triceps surae on peak torque and voluntary activation in untrained and resistance-trained men. **METHODS**: Six men (mean±sd: age: 25.8±4.9 years; height: 177.1±8.7 cm; body mass: 73.6±8.7 kg) with no previous experience of resistance training and eight men (23.5±1.1 years; 175.9±7.7 cm; 78.1±6.2 kg) with similar histories of chronic resistance training (9.8±5.9 years, 3.8±0.7 days/week) volunteered for this study. Voluntary activation (VA%) of the triceps surae was assessed using the interpolated twitch method. Following determination of the maximal compound action potential, subjects performed an isometric maximal voluntary contraction (MVC) before and immediately following a bout of fatiguing exercise. The fatiguing exercise was unilateral dynamic isotonic contractions of the plantarflexors, with a load equal to 40% of MVC, performed until volitional exhaustion. Comparison of the twitch torque amplitude of an interpolated supramaximal twitch (doublet) delivered during the torque plateau of the MVC to a supramaximal twitch (doublet) delivered at rest was used to estimate VA%. Measurement of completeness of activation was quantified by determining central activation ratio (CAR). A two-factor repeated measures ANOVA was used to determine differences between groups and time. **RESULTS**: The resistance-trained (RT) men produced significantly greater levels of force before and after the fatiguing exercise bout ($p<0.05$). There was a significant reduction in MVC torque in both the untrained (UT) and RT men as a result of the fatiguing exercise bout (-10.7±6.8%, $p<0.02$; -9.1±8.7%, $p<0.02$, respectively), with no difference in the number of repetitions performed between groups (40.6±6.3 and 40.8±3.5; $p>0.05$). Both the UT and RT men experienced a significant decrease in VA% following the fatiguing exercise bout (90.5±8.0% to 78.2±15.3%, p=0.03; 96.1±4.7% to 88.8±12.1%, p=0.045, respectively). The UT men also experienced a significant decrease in CAR (99.5±0.8% to 91.4±6.4%, p=0.025) with no change ($p>0.05$) in the RT group. However, no differences were determined between groups ($p>0.05$) for either VA% or CAR. **CONCLUSION**: Despite the similar number of repetitions completed at the same relative load and similar reductions in MVC torque post-exercise, the UT men had a significant decrease in CAR ($p<0.05$) and experienced nearly twice the decline in VA% than the RT men (-14.2±11.8% vs. -7.8±9.3%, respectively). These results indicate that the neural adaptations associated with chronic resistance training may lead to less susceptibility to central fatigue as measured by VA% and CAR.

Free Communication/Slide – October 19, 4:30-4:45 pm

DOSE REPONSE EFFECTS OF CAFFEINE ON EXERCISE IN YOUNG CHILDREN

J.R. Bland, M.D. Holeman, J.A. Wilson, B.L. Phillips, Ph.D., W.J. Evans, Ph.D., and K.R. Turley, Ph.D., FACSM, Human Performance Laboratory, Harding University, Searcy, AR; krturley@harding.edu

Only three studies have systematically investigated the effects of caffeine in children during exercise (Barta, Acta Paediatr.,1982; Turley, Med. Sci. Sports Exerc., 2005; Turley, Ped. Exerc. Sci.. 2006) and all used relatively high doses of caffeine (4-5mg/kg). No study has investigated the physiological dose response effects of caffeine in children during submaximal exercise. **PURPOSE:** Determine the influence of low (1mg/kg), moderate (3mg/kg), and high (5mg/kg) doses of caffeine on physiological responses to exercise in young children. **METHODS:** Forty children (20 boys and 20 girls) ages 7-9 years participated in a randomized, double-blind, counter-balanced, cross-over study. Over four separate visits each child consumed a placebo (PL-cherry flavored drink), 1.0 mg/kg (CAF-1), 3.0 mg/kg (CAF-3), and 5 mg/kg (CAF-5) of anhydrous caffeine mixed with PL, and then rested. After an hour wash-in period, resting measurements were taken (heart rate (HR) and blood pressure (BP)) and the children then rode at 25 W and 60% VO_2max for eight minutes each. During exercise HR, VO2, and respiratory exchange ratio (RER) were measured continuously and BP was measured every two minutes. **RESULTS:** Resting HR was significantly ($p \leq 0.05$) lower at 1, 3, and 5 mg/kg vs PL (81.9±10.0, 79.9±9.1, 79.0±6.8 vs 84.8±10.4, respectively). HR was significantly lower in CAF-1, CAF-3, and CAF-5 vs PL at 25W (124.7±11.3, 122.8±12.2, 122.0±10.9 vs 128.4±12.4, respectively) and 60% VO_2max (154.8±13.6, 153.5±13.4, 154.0±15.0 vs 158.9±13.9, respectively). Resting diastolic BP (DBP) was significantly higher in CAF-1, CAF-3, and CAF-5 vs PL (65.2±6.6, 66.0±5.9, 66.6±7.8 vs 61.3±7.0, respectively). Resting systolic BP (SBP) was significantly higher at CAF-5 vs CAF-1 and PL (109.7±8.7 vs 105.6±6.9, 104.9±9.0 respectively). SBP during exercise was significantly higher at 25W during CAF-5 vs CAF-1 and CAF-3 (127.6±9.4 vs 125.1±8.7, 124.6±9.6 respectively). At 60% VO_2max SBP was significantly higher in CAF-5 vs CAF-1 and PL (144.5±12.8 vs 141.6±11.1, 141.3±12.4, respectively). RER, at 25W, was significantly higher in CAF-5 vs CAF-1 (0.99±.04 vs 0.98±0.04, respectively) and at 60% VO_2max it was significantly higher in CAF-5 vs CAF-1 and PL (1.02±0.04 vs 1.00±0.04, 1.00±0.04, respectively) **CONCLUSION:** In this study low, moderate, and high doses of caffeine were found to significantly lower HR and increase DBP at rest. During both exercise intensities all doses of caffeine significantly lowered HR. Although there was a trend for CAF-5 to elevate BP during exercise, it was only significant for SBP vs CAF-1 and PL.

Supported by Arkansas INBRE a grant from the National Institutes of Health and the National Center for Research Resources (P20 RR-16460).

Free Communication/Slide – October 19, 4:45-5:00 pm

A TOTAL BODY RECUMBENT STEPPER EXERCISE TEST (TBRS-XT) TO OBTAIN VO_{2peak} IN PEOPLE WTH STROKE

S.A. Billinger, P.M. Kluding, and B.Y. Tseng. Department of Physical Therapy and Rehabilitation Science, University of Kansas Medical Center, Kansas City, KS

People with stroke have lower values for cardiorespiratory fitness than age-matched sedentary individuals. Assessment of peak oxygen consumption (VO_2 peak) using traditional modes of testing such as treadmill or cycle ergometer may prove to be difficult in individuals with stroke due to balance deficits, gait impairments, and decreased coordination. In order to address these issues, we chose to validate an exercise testing protocol using a recumbent stepper. In our previous work, 22 healthy adults were recruited to participate in a study comparing the total body recumbent stepper exercise test (TBRS-XT) to the Bruce protocol using a treadmill. The results of that study indicated a strong correlation between the TBRS-XT and Bruce protocol exercise tests. **Purpose**: The purpose of this study was to determine if the TBRS-XT is a feasible exercise test protocol to obtain VO_2 peak ($ml*kg^{-1}*min^{-1}$) for individuals with chronic stroke. **Methods**: Nine individuals with stroke (4 females, 5 males; 63.0 ± 10.0 years of age) participated in two peak exercise tests in alternating order. Subjects participated in the study were an average of 51±38 months post-stroke with mild to severe stroke (Fugl-Meyer (FM) scores ranged 13-34 for lower extremity). One exercise test was performed on the cycle ergometer using a protocol that has been used with individuals with subacute and chronic stroke and the other exercise test was performed used the recumbent stepper. Statistical analysis of data was conducted using paired t-tests and Pearson's correlation. **Results**: The TBRS-XT and cycle ergometer test demonstrated a high correlation for VO_2 peak (R^2 =0.91) and peak HR (R^2 = 0.91). No significant differences were observed between the TBRS-XT and cycle ergometer for VO_2 peak (15.7 ± 6.0 vs 14.6 ± 4.9 $ml * kg^{-1} * min^{-1}$; p = 0.19), peak heart rate (138.1 ±19.9 vs 137.6 ±16.9 beats $*min^{-1}$; p= 0.87), respiratory exchange ratio (1.1 ± 0.1 vs 1.1 ± 0.1; p= 0.36), and exercise time (12.1 ± 2.4 vs 11.1 ± 5.0 minutes, p= 0.56). A moderate correlation (0.77) was observed between FM scores and VO_2 peak values from the TBRS-XT. One subject (FM score = 18) was unable to perform the cycle ergometer exercise test but was able to complete the TBRS-XT to volitional fatigue. **Conclusion**: Data suggest that the TBRS-XT may be a safe, feasible and valid exercise test to obtain VO_2 peak in people with stroke. Use of the TBRS-XT may allow accurate exercise prescription based on VO_2 peak values for individuals post-stroke with mild to severe deficits as defined by FM scores.

Free Communication/Slide – October 19, 5:00-5:15 pm

STRAIN IN THE ACL DURING A SIMULATED IN VITRO NON-CONTACT CUTTING MANEUVER

N.A. Morton, N.M. Lenz, L.P. Maletsky
Department of Mechanical Engineering, University of Kansas, Lawrence, KS

Anecdotal evidence suggests that a non-contact sidestep cutting maneuver can rupture the ACL; however the mechanism of this injury is unknown. **PURPOSE**: The objectives of this study were to determine the *in vitro* strain in the ACL during a simulated walking and sidestep cutting maneuver, and to determine the effect of systematically increasing anterior-posterior force (A-P), varus-valgus (V-V) torque, and internal-external (I-E) torque on the ACL strain. **METHODS**: Six fresh frozen cadaver knees (mean age 53 ± 10 years, 5 male) were obtained for this study. Physiological motions were simulated on each specimen using the Kansas Knee Simulator. Each trial included three walk cycles followed by a sidestep cutting maneuver. The baseline cutting maneuver loading profile was obtained from force plate data of a healthy, male subject. The percent strain in the ACL was measured throughout these trials using a differential variable reluctance transducer (DVRT) which was aligned with the long axis of the proximal anterior medial band of the ACL. During each subsequent trial the A-P force, V-V torque, or I-E torque was increased throughout the cutting maneuver either independently or in combination. The procedure of increasing applied loads was repeated until ACL rupture occurred. **RESULTS**: The peak percent ACL strain during walking was 9.1% (±3.75%) occurring during stance phase of gait. Peak ACL strain during the baseline cutting maneuver was 9.3% (±4.72%) and occurred during weight acceptance of cutting maneuver stance. Increasing the anterior load at the knee 50 N during the cutting maneuver significantly increased the strain in the ACL by 0.48% ($p < 0.05$). Independently increasing V-V or I-E torques by 50 Nm and 10 Nm, respectively, did not cause significant changes in ACL strain, while increasing these moments in combination elicited 0.51% greater strain in the ACL ($p < 0.05$). The cutting maneuver protocol elicited ACL ruptures in all specimens. The ultimate strain at the time of rupture was 16.8% (±1.5%). The maximum anterior directed tibial force supported by any specimen prior to ACL rupture was 387 N. **CONCLUSION**: Out of sagittal plane knee moments cause significantly greater strain in the ACL and reduce the anterior force required to elicit an ACL rupture.

Supported by a grant from the Centers for Disease Control and Prevention (1 R49 CE000294-01).

Free Communication/Slide – October 19, 5:15-5:30 pm

INTER-INDIVIDUAL VARIABILITY IN THE PATTERNS OF RESPONSE FOR MECHANOMYOGRAPHIC AMPLITUDE AND FREQUENCY VERSUS ISOMETRIC TORQUE.

E.D. Ryan[1], J.T. Cramer[1], T.J. Housh[2], T.W. Beck[2], T.J. Herda[1], and M.J. Hartman[1]
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[2]Human Performance Laboratory, University of Nebraska-Lincoln, Lincoln, NE;
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The surface mechanomyogram (MMG) records and quantifies the low-frequency lateral oscillations of active skeletal muscle fibers and has been used as a non-invasive technique to examine neuromuscular control strategies. **PURPOSE**: The purpose of this study was to examine the inter-individual variability among the patterns of response for MMG amplitude (MMG_{RMS}) and mean power frequency (MMG_{MPF}) versus isometric torque relationship in low- and high-strength individuals. **METHODS**: Twelve healthy men (mean ± SD age = 25 ± 4 years; height = 177 ± 8 cm; mass = 79 ± 11 kg) performed 2 isometric maximal voluntary contractions (MVCs) before and after the 9 randomly-ordered submaximal step muscle actions of the right leg extensors at 15%, 25%, 35%, 45%, 55%, 65%, 75%, 85%, and 95% of the pre-testing MVC. MMG signals were recorded from the vastus lateralis muscle, and time (MMG_{RMS}) and frequency domain (MMG_{MPF}) values of the MMG signal were computed for each percentage of the MVC. **RESULTS**: Polynomial regression analyses indicated that the composite MMG_{RMS} vs. isometric torque relationship was best fit with a linear model ($r^2 = 0.980$) for the low-strength group and a cubic model ($R^2 = 0.994$) for the high-strength group. The composite MMG_{MPF} vs. isometric torque relationships were best fit with linear models for both the low- ($r^2 = 0.529$) and high-strength ($r^2 = 0.591$) groups. However, only 66% of the individuals exhibited the same linear MMG_{RMS} patterns as the composite relationship for the low-strength group, whereas only 33% of the individuals were cubic for the high-strength group. Only 1 subject exhibited a positive linear ($r^2 = 0.681$) relationship for the MMG_{MPF} vs. isometric torque relationship for either the low- or high-strength groups. **CONCLUSIONS**: These results suggested that strength differences do not affect the patterns of response for MMG_{RMS} or MMG_{MPF}. The lack of consistency between the individual and composite patterns of response suggested some degree of inter-individual variability. Therefore, future studies should examine the individual patterns of response to draw conclusions about motor control strategies, which may be influenced by factors such as muscle fiber type differences, rather than strength differences.

Free Communication/Poster #1

EFFECTS OF 8-MONTH VIBRATION PLUS RESISTANCE TRAINING ON MUSCLE STRENGTH IN POSTMENOPAUSAL WOMEN

I. Palmer, A. Egan, H. Lamont, J. Baker, M. Bemben FACSM, D. Bemben FACSM
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Email: **ipalmer@ou.edu**

Maintenance of muscle strength through resistance training is an important concern for healthy aging. Whole body vibration may be a safe and effective method of enhancing muscular strength among the aging population. **PURPOSE**: The purpose of this study was to examine the effect a vibration stimulus preceding resistance exercise on musculoskeletal parameters in postmenopausal women (n=55), 55 to 75 years of age. **METHODS**: Subjects were randomly assigned to a control group (C, n=12), resistance training group (R, n=22), or a vibration plus resistance training group (VR, n=21). R and VR trained three days a week for 8 months. Training consisted of 3 sets of 10 repetitions at 80% of 1RM on 8 exercises targeting the major muscle groups of the entire body. Strength was tested by 1-RM at baseline, month 4, and month 8. The principle of progressive overload used and training loads were adjusted every 5 weeks. VR received several vibration bouts (Powerplate, Northbrooke, IL) during the resistance training protocol. The principle of progressive overload was applied concerning the vibration stimulus, beginning with the lowest frequency and amplitude. **RESULTS**: At baseline, there were no group differences in age, height, weight or strength. Repeated measures ANOVA (group X time) revealed a significant ($p<0.01$) main effect and interaction effect for each of the 8 tested exercises. The Bonferroni *post hoc* multiple comparison procedure determined that R and VR significantly ($p<0.05$) increased strength greater than C in the hip abduction, hip adduction, hip extension, hip flexion and low row. ANOVA determined significant ($p<0.01$) group differences in percent change (%change) in strength from pre to post intervention in 2 upper body and 4 lower body exercises. The Bonferroni *post hoc* comparisons revealed VR %change was significantly ($p<0.05$) greater than R and C in lat pull-down. The low row %change by VR was significantly ($p<0.05$) greater than C. The hip extension and hip flexion %change by VR and R was significantly ($p<0.05$) greater than C. Hip abduction and adduction %change by VR was significantly ($p<0.05$) greater than R, which was significantly ($p<0.05$) greater than C. **CONCLUSION:** Resistance training greatly increased the strength in all upper body and lower body exercises in these healthy postmenopausal women. The addition of the vibration stimulus did not significantly enhance the muscular strength changes beyond what was achieved by resistance training alone, however it did influence percent change in strength from baseline in some exercises. The use of whole body vibration training is safe to use among the healthy aging population.

Free Communication/Poster #2

HANDGRIP STRENGTH VARIATIONS IN BASEBALL AND SOFTBALL OVER A SIX-WEEK PERIOD OF NO STRENGTH TRAINING

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email: amanda.wheeler10@okstate.edu (Sponsor: S.W. Edwards, FACSM)

Resistance training has proven effective in increasing sport performance. Programs established to produce this increase are often overlooked in smaller schools that do not employ certified strength and conditioning specialists. The task of strength and conditioning is then put on the specific sport coaches, who often are already filling more than one role. This results in the cessation of resistance training during the in-season period. **Purpose:** To determine the need for strength training over the course of a baseball and softball season in order to maintain strength. **Methods:** Grip strength scores were obtained from nine males and ten females involved in Division II intercollegiate baseball and softball. Scores were taken once a week for a period of six weeks during the spring seasons. A paired *t*-test was run on each data set after compilation. **Results:** A significant difference ($p = 0.015$) was found from week one to week six of testing on the right hand. No significant difference ($p = 0.278$) was found from week one to week six of testing on the left hand. No significant difference ($p = 0.371$) was found between gain scores of the right and left hand. **Conclusions:** These results indicate that strength may be maintained with no resistance training. Future research should focus on incorporating a resistance program into the protocol in order to determine if strength scores will increase.

Free Communication/Poster #3

RELATIONSHIPS BETWEEN BODY COMPOSITION, STRENGTH AND BONE DENSITY IN POSTMENOPAUSAL WOMEN

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Osteoporosis is a major concern for aging women, especially after menopause. It is important to understand the role of body composition and strength in the maintenance of bone health. **PURPOSE:** The purpose of this study was to examine relationships between strength, body composition, and bone mineral density (BMD) in sedentary postmenopausal women who are not on hormone replacement therapy (HRT). **METHODS:** Sixty-one women (63.38 ± 4.64 yrs) filled out a Menstrual History, PASE, and Calcium Intake questionnaires. Blood samples were collected by venepuncture to determine the bone formation marker, bone specific alkaline phosphatase (BAP). Body composition and BMD (total body, AP spine, left femur, forearm) were measured using Dual Energy X-ray Absorptiometry (DXA GE Lunar Prodigy). Participants performed 1RM tests for 3 upper body and 5 lower body exercises. Zero order Pearson correlation coefficients were used to determine relationships between strength, body composition, BAP and BMD variables. Stepwise multiple regression was used to test for predictors of BMD. **RESULTS:** Body mass index (BMI) showed low positive correlations (r .27- .46, $p<.05$) with all BMD sites. Fat mass was positively related to spine, trochanter and total body BMD, while lean tissue mass was related to total hip, forearm, and total body BMD. Lower body strength (leg press, hip adduction, hip extension) was related to trochanter and total hip BMD. Similar results were determined from the regression analyses as fat mass was found to be a significant predictor ($p<.05$) of total body and spine BMD, accounting for about 10-19% of the variance. Age and fat mass were found to be significant predictors of L2-L4 BMD ($R^2=0.134$). Lean tissue mass predicted trochanter and total hip BMD. BAP and calcium intake were not correlated with BMD variables. **CONCLUSION:** The contribution of body composition and strength variables to BMD varied by site as fat mass was more important for total body and spine BMD and lean mass and lower body strength exerted greater influences on the hip sites.

Free Communication/Poster #4

EFFECTS OF WEIGHT-BEARING AND NON-WEIGHT-BEARING EXERCISE ON BONE MINERAL DENSITY AND TURNOVER IN MEN

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Although male athletes in non-weight-bearing sports like swimming and cycling have improved cardiovascular and metabolic fitness, the long-term effects of regular non-weight bearing exercise on bone health are largely unknown. **PURPOSE:** To determine the effects of long-term participation in non-weight bearing sports on bone health in adult, male recreational athletes. **METHODS:** Cyclists (NWB; n=21), runners and triathletes (WB; n=15), and strength-trained males (STRENGTH; n=9), aged 19-59 y, completed 7-day training logs and diet records and a sport participation history questionnaire. Whole body and regional bone mineral content (BMC) and density (BMD), and body composition were assessed using dual x-ray absorptiometry (DXA). Bone formation (osteocalcin, OC; bone alkaline phosphatase; insulin-like growth factor-I, IGF-1) and resorption markers (C terminal telopeptide of type I collagen; interleukin-6; tumor necrosis factor-alpha) were measured in fasting serum samples. **RESULTS:** Calcium and vitamin D intakes were greater in the STRENGTH athletes compared with WB and NWB; whereas, other macro- and micronutrients did not differ among groups. STRENGTH athletes had significantly greater body weight, lean body mass, whole body and regional bone mineral content than WB and NWB athletes; percent body fat did not differ among groups. Spine and leg BMD were lower in NWB compared to WB and STRENGTH. Bone loading during adulthood was positively associated with whole body, leg and spine BMD, adjusting for body weight. Serum IGF-I and OC were significantly greater in STRENGTH versus NWB and WB athletes. **CONCLUSION:** Non-weight-bearing exercise is associated with decreased whole body and regional bone mineral density, in a cumulative manner. Moreover, the beneficial long-term effects of weight-bearing exercise on bone mineral density may be, in part, due to increased rates of bone formation.

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Free Communication/Poster #5

EFFECTS OF VASCULAR RESTRICTION ON MUSCULAR FUNCTION DURING INTERMITTENT SUBMAXIMAL ISOMETRIC EXERCISE.

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It is generally accepted that a threshold intensity of 65% 1-RM is needed to induce muscle hypertrophy; however, recent studies using low-intensity resistance exercise (20% 1-RM) combined with vascular restriction (Kaatsu) have also been able to demonstrate increases in muscle size and strength. **PURPOSE:** To investigate EMG and MMG responses of the vastus lateralis before, during, and after low intensity intermittent isometric exercise in combination with moderate vascular restriction and to examine the percent voluntary activation (PVA) of vastus lateralis. **METHODS:** Twelve healthy males volunteered to participate in this study (mean ± SD age = 23.7±4.1 years). Each participant visited the laboratory 3 times: one familiarization trial and two experimental trials, separated by at least 48 h. The two experimental trials consisted of the same testing and isometric exercise protocol, however, the participants experienced either the Kaatsu or control (no-Kaatsu) conditions in random order. For the experimental trials, the following procedures were performed in order: a) Resting blood pressure assessment after 5 min rest (for the Kaatsu trial only), b) five-minute warm-up on a stationary cycle ergometer with a power output of 50 W and a pedaling cadence of 50-70 rpm, c) two pre-exercise 5-s isometric MVCs with 1 min rest between trials, d) five sets of 20 intermittent isometric contractions (2-s on and 1-s off) at 20% of MVC with a 30-s interset rest period, and e) two post-exercise isometric 5-s MVCs with 1 min rest between trials. **RESULTS:** For MVC torque, PVA, EMG amplitude, EMG mean power frequency (MPF), MMG amplitude, and MMG MPF, there was no interaction and no main effects for time or session for the pre- and post-exercise isometric MVCs with and without Kaatsu. The average normalized EMG amplitude (%MVC) increased from repetitions 1-4 to 5-8 to 9-12 and MMG amplitude increased significantly from set 1 to 2 for both the Kaatsu and no-Kaatsu sessions. **CONCLUSION:** The present study demonstrated no significant change in post-exercise torque values and % activation, suggesting that the exercise task was not intense enough to cause muscular fatigue in either treatment condition.

Free Communication/Poster #6

EFFECTS OF OMEGA-3 FATTY ACIDS AND EXERCISE ON INFLAMMATION AND OXIDATIVE STRESS IN SEDENTARY INDIVIDUALS

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Lifestyle modification to improve metabolic health may include omega-3 fatty acids (n-3fa) with fish oil supplementation or adopting a more active lifestyle; however, little is known about the combination of these two treatments on markers of inflammation and oxidative stress. **PURPOSE:** The purpose of this study was to investigate the effects of four weeks of n-3fa supplementation alone or in combination with aerobic training on circulating measures of oxidative stress and inflammation. **METHODS:** Twenty-two sedentary and normal to overweight (BMI=23-29.9) individuals (10 males, 12 females) age 18-45y were randomly assigned to an n-3fa (n=10) or an n-3fa plus exercise group (n=12). Both groups consumed 4 g/d n-3fa, while the combination group also exercise trained for 45 min/d, 5d/wk of treadmill exercise at 60% VO_2max. Fasting serum samples were collected at baseline and post treatment (wk 4) for the assessment of superoxide dismutase (SOD) activity, glutathione peroxidase (GPX) activity, myeloperoxidase (MPO), adiponectin, serum amyloid A (SAA), interleukin-6 (IL-6), C-reactive protein (CRP), and soluble intercellular adhesion molecule-1 (sICAM-1) by commercially available ELISA procedures. **RESULTS:** Body weight and body mass index were not significantly altered by the short-term interventions. VO_2max was significantly increased in the n-3fa plus exercise group. N-3fa supplementation alone or in combination with aerobic training did not significantly influence any of the measured biomarkers ($p>0.05$). **CONCLUSION:** Short-term lifestyle interventions such as n-3fa supplementation alone or in combination with aerobic training in the absence of weight loss does not appear to influence systemic biomarkers of oxidative stress and inflammation in previously sedentary individuals.

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Free Communication/Poster #7

ESTIMATING POSTPRANDIAL LIPEMIA USING A SINGLE POINT TRIGLYCERIDE CONCENTRATION

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Traditionally, postprandial lipemia (PPL) has been measured through a time consuming process in which subjects are fed a high-fat meal and plasma triglyceride (TG) concentrations are measured at two hour time intervals for eight hours. **PURPOSE:** The purpose of this study was to determine whether a single point triglyceride (TG) concentration could be used to accurately estimate the 8h postprandial lipemic response with and without exercise. **METHODS:** Baseline PPL trials (N = 205; 111 males, 94 females) and exercise PPL trials (N = 105; 61 males, 44 females) were used to generate Pearson correlations between TG concentrations at 0h (baseline) and time points up to 8h after a high-fat meal vs. the PPL response quantified as area under the TG curve (TG-AUC_{tot} and TG-AUC_{inc}) and peak TG response (TG-$peak_{tot}$ and TG-$peak_{inc}$). Stepwise multiple regression was used to create prediction equations for PPL measures using additional predictor variables: gender, age, percent body fat, training status, and VO_2max. **RESULTS:** Except training status, all predictor variables significantly correlated with the PPL response, with $4h_{tot}$ TG concentration having the highest correlations with each quantification of PPL ($r>0.93$, $p<0.001$), with or without exercise. Multiple regression indicated the $4h_{tot}$ TG concentrations accounted for 94% of the variance in TG-AUC_{tot} ($p<0.001$), with baseline TG values only adding a slight contribution to the model ($R^2adj=0.96$, $p<0.001$). The $4h_{inc}$ TG concentration accounted for 86% of the variance in TG-AUC_{inc}. Results were similar for 4h TG concentrations in predicting TG-peak responses. Other predictor variables did not significantly contribute to the models. Cross-validation indicated that predicted values were highly correlated with actual values, e.g., TG-AUC_{tot} $r=.98$, $p < 0.001$. **CONCLUSION:** Our data suggest that the 4h TG concentration is highly related to the total 8h PPL response and can be used for accurate estimation of PPL. The abbreviated single point method could be useful in clinical risk factor assessment.

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Free Communication/Poster #8

TISSUE OXYGENATION DIFFERENCES BETWEEN MALES AND FEMALES IN THE FOREARM, THIGH AND CALF

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PURPOSE: To determine the difference in tissue oxygenation values in the forearm, thigh, and calf between young adult males and females. **METHODS:** A total of 30 healthy men (age = 21.6 ± 1.6 yrs; BMI = 24.4 ± 3.5 kg/m^2; mean ± SD) and 30 healthy women (age = 21.8 ± 2.2 yrs; BMI = 21.1 ± 2.6 kg/m^2) participated in this cross-sectional study. After a 10-minute rest in a supine position, near-infrared spectroscopy (InSpectra™ Tissue Spectrometer) was used obtain tissue oxygenation values at the forearm, thigh, and calf. Circumference and skinfold thickness were obtained at each location of near-infrared spectroscopy assessment. Lastly, the physical activity level was scored (ranging from "0" to "7") with the Johnson Space Center (NASA) Physical Activity Questionnaire. **RESULTS:** An independent t-test showed that males had significantly higher ($p < 0.05$) tissue oxygenation values than females in the forearm (83.6 ± 7.4 %StO_2 vs. 79.1 ± 7.7 %StO_2, respectively), thigh (71 ± 19.1 %StO_2 vs. 55.6 ± 12.9 %StO_2), and calf (85.1 ± 6.7 %stO_2 vs. 68.6 ± 11.0 %StO_2). Adjusting for physical activity score, site-specific subcutaneous adipose tissue thickness and limb circumference with an ANCOVA revealed that the differences in thigh and forearm tissue oxygenation values between males and females were no longer significant ($p > 0.05$). However, the adjusted values for calf tissue oxygenation remained significantly different between males and females (82.4 ± 12.0 %StO_2 vs. 71.3 ± 12.0 %StO_2, $p = 0.005$) after adjusting for activity and anthropometric differences. **CONCLUSION:** Our findings show that healthy men and women differ in tissue oxygenation concentrations only in the calf tissues after adjusting for differences in body composition and activity status. However, there were no gender differences in tissue oxygenation found in the thigh and forearm, where subcutaneous adiposity and circumference varied the most. Therefore, body composition may have a greater influence on tissue oxygenation than gender.

Free Communication/Poster #9

CHANGES IN HEART RATE MAY BE A VITAL INDICATOR TO POOR LIFTING MECHANICS

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Changes in heart rate (HR) may be a vital indicator of poor lifting mechanics in the healthy college-aged individual. It was hypothesized that poor lifting mechanics would trigger Valsalva maneuver (VM) causing a significant increase in HR and blood pressure (BP). **METHOD:** The use of an electrocardiogram (ECG) machine during the activity of lifting can be a reliable means of assessing poor lifting mechanics. Individuals had physiological parameters assessed during a functional movement while lifting objects ~50% of their bodyweight. An ECG test was conducted during the study. Participants performed the movement with no instruction during Trial 1, and with proper lifting technique and breathing instruction prior to Trial 2. Monitoring continued and was carefully observed throughout the lifting movement to record any changes that occurred during the functional activity. **RESULTS:** Statistical analyses were run on absolute HR values, and significance was observed between Stages 1-3 of the lift when comparing Trials 1 and 2 (100.2 ± 19.1 vs. 105.1 ± 21.4; 98.1 ± 16.3 vs. 105.2 ± 19.8; 97.1 ± 16.7 vs. 105.7 ± 18.9, respectively, units are bpm). **CONCLUSION:** VM can occur regardless of the amount of weight lifted and incorrect lifting mechanics may be the trigger for this response.

Free Communication/Poster #10

ASSOCIATIONS OF PHYSICAL ACTIVITY AND HEALTH-RELATED PHYSICAL FITNESS TEST COMPONETS WITH BONE MINERAL DENSITY IN FEMALE COLLEGE STUDENTS

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PURPOSE: Whether physical activity and health-related physical fitness test items relate to bone mineral density in female college students remain less explored. We therefore investigated the associations of physical activity and physical fitness test items with bone mineral density in 121 female college students, aged 18 to 34 years. METHODS: We assessed physical activity using the modified Heyward's questionnaire. Physical fitness test items [strength, sit-up, sit and reach, body composition, and cardiorespiratory fitness (PEI)] were assessed by using standardized protocols. Bone mineral density (T-score) was measured by quantitative ultrasonography (QUS). We used partial Pearson correlations to examine the associations of physical activity and health-related physical fitness test components with bone mineral density in female college students after adjustment of age, cigarette smoking, body mass index (BMI), dietary habits, and alcohol consumption. RESULTS: We observed that physical fitness components [muscular strength ($r = 0.26$, $p<0.01$), sit-up ($r = 0.36$, $p<0.001$), sit and reach ($r = 0.27$, $p<0.01$), PEI ($r = 0.36$, $p<0.001$)] were positively associated with bone mineral density, respectively, after adjustment of age, cigarette smoking, BMI, dietary habits, and alcohol consumption. There was also a positive association between physical activity and bone mineral density after adjustment for multiple risk factors ($r= 0.38$, $p<0.001$). CONCLUSION: We conclude that physical activity and health-related physical fitness test components may improve bone mineral density in female college students.

Free Communication/Poster #11

PREDICTORS OF BALANCE IN YOUNG, MIDDLE-AGED, AND OLDER WOMEN

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PURPOSE: This study examined possible predictors of static and dynamic balance in young, middle-aged, and older women. **METHODS:** Young (n=30; 18-25 yrs), middle-aged (n=26; 35-45 yrs), and older (n=29; 55-64 yrs) women were assessed for one repetition strength (1RM; leg press, knee extension, and knee flexion), flexibility (hip flexion, dorsiflexion, plantar flexion, and sit and reach), body composition (DXA; total and regional fat and bone-free fat-free mass – FFM), and bone mineral density (DXA; BMD-total, hip, and spine). The NeuroCom Balance Master was used to assess static postural stability (Modified Clinical Test of Sensory Interaction on Balance-MCTSIB, eyes open on foam; Unilateral Stance-US, eyes open; and Unilateral Stance-US, eyes closed) and dynamic balance (Tandem Walk-TW and Step Quick and Turn-SQT). **RESULTS:** There were significant age group differences ($p<0.05$) for each measure of strength, with the youngest group being significantly stronger than the two older groups. In addition, the youngest group had greater ($p<0.05$) BMD, lower ($p<0.05$) percent fat, and greater ($p<0.05$) bone-free FFM than the two older groups. Flexibilities were generally similar between groups and only two (US-eyes open and SQT) measures of balance were different, with the oldest group being significantly worse ($p<0.05$) than the two younger groups. Regression analyses determined only one significant prediction equation for the youngest age group; leg fat and the sit and reach test significantly predicted TW sway velocity. There were two significant prediction equations developed for the middle-aged group; plantar flexion flexibility significantly predicting US sway velocity with eyes closed while SQT sway velocity was best predicted by knee extension 1RM strength. Finally, the oldest age group had five significant prediction equations for balance. MCTSIB sway velocity was significantly predicted by leg percent fat; US sway velocity was significantly predicted by total bone-free FFM; US sway velocity with eyes closed was significantly predicted by total BMD; TW sway velocity was significantly predicted by plantar flexion flexibility; and SQT end sway was significantly predicted by 1RM leg press and trunk BMD. **CONCLUSION:** In general, as age increased there were more variables related to strength, flexibility, and body composition which predicted measures of balance. Additionally, there were more significant correlations between possible predictors of balance when balance was assessed in a dynamic fashion (TW and SQT) as compared to static measures of postural stability (MCTSIB and US).

Free Communication/Poster #12

SEASONAL CHANGES OF QUADRICEPS FEMORIS PERCENT DECLINE IN COLLEGIATE WRESTLERS

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PURPOSE: The purpose of the present study was to examine the changes in percent decline of the quadriceps femoris muscle in college wrestlers. **METHODS:** Ten Division I collegiate wrestlers volunteered for participation in this study. Age, height, body weight, initial peak torque (IPT), and final peak torque (FPT) was recorded pre-season, mid-season, pre-nationals, and post-nationals. The IPT and FPT of the quadriceps femoris was recorded isokinetically using a Biodex III isokinetic strength tester. Subjects were in the seated position on the Biodex and proceeded to performed 50 maximal leg extensions at 180 degrees per second with their dominant limb. The IPT and the FPT were recorded and used to calculate percent decline. **RESULTS:** The results of the present study indicated that there was not a significant ($p>0.05$) change in percent decline during the seasonal test times. **CONCLUSION:** Repeating maximal contractions causes a decline in torque production and can give us an idea of the fatigability of muscle. Competing throughout a wrestling season is a long difficult process. It is possible that at various points during the season a wrestler may be more susceptible to fatigue; however, in the present study the wrestlers were able to maintain percent decline values.

Free Communication/Poster #13

EFFECTS OF WHOLE BODY VIBRATION ON MUSCULAR FORCE IN YOUNG, MIDDLE-AGED, AND OLDER MEN

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PURPOSE: The purpose of this study was to examine the influence of age on the ability to exert muscular force following whole body vibration in healthy males between the ages of 18-25, 35-45, and 55-64 years. **METHODS:** 50 total subjects were assigned to one of three groups depending solely on age. The three groups were young (n=20; 22.75±1.74 years), middle-aged (n=15; 40.53±3.07 years), and old (n=15; 58.07±2.40 years). All subjects participated in a 2-hour testing session which consisted of pre- and post-trials for both countermovement vertical jumps and a maximal isometric leg extension, with a whole-body vibration intervention in between. The vibration protocol was 3 sets, 30-seconds in duration, at a frequency of 30 Hz on a low-amplitude. From these tests, several variables were obtained including; peak power, peak rate of force development, rate of force development index, peak force, time to peak force, average time to peak force, and EMG amplitude values for both the vastus lateralis and rectus femoris. **RESULTS**: Examination of the pre- and post-vibration values for each measure indicated a non-significant decrease in average peak power, average peak RFD, average peak force, average time to peak force (young only) and average EMG amplitude for both the VL and the RF. There were non-significant increases in RFD index, and time to peak force (middle-aged and old only). There were significantly higher values for pre-vibration values compared to post-vibration values across age groups for average peak power, average peak RFD, average peak force, and EMG amplitude for both the VL and RF. The young showed significantly higher values for average peak power, average peak force, and RF EMG amplitude when compared to the old across pre- and post-vibration. One significant age group by trial interaction occurred in the EMG amplitude for the VL. The young group decreased significantly more than both the middle and older groups. **CONCLUSIONS:** These results suggest that there is no significant influence of age on the ability to exert muscular force following whole body vibration in healthy males, with each age group generally demonstrating a post-vibration depression in performance parameters.

Free Communication/Poster #14

BODY COMPOSITION CHANGES AFTER EIGHT MONTHS OF RESISTANCE TRAINING WITH AND WITHOUT VIBRATION IN WOMEN

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Age-related changes in body composition are well-documented with a decrease in lean body mass and a re-distribution of body fat generally observed. Resistance training has been shown to have a positive effect on body composition in young adults by decreasing fat and increasing lean tissue, such as muscle and bone mass. **PURPOSE:** The purpose of this study was to determine the effects of 8 months of resistance training with and without whole body vibration on body composition in sedentary postmenopausal women. **METHODS:** Fifty-five women were divided into resistance only (RG), non-exercising controls (CG) or vibration plus resistance (VR) groups. Resistance training was performed using isotonic weight training equipment (Cybex Inc.) and whole body vibration was done with the use of the Powerplate (Northbrooke, IL) vibration platform for three times per week for eight months. Total and regional body composition was assessed from the total body DXA scans at baseline (pre), 4 months (mid) and after 8 months (post) of training. **RESULTS:** In the VR group, total % body fat decreased from pre to mid and post time points ($p<.05$), whereas, the CG group had a significant increase in total % body fat ($p<.05$). Arm lean tissue (g) increased ($p <.05$) for pre vs mid and pre vs post measures. Both training groups exhibited significant increases in total bone-free lean tissue mass (g) from pre to mid and post ($p<.05$). There was a significant increase ($p<.05$) in trunk lean mass for the RG group from pre to post measures and an increase in the VR group pre vs. mid and pre vs. post measures. CG group did not show any changes in lean tissue. Leg BMC (g) also increased for both training groups (RG pre vs. mid and post; VR pre vs. post). **CONCLUSION:** In older women, resistance training alone and with whole body vibration resulted in positive body composition changes by increasing lean tissue. However, only the combination of resistance training and whole body vibration was effective for decreasing percent body fat.

Free Communication/Poster #15

EFFECTIVENESS OF NANOSCALE BIOMOLECULAR ENERGY PATCHES ON STRENGTH AND POWER IN COLLEGIATE FOOTBALL PLAYERS

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Recently developed energy patches are claimed to incorporate organic nanoscale biomolecular "antennas" that resonate at frequencies in unison with biomolecules in the cells and signal specific metabolic pathways. The induced electron flow allegedly assists in recruiting calcium ions into the muscle fiber, thereby allowing a greater muscle fiber recruitment during contraction allowing lifting of heavier weights. According to the manufacturers these patches use bioelectric stimulation produced by specific electrical frequencies in the body's magnetic field and claim that over 99% of users experienced significant improvements (10% or higher) in strength after only a few minutes of wearing the patches.

Purpose: To compare the efficacy of energy and placebo patches in the performance of bench press repetitions, standing vertical jump, and grip strength in college varsity athletes.

Methods: Following a five-minute warm-up, 18 college varsity football players assigned to defensive and offensive line positions (height=76.37, SD=1.13 in; weight=287, SD 16.48 lbs.) were tested on 225 lb. maximum bench press repetitions, standing vertical jump and grip strength. The following week the players were randomly assigned the active or placebo patches. Following placement of the patches on the participants by research assistants the participants again completed a five-minute warm-up followed by identical pre-test protocol. Repeated measures ANOVA was used to compare each dependent variable.

Results: No significant within or between group differences were found between active and placebo patches for maximum bench press repetitions ($p=0.19$), vertical jump distance ($p=0.17$) or grip strength ($p=.53$). Proportional change for bench press repetitions by the active patch group was +4.5%, for the vertical jump -.5% inches, and for grip strength -2.7% units.

Conclusions: Based on these results, the energy patches used in this study did not significantly improve performance in any of the measured variables. The manufacturers suggest that the energy patches simulate fat transport to the mitochondria for the production of ATP resulting in a CHO sparing effect thus contributing to greater endurance. Future research should focus on the efficacy of energy patches on endurance activities.

Free Communication/Poster #16

LARGE AND SMALL ARTERIAL ELASTICITY IN HEALTHY ACTIVE AND SEDENTARY PREMENOPAUSAL WOMEN

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PURPOSE: To compare large and small arterial elasticity in apparently healthy sedentary and recreationally active adult women, and to examine if age affects large and small arterial elasticity. **METHODS:** This cross-sectional study consisted of 43 premenopausal women without overt cardiovascular disease (age = 43.4 ± 4.7 yrs; mean ± SD). The subjects were grouped into a sedentary group or a leisurely active group (30 min, 3d wk of moderate intensity) in addition to the following age groups: 35-40 years, n = 13; 41-45 years, n = 14; 46-54 years, n = 16. Subjects rested supine while pulse contour analysis was measured from the radial artery using an HDI/Pulsewave CR-2000 instrument (Hypertension Diagnostic, Inc.) to examine arterial elasticity in the large and small arteries. Activity level and menopausal status was based on self-report. **RESULTS:** There were no differences in large (14.5 ± 1.0 ml/mmHg x 10; 14.9 ± 0.9 ml/mmHg x 10; mean ± SD) and small (5.5 ± 0.5 ml/mmHg x 100; 6.4 ± 0.4 ml/mmHg x 100) arterial elasticity between the sedentary group and the recreationally active group, respectively. Large (12.8 ± 0.9 ml/mmHg x 10) arterial elasticity was lower in the oldest group ($p = 0.008$) compared to the youngest group (17.6 ± 5.9 ml/mmHg x 10). After adjusting for body mass index, large arterial elasticity ($p = 0.022$) remained lower in the oldest group. Small arterial elasticity was lower in the older group compared to the young group, but did not reach level of significance ($p = 0.063$). **CONCLUSION:** There is no difference in large and small arterial elasticity between healthy sedentary and recreationally active premenopausal women. This suggests that more strenuous physical activity is necessary to gain beneficial effects on the vasculature. Large arterial elasticity is decreasing with advancing age independent of body mass index.

Free Communication/Poster #17

SEASONAL CHANGES IN BODY WEIGHT AND QUADRICEPS PEAK TORQUE IN ELITE COLLEGE WRESTLERS

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PURPOSE: The purpose of this study was to examine the changes in peak torque (PT) to body weight (BW) ratios in collegiate wrestlers. Measurements were taken during the pre-season, mid-season, pre-nationals, and post-nationals periods. **METHODS:** Ten Division I collegiate wrestlers volunteered for participation in this study. PT and BW were recorded during the times mentioned above. The PT of the quadriceps femoris was recorded isokinetically at 180 degrees per second using a Biodex III isokinetic strength tester. A one-way repeated measures ANOVA and a Tukey post-hoc were used to determine significance. **RESULTS:** Results indicated that neither PT in the leg extensors nor BW changed over the course of the season. Subsequently, there was no significant change in PT to BW ratios. **CONCLUSION:** The results of the present study indicated no significant change in PT throughout the course of the season. This information could be beneficial for both wrestling and strength and conditioning coaches who try to minimize strength loss over the course of the year. Results also indicated no significant change in BW as well. A possible explanation for this is that only a portion of our subjects participated at nationals, and thus were required to maintain wrestling weight, while the rest of the sample was not required to maintain wrestling weight.

Free Communication/Poster #18

THE EFFECT OF CHRONIC ENDURANCE EXERCISE ON AIRWAY HYPER-REACTIVITY IN HEALTHY SUBJECTS

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In the healthy lung, there is continuous modulation of airway smooth muscle tone, presumably to provide a balance between airway resistance and anatomic dead space to maintain minimal work for each breath. Physical activity has recently been shown to have an effect on airway hyper-responsiveness, a hallmark of asthma. Presently, little is known of the underlying mechanisms of airway hyper-responsiveness. **PURPOSE**: The purpose of our study was to determine if repeated airway smooth muscle stretch through habitual exercise would lead to the airways being less responsive to irritants and be less prone to developing asthma or asthma-like symptoms. **METHODS**: Seventeen healthy subjects with a wide range of exercise habits were studied. Physical activity (PA) was determined via the International Physical Activity Questionnaire (IPAQ). Subjects were tested during two randomized sessions within a 2 week period. Initially, subjects performed pulmonary function testing (PFT) and exhaled nitric oxide measurements (eNO) (a measure of airway inflammation). Subjects then breathed a 25% (hypertonic) saline solution from a nebulizer (which served as a spasmagen) for 20 minutes followed by PFTs. Subjects then performed either five maximal deep inhalations (DI) (indirect effect) or inhaled epinephrine (E) (direct effect) followed by PFT measurements on separate days. **RESULTS**: Following hypertonic saline inhalation, the decrease in FEV1 (forced expiratory volume in 1 sec) and the decrease in eNO were significantly related to PA ($r=0.69$; $r=0.57$, respectively) with the more sedentary subjects demonstrating greater airway responsiveness. The relationship was curvilinear suggesting that there is a threshold level of PA of ~2000-3000 MET min/wk that affects airway responsiveness. Also, both E and DI lessened ($P<0.05$) the decrease in FEV1 following hypertonic saline inhalation. The relationship between the change in FEV1 to PA was related ($P<0.05$) to both E ($r=0.86$) and to DI ($r=0.75$). **CONCLUSION**: These data suggest that chronic endurance exercise, presumably through smooth muscle stretch, has a positive effect on airway hyper-responsiveness. The implication of these data is that a sedentary lifestyle may contribute to the increased prevalence of asthma and asthma-like symptoms.

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RELIABIITY OF HYDRATION TESTING IN COLLEGIATE WRESTLERS

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Proper hydration plays a significant role in the performance and health of athletes. In response to the potential health risks associated with dehydration, organizations such as the American College of Sports Medicine and the National Athletic Trainers' Association have encouraged more careful monitoring of hydration in athletes. The National Collegiate Athletic Association and the National Federation of State High School Associations have included hydration testing in their minimum weight protocol assessment of competitive wrestlers. In light of the moderate to severe physiological effects dehydration causes within the active individual, it is imperative that healthcare clinicians utilize the most appropriate instruments to ascertain indirect measures of acute hydration. **PURPOSE:** To determine the intra-tester and inter-tester reliability of three commonly used methods of hydration assessment; 1) urine color 2) urine specific gravity assessed via dipstick reagent strip, and 3) urine specific gravity assessed via a refractometer across multiple trials and testers. **METHODS:** Twenty-three NCAA Division I collegiate wrestlers (n = 23, age = 20.09 ± 1.35, height = 174.49 ± 7.23, weight = 78.73 ± 11.25) volunteered for study participation. Initial morning, midstream urine samples were collected on three separate occasions accounting for a total of 69 urine samples (n = 69). Each urine sample was analyzed three separate times by three different investigators using a urinalysis dipstick reagent strip (URI), a hand-held refractometer (REF), and a urine color chart (UCC). Statistical analyses consisted of calculating inter-tester and intra-tester reliability coefficients of the three methods of hydration measurement. **RESULTS:** Chronbach's Alpha coefficients indicated very high inter-tester reliability for all measures of hydration assessment with URI being the most consistent method (r = .985, p = .000), followed by UCC (r = .973, p = .000) and REF (r = .968, p = .000). Intraclass correlation coefficients were also found to be very high among the three testers ranging from .983 - .994 for URI, .964-.983 for UCC, and .829-.996 for REF. **CONCLUSIONS:** Several clinical measures are commonly used to determine hydration status through assessments done in urine and blood. According to our study, the three methods of hydration assessment using urine are highly reliable, and are a feasible, noninvasive evaluation of a body fluid. Our results show that either method can be used reliably, both between testers and within testers, to assess hydration status in athletes.

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BODY COMPOSITION CHANGES IN COLLEGIATE WRESTLERS OVER THE COURSE OF A SEASON

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PURPOSE: The purpose of this study was to examine the changes in body composition in collegiate wrestlers over the course of a season. **METHODS:** Ten Division I collegiate wrestlers (Mean Age= 19.5 +/- 1.17 yrs, Mean Ht.= 60.5 +/- 4.26 in, Mean Wt.= 182.4 +/- 23.27lbs), volunteered for participation in this study. Body composition was recorded pre-season, mid-season, pre-nationals and post-nations. The body composition was measured using a skin-fold caliper. A one-way repeated measures ANOVA and Tukey's Post Hoc were used to determine significance. **RESULTS:** There was statistical significance in the change in body composition from pre-season to post-national (P=0.41). There was no statistical significance in pre-nationals to post-nationals body composition. **CONCLUSION:** There is a significant change in body composition for collegiate wrestlers over the course of a season. However, due to the limited number of participants in the study, starters as well as bench players had to be used. Pre-nationals and post-nationals testing may have been skewed because of these different levels of participation.

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