

2011 Annual Meeting



CENTRAL STATES CHAPTER
OF THE
AMERICAN COLLEGE OF SPORTS MEDICINE

October 20th-21st, 2011
Overland Park Marriott
Overland Park, KS

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American College of Sports Medicine

CENTRAL STATES CHAPTER ANNUAL MEETING



**AMERICAN COLLEGE
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Overland Park Marriott: Overland Park, Kansas

October 20th & 21st, 2011

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Welcome to the Annual Meeting of the Central States Chapter of the American College of Sports Medicine. This year's conference emphasizes presentations related to ACSM's focus on Exercise Is Medicine (EIM). I feel very fortunate to have a leader in that field starting us off Thursday. Dr. Jeff Roitman will talk about translating basic science to patients in clinical settings. Following Dr. Roitman, a group from Pittsburg State University will describe their efforts to implement an EIM on Campus program at their school. Professor Mike Leiker is the lead Exercise Science faculty member for this initiative and Dr. Steve Scott, President of Pittsburg State University, is planning to participate in the presentation. It is great to have lead university administrators like Dr. Scott actively supporting EIM. Dr. Carey Savage will explain the cognitive neuroscience of obesity. I have had the pleasure of hearing Dr. Savage before and know him to be an entertaining speaker with a unique health research perspective. Dr. Susan Sisson will discuss her work on cardiometabolic risk factors in children with particular emphasis on the contribution of sedentary behaviors. The afternoon speaking sessions will finish off with some excellent student research presentations. Make sure to start your evening by visiting the poster session and social featuring over 50 posters, then cheer on the Quiz Bowl teams in that epic competition. Leading off Friday will be Dr Matt Ganio discussing thermoregulatory impairments. Concurrent sessions by Dr. Sandra Billinger & Dr Todd Whitehead follow at 10:15 with Drs. Barnes and Wagganer and Dr, Rio Di Brezzo on at 11:00. Following lunch, our Gatorade speaker, Susan Kundrat MS RD, CSSD, LDN will provide a Sports and Exercise Nutrition Update. The afternoon will finish off with excellent presentations by Dr Linda May on exercise during pregnancy and Dr. Kwon explaining research based considerations for optimizing resistance during weight training. I am pleased that so many newer faculty members in the Central States Region were willing to begin contributing to our meeting so quickly. It certainly speaks well for the future of the Chapter. I also appreciate that numerous colleagues I have worked with closely over the years agreed to present at this event. Dr. Di Brezzo only mildly rebuked me after I misspelled her name when I first distributed presenter information. I can't believe I didn't catch that, for a while I probably typed her name more than my own with all the papers I submitted to her.

I hope that you enjoy the meeting. Please take special note of our sponsors listed on the following pages. Without their continued support this meeting would not be possible.

Greg Kandt, Ed.D.
Past-President CSC ACSM

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**Central States Chapter
of the
American College of Sports Medicine
FALL 2011 MEETING SCHEDULE**

THURSDAY, OCTOBER 20TH, 2011

10:00-11:45	Registration - Lobby	
11:45-12:00	Opening Remarks Greg Kandt, Past-President CSC ACSM	Salon E
12:00-1:00	Jeff Roitman, Ph.D. Rockhurst University Things I Wish I Would H Known 25 Years Ago (or getting basic science to patients in the clinic).	Salon E
1:00-1:15	Break	
1:15-2:00	Mike Leiker, Ed.D, Steve Scott, Ph.D., Rita Gerth, RN & Bryan Winkleplec, MS Pittsburg State University Implementing Exercise is Medicine of Campus at a Regional University	Salon E
2:00-3:00	Carey Savage, Ph.D. University of Kansas Medical Center Cognitive Neuroscience of Obesity: Implications for Intervention	Salon E
3:00-3:15	Break	
3:15-4:00	Susan Sisson, Ph.D. University of Oklahoma Health Sciences Center Cardiometabolic Disease Risk in Children: Influence of Sedentary Behaviors	Salon E
4:00-5:00	Student Oral Research Presentations 4:00 p.m. (pg. 11) – Dave Burnett: Doctoral Award Winner 4:15 p.m. (pg. 12) – Matthew Andre 4:30 p.m. (pg. 13) – Ruth Adamiec 4:45 p.m. (pg. 14) – Zachary Graham	Salon E

5:15-6:45 Poster Session and Chapter Social Quail Creek Ballroom
President: Steve Burns, Ph.D.
Poster set-up begins at 5:00
Presenters are to be present from 5:15-6:15

7:00-8:00 Quiz Bowl

FRIDAY, OCTOBER 21ST, 2011

8:45-9:00 Greg Kandt, Past-President Salon E
Announcements

9:00-10:00 Matt Ganio Ph.D. Salon E
University of Arkansas
Thermoregulatory Impairments: A Barrier to Fulfilling Exercise Goals

10:00-10:15 Break

10:15-11:00 I. Sandra Billinger, Ph.D. Salon E
Missouri State University
Benefits of Exercise at Menopause

II. Todd Whitehead, Ph.D. Salon B C D
Arkansas State University
Physical Activity And Risk For CAD in College Students

11:00-11:45 I. Ro Di Brezzo, Ph.D. Salon E
University of Arkansas
Biomechanics of Exercise: Staying Healthy

II. Jeremy Barnes, Ph.D. and Jason Wagganer, Ph.D. Salon B C D
Southeast Missouri State University
Keys to Employment Success

12:00-1:30 Lunch Quail Creek Ballroom
Susan Kundrat MS, RD, CSSD, LDN
Sports Nutrition Update: Separating Fact From Fiction
University of Illinois / Nutrition on the Move
Sponsor: Science Advisory Board - Gatorade Sports Science Institute

1:30-2:15	I. Professional Business Meeting – John Thyfault, Ph.D, II. Student Meeting Moderator – Kyle Gibson, Ph.D., Jeffrey Krug, M.S. University of Missouri How to Negotiate a Competitive Salary	Salon E Salon B C D
2:15	Break	
2:30-3:15	Linda May, Ph.D.. Kansas City University of Medicine and Biosciences Exercise During Pregnancy: Cardiac Outcomes In Baby (And Mom)	Salon E
3:15-4:00	Yung Sub Kwon, Ph.D. Washburn University Optimizing Resistance During Multiple-Set Weight Training To Increase Training Volume	Salon E
3:45-4:00	Closing Remarks – Greg Kandt	Salon E

2010-2011 Administrative Council Members

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Learning Objectives

Intended Audience

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

Learning Objectives

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

- Recognize contemporary issues related to sports medicine, exercise science, and health promotion.
- Identify new approaches to, and perspectives on, problems in exercise science and sports medicine through interactions among scientists and clinicians in related fields.
- Identify how physical activity and physical inactivity contribute both positively and negatively to health in different populations.
- Recognize the importance of research in understanding problems related to physical inactivity.

CEC Credit

The CSC-ACSM meeting is offering 10.5 CEC's. To obtain CEC credit, the attendee will be provided a certificate, which they hold onto until they are audited for their recertification. They don't have to send anything to ACSM after the meeting. Meeting attendees will NO LONGER have to pay the \$15/\$20 CEC processing fee to receive the credits.

Sponsors

Financial sponsors include Gatorade Sports Science Institute, The University of Missouri School of Health Professions, The University of Missouri Office of the Provost, Hans Rudolph, Inc., RehabCare, Midwest Dairy Council, and New Lifestyles.

STUDENT DOCTORAL AWARD – ORAL PRESENTATION

Presentation Time - 4:00 p.m.

AEROBIC FITNESS IN BREAST CANCER SURVIVORS: ASSOCIATION BETWEEN SUBMAXIMAL AND MAXIMAL CARDIOPULMONARY EXERCISE TESTING

D.M. Burnett, J.R. Klemp, S. Aversman, C. Greer, M. Good, C. Porter, C.J. Fabian, P. Kluding*.

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Maximal oxygen uptake ($\text{VO}_{2\text{ peak}}$) is a gold standard for peak aerobic fitness and has been used to assess risk for all-cause mortality, cardiovascular disease (CVD), and breast cancer occurrence. Effort during a maximal test may vary in breast cancer patients throughout the continuum of care from diagnosis, during treatment, and until end of post treatment secondary to changing levels of fatigue and treatment tolerance. Sub-maximal exercise testing can be more resilient to symptom fluctuations. **PURPOSE:** To determine associations between two different submaximal testing modalities with a maximal $\text{VO}_{2\text{ peak}}$ treadmill test and assess peak aerobic fitness in breast cancer survivors. **METHODS:** We performed a single maximal cardiopulmonary exercise test (CPET) on a treadmill using indirect calorimetry with 30 breast cancer survivors (mean age 50.5 +/- 5.6 years), while analyzing maximal $\text{VO}_{2\text{ peak}}$. Sub-maximal VO_2 was assessed during the $\text{VO}_{2\text{ peak}}$ treadmill test for comparison to the $\text{VO}_{2\text{ peak}}$. A second sub-maximal test on an ARC trainer was conducted for comparison to the treadmill maximal $\text{VO}_{2\text{ peak}}$ values. Criteria for both sub-maximal VO_2 tests was established by using the respiratory exchange ratio (RER >1.0) and confirmed upon visual assessment of 1) ventilatory equivalent technique, and 2) modified V-slope method. **RESULTS:** VO_2 measures for both sub-maximal tests were strongly correlated with the maximal $\text{VO}_{2\text{ peak}}$. Mean values (+/- S.D.) with correlation coefficients for maximal and sub-maximal associations were $\text{VO}_{2\text{ peak}} = 25.4 \pm 5.3$ ml/kg/min compared to; 1) treadmill sub-maximal $\text{VO}_2 = 20.5 \pm 4.3$ ml/kg/min ($r = .83$; $p < 0.001$), and 2) ARC sub-maximal $\text{VO}_2 = 19.0 \pm .26$ ml/kg/min ($r = .80$; $p < 0.001$). **CONCLUSION:** Treadmill and ARC submaximal VO_2 exercise tests showed a strong correlation with maximal $\text{VO}_{2\text{ peak}}$, indicating that sub-maximal testing can be a good measure of aerobic fitness in breast cancer survivors. Breast cancer survivors in this study had a marked decrease in $\text{VO}_{2\text{ peak}}$, putting them at a higher risk for all cause mortality, CVD, and breast cancer recurrence.

Supported by Back in the Swing and NIH BIRCWH K12 Grant.

ORAL PRESENTATION

Presentation Time - 4:15 p.m.

RELATIONSHIPS BETWEEN FREE TESTOSTERONE, CORTISOL, AND ANAEROBIC PERFORMANCES IN RECREATIONALLY-TRAINED SUBJECTS

M. J. Andre, A. C. Fry, J. B. Winchester, A. G. Nelson FACSM, J. P. Ambegaonkar, and S. V. Caswell.
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Free testosterone (FT) and its ratio to cortisol (FT/C) has been reported to be highly correlated with jumping and sprinting ability in football, soccer, sprint, throwing, handball, and volleyball athletes (Bosco et al., 1996 & 2002; Cardinale & Stone, 2006; Nelson et al., 2009; Winchester et al., 2008a). One study has also reported a significant relationship in a recreationally-trained population (Winchester et al., 2008b). **PURPOSE:** To examine relationships among salivary FT or FT/C and anaerobic performances in recreationally-trained individuals. **METHODS:** Recreationally-trained college males (n=17, mean±SE: age=23.7±1.3 years, height=180.9±1.9cm, weight=87.5±7.0kg) reported for one testing session. Saliva was collected from each subject. Following a dynamic warm-up, subjects were tested for vertical jump (VJ), standing broad jump (SBJ), and 36.6m (40yd) sprint (SPR). Saliva samples were analyzed in duplicate for FT and cortisol (C) via enzyme-linked immunoassays. Pearson product correlation coefficients (r) examined relationships between salivary FT or FT/C and performance (p<0.05). **RESULTS:** Mean VJ (cm), SBJ (m), and SPR (seconds) were 58.1±2.3, 2.22±0.06, and 5.51±0.10, respectively. Mean FT (nmol/L), C (nmol/L), and FT/C were 1.09±0.2, 5.89±1.4, and 0.29±0.04, respectively.

Pearson Correlation Coefficients ($r_{crit}=0.48$, n=17, $\alpha=.05$)			
	Vertical Jump	Standing Broad Jump	Sprint
Free Testosterone	0.37	0.08	-0.21
Cortisol	0.02	0.25	-0.01
Free Tes/Cort	0.21	0.11	-0.22

No correlations were statistically significant. **CONCLUSION:** The results of this study suggest that FT, C, and FT/C are not related to vertical jump, standing broad jump, or sprint performance in non-athletic, but physically-active, populations. This contrasts with the results of another study (Winchester et al., 2008), indicating further research is needed to determine relationships between endocrine profiles and anaerobic performances for this population.

Supported by Speedology.

ORAL PRESENTATIONS

Presentation Time - 4:30 p.m.

EXPLORING THE RELATIONSHIP BETWEEN CHILD CARE CENTER STAFF ENCOURAGING HEALTHY EATING AND PHYSICAL ACTIVITY

R. Adamiec, S.B. Sisson¹, J. Campbell², K. May¹, D.R. Brittain³. ¹Department of Nutritional Sciences, University of Oklahoma Health Sciences Center, Oklahoma City, OK; ²Department of Biostatistics and Epidemiology, University of Oklahoma Health Sciences Center, Oklahoma City, OK; and ³School of Human Sciences, Community Health Program, University of Northern Colorado, Greeley, CO;
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Understanding how child care center staff interact with children regarding health behaviors is important in developing obesity prevention interventions that target early childhood. **Purpose:** The purpose of this study was to evaluate child care center staff support of healthy lifestyle behaviors related to obesity such as talking about healthy food and encouraging physical activity. **Methods:** A total of 314 child care centers in the state of Oklahoma participated in this state-wide survey of obesogenic practices and policies. The Nutrition and Physical Activity Assessment for Child Care (NAP-SACC) survey was mailed to child care directors in Oklahoma using a random stratified proportionate sampling so that each quadrant of the state as well as Tulsa and Oklahoma City were represented. With 1,390 child care centers licensed to provide all-day care to 2-5 year old children, a sample of 315 was needed based on 95% confidence intervals and a 5% margin of error. A 45% response rate was expected, therefore the surveys were mailed to 703 centers. Detailed follow-up strategies, including telephone calls and mailings, were utilized to maximize response rate. Two questions regarding frequency of staff encouraging healthy eating and staff participating along with children in active play time were used. SPSS 19.0 was used for analyses. **Results:** Although both were high, the frequency of centers reporting that staff sometimes often engaged in active play time was higher than the frequency reporting that staff informally talked about healthy eating most of the time (96.5% vs. 85.8%). Only 82.7% of centers reported staff engaging in both active play and speaking informally with children about healthy eating. **Conclusion:** These results indicate that most centers reported high levels of staff support for healthy lifestyle behaviors related to obesity. Additionally, nutrition education and training for staff regarding informal prompting of healthy eating needs to be increased as 14.2% of centers reported informal talk about healthy eating some of the time or less.

ORAL PRESENTATIONS

Presentation Time – 4:45 p.m.

FOCAL ADHESION KINASE EXPRESSION IN HEAT-SHOCKED RAT SOLEUS MUSCLE FOLLOWING ECCENTRIC EXERCISE

Zachary Graham¹, Chad Touchberry¹, Paige Geiger², Anisha A. Gupte², Gregory L. Bomhoff², Philip Gallagher¹

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Integrins are heterodimeric proteins that span the cell surface. They also detect stretch and coordinate intracellular protein signaling. One of these principal proteins, focal adhesion kinase (FAK), has been shown to coordinate hypertrophic and protective signaling in skeletal muscle. It has also been demonstrated that inducing heat shock protein 70 (Hsp70) prevents caspase-mediated degradation of FAK, possibly allowing it to maintain pro-survival signaling and providing an overall protective mechanism for the cell. **PURPOSE:** The purpose of this study was to compare total and phosphorylated FAK in the soleus (SOL) muscle of rats following exercise-induced muscle damage. **METHODS:** Male Wistar rats were randomly assigned to either a control group (CON), an eccentric exercise group (EE) (downhill running), or a heat shock (core temp 41°C for 20 min) + EE group (HS). SOL muscles were removed at 2h and 48h following exercise. Protein expression of FAK was determined using western immunoblotting and spot densitometry. A multivariate analysis of variance (MANOVA) was used to determine significance. Follow-up tests were conducted using one way ANOVAs and a Bonferroni test was used to adjust the level of significance. **RESULTS:** Total FAK was significantly lower in the EE and HS groups when compared to CON 2h post-exercise. There were no significant differences in total FAK in the 48hr group. There were also no differences in phosphorylated FAK at either 2hr or 48hr post-exercise. **CONCLUSION:** Eccentric exercise, regardless of heat treatment, causes a decrease in total FAK expression in rat soleus muscle two hours post-exercise.

Research supported, in part, by a University of Kansas General Research Fund grant (P. Gallagher).

POSTER PRESENTATIONS (5:15-6:45)

1. EFFECT OF WHOLE BODY VIBRATION ON FLEXIBILITY AND PERCEPTION OF MUSCLE SORENESS IN COLLEGE AGED FEMALES

A.A. Wheeler, B.H. Jacobson*, A.J. Warren*, S. Edwards*, J. Mendez**. Department of Health, Physical Education, and Sport Sciences, Arkansas State University, Jonesboro, AR, *School of Applied Health & Educational Psychology, Oklahoma State University, Stillwater, OK, and **School of Educational Studies, Oklahoma State University, Stillwater, OK;
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Therapeutic modalities such as massage, cold or warm whirlpools, contrast baths, ultrasound, and superficial heat are often used to alleviate the symptoms of delayed-onset muscle soreness (DOMS); however, no standard treatment protocols currently exist for DOMS. **PURPOSE:** To determine the effects of whole body vibration on delayed-onset muscle soreness through measures of perceived pain, flexibility, and explosive power. **METHODS:** Ten female participants signed an informed consent, completed a health history questionnaire, and were randomly assigned to a treatment group (whole body vibration = WBV; treadmill walking = TW). Participants attended five consecutive days of data collection. Session one began with baseline readings on a visual analog scale (VAS), sit-and-reach (SR), and vertical jump (VJ). DOMS was then induced by participants performing three sets of 10 lunges while holding 12-18% of their body weight. Post-induction measures were then taken for the VAS, SR, and VJ. Participants were then treated by either WBV or TW for ten minutes. Session one was concluded by a post-treatment measure of VAS, SR, and VJ. Sessions 2-5 consisted of pre-treatment VAS, SR, and VJ measures, treatment, and post-treatment VAS, SR, and VJ measures. A Repeated Measures Analysis of Variance (ANOVA) was conducted on each dependent variable. **RESULTS:** No significant results were found between the control and experimental groups regarding pain ratings ($p=0.18$), sit-and-reach scores ($p=0.11$), and vertical jump scores ($p=0.38$). **CONCLUSIONS:** While not statistically significant, differences were noted between groups. At 48 hrs, post treatment pain ratings were slightly higher for the TW group than the WBV group. No other trends were noted. These findings suggest more research should be done in this area to validate claims that WBV is beneficial in reducing DOMS.

2. THE USE OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION TO CHANGE PERCEPTION OF FUNCTIONAL ABILITY IN COLLEGE-AGED STUDENTS.

P. Vardiman, M. Andre, Z. Graham, P. Moodie, J. Maresh, M. Lane, Y. Alayafi, D. Carr,
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Many manual therapy techniques and therapeutic modalities are utilized to return patients to functional activities or activities of daily living. Assessing the change in a patients perception of their functional ability after receiving Instrument Assisted Soft Tissue Mobilization (IASTM) treatment has yet to be determined. **Purpose:** The purpose of this project was to assess the efficacy of the Instrument Assisted Soft Tissue Mobilization (IASTM) technique at changing a patients functional ability as well as their perception of functional ability of the functional squat test. **Methods:** Twenty-seven college-aged students (21.29 ± 1.89 years, 64.81 ± 15.52 kg, 170.05 ± 9.89 cm) participated in this study. Thirteen subjects (8 female, 5 male) were randomly selected to receive the IASTM treatment (TG) and 14 subjects (11 female, 3 male) were selected for the control group (CG). All subjects completed the Perception of Functional Ability Questionnaire (PFAQ) and then performed a baseline functional squat test in a 3-D Marker-less Motion Capture System (Dynamic Athletics, Overland Park, KS). The TG received a bilateral IASTM treatment to the posterior lower leg and the CG rested in a prone position for 10 minutes and did not receive the treatment. After the IASTM or 10 minute rest period all subjects performed a follow-up functional squat test in the motion capture system and completed a follow-up PFAQ. All data was analyzed using a 2x2 repeated measures ANOVA ($p < .05$). **Results:** There was no significant difference in data from the PFAQ between the TG and CG. There was significantly more stability in body weight distribution found in the TG following the IASTM treatment compared to the CG. There was also significantly more posterior heel shift in the TG following IASTM compared to the CG. **Conclusion:** Though not statistically significant, all components of perception of functional ability improved following IASTM with the healthy, college-aged subjects. IASTM treatment did significantly increase critical components of the functional squat test. These data indicate that IASTM is an effective modality for increasing functional ability with the functional squat test.

3. THE YMCA SUBMAXIMAL EXERCISE TEST USING A TOTAL BODY RECUMBENT STEPPER TO PREDICT VO₂ PEAK.

E. L. van Swearingen,¹ M. E. McClain,¹ M. B. Good,² K. Brucks,³ and S.A. Billinger.¹

¹School of Health Professions, ²School of Medicine, University of Kansas Medical Center, Kansas City, KS; and ³Department of Exercise Science, Rockhurst University, Kansas City, MO.

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Total body recumbent steppers (TBRS) have been increasing in popularity as an exercise modality for older adults and those with physical impairments. Rehabilitation settings use the TBRS for exercise due to accommodating a variety of patient populations. However, there is a need to use a standardized submaximal exercise test on the NuStep to inform clinical exercise physiologists, physical therapists and healthcare professionals about their client's cardiorespiratory health and as a baseline for exercise prescription and performance. **PURPOSE:** The purpose of this study was to examine the ability of the Young Men's Christian Association (YMCA) submaximal exercise test protocol using a TBRS (NuStep T5xr) to predict VO₂ peak. **METHODS:** Seventy-two individuals were screened for enrollment into the study. Seventy individuals (34 males, 37 ± 11 years of age (range 22-59), race: African American, n = 1; Caucasian, n = 62, Asian n = 7) with low to moderate cardiac risk met the inclusion criteria for participation in the study. The maximal exercise test used a motorized treadmill and the Bruce or modified Bruce protocol, which consists of 3-minute stages. Oxygen uptake was measured and analyzed through collection of expired gases using a metabolic measurement system. The submaximal exercise test was performed at least 24 hours later but no more than 5 days. For the submaximal test, participants wore a HR monitor. Participants were instructed to move their arms and legs in an alternating pattern at a constant speed of 100 steps per minute. Using the YMCA protocol, participants were instructed that the exercise test would begin at 25 watts and resistance increase every 3 minutes according to the exercise test protocol until 85% of HR max is met (test termination endpoint) or completion of the exercise test. A multiple linear regression was performed to identify significant predictors (p < 0.05) of VO₂ peak with demographic and submaximal exercise testing variables. **RESULTS:** Five variables were identified as significant predictors of VO₂ peak. The variables of interest were age, sex, body weight, HR at the final stage of the submaximal test and the watts at the end of the submaximal test. **CONCLUSION:** These data suggest the YMCA submaximal exercise test can be used with the TBRS to predict VO₂ peak in healthy adults.

Supported by: SAB is supported in part by K01HD067318 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development

4. ISOMETRIC RAPID TORQUE CHARACTERISTICS AS PREDICTORS OF PLAYING ABILITY IN COLLEGIATE FOOTBALL PLAYERS

B.J. Thompson, D.B. Smith, E.J. Sobolewski, K. Akehi, E.C. Conchola, R.E. Fiddler, and E.D. Ryan
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INTRODUCTION: Success in collegiate football programs is critically dependent upon the ability of coaches to identify and recruit athletes with a high degree of football playing ability. Previous authors have investigated the use of performance tests to discriminate among football playing ability, with varying success. However, rapid torque characteristics are an important measure of muscle performance and thus may provide a sensitive measure for talent identification in collegiate football players. **PURPOSE:** To examine the effectiveness of rapid torque characteristics to discriminate among football playing ability in division I collegiate football players. **METHODS:** Sixteen starters (mean \pm SD: age = 20.81 \pm 1.28 yr) and 15 non-starters (20.40 \pm 1.68) volunteered to participate in the study. Participants performed three isometric maximal voluntary contractions (MVCs) with the leg flexors and extensor muscle groups with one minute of recovery between each contraction and three minutes of recovery between muscle groups. Rate of torque development (RTD; N \cdot sec⁻¹) and contractile impulse (IM; N \cdot m \cdot s) were determined from the following time intervals (0-30ms, 0-50ms, 0-100ms, 100-200ms). Peak rate of torque development (PRTD) and time to PRTD (TTPRTD) were also calculated. Separate 2-way mixed factorial ANOVAs (muscle \times playing status) were used to analyze torque – time variables. Follow up analyses included independent samples t-tests and paired samples t-tests with Bonferroni-corrected post-hoc comparisons. **RESULTS:** For the leg flexors, RTD50, IMP30 and IMP50 was greater (P=0.02-0.03) and TTPRTD was shorter (P=0.03) for the starters when compared to the non-starters. There were no significant differences between starters and non-starters for any of the leg extensor variables (P=0.14-0.94). In addition, the leg extensors were greater (P<0.001) for all RTD and IM variables and less for TTPRTD when compared to the leg flexors for all players. **CONCLUSIONS:** These findings showed that early rapid torque – time variables of the leg flexor muscle group may effectively discriminate among playing ability in division I collegiate football players. Thus, coaches and practitioners may use these findings to evaluate football playing ability. Further, strength coaches may consider designing strength programs aimed at maximizing rapid muscle contraction characteristics, specifically for the leg flexors.

5. SWEAT RATE VS. BODY TEMPERATURE

H.E.Thomas, K.N.Fox, W.A.Harvey, S.P. Burns.
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PURPOSE: Thermoregulation is an important aspect of exercise in heat stress environments particularly when top performance is required. The purpose of this study was to find how core temperature and sweat rate correlate. The hypothesis was that women with higher sweat rates would have a lower core temperature. **METHODS:** Subjects were 18 women ages 18 to 21 with an average weight 66.41 kg and height 1634.34 cm, body fat = 25% - 49.2%. Subjects cycled indoors in the heat (22° C) for 60 min. including 45 minutes at an intensity determined by 75% of their age-predicted maximum heart rate. During the remaining 15 minutes subjects were encouraged to reach the highest possible intensity they could tolerate. Heart rate and core temperature were tracked and recorded every five minutes. No fluids were given during exercise. **RESULTS:** The average fluid loss by sweat was 0.595 kg \pm with range of 0.360 – 0.904 kg. Average temperature increase 2.36°C with a very narrow range of 37.7°C-38.3°C. **CONCLUSIONS:** The data collected suggests that while individuals sweat at different amounts they tend to maintain relatively the same body temperature throughout. Future research should be conducted on how body fat percentage affects sweat patterns.

6. ENERGY DRINKS AND RATING OF PERCEIVED EXERTION

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Introduction: As more energy drinks stock the shelves, questions arise about how they affect the body, especially during exercise. **Purpose:** The primary purpose of this study was to determine how energy drinks affect a person's Rate of Perceived Exertion blood pressure and heart rate during extended, steady-state exercise. **Methods:** Participants were 10 active (6+ hours of physical activity per week), male, UCM students, ages ranging from 19-25. All subjects completed a placebo (caffeine free diet Mountain Dew) and experimental trial (monster energy drink).. One-hour after administering the drink participants completed 1 hour of steady-state cycling on a Monark 828 ergometer . Heart rate was monitored throughout the exercise with a Polar Heart Rate monitor, while every 15 minutes, the RPE of each participant was recorded using the Borg's Scale. Blood pressure was taken before the digestion period and immediately following the exercise. The distance the participants traveled was tracked using the Monark 828 ergometer and recorded after completion of the exercise. **Results:** The subjects displayed an average HR of 125.8 ± 19.8 bpm during the placebo trial and 133.9 ± 25.6 bpm during the Monster trial with a T-Test value of 0.125. The average change in blood pressure showed no notable difference between the two trials. In the Monster trial, the average distance traveled demonstrated a slight increase from 30.59 ± 3.9 km in the placebo trial to 31.19 ± 4.4 km with a T-Test value of 0.304435 while the average overall RPE declined from 14.0 ± 1.63 from the placebo trial to 13.8 ± 2.25 in the Monster trial with a T-Test of 0.002) **Conclusion:** These results indicate that Monster energy drinks will allow for a higher work output (determined by the increase in the average distance the subjects travelled while the duration remained constant) during exercise, while decreasing the user's feeling of exertion. An increase in heart rate is also possible, however; there is no evidence to suggest that it will cause a change in blood pressure. This is important for physically active individuals willing to trade off the probability of a higher heart rate during a steady-state exercise, for the possibility of an increased work output with a feeling of less exertion.

7. Testing Performance and Physical Activity Level between Two Health Majors

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Introduction: Physical activity is crucial to maintain a healthy body. Most people know that they should be getting at least thirty minutes of physical activity a day, and no one should know this better than health majors. **Purpose:** The purpose of this research project was to compare two health majors (Exercise Science and Physical Education) on performance on the presidents' challenge test and current daily physical activity level. **Methods:** Twenty students (ten students from each major), ages 18-25 participated. At subjects completed the presidents' challenge test consisting of push-ups in a minute, running a mile, sit and reach for flexibility and sit-ups in a minute. Scores were compared, and ranked by percentile. Each participant also wore a pedometer daily for seven days to determine number of steps. The participants were also asked to rate themselves on how fit they perceive themselves being, on a scale of, 1 being out of shape to 10 being physically fit. **Results:** The results indicated Exercise Science majors had higher averages in three out of the four tests in the president's challenge test. Sit-ups and push-ups had an average of 47 ± 9 , and 34 cm being the average sit and reach length. While Physical Education majors performed greater in the one mile run test, with an average of 7 minutes and 31 seconds, compared to Exercise Science with an average of 7 minutes and 81 seconds. But when it came to who was more active, (number of steps) Physical Education majors' greatly outnumbered Exercise Science majors with 750, 717 steps taken for the P.E. major, while Exercise Science had 535, 823. Exercise Science had a higher average rating of how physically fit they perceive themselves to be, with a 7, and P.E. having an average ranking of 6.2. **Conclusions:** The conclusions were (1) Exercise Science majors performed superior on the presidents' challenge physical test (2) Physical Education majors had a higher total average of steps taken for the seven day period, meaning their level of physical activity was greater, and (3) Exercise Science perceive themselves more physically fit compared to P.E. majors. One major did not completely dominate over the other. Both majors are good examples of students that take their majors seriously and really do "practice what they preach" when it comes to being physically fit.

Key Words: Exercise Science, Physical Education, presidents' challenge test, physical activity

8. THE RELATIONSHIP BETWEEN FUNCTIONAL FITNESS AND EXERCISE SELF-EFFICACY
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With functional fitness ordinarily decreasing with age, it is imperative to not only recognize older adults' functional fitness capabilities but also their internal eagerness to complete exercise tasks. Therefore, both entities are crucial to quality of life and independence that may be practical in an individual's life.

PURPOSE: The purpose of this study was to examine the relationship between functional fitness and exercise self-efficacy in older adults. Researchers hypothesized that Exercise Self-Efficacy (ESE) would strongly correlate to the Chair Stand test and the 8-foot up-and-go test from the Senior Fitness Testing (SFT) protocol, but not with other measures of functional fitness. **METHODS:** Eighty-eight men and women completed the SFT, hand-grip strength test, and the ESE survey. The ESE is a survey consisting of nine questions, which asks participants how sure they are that they will perform exercise. The ESE is scored on a scale of 1-5 with lower scores representing greater amounts of self-efficacy. The SFT involves six tests related to an individual's functional fitness. The tests include Chair Stand, Arm Curl, 6-Minute Walk, 8-Foot Up-and-Go, Sit-and-Reach, and Back Scratch. The hand-grip strength assessment tests maximal grip strength on a hand-grip dynamometer. The relationship between measures of functional fitness and ESE were assessed using Pearson's product moment correlation coefficient. **RESULTS:** Results showed significance with moderate inverse correlations between ESE surveys and the performance of Chair Stands ($r = -.344, p = .001$) as well as the 6-Minute Walk test ($r = -.250, p = .043$). The Arm Curl ($r = -.237, p = .021$) was also significant, but weak. Other weak, but non-significant, findings included the inverse relationships of the Sit-and-Reach ($r = -.157, p = .131$), Back Scratch ($r = -.173, p = .098$), and Hand-Grip Average ($r = -.183, p = .078$) tests, as well as a direct weak relationship in the 8-Foot Up-and-Go ($r = .098, p = .363$). **CONCLUSION:** These results indicate the perception an individual has of their ability to perform is related to their functional fitness performance. Therefore, building the belief in their capability through early training, positive reinforcement, and successes could increase the likelihood of continued physical activities and functional fitness.

9. FOOD AND PHYSICAL ACTIVITY AS REINFORCING STIMULI IN CHILDCARE CENTERS ACROSS OKLAHOMA

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Reinforcement strategies are used in child care centers (CCC) to modify behaviors. The stimuli used can have lasting impacts on child behaviors. **PURPOSE:** The purpose of this study was to determine the prevalence of reinforcement strategies using food and/or physical activity (PA) as reinforcing stimuli in CCC across Oklahoma. Specifically, food used to encourage positive behavior (positive reinforcement) and active playtime withheld for children who misbehave (negative punishment). **METHODS:** The Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) was mailed to childcare center directors across Oklahoma. A randomized, stratified proportionate sampling strategy was utilized to sample CCC representing each quadrant of the state as well as the major metropolitan areas (Oklahoma City and Tulsa). With 1,390 CCC licensed to provide all-day care to 2-5 year old children, a sample of 316 was needed based on 95% confidence intervals and a 5% margin of error. A 45% response rate was expected; therefore surveys were mailed to 703 centers. Follow-up strategies were used to enhance response rate. **RESULTS:** A total of 314 CCC returned the survey for a 44.6% response rate. There were no meaningful differences between responders and non-responders. While 82.5% of responders neither deny active playtime from children who misbehave nor use food to encourage positive behavior, 2.0% either often or sometimes use both as reinforcing stimuli. Over 15% do not use food to encourage positive behavior or deny active playtime to children who misbehave, but do provide additional active playtime for children with good behavior. Of the CCC that never use PA reductions as negative punishment, 9.4% use food to encourage good behavior at least some of the time. Of the CCC that rarely or never use food as reinforcement, 6.1 % reported denying PA at least some of the time. **CONCLUSIONS:** Overall, the majority of CCC across Oklahoma are not using food or physical activity in behavioral reinforcement strategies. However, some CCC (15.5%) use one of these undesirable reinforcement stimuli, thus there is still more work to be done. Study limitations include low response rate and possible unwillingness to respond honestly. However, the predicted response rate was achieved and CCC assured that data would be aggregated.

10. EFFECTS OF TOPICAL MENTHOL GEL ON BLOOD LACTATE AFTER 30-SECOND HIGH-INTENSITY ANAEROBIC EXERCISE

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Topical menthol gel has been reported to reduce acute pain and studies of its effects as a cryotherapy tool have revealed levels of vasoconstriction similar to that of ice. During and following intense anaerobic activity when large amounts of lactate are being produced, lactate is cleared within muscle or transported from muscle to liver as it accumulates. Therefore, if blood flow is restricted then the ability to clear lactate and recover from a bout of intense exercise may be attenuated. **PURPOSE:** To determine if the topical application of menthol gel has any effect on blood lactate accumulation levels during a 30-second sprint. **METHOD:** 30 participants (14 male; 16 female) aged 20-38 (24.4 ± 4.8) years each completed two trials, one with menthol gel and one without, with 48 hours between trials. For the trial with gel, a dose of 1ml of gel for every 200 cm² sq cm of surface area was applied bilaterally to the anterior thigh area of each participant. For both trials, following a brief (2-3 sec) unloaded acceleration period, participants pedaled as fast as possible against a load of 0.75 kg \square kg⁻¹ body mass for 30 sec. Blood lactate measures were obtained immediately after each trial. **RESULTS:** Mean \pm SD for blood lactate for the control group was 8.88 ± 3.8 mmol. The trial group the mean \pm SD for blood lactate was 9.28 ± 5.69 mmol. There were no statistical differences ($p < 0.05$) between blood lactate levels with or without topical menthol gel application. **CONCLUSION:** Blood lactate levels immediately following exercise do not appear to be affected by using topical menthol gel. Given that our other research has revealed no higher power outputs with the use of topical menthol gel, it appears that anaerobic metabolism is unaffected by its use. However, future studies should evaluate local blood flow and lactate measures at longer post-exercise sampling times that would take into consideration the delay in transporting lactic acid from tissue to blood.

Supported by Hygenic Corporation

11. A QUALITATIVE LOOK AT PARENTAL SUPPORT OF PHYSICAL ACTIVITY

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Purpose: This was a qualitative study designed to gain an understanding of families' experience with physical activity, specifically how parents support their children's physical activity. **Methods:** This qualitative study consisted of semi-structured interviews by trained interviewers that were analyzed using phenomenological research methods, a means for understanding the essence of human experience. Interviews were conducted until saturation occurred ($n=11$) and were digitally recorded for transcription. Once transcribed, the research team coded, compared, categorized and developed themes. Each researcher initially completed these processes alone before coming together for verification of the data. **Results:** Four themes emerged through analyses. "*These are the things I want them to know*" Parents indicated a desire to convey the importance of physical activity to their children. "*Doing something*" Families recognize the importance of spending time together and are often using this time to be active together. "*Opportunity to do it*" When speaking about the amount of physical activity they participate in, opportunity for activity or lack thereof was a common theme identified by participants. "*Taking the time*" When describing the ways they support their children, the parents often mentioned the effort to take the time and money to support them by taking them to practice/games, paying for teams and volunteering as coaches, etc.. **Conclusion:** It appears from the findings that parents understand the importance of physical activity but also identify barriers related to the context of their environment. By understanding parental values about physical activities (what they know, what they want to teach their children, what they do, etc.) and working with families to infuse physical activity into everyday life the physical activity of youth could be increased.

12. CARDIOVASCULAR FITNESS IMPROVEMENTS FROM HIGH INTENSITY TRAINING IN CHILDREN

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High intensity exercise improves cardiovascular fitness in children, and research has shown significant improvements in adults' cardiovascular fitness from engaging in high intensity exercise. Data show many children do not meet the weekly physical activity recommendations of the ACSM. With high intensity training, cardiovascular fitness and body composition can be improved while spending significantly less time exercising. **PURPOSE:** The purpose of this study was to determine the effects of a short-duration, high intensity exercise training program lasting four weeks on cardiovascular fitness and body composition of children when compared to active children of similar age. **METHODS:** This study used a pre-test posttest quasi-experimental two-group design. Nine (8 males, 1 female, mean age 10.6y) were in the intervention group (IG) and 6 (6 males, mean age=11.3y) were in the Comparison Group (CG). The IG participated in 45-minute high intensity exercise sessions (2d/wk for 4wk). In brief, sessions consisted of 5min warm-up, 10min skill/technique work, 10-15min workout, short water break, and 10-15min playing an active game. Both groups completed the Fitnessgram pacer cardiovascular fitness test developed by the Cooper Institute. Heart rate was recorded immediately following the Pacer along with heart rate recovery one minute and two minutes following. Each participant also completed a dual-energy X-ray absorptiometry scan 4 weeks apart to monitor body composition. Difference scores were computed and t-tests were conducted for statistical significance between groups. **RESULTS:** The number of 20m laps completed during the Pacer decreased for both groups with a mean difference score of -5.44 (sd=5.79) for the IG and -3.67 (sd=8.94) for the CG; this difference was statistically significant, $t=3.43$, $p=.004$. Heart rates remained similar and neither group showed significant improvement in their heart rate recovery measured after completion of the PACER test ($p>.05$). Body weight of either group did not change significantly, but the CG made significant gains in lean body mass and decreases in fat mass ($p<.05$), as compared to the IG. **CONCLUSION:** Both groups failed to show improvements in cardiovascular fitness (as measured by the Pacer test). Failure to improve cardiovascular fitness may be attributed to the overall duration of the intervention and total number of training sessions. Changes in body composition of the CG may be due to the additional activity they completed. Future research should examine if lengthening intervention duration or adding training sessions each week might result in significant improvements in cardiovascular fitness.

13. CORRELATION BETWEEN CHEST GIRTH, WINGSPAN AND 1-RM ON THE BENCH PRESS IN COLLEGE AGE MALES

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Abstract

The distance a person moves an amount of mass on a bench press determines the amount of work conducted. That being said, greater distances might result in decreased force production; whereas, greater muscle mass may result in increased force production. **Purpose:** To determine if there is a correlation between wingspan, chest girth, weight, and bench press 1RM in college-aged males. **Methods:** All the subjects of this study were male (N=26; age=21.12 ± 1.840) volunteers from a small public HBCU in a southern state. Subject's weight, wingspan, chest girth, and bench press 5RM were measured and a 1RM was calculated. Data was analyzed using a bi-variate Pearson correlation. **Results:** Analysis yielded no correlation between chest girth and wingspan ($p=.058$) and wingspan and 1RM ($p=.929$). However, there was a correlation between chest girth and 1RM ($p=.002$; $R=.572$); weight and chest girth ($p<.000$; $R=.944$) and weight and 1RM ($p=.002$; $R=.580$). **Conclusion:** These results indicated that there is a distinct correlation between a person's weight, chest girth, and amount of mass they can move on a bench press; this may be due to greater muscle mass in the thoracic region.

14. WEEKLY HEAT TREATMENTS REDUCE WHOLE-BODY INSULIN RESISTANCE

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Heat treatments have been reported to reduce whole-body insulin resistance with upregulation of heat shock proteins (HSPs) in skeletal muscle as a likely mechanism. **PURPOSE:** The purpose of the present study is to investigate whether an intervention of weekly heat treatments can reduce whole-body insulin resistance induced by a high-fat diet (HFD). **METHODS:** Male Wistar rats were fed a HFD (60% calories from fat) for 15 wk to induce whole-body insulin resistance. After 8 wk of the HFD, rats received weekly lower-body heat treatments (HT, 41° C for 20 min) or sham treatments (ST, 37° C for 20 min). Before and after HT or ST, an intraperitoneal glucose tolerance test (IPGTT) was performed and blood was analyzed for glucose and insulin. Extensor digitorum longus (EDL) and soleus (SOL) muscles were dissected and treated with and without insulin in flasks containing KHB with 2[1,2-³H]-deoxyglucose (1.5 μ Ci·ml⁻¹) and [¹⁴C] mannitol. 2-deoxyglucose uptake was quantified in a scintillation counter. Muscle lysates were assessed for protein expression using standard Western blotting techniques. **RESULTS:** Body weight and food intake were not significantly different between HT and ST throughout the experiment. Plasma glucose following an IPGTT was significantly lower following HT compared to ST ($p < 0.01$). Serum insulin following an IPGTT was not significantly different between HT and ST. Homeostatic model assessment of insulin resistance (HOMA-IR) was significantly reduced following HT compared to ST ($p < 0.05$). Insulin stimulated glucose transport in EDL and SOL was not significantly different between ST and HT. Heat shock protein 70 (HSP70) expression was significantly greater following HT compared to ST in the EDL only ($p = 0.01$). **CONCLUSION:** Heat treatment may alleviate whole-body insulin resistance in rats fed a HFD. Although insulin stimulated glucose uptake in skeletal muscle was not improved by HT, mechanisms in the liver and adipose tissue may contribute to the reduction in whole-body insulin resistance. Supported by AG031575 and K-INBRE P20 RR016475 from the National Institutes of Health.

15. THE EFFECTS OF CAFFEINE IN STEP AEROBICS CLASSES IN PHYSICALLY ACTIVE COLLEGE-AGED FEMALES

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Lack of exercise and a poor diet are one of the main reasons why the United States has a high obesity rate. **Purpose:** Step aerobics are a low impact activity which increases heart rate (HR) and promotes a healthy lifestyle. Caffeine also increases the HR which is beneficial during exercise. People usually ingest caffeine prior to beginning a workout and caffeine has also been used as a supplement. (Malek, Housh, Coburn, Beck, Schmidt, Housh, & Johnson, 2006). The purpose of this study is to monitor how different doses of caffeine affect the HR and rating of perceived exertion (RPE). **Methods:** Subjects were 10 recreationally active college-aged females who participated in a step aerobics exercise video workout for 30 min. Subjects were caffeine naïve which is defined by not regularly ingesting caffeine. Each participant blindly ingested three trials spaced a minimum of 48 hours apart of 6mg/kg caffeine, 9mg/kg caffeine, or a placebo. The mean HR and RPE were recorded after every exercise trial. The trials were compared to determine if there was a difference in RPE or HR due to caffeine. It was hypothesized that caffeine at both doses would increase HR and lower the RPE. **Results:** The placebo had the lowest mean HR and the highest RPE. The 6mg/kg dose had the next highest heart rate while the RPE was the second highest. The 9mg/kg dose had the highest mean for HR with the lowest RPE. Each caffeine trial indicated a significant difference. **Conclusion:** According to the data collected in this study, 6mg/kg or 9mg/kg of caffeine powder administered 45 minutes prior to exercise leads to a higher HR and lower RPE with the higher dose causing a greater effect.

16. SITTING VS. LIGHT ACTIVITY AND POST PRANDIAL SERUM HDL AND LDL CHOLESTEROL: INFLUENCE OF HIGH FAT MEAL

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Low HDL-cholesterol and high LDL-cholesterol in childhood are associated with atherosclerosis and risk for heart disease in adulthood. High fat diets are associated with elevated total cholesterol and lowered HDL-C levels in children. Regular exercise in children is a protective factor to heart disease by increasing HDL-C and providing an indirect effect on lowering LDL-C. **Purpose** To determine if the acute effect of light physical activity (LPA) following a high fat meal would result in lower post prandial HDL-C, LDL-C, and HDL/LDL ratio between sitting and walking treatments. **Methods** A convenience sample of 18 adolescents (aged 10 to 18) was recruited. Participants were randomly assigned to walking and sitting treatments, each lasting 3 hours, separated by a minimum of 48 hours. On both treatment days, following an overnight fast, an identical high fat meal was consumed, containing 600 kcal (35% fat, (10% saturated fat). The sitting treatment consisted of sitting in a recliner or bed. The walking treatment consisted of walking at pace of 1.5 mph on a treadmill for 3 periods of 45 minutes with 15 minute rest periods. Blood was sampled before the meal and hourly thereafter and used to measure serum cholesterol levels. **Results** The average age was 14.8 years; 50% males. No difference was found between fasting HDL-C between sitting (44 ± 9 mg/dl) and walking (44 ± 10 mg/dl) treatments ($p=0.96$). No difference was found between fasting LDL-C between sitting (86 ± 5 mg/dl) and walking (85 ± 5 mg/dl) treatments ($p=0.54$). No difference was found between fasting HDL/LDL ratio between sitting (2 ± 0.8) and walking (2 ± 0.8) treatments ($p=0.76$). HDL-C declined ~6% and ~5% respectively from fasting to the end of the 3-hour post meal period on both trials ($44-41$ mg/dl for sitting ($p < .001$) and $44-42$ mg/dl for walking ($p=.002$)). LDL-C declined ~8% from fasting to the end of the 3-hour post-meal period on both trials ($86 - 79$ mg/dl on the sitting day and $85-78$ mg/dl on the walking day, $p < 0.02$ for both days). No significance was found in HDL/LDL ratio from fasting to end of the 3-hour post meal period in either sitting ($p=.95$) or walking ($p=0.40$). Significant difference was found between sitting (-4 ± 2 mg/dl) and walking (-2 ± 2 mg/dl) treatments change (i.e., Delta) in HDL ($p=0.02$). No significance was found between sitting (-8 ± 12 mg/dl) and walking (-7 ± 6 mg/dl) treatments Δ LDL ($p=0.86$). No significance was found between sitting ($-.01 \pm .34$) and walking ($-.08 \pm .17$) treatments for Δ HDL/LDL ratio ($p=0.34$). **Conclusion** The main finding was that the decrease in HDL was lower following LPA than sitting post a HFM meal, implicating the importance of acute impact of LPA on HDL.

Supported by University of Oklahoma Health Sciences Vice President of Research Seed Grant

17. EIGHT WEEKS FUNCTIONAL TRAINING IMPROVES MUSCLE ENDURANCE, BALANCE, POWER, SPEED IN ATHLETES WITH DISABILITIES

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Athletes with disabilities are competing at higher levels of national and international contest and are showing potential at the Paralympic Level. High intensity functional training is an effective method in training these athletes. **PURPOSE:** The purpose of this study was to determine whether a high intensity functional training program was effective in improving athletic muscle endurance (ME), dynamic balance (DBAL), power (P), and speed (S) in athletes with various disabilities. **METHODS:** Nine individuals (Mean age = 18, Males n = 6, Females n = 3) with disabilities varying from cerebral palsy, visual impairment, spinal cord injury, and spina bifida participated. Each athlete performed pre and post-tests which consisted of: 1 min push-up, 1 min sit-up, stabilometer, vertical jump (VJ), medicine ball throw (MBT), and 40 yard dash. Athletes participated in one 45 minute training session per week for 8 weeks. Training sessions included a dynamic warm-up, a high intensity training incorporating ladder agility drills, hurdles for balance and flexibility, sand pit for balance, bodyweight core training, muscle strength and endurance exercises, cable columns for core strength, medicine balls for power and core stability, over-speed workouts on treadmills, stability balls for balance, tennis balls for hand-eye coordination, and an appropriate cool down. **RESULTS:** Eight weeks of functional training considerably improved ME (40.6% sit-ups, 40.0% push-ups), DBAL (178%), P (13.0% MBT), and S (10.6%). **CONCLUSION:** These results indicate that an 8 week functional training program was effective in improving muscle endurance, dynamic balance, power, and speed in athletes with various disabilities.

Supported by Disabled Athletes Sports Association (DASA)

18. ELECTROMYOGRAPHIC ANALYSIS OF CONVENTIONAL AND RUBBER-BASED BAND SQUATS

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Recently, an alternative method of attaching bands to the power rack during the back squat exercise has been established. This heightened method rearranges the band attachment point to where one end of the bands is affixed to the top of the power rack and the opposite ends to the barbell. **PURPOSE:** The purpose of this study was to compare mean integrated electromyography (I-EMG) values for the vastus lateralis (VL) muscle amongst 3 resistance conditions on the squat exercise. The no band (NB) condition used only the barbell plus weighted-plates. The bottom band (BB) and top band (TB) conditions combined weighted-plates with bands attached to the barbell originating from the bottom and tops of the power rack, respectively. **METHODS:** Twenty-two healthy, physically active collegiate males volunteered to participate in this study (age = 22.4 ± 2.6 yr; height = 177.8 ± 9.7 cm; weight = 87.0 ± 19.0 kg). Initial testing was conducted on the squat exercise in order to assess each subject's maximal strength. To evaluate maximal strength, three 1-repetition maximums (1RMs) were required from every subject, one for each resistance condition. During EMG testing, subjects were evaluated during a single session on the back squat exercise inside a power rack for each resistance method with the order of testing randomized for each subject. Eighty percent of the 1RM, based upon the subject's maximal strength using the measured NB, BB, and TB resistances, was used as the external load during EMG testing. One set of 3 repetitions was performed by every subject for each band configuration, where only the 3rd repetition was used for mean I-EMG data collection. To compare mean I-EMG output amongst the 3 resistance conditions throughout the entire ROM, both the eccentric and concentric phases of movement were each broken down into ten 10% intervals based upon the time it took each subject to complete the eccentric and concentric phases of the measured repetition. Mean I-EMG output was calculated in volts (V) for the 90 (top portion of the squat ROM) and 10% (bottom portion of the squat ROM) intervals. **RESULTS:** Repeated measures ANOVA indicated a significant two-way interaction between band type configuration and percent interval ($p < 0.05$). At the 90% interval there was a significantly higher VL mean I-EMG output in both the BB (0.123 ± 0.082 V) and TB (0.126 ± 0.094 V) conditions than the NB condition (0.088 ± 0.051 V). **CONCLUSION:** Results from this investigation suggest that with an external load of 80% of the 1RM, both TB and BB squat configurations elicit significantly greater mean VL I-EMG output at the top of the ROM when compared with NB squats.

19. PREDICTING BONE MASS IN COLLEGE-AGED FEMALE ATHLETES

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Numerous studies have indicated that participation in high level athletics has a significant positive impact on bone mineral density. However, many athletes do not present general knowledge of nutrition. Since calcium plays such an important role in bone integrity, knowledge about this specific nutrient may be of particular importance in the athletic population. The purpose of this study was to examine the connection between knowledge of dietary calcium and bone mineral density in college-aged, female athletes. **METHODS:** Fourteen, Division I, female athletes from various sports, including golf, gymnastics, cross country, swimming, and volleyball, participated in the study with mean (\pm SD) age, height, and weight of 19.74 ± 1.17 yr., 65.34 ± 3.74 in., and 139.83 ± 20.27 lbs. Testing consisted of a Dual-emission X-ray Absorptiometry (DXA) scan and completion of a brief dairy questionnaire. **RESULTS:** A multiple regression analysis was used with height, weight, knowledge of recommended dairy consumption, knowledge of non-dairy high calcium food sources and reported dairy consumption as predictors of bone mineral density. Statistical significance was set at $p < .05$. The model was not found to be significant; $F(5,8) = 1.48, p = .30$. However, the predictor variables accounted for almost half of the variance in bone mineral density ($R^2 = .48$). After height and weight were accounted for, the ability to identify additional calcium rich food sources was the next most important predictor of bone mineral density accounting for 15% of the variance; $F(1,13) = 1.53, p = .16$. Actual dairy consumption, $F(1,13) = .29, p = .77$, and knowledge of how many servings of dairy should be consumed per day, $F(1,13) = .07, p = .95$, contributed very little to the model. **CONCLUSION:** Although the overall model was not found to be significant, the amount of variance accounted for by body size was substantial and consistent with reviewed literature. Being able to identify non-dairy calcium rich foods was more important than identifying how many servings of dairy to consume and the actual amount consumed per day. This finding leads us to believe that athletes with more advanced knowledge of calcium rich food sources could potentially lead athletes to make more informed food choice to positively influence bone mineral density. More research is needed to explore the relationship between athletes' knowledge of dietary calcium and bone mineral density.

Supported by the University of Arkansas Human Performance Lab.

20. A SINGLE EXERCISE BOUT DOES NOT IMPROVE GLYCEMIC CONTROL IN VOLUNTEERS WITH TYPE 2 DIABETES.

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Type 2 diabetes (T2D) and the associated impaired glycemic control greatly increase risk of cardiovascular disease related death. **PURPOSE:** Our lab has previously shown that seven consecutive days of aerobic exercise can effectively reduce the amplitude of change in postprandial glycemic excursions (Δ PPG; = post meal glucose - pre meal glucose) in previously sedentary individuals with T2D measured by continuous glucose monitors (CGMS). It is unknown if and for how long a single bout of exercise will reduce Δ PPG in T2D. **METHODS:** To test these questions, we recruited 6 individuals with T2D (BMI: 37.64 ± 0.74 kg/m²; Age 58.83 ± 2.08 years; HbA1c: 6.53 ± 0.4 %) who were non-insulin dependent and sedentary (<30 minutes/week of exercise). The subjects consumed a standard study diet individually adjusted to maintain energy balance during two separate 3 day periods while wearing CGMS monitors to continually monitor blood glucose. During one 3 day period the subjects performed one 60 minute, monitored exercise bout (EX; 60-75% of heart rate reserve) prior to breakfast on the morning of the first day. In contrast, the subjects maintained their sedentary lifestyle during a second 3 day period (SED). **RESULTS:** A comparison of the 2 periods revealed that one bout of exercise did not significantly change post prandial Δ PPG averaged across all meals (EX: 0.68 ± 0.07 vs. SED 0.53 ± 0.05 mmol/l), percent of time spent within normal glucose levels (EX: 83.83 ± 2.25 vs. SED: 91.5 ± 0.41 %), or average blood glucose (EX: 6.51 ± 0.06 vs. SED: 6.53 ± 0.21 mmol/l) throughout the day. **CONCLUSION:** These preliminary results suggest that more than one exercise bout is needed to significantly improve glycemic control in subjects with T2D.

21. DtP SCORE METHOD FOR ASSESS DUAL-TASK USING STABILITY AND COGNITION MEASURES

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PURPOSE: The purpose of this study was to design a method to assess dual-task performance by using balance and cognition measures. **METHODS:** Twenty- three (8 female/15 male; 25± 3.4 yrs) healthy college-aged individuals were participated in this study. Participants were recruited from the Wichita State University campus. Each participant attended two sessions. The dual-task assessment was completed during both visits, this consisted of testing cognition (Stroop color-word test/ N-back test) while measuring balance at the same time. The balance test consisted of two 30 second tests. Test 1 was completed with eyes open on a firm surface and Test 2 with eyes closed on a firm surface, and values were recorded as Stability Index which is the average position of the participant’s body from center. During Test 1, participants stood on the balance machine with eyes open and responded to Stroop color-word test by naming the color of the word – which appears in a color not donated by the name- on the screen in front of them. During Test 2, N-back test was completed with eyes closed and participants responded by saying ‘yes’ when a word read aloud was again read aloud two words previously. After collecting data, the scores of cognitive tests were then divided by the results of Stability Index in order to create a single score to assess dual-task performance (DtP Score = Cognition Score / Stability Index). The results of Stroop Color-word and N-back tests were scored by number of correct answers, numbering to 20 and 5, respectively. **RESULTS:** Study results suggest that individuals who achieved a higher DtP Score had a greater capacity to complete the dual-task assessment and a low DtP Score suggested a poor ability to perform dual-tasks.

Table1- Mean of DtP Score Test 1 and 2 (Session1)

<i>Session 1</i>	<i>Cognition Score</i>	<i>Stability Index</i>	<i>DtP Score</i>
<i>Test 1</i>	16.83± 2.83	2.7± 2.35	9.79± 5.76
<i>Test 2</i>	4.4 ± 0.88	2.7 ± 2.35	3.41 ± 3.74

Table2- Mean of DtP Score Test 1 and 2 (Session2)

<i>Session 2</i>	<i>Cognition Score</i>	<i>Stability Index</i>	<i>DtP Score</i>
<i>Test 1</i>	18.25 ± 2.32	1.99 ± 1.95	13.82 ± 7.51
<i>Test 2</i>	4.83 ± 0.38	2.42 ± 2.29	3.86 ± 3.22

CONCLUSION: The presented DtP Score in this study was created to provide a single score assessment value to measuring two tests completed at the same time, such as in the dual-task assessments conducted in this study. Preliminary results suggest that the DtP Scoring has consistent reproducibility and represents a unique scoring scale for evaluating dual-task performance. Further studies with larger sample sizes and including populations with balance and or cognitive deficits need to be completed to assess the effectiveness of the DtP Score.

22. WATTS UP – MEASURING POWER. A MOBILE DEVICE FOR MEASURING MUSCULAR POWER: A VALIDATION STUDY.

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The testing of speed and power is vital to accurately assessing many sport movements and activities of daily living. The current devices used to measure power accurately in a lab setting are prohibitively expensive and limited in the movements that can be performed. Many of the field measures for power are contraindicated for older adults. The Tendo Weightlifting Analyzer (Tendo; Tendo Sports Machines, Trencin, Slovak Republic) device is both affordable and flexible in the measures that can be taken. The Tendo can be used to safely measure power in an older adult population, and can assess sport specific movement. **PURPOSE:** The purpose of this study was to compare the power measurements of the Tendo to two well-established measures of power in an attempt to validate the Tendo. **METHODS:** Fifty-two individuals ($n = 52$) participated in a field measure and a lab measure in an attempt to validate the Tendo. The field measure included connecting the participant to the Tendo and performing a vertical jump as measured on a Vertec Jump Training System (Vertec, Sports Imports, Hilliard, OH). Participants repeated attempts until failing to move an additional vane on two consecutive attempts. The lab measure included connecting the participant to the Tendo and analyzing power in knee extensions using the Biodex isokinetic dynamometer (Biodex; Biodex Medical Systems, Inc. Shirley, NY). The Biodex was set to move at 240 degrees/second. The average maximum power in watts from the Tendo and average watts from the Biodex were paired. A Pearson's product moment correlation coefficient was performed comparing the Tendo and the vertical jump results as well as comparing the Tendo and the Biodex results. **RESULTS:** A significant positive correlation was found in both the established field and power measures when compared to the Tendo. The Tendo and Biodex outputs resulted in a large positive correlation ($r = .55, p = .01$). The Tendo and Vertec outputs resulted in a similarly large positive correlation ($r = .55, p = .01$). **CONCLUSION:** These results indicate a strong correlation between the Tendo and both the Vertec and the Biodex validating the use of the Tendo as an appropriate measure of power in both lab and field settings. The flexibility and ease of use of the Tendo open the possibility of studies of power that were formerly unrealistic.

23. KINETIC COMPARISON OF FREE WEIGHT BENCH PRESS AND SLOW VELOCITY ISOKINETIC CHEST PRESS

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INTRODUCTION: Current research is limited when comparing maximal force production on the free weight bench press to isokinetic horizontal chest press machines, especially the comparison of machines that operate at slow velocities (<0.2 m/s) that purport to result in greater forces. **PURPOSE:** To compare force development on a free weight 1 repetition maximum (1 RM) bench press and an isokinetic chest press machine (Exerbotics, Tulsa, OK) in recreationally trained men. **METHODS:** Ten recreationally trained males participated in the study ($X \pm SD$; $n=10$, age = 22.8 ± 2.6 yrs, hgt = 1.83 ± 0.06 m, body wgt = 81.3 ± 7.9 kg). Subjects performed the exercise sessions in random order. One session was a free weight barbell bench press performed on a ProSpot barbell (FW; Prospot Fitness Inc. Pompano Beach, FL) while on a uni-dimensional force plate (Rough Deck, Rice Lake, WI) to measure total force at 1000 Hz using a Biopac (Goleta, CA) data acquisition system. One RM FW bench presses were determined after a brief warm up, followed by regular load increments until a maximal effort was achieved. Kinetic variables (maximum and mean force, time to maximum force) during the 1 RM lift were then determined. During the other session, subjects performed a maximum effort bench press on an isokinetic chest press (CP) using an interfaced data acquisition system sampling at 252 Hz/range of motion. Each session was performed one week apart. **RESULTS:** Max FW force = 2998.5 ± 686.0 N, mean FW force = 2203.8 ± 662.3 N compared to max CP force = 2887.9 ± 527.3 N and mean CP force = 2203.7 ± 371.4 N for the concentric action. For the eccentric action, Max FW force = 2806.2 ± 642.7 N and mean FW force = 2135.4 ± 766.7 N, compared to max CP force = 2948.4 ± 657.9 N, and mean CP force = 1980.6 ± 521.5 N. There was no significant difference between any of the concentric or eccentric force measures using independent t-tests ($p > 0.05$). Mean time to peak force was 0.026 ± 0.0180 s for FW and 3.390 ± 0.7110 s for CP, which was significantly different. **CONCLUSIONS:** These data indicate there is no difference in maximal or average force produced during either modality, but there is a difference in where maximum force occurs in the range of motion based on the time to maximum force. Both FW and CP produce similar forces, but the time to maximum force is significantly faster using FW. This project is supported in part by Exerbotics.

24. RUNNING EFFICIENCY: SPRINTERS VS. DISTANCE RUNNERS

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Introduction: In the world of running, one of the most important concepts is running economy, which is a measure of how efficiently a person uses oxygen while running at a given pace. **Purpose:** The purpose of this research project was to compare two different types of collegiate level runners. Sprinters and distance runners were compared to determine which type of runner is more efficient in their running techniques. In other words, which type of runner exerts the least amount of energy to power themselves forward while running. It was hypothesized that distance runners are more efficient. **Methods:** Eight distance runners and eight sprinters were assessed for lean mass using air displacement plethysmography (Bod Pod). Subjects were assessed for VO_2 consumption at a submaximal level, using a treadmill. The treadmill was chosen because it matched the type of activity that these individuals partake in on a daily basis. All subjects ran at a 0.0 incline for 7 minutes at a 6.0 mph pace. The heart rate was measured and recorded with a heart rate monitor as well as weight (kg) and height (cm). **Results:** Distance runners had a mean oxygen consumption of 42.56 ± 1.8 ml/kg/LBM as compared to sprinters, with 43.22 ± 2.6 ml/kg/LBM. Distance runners had a mean LBM percentage of 81.16%, while sprinters had an average of 87.4%. A T-test was applied to tell if the means of the results were different enough to be beyond chance. The T-test result was 0.28, which indicated that the difference in the mean oxygen consumption was not significant enough to say that one group was more efficient than the other. **Conclusion:** Based on the data collected, the conclusion supports the hypothesis that distance runners are more efficient than sprinters when running 6 mph. Although the means of oxygen consumption data proved that distance runners were more efficient, the difference was not significant enough to say that distance runners are more efficient than sprinters. Therefore, each runner runs efficient enough for their type of race. Additionally the data indicates that sprinters have significantly higher lean body mass average percentage. However, their level of oxygen consumption was still higher at a submaximal level. Thus, according to the results, lean body mass percentage does not affect running economy. **Key Words:** running efficiency, lean body mass, oxygen consumption.

Supported by the University of Central Missouri

25. HAMSTRING-TO-QUADRICEPS RATIOS IN NATIONAL COLLEGIATE ATHLETIC ASSOCIATION (NCAA) DIVISION I WOMEN'S SOCCER PLAYERS COMPARED TO NON-ATHLETE CONTROLS.

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The hamstrings-to-quadriceps (H:Q) ratio has traditionally been used as a tool to assess the risk of knee- or hamstring-related injuries. Low H:Q ratios may signify a greater risk of injury. Furthermore, women may have a greater predisposition for knee-related injuries due to structural and biomechanical differences. Therefore, the H:Q ratio may be particularly important in women's athletics. **PURPOSE:** To assess H:Q ratios in National Collegiate Athletic Association (NCAA) Division I women's soccer players and compare them to non-athlete controls. **METHODS:** Eighteen healthy NCAA Division I women's soccer players (mean age \pm SD = 20 \pm 1 yrs; height = 168 \pm 5 cm; body mass = 65 \pm 5 kg) and thirteen healthy female controls (age = 21 \pm 2 yrs; height = 163 \pm 6 cm; body mass = 64 \pm 8 kg) performed voluntary maximal concentric isokinetic leg extension and flexion muscle actions on a Biodex System 3 dynamometer (Biodex Medical Systems, Inc., Shirley, NY, USA) at 180°•s⁻¹. The highest peak torque (PT) value from three consecutive leg extension and flexion repetitions were used to calculate the traditional H:Q ratio. Independent t-tests were used to compare means between the athletes and non-athletes for leg extension peak torque (PT_E), leg flexion peak torque (PT_F), and H:Q ratio. Microsoft Excel was used for all statistical analyses, and a type I error rate of \leq 5% was considered statistically significant for all comparisons. **RESULTS:** Mean \pm SD values for PT_E were 79 \pm 12 Nm and 69 \pm 5 Nm, the PT_F were 48 \pm 9 Nm and 32 \pm 3 Nm, and the H:Q ratios were 0.60 \pm 0.08 and 0.47 \pm .03 for the athletes and non-athletes, respectively. There was no difference in mean PT_E (P = 0.08), but mean PT_F and H:Q ratios were significantly lower (P < 0.01) for the non-athletes than the athletes. **CONCLUSION:** The H:Q ratios in NCAA Division I women's soccer players were greater than the non-athlete controls and were equivalent to the minimum ratio suggested to avoid knee- and hamstring-related injuries (H:Q= 0.60). These findings also emphasize the importance of hamstring strength as a factor for improving the H:Q ratio and potentially reducing the risk of injuries. Finally, perhaps important delineating characteristics between NCAA women's athletes and non-athletes are PT_F and the H:Q ratio, which may result from competition and training demands.

26. PRE-PARTICIPATION SCREENING FOR COLLEGE ATHLETES: THE ROLE OF RESTING ECG

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An unexpected death in athletes who most would consider to be in good health is particularly disconcerting and often visible to the public. Effective pre-participation screening is controversial and the addition of resting ECG has been suggested to be of limited value. **Purpose:** The purpose of the current study was to determine the efficacy of adding a resting ECG as part of the pre-participation screening of Division 2 athletes. **Methods:** Resting ECG's were conducted on 326 male and female athletes to determine cardiac anomalies. ECG's were interpreted by a sports medicine physician experienced in the athlete ECG. All ECG's were also evaluated for mean QRS axis and long QT syndrome. **Results:** Based on resting ECG's, 3 athletes were referred to the local hospital for further cardiac studies (echocardiogram and stress ECG) however all were cleared for activity due to negative results. Mean QRS axis Of the 326 ECG's was 85.5° with 15 athletes documenting right axis deviation @ 120-130 degrees and 1 athlete with left axis deviation @ -30°. Mean QTc was 414.4 ms with 19 athletes demonstrating QTc > 440ms. **Conclusion:** Based on the data analyzed, resting ECG's for pre participation screening have little value in elucidating cardiovascular risk but may have value as a baseline for future reference.

27. "The Influence of Pre-Exercise Short-Wave Diathermy Treatment on Inflammatory Cytokines and Pain Perception"

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Many chronic diseases are associated with skeletal muscle damage and an altered immune state. Eccentric exercise is commonly employed as a model to understand characteristics associated with muscle damage. Previous studies have revealed heat treatment 24 hours prior to eccentric exercise attenuates the muscle damage associated with this exercise. **PURPOSE:** The purpose of this study was to examine the influence of short-wave diathermy on delayed onset muscle soreness (DOMS) and the inflammatory response to an eccentric exercise protocol. **METHODS:** Twelve subjects (23.87 ± 5.54 years; 177.95 ± 30.95 lbs) were randomized into heat treatment (HT) and control (CON) groups. HT subjects were exposed to 40 minutes of short-wave diathermy of the thigh 24 hours prior to exercise. All subjects completed 7 sets of 10 eccentric repetitions on a leg extension machine at 120% of their concentric 1-RM. Muscle biopsies of the vastus lateralis were obtained 24 hours prior to exercise, and at 24 and 48 hours post exercise. Blood was drawn at 24 hours before, and 4, 24, and 48 hours post exercise. Strength measures and pressure testing of the thigh were used to examine strength and DOMS prior to and at 24 and 48 hours post exercise. The presence of tumor necrosis factor alpha (TNF α) in muscle samples at each time point was determined through western immunoblotting techniques. A creatine kinase (CK) reagent kit was used for the quantitative determination of CK in serum samples. Repeated measures ANOVAs were used to determine differences in TNF α , CKs, strength, and pressure scores across time points and between groups. **RESULTS:** No significant differences in CK values or TNF α detection were seen between groups at any time point. Strength was not significantly different following the muscle damage protocol, $F(2,5)=0.282, p>0.05$. Pressure testing revealed a significant difference between groups, as the heat treatment group revealed lower pain tolerance at 24 and 48 hours post exercise ($F(2,5)=14.928, p=0.008$). **CONCLUSION:** The results of this study suggest preheating the skeletal muscle does not significantly alter the inflammatory response to muscle damage.

Research funded, in part, by a University of Kansas General Research Fund Grant (JPV).

28. MECHANOMYOGRAPHIC FREQUENCY DOMAIN RESPONSES DURING FATIGUING CONCENTRIC ISOKINETIC LEG EXTENSIONS

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The mechanomyographic (MMG) signal represents a summation of the mechanical activity from individual motor units. During voluntary contractions, it has been suggested that the frequency domain parameters of the MMG signal may reflect the firing rate. Furthermore, during fatiguing concentric isokinetic muscle actions it is believed that the median frequency may reflect the decrease in recruitment of fast-twitch muscle fibers. **PURPOSE:** The purpose of the present study was to examine the MMG median frequency (MDF) responses of the vastus lateralis (VL) and rectus femoris (RF) during concentric isokinetic leg extension endurance tests. **METHODS:** Twenty-four healthy men (mean \pm SD, age = 23 ± 4 yrs, body mass 82 ± 12 kg) volunteered for this investigation. The MMG sensor (EGAS-FS-10-/V05; Measurement Specialties, Inc., Hampton, VA) was placed over the VL and RF of the muscle at 50% of the distance between the greater trochanter and lateral condyle of the femur. Each participant completed the leg extension endurance test on the Biodex System 3 isokinetic dynamometer (Biodex Medical Systems, Inc., Shirley, NY). Three to five submaximal trials preceded 50 consecutive maximal concentric isokinetic leg extension muscle actions performed at 180°s^{-1} with the right leg. The active range of motion was standardized from 90° to 180° of knee flexion and extension. Not all subjects were able to complete all 50 repetitions; however, all subjects did complete at least 48 repetitions. Therefore, the first 48 repetitions were analyzed. Percent decline calculations were used to measure the changes in MMG_{MDF} during the endurance tests (percent decline = $\frac{\text{initial MMG}_{\text{MDF}} - \text{final MMG}_{\text{MDF}}}{\text{initial MMG}_{\text{MDF}}} \times 100$). The initial MMG_{MDF} was calculated as the average of the 3 highest values, whereas the final MMG_{MDF} represented the average of the 3 lowest values during the endurance test. A paired-samples *t* test was used to examine if there was a difference between the VL and RF muscles on percent decline of MMG_{MDF} . **RESULTS:** There was a greater ($P < 0.001$) percent decline in MMG_{MDF} for the RF ($59.52 \pm 4.85\%$) than the VL ($50.95 \pm 7.38\%$) during the fatiguing leg extension tests. **CONCLUSION:** Previous studies have reported that the RF has a greater percentage of type II muscle fibers than the VL. The results of the present study indicated that the MMG_{MDF} responses during the fatiguing concentric isokinetic leg extensions reflected the differences between fiber type compositions of RF and VL muscles. MMG_{MDF} may have reflected a fatigue-induced “dropout from recruitment” of fast-twitch fibers, which are more abundant in RF than the VL.

29. EFFECT OF TOPICAL MENTHOL GEL ON POWER OUTPUT DURING 30-SECOND HIGH INTENSITY ANAEROBIC EXERCISE

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Menthol-based gels have been reported to reduce acute pain and reduce inflammation. However, the effect of topically applied menthol on power output during high intensity anaerobic bouts has not been studied. **PURPOSE:** To determine if the topical application of menthol enhances power output during a 30-second sprint. **METHOD:** 30 participants (14 male; 16 female) aged 20-38 (24.4 ± 4.8) years each completed two trials, one with menthol gel and one without, with 48 hours between trials. For the trial with gel, a dose of 1ml of gel for every 200 cm² sq cm of surface area was applied bilaterally to the thigh of each participant. For both trials, following a brief (2-3 sec) unloaded acceleration period, participants pedaled as fast as possible against a load of 0.75 kg • kg⁻¹ body mass for 30 sec. Peak and average power for the 30 sec trials, average power for each 5 sec interval, and overall fatigue index were recorded. **RESULTS:** Mean \pm SD of the two trials are provided below. There were no significant differences ($p < 0.05$) in any variable between trials. Additional analyses also revealed that, although males achieved greater power outputs compared to females, there were no differences between trials when grouped by gender.

	<u>With Menthol</u>	<u>Without Menthol</u>
Peak power (W)	804.7 \pm 268.9	790.0 \pm 272.8
Average power over 30 sec (W)	561.5 \pm 159.7	545.7 \pm 156.8
Average power 0-5 sec (W)	746.1 \pm 241.4	732.9 \pm 237.7
Average power 5-10 sec (W)	638.5 \pm 191.6	634.4 \pm 189.6
Average power 10-15 sec (W)	561.4 \pm 168.0	556.1 \pm 166.0
Average power 15-20 sec (W)	505.3 \pm 148.2	500.2 \pm 148.8
Average power 20-25 sec (W)	456.8 \pm 128.5	452.5 \pm 130.1
Average power 25-30 sec (W)	409.6 \pm 110.4	406.1 \pm 112.1
Fatigue Index (%)	50.0 \pm 0.12	50.0 \pm 0.14

CONCLUSION: Many products including topical gels have been theorized to improve human performance during high intensity anaerobic exercise. Menthol-based gels have long been accepted as a chemical cryotherapy agent but this study indicates that menthol gels do not increase power output. Future studies should explore the benefits of menthol based topical gels on recovery from DOMS.

Supported by Hygenic Corporation

30. THE INFLUENCE OF ACUTE EXERCISE ON TORQUE DECLINE BETWEEN POSITIONS IN COLLEGIATE FEMALE SOCCER PLAYERS

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INTRODUCTION: The ability among players to sustain muscular activity following intense bouts of muscular exertion that may frequently occur during soccer match play may play an important role in successful performance and injury prevention. Muscular fatigue results in decreased muscular torque production and consequently may hinder playing performance. Research findings have suggested that various positions in elite level soccer players may be functionally unique in regards to the distances covered and metabolic demands imposed during match play. **PURPOSE:** To examine the effects of a fatigue inducing bout of isokinetic exercise on peak torque decline for the leg flexor and leg extensor muscle groups between playing positions in Division I collegiate female soccer players. **METHODS:** Eighteen healthy female individuals (seven defenders: mean \pm age = 19.86 ± 0.83 ; seven midfielders: mean \pm age = 20.57 ± 1.59 ; four forwards: mean \pm age = 20 ± 0) volunteered to participate in the study. Peak torque of the right leg extensors and flexors was assessed on a Biodex System 3 dynamometer (Biodex Medical Systems, Inc., Shirley, NY USA) at 180° s^{-1} . Following a general warm-up, participants performed 50 consecutive maximal leg extensions and leg flexions in tandem. Peak torque and least torque values across the 50 repetitions for both leg flexors and leg extensors were used to calculate the percent of torque decline. Percent decline values were calculated by taking the highest peak torque minus the least torque divided by peak torque and multiplying by 100. A one-way analysis of variance (ANOVA) was used to analyze the peak torque percent decline values. An alpha level of $p \leq 0.05$ was used to determine statistical significance. **RESULTS:** There was no significant difference ($p = 0.78$) for peak torque percent decline for any of the player position groups. **CONCLUSIONS:** These findings indicated that there appears to be no difference in leg flexor or leg extensor peak torque decline between playing positions during a repeated bout of fatigue inducing isokinetic exercise in Division I collegiate female soccer players. Thus, strength and conditioning professionals may choose to develop muscle endurance conditioning programs to maximize time and efficiency given the similarity of lower body muscle endurance capacities among player positions.

31. EVALUATING THE CONSISTENCY OF COACHES' PERCEPTION OF INDIVIDUAL FEMALE BASKETBALL PLAYERS' TALENT IN THE NCAA.

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Evaluation of athletic talent consists of two primary elements, measured performance standards and subjective assessment of performance. While measured performance variables such as strength, speed, and agility can provide valuable data, coaches must also depend on their own experience and expertise in evaluating talent. **PURPOSE:** The aim of this study was to determine the consistency of player talent evaluation among female coaches of an NCAA basketball program. **METHODS:** Coaches were given a visual analog scales (VIS) pertaining to players offensive, defensive, passing ability, anticipation, and overall basketball "IQ". VIS scales were 100 mm long with polar opposites. Subsequently, coaches placed a mark along each of the five VISs indicating their perception of the 10 basketball players' individual performance variable. Comparisons were made using repeated measures ANOVAs. **RESULTS:** Offensive, defensive, passing ability, and anticipation means yielded significant ($p < 0.05$) differences among the coaches perceived ranking. Differences among coaches were as much as 27.6 mm with the same coach consistently rating every player the highest and another coach consistently rating every player the lowest. **CONCLUSION:** Subjective measures of athletic ability often transcends the numerical data in that such evaluation includes such intangibles as playing savvy, judgment, orientation, anticipation, and awareness. Consistency among coaches' perceptions with respect to an athlete's playing potential is necessary in order to agree upon fielding the best possible combination of personnel. This data indicates that while there was a significant difference in the evaluations reflected by how coaches perceived talent, the coaches remained consistent in their high to low evaluations of each player. Given that while one coach may evaluate more harshly than another, the consistency among the critiques by each individual coach provides reliable evidence that there is agreement in the evaluations.

32. THE EFFECTS OF MENTAL FATIGUE ON CONSTANT-LOAD EXHAUSTION TESTS

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INTRODUCTION: It has been traditionally assumed that high-intensity aerobic exercise stops at the point of exhaustion because fatigued subjects are no longer able to generate the power output required by the task despite their maximal voluntary effort. **PURPOSE:** The purpose of this study was to examine the limitations of exercise tolerance. It was hypothesized that immediately after a constant-load exhaustion test participants would produce a power output that exceeded the load of their exhaustion test.

METHODS: Nine recreationally active male college students at the University of Central Missouri were recruited to perform a constant-load of 90% of their aerobic output to exhaustion; subjects then immediately performed a 10-second maximal power output test. **RESULTS:** The results that the max power output measured directly after exhaustion (444 ± 91 W) were more than twice the power output required during the time-to-exhaustion test (210 ± 31 W) [$t(8) = 7.91, P < 0.05$]. In all nine participants, the max power output measured immediately after exhaustion was well above the power output required by the time-to-exhaustion test. **CONCLUSION:** The hypothesis that after a constant-load exercise at 90% of VO_2 max till exhaustion has been completed, the max power output directly after this exercise would greatly exceed the power output required during the constant-load exercise was supported. As a whole, the subjects proved the hypothesis accurate by exceeding the constant-load exercise during the max power output test by more than double (444 ± 91 W vs. 210 ± 31 W).

Supported by University of Central Missouri

33. ASSESSING BENCH PRESS STRENGTH AFTER TRAINING WITHOUT THE BENEFIT OF VISION IN COLLEGE AGE MALES

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It has been suggested that loss of vision leads to increased proprioceptive response. Increased proprioceptive response leads to increased accuracy during movement. Accuracy improves force production. **PURPOSE:** To determine whether strength training without the benefit of vision can improve bench press strength in college age males. **METHOD:** Subjects ($N=26$; age= 20.34 ± 1.068) with 1yr or less of weight training experience were separated into experimental ($E=13$) and control ($C=13$) groups. A 5-RM was tested for each subject and a 1-RM calculated. Each subject was assigned the same exercise protocol, however subjects in the experimental group was instructed to train with blindfolds on the bench press. After 6 weeks of training subjects 5-RM was measured again. A repeated measures one-way ANOVA was used to analyze results. **RESULTS:** There was no significant difference in E and C group ($p=0.19$). However, there was an increase in 5-RM for both E ($20.38\text{lbs} \pm 12.49$) and C ($14.23\text{lbs} \pm 11.15$) groups. **CONCLUSION:** Although there was not a statistically significant difference between those who trained with blindfolds and those without it should be noted that mathematical changes in E group were higher than those in C group. Therefore, it is recommended to further study investigate this theory by using a different test or using a similar protocol, however asking subjects to conduct all their training without the benefit of vision.

34. EFFECTS OF COMMERCIAL BALANCE BOARD INTERVENTIONS ON SELECTED EMG ACTIVITY AND FUNCTIONAL BALANCE OVER TIME

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Research indicates that unstable surface training can benefit an individuals' balance over time. Studies have been conducted in areas of muscle activation on different modalities including, Swiss Balls and Bosu Balls, but minimal research has been conducted to interpret a commercial balance board's (BB) effectiveness on functional balance (FB) and abdominal endurance (AE). **PURPOSE:** The purpose of this study was to determine the BB's ability to improve muscle activation of the core and legs and improve functional balance over time. **METHODS:** Thirty two subjects with no experience in unstable surface training were placed randomly into an intervention group (IG) (n=16; age=21.98 2.44) and a control group (CG) (n=16; age=22.35 2.67). During exercise sessions (10min, 3d wk, for 6 wk), the IG used the BB as an unstable intervention during a continually running protocol. The CG performed the same protocol on stable ground. EMG signals were measured using the ME6000 Biomonitor data logger. Ambu Blue Sensor M electrodes were placed on the rectus femoris (RF), Biceps Femoris (BF) and Rectus Abdominus (RA). EMG activity (mV), right and left leg stork stand (SSR, SSL) test (seconds), and APFT Sit-up (APFT) test (repetitions) data were taken during pre- and post-testing. **RESULTS:** A repeated measures ANOVA showed that pre- and post-test EMG activity, SSR ($p=.494$), SSL ($p=.195$), and APFT ($p=.244$) data were not statistically significant ($p \leq .05$). **CONCLUSIONS:** Based on this study, a 6 week program using a BB was not more effective than stable ground training for FB measured by the SS or AE measured by the APFT. Initial levels (EMG, SS, APFT) of the CG were higher than those of the IG. Future research recommendations would include testing groups with similar fitness levels in order to be able to correctly measure the effects of unstable surface training using a BB on EMG measures in musculature.

35. STRENGTH AND POWER AS INDICATORS OF FUNCTIONAL FITNESS FOR SENIOR ADULTS

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Introduction: There are many physiological declines that often occur with aging, two of which involve muscular strength and power. It is believed that these components may contribute to the functional fitness of older adults. Previous research indicates that muscular power may be the better predictor of functionality for this population. Additional research should be conducted to investigate this further using a variety of functional measures. This research would assist in providing evidence for the case and help health professionals understand which health component(s) to focus on when attempting to help senior adults maintain functionality. **Purpose:** The purpose of this study was to determine if strength and power are predictors of functional fitness for senior adults and if so, which the better predictor is. **Methods:** Forty-six senior adults over the age of 75 years completed the Short Physical Performance Battery (SPPB), hand-grip (HG) assessment, the Senior Fitness Test (SFT) battery, chair stand power test, and one-repetition maximum (1RM) testing. SPPB, HG, and SFT were utilized as functional measures. The SPPB is a survey-based functional assessment evaluating balance, gait, and chair stands. Handgrip was measured with a handgrip dynamometer. Participants produced three separate maximum squeezes with each hand. The maximum of each hand was averaged as the measurement. The SFT includes chair stands (CS), arm curl (AC), 8-foot Up-and-Go (UpGo), sit-and-reach (SR), back scratch (BS), and 6-Minute walk (WALK). The chair stand power test was utilized to determine average power and involved 10 explosive chair stand trials. The mean of the average power values was calculated. Lastly, six 1RM tests were combined to quantify total strength. These tests included chest press, bent over row, knee curl, lateral raise, and triceps extension. Multiple regression analyses were conducted to determine whether strength or average power was the best predictor for functional fitness. **Results:** For this model, strength and power were indicated as significant predictors collectively for SPPB, CS, AC, UpGo, and HG ($p = .004$, $p = .001$, $p = .011$, $p = .036$, and $p < .001$, respectively). When comparing power and strength, power emerged as the only significant individual predictor for SPPB, CS, AC, and UpGo ($p = .002$, $p = .001$, $p = .042$, $p = .002$, and $p = .014$, respectively). Conversely, total strength was indicated as the significant predictor for HG ($p < .001$). Neither strength nor average power was indicated as a significant predictor for WALK, BS, and SR. **Conclusion:** These results suggest that average power may be a better predictor for the functional fitness of older adults than strength.

36. VALIDITY AND RELIABILITY ASSESSMENT OF A POWER METER FIELD TESTING DEVICE.

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There are many devices used to measure power output in cycling sports. However, limited data exists on physiological parameters associated with specific power outputs when compared to laboratory exercise equipment that has been calibrated. **Purpose:** The purpose of this study was to determine the validity, test-retest reliability, and the inter-unit reliability of the PowerTap Pro+, Power Meter (Saris Cycling Group, Madison, WI) (PT) using physiological measures. For validity, the PT was compared to the Lode Excalibur bicycle ergometer (Netherlands) (SBE). **Methods:** Twelve trained male cyclists between the ages of 18-35, were recruited for this study. Each subject was randomly assigned for his first trial to the Lode stationary bicycle ergometer or to one of two different PowerTap Pro+, Power Meters. Each subject returned at day seven, day 14, and day 21 to complete the other three randomly assigned exercise trials. Heart rate, oxygen consumption, ventilatory expiration (VE), blood lactate, and rate of perceived exertion were all recorded during each stage of intensity: 25, 50, 100, 150, 200, 250 watts. Validity of the PT compared to the SBE and the PT test-retest and inter-unit reliability was determined using Pearson Correlation Analysis ($p \leq 0.05$). **Results:** While there were arbitrary differences in physiological parameters between the PT and SBE, overall the PT was valid. Furthermore, there were few significant differences in the test-retest and inter-unit reliability tests. **Conclusions:** The PowerTap Pro+ appears to be a valid and reliable tool to measure power output of cyclists. In addition, the PowerTap Pro+ would be a valid instrument to use in the field while collecting physiological measures.

37. VO_2 Kinetics in Uphill Cycling

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Purpose: The objective of this research study was to test for differences in oxygen consumption during a cycling hill climb based on whether the subject was seated or standing while pedaling. **Methods:** The study began by doing a body composition test using a DEXA scanner and a preliminary VO_2 max test on an electronic bike ergometer. The VO_2 data was used to set the ergometer bike wattage levels and indication of the subject's cardio respiratory fitness. Subjects returned on a separate day to do a simulated climb portion of the research. The subjects began cycling at a light pace to warm up. After warm-up, the intensity was increased to a wattage equal to 60% of VO_2 max to simulate a moderate hill climb. The subject pedaled in a standing position for 3 minutes while VO_2 data and heart rate were monitored and collected. After the 3 minute climb, the wattage was lowered to allow the subject to recover. After recovery, a second climb using seated pedaling method for 3 minutes at 60% was completed. The subject was then allowed to recover and a second more difficult simulated climb was performed at 85% the VO_2 max data for 3 minutes seated and standing. Data was collected for VO_2 consumption, wattage and heart rate for all 3-minute sessions. The VO_2 data used for comparison was an average of the last minute of each 3 minute "climb" session. **Results:** The hypothesis was that the seated hill climb will require more oxygen consumption when compared to the standing climb. Results for the 60% intensity was 3.376 (± 0.58) L/min standing and 2.967 (± 0.31) L/min seated. The values for the 85% intensity were 3.993 (± 0.52) L/min standing and 3.904 ($\pm .32$) L/min for seated. **Conclusion:** Based on the current data at lower wattage levels seated cycling is more efficient, while higher wattage levels were equal seated or standing.

38. ROLE OF RESISTANCE EXERCISE VOLUME ON METABOLIC COST: A CASE STUDY

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Heavy resistance exercise is typically recommended for enhancing lean body mass and muscular strength, but research suggests the metabolic cost of resistance exercise may be of importance, and is related to relative exercise intensity. Interestingly, it has been suggested that one set of each resistance exercise is adequate for fitness and multiple sets are not warranted (Carpinelli et al. 2004). **PURPOSE:** The purpose of this pilot study was to determine the metabolic cost when total work was increased by simply adding a second resistance exercise set. **METHODS:** A highly experienced strength athlete (age = 21 yrs., BW = 150.0 kg, competition 1 RM barbell squat = 380.0 kg) participated in two squat testing sessions. Both sessions included a standardized warm-up followed by 1 set x 10 repetitions at 227.3 kg (500 lbs.; 60% 1 RM; session 1) or 2 sets x 10 repetitions at 204.5 kg (450 lbs.; 54% 1 RM; session 2). An indirect metabolic cart (SensorMedics, Yorba Linda, CA) was used to determine O₂ uptake during the actual exercise and the subsequent recovery period (i.e., return to 1 MET). HR was assessed using a V₅ lead. Work was estimated from the load lifted (system mass = BW + barbell mass) and the distance moved for each repetition (0.61 m).

RESULTS:

	Session 1 (1 x 10; 227.3 kg)	Session 2 (2 x 10; 204.5 kg)
Estimated work (J)	2298.5 J	43.64 J
O ₂ uptake (L)	15.49 L	27.96 L
Kcal	77.4 Kcal	139.8 Kcal
Caloric rate (Kcal/J)	$3.37 \cdot 10^{-2}$ Kcal/J	$3.24 \cdot 10^{-2}$ Kcal/J
Peak VCO ₂ (L·min ⁻¹)	3.730 L·min ⁻¹	3.509 L·min ⁻¹
Peak RQ (VCO ₂ /VO ₂)	1.68	1.66
Peak HR (bpm)	189 bpm	184 bpm

DISCUSSION: As has been previously reported for different exercise modalities and variations of resistance exercise, it appears that caloric expenditure is related to work performed. Adding a second set of exercise increased work performed by 88%, and increased caloric expenditure by 81%. The extremely high RQ and VCO₂ were indicative of the highly anaerobic nature of the exercise. The simple addition of a second set had a profound effect on the energy expenditure and appears to be a simple adjustment to a training program if increased caloric expenditure is a training goal. Additionally, these data illustrate the potentially large caloric expenditures possible when large muscle mass, free weight exercises are performed at high relative intensities.

39. THE RELATIONSHIP BETWEEN ACCELEROMETER-DETERMINED PHYSICAL ACTIVITY DURING PREGNANCY AND INFANT BODY COMPOSITION AT BIRTH

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Regular physical activity (PA) affords numerous health benefits, however, the amount and type of PA recommended to pregnant women has changed. The American College of Obstetricians and Gynecologists (ACOG) recommends that pregnant women participate in ≥ 30 minutes of moderate PA on most days of the week. Few studies have objectively measured PA in pregnant women. Lifestyle modifications, including PA, are a means to influence maternal health and infant birth weight. There is a broad literature base relating maternal PA to infant birth weight, however there is little research relating maternal PA to infant body composition. **PURPOSE:** The purpose of this study was to explore the relationship between objectively-measured maternal PA during pregnancy and infant body composition at birth. **METHODS:** Twelve pregnant women attended a prenatal appointment at approximately 32 weeks gestation where they completed demographic questionnaires and were fitted for an accelerometer. The accelerometer (ActiGraph GT3X) was attached to an elastic belt worn around the waist and below the abdomen, and was positioned over the right hip. The women were instructed to wear the device for 7 days during waking hours. Cut points were applied during data processing to determine the average minutes spent in moderate physical activity (MPA; ≥ 1952 counts per minutes [cpm]) and lifestyle activity (LA; 760 – 1951 cpm). At 2-4 weeks after birth, the body composition (fat mass [FM] and fat free mass [FFM]) of the infants was measured using the Pea Pod®. Means and standard deviations were used to describe the sample. Two series of multi-variate linear regression models were used. The first examined MPA and FM as well as MPA and FFM both with and without covariates. The second examined LA and FM in addition to LA and FFM both with and without covariates. Covariates for both models included maternal age, pre-gravid body mass index (BMI), gestational weight gain, infant gender, gestational age, and infant age at the time of test. **RESULTS:** Most women were normal weight with a mean BMI of 24.98 ± 7.14 kg/m². Mean time spent in MPA and LA was 22.17 ± 15.40 min/d and 62.12 ± 19.39 min/d, respectively. Two women (16.7%) met ACOG physical activity recommendations. Linear regression models revealed no significant relationship between MPA or LA and infant body composition. **CONCLUSION:** The proportion of women in the sample meeting physical activity recommendations is consistent with previous research. In spite of the lack of significant results, further research is warranted based on the sample size limitations of this study.

40. Validity of a Vertical Jump Mat for Determining Vertical Jump Height

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Vertical jump (VJ) height is often related to athletic performance and is a common test for coaches and personal trainers. Several types of devices are available to measure VJ height based on flight time, jump reach height, or ground reaction forces. **PURPOSE:** The purpose of this study was to determine the validity of a VJ mat used for measuring flight time, when compared to VJ heights when determined with either a Vertec VJ tester or a force plate. **METHODS:** Seventeen men and 18 women (age = 20.9 ± 0.7 yrs, hgt = 176.1 ± 0.9 cm, wgt = 72.6 ± 13.5 kg) served as subjects for this study. Subjects performed counter-movement vertical jumps (CMVJ) while standing on both a uni-directional force plate (Rough Deck, Rice Lake, WI) sampling at 1000 Hz (BioPac Systems, Goleta, CA), and a VJ mat (Probotics Inc., Huntsville, AL). A Vertec VJ tester (Sports Imports, Columbus, OH) was used to measure jump reach. Each subject reported for a familiarization session followed by one test session. Familiarization included completion of informed consent, anthropometric measures, and an overview of the testing protocol. Subjects were measured for maximal standing reach, using a one-arm reach while both feet were flat on the ground. During the VJ testing session, subjects performed 3-7 CMVJ, with the best jump recorded for statistical analysis. Both sessions were completed over a three week period. A one-way ANOVA with Scheffe post-hoc test was used to determine differences between VJ measures (i.e., jump mat, force plate flight time, and Vertec methods). An independent t-test was used to compare flight times between the force plate and the VJ mat. Linear regression was used to establish explained variances (r^2) and agreement between the VJ mat data and the criterion measures from both the force plate and the Vertec. Significance was set at $p < 0.05$. **RESULTS:** Statistical analysis revealed a correlation between flight time measured from the force plate and the VJ mat ($r = 0.99$). When compared to the force plate, the VJ mat revealed greater values in VJ height (VJ mat = 0.50 ± 0.12 m, force plate = 0.34 ± 0.10 m) and flight time (VJ mat = 0.629 ± 0.078 s, force plate = 0.524 ± 0.077 s). Comparison of VJ heights from the VJ mat and the Vertec revealed no significant differences (Vertec = 0.48 ± 0.11 m). **CONCLUSION:** The jump mat consistently reported greater VJ heights and flight times when compared to the force plate. This is to be expected since the force plate determines changes in the center of mass, not the VJ reach. While the VJ mat compared favorably with the Vertec for the population in the present study, the resulting regression equations suggest further study on high performance athletes may be warranted.

41. DAILY EXERCISE AND CALORIC RESTRICTION IMPACT FIBROBLAST GROWTH FACTOR-21 IN HYPERPHAGIC OLETF RATS

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PURPOSE: Chronic treatment with fibroblast growth factor-21 (FGF-21) favorably improves obesity and nonalcoholic fatty liver disease (NAFLD) outcomes; however, FGF-21 expression is paradoxically elevated in obese conditions. Here, we sought to determine the effects of obesity prevention by daily exercise (EX) vs. caloric restriction (CR) on hepatic FGF-21 in the hyperphagic, Otsuka Long-Evans Tokushima Fatty (OLETF) rat. **METHODS:** At 4 wks of age, male OLETF rats (n=7-8/group) were randomized to groups of ad libitum fed, sedentary (OLETF-SED), voluntary wheel running exercise (OLETF-EX), or CR (OLETF-CR; 70% of SED) until 40 wks of age. Nonhyperphagic, Long-Evans Tokushima Otsuka (LETO-SED) rats served as controls. **RESULTS:** Both daily EX and CR prevented obesity and NAFLD development observed in the OLETF-SED animals. This was associated with significantly ($p < 0.01$) lower serum FGF-21 and hepatic FGF-21 mRNA expression in the OLETF-EX and OLETF-CR rats compared with OLETF-SED. However, hepatic FGF-21 protein content was reduced to the greatest extent in the OLETF-EX animals and did not differ between OLETF-SED and OLETF-CR. Further examination of hepatic FGF-21 signaling mediators revealed that the protein content of the hepatic co-factor of FGF-21 (β -Klotho), hepatic FGF-21 receptor 2 (FGFR2) mRNA expression, and hepatic FGF-21 receptor substrate 2 (FGFR2) protein content were elevated in the OLETF-EX and OLETF-CR compared with OLETF-SED animals. **CONCLUSIONS:** Daily exercise and caloric restriction modulate hepatic FGF-21 and its primary signaling mediators in the hyperphagic OLETF rat. Enhanced metabolic action of FGF-21 may partially explain the benefits of exercise and caloric restriction on NAFLD outcomes.

Sponsored by Departments of Internal Medicine and Nutrition and Exercise Physiology, NIH grant T32 AR 048523-07 (JAF), and VHA grants CDA-2 (JPT) and CDA-2 (RSR).

42. THE ACUTE EFFECTS OF A MODERATE INTENSITY ACTIVE WARM UP AND STATIC STRETCHING OF THE PLANTAR FLEXORS ON PEAK TORQUE AND EMG AMPLITUDE DURING A MAXIMUM VOLUNTARY ISOMETRIC CONTRACTION

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A traditional warm-up includes a submaximal aerobic component to increase body temperature and is often combined with static stretching (SS) to reduce the risk of muscular injury, increase range of motion, and improve athletic performance. However, several recent studies have identified stretching-induced reductions in muscular performance. **PURPOSE:** The purpose of the present study was to examine the effect of both an active warm-up (AW) and SS on peak torque and EMG amplitude during a maximum voluntary isometric contraction (MVIC) of the plantar flexors. **METHODS:** Twenty five recreationally-active males (mean age \pm SD = 21.4 \pm 2.24 years; body mass = 79.4 \pm 6.9 kg; height = 176.0 \pm 9.0 cm) participated in this study. Subjects completed four testing sessions separated by 2-7 days. The first session served as familiarization. Subjects practiced the MVIC peak torque testing then performed passive dorsiflexion of the ankle at 5°·sec⁻¹ to determine their maximum stretch tolerance to be used for the SS protocol. The stretch tolerance was determined by the maximum passive torque (N·m) the subject could sustain for 30-sec without visual EMG activity. Following the MVIC and SS subjects ran on a treadmill to determine treadmill speed for the AW. The following three sessions were randomized and included 1) control 2) 3-min SS 3) a 20-min AW 4) 20-min AW followed by 3-min SS. MVIC peak torque was assessed using a Biodex System 4 dynamometer with the knee fully extended and the ankle at 90°. EMG amplitude was quantified as root mean square (RMS) EMG for the soleus (SOL) and the medial gastrocnemius (MG) and was normalized to MVIC. **RESULTS:** One-way repeated measures ANOVA resulted in a significant effect for condition on MVIC peak torque ($p = 0.001$). Pairwise comparisons with Bonferroni corrections indicated the AW + SS was lower than the control ($p = 0.038$) and the SS ($p = 0.036$). Additionally, the AW was lower than the SS ($p = 0.023$). However, neither AW nor SS was significantly different from the control when performed alone. One-way repeated measures ANOVA resulted in a significant effect for condition on MG RMS EMG ($p = 0.005$). Pairwise comparisons with Bonferroni corrections indicated the AW + SS MG RMS EMG was reduced compared to the control ($p = 0.015$) and the AW ($p = 0.038$). There was no change in SOL RMS EMG. **CONCLUSIONS:** These findings indicated that 20-min AW may result in a greater reduction in MVIC peak torque compared to 3-min SS, and when a 20-min AW is combined with 3-min SS a reduction in MVIC peak torque may result compared to SS alone, possibly due to a reduction in muscle activation of the MG. However, when performed alone, 3-min SS and 20-min AW did not reduce MVIC peak torque compared to a control.

43. BALANCE ASSESMENT OF ATHLETES PRE AND POST-CONCUSSION USING A VIDEO GAME BALANCE BOARD SYSTEM

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The NCAA concussion management best practices recommend that athletes undergo Balance Error Scoring System (BESS) testing each pre-season and must have a comparable score prior to return to play after sustaining a concussion. Due to the subjectivity of BESS, athletes may be kept unnecessarily from playing or may be returned to play too soon. Having an objective measurement of postural stability from preseason baseline values, with correlative properties to the concussed state, would enhance our abilities to care for our athletes. **PURPOSE:** The primary objective of this study was to correlate an athlete's balance pre and post-concussion with Wii center of balance (COB) scores. The secondary objective was to correlate the Wii COB scores with the standard BESS scores in athletes prior to and after sustaining a concussion.

METHODS: Standard BESS scores and Wii COB scores were recorded at the beginning of this study for all participants. In addition, each participant completed a demographic questionnaire. We had planned to retest BESS and Wii COB at the time of suspected concussion injury, once concussion symptoms had resolved, and prior to release for return to play. This was not performed as none of the athletes participating suffered from a concussion during the study period. All participants were asked to test again with both tests at the end of the season. **RESULTS:** 30 athletes participated in the baseline and post-season testing. On post-season testing paired samples comparisons revealed no changes in balance between the two time frames. At baseline, only two of the six positions on the Wii (tandem stance eyes open and double stance eyes closed) were significantly related to BESS total. After the season, height and one Wii position (tandem stance eyes closed) were significantly related to BESS total. **CONCLUSION:** None of the athletes participating in this trial sustained a concussion, making it impossible for us to meet our primary and secondary objectives. As this was a pilot study, we believe that the results correlating the Wii COB scores with the BESS scores are encouraging and plan to repeat this study at the beginning of the new academic year. We believe that enrollment of a larger number of athletes for a longer time period will allow us to test concussed athletes and correlate balance pre and post-concussion with Wii COB scores.

Supported by a grant from the AAFP Foundation.

44. THE REALIABILITY OF PERCENT VOLUNTARY ACTIVATION DURING SUBMAXIMAL AND MAXIMAL ISOMETRIC MUSCLE ACTIONS.

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The interpolated twitch technique is a popular method used to assess percent voluntary activation (%VA) during submaximal and maximal isometric muscle actions, however, there is limited knowledge on the reliability of this technique at different contraction intensities. **PURPOSE:** The purpose of this study was to examine the test-retest reliability of the %VA versus force relationships. **METHODS:** 14 healthy men (mean±SD age=21±2.6 yrs) and 8 women (age=21±1.8 yrs) completed four maximal voluntary contractions and nine randomly-ordered submaximal isometric plantar flexions from 10 to 90% of the MVC. Transcutaneous electrical stimuli were delivered to the tibial nerve using a high-voltage constant-current stimulator (Digitimer DS7AH, Herthfordshire, UK) during two of the four MVC's and during all submaximal isometric plantar flexions. Submaximal isometric step contraction percentages were calculated from the higher of the two initial MVCs that were performed without the transcutaneous electrical stimuli. Doublets were administered at a supramaximal stimulus intensity during the maximal and submaximal MVC plateau and then again 3-5 s after the maximal and submaximal MVC at rest. %VA was calculated for each maximal and submaximal MVC. The intraclass correlation coefficients (ICCs) and standard errors of measurements expressed as a percentage of the mean (%SEMs) were used for test-retest reliability, while paired samples *t* tests were used to quantify systematic variability. Model "2,1" from Shrout and Fleiss (1979) was used to calculate the ICCs. **RESULTS:** Systematic variability was not present at any of the contraction intensities (*P* > 0.05). The ICCs ranged from 0.52 to 0.84, while the %SEM ranged from 6.75 to 38.45%. The ICCs were ≥ 0.74 at contraction intensities ranging from 40 to 100% MVC (6.75 to 16.78% SEM), while the ICCs were ≤ 0.65 (20.95 to 38.45% SEM) for the contraction intensities ≤ 30% MVC. **CONCLUSIONS:** Although not statistically tested, the ICCs tended to be higher, while the %SEMs lower for contractions ≥ 40% MVC (Table 1). Future research in assessing muscle activation or predicting the true maximal force from the %VA versus force relationships may want to exclude contractions intensities below 40% MVC.

Table 1. Mean±SD percent voluntary activation (%VA) values and the reliability and measurement variability statistics for %VA from the submaximal and maximal voluntary contractions.

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
% VA	11.62±6.60	18.63±8.28	29.44±10.13	37.67±12.13	49.39±12.90	60.42±14.20	71.34±16.15	81.04±16.29	87.61±14.31	84.19±14.15
<i>P</i> -Value	0.092	0.508	0.268	0.917	0.602	0.166	0.345	0.060	0.281	0.197
ICC _{2,1}	0.51	0.65	0.63	0.74	0.77	0.84	0.81	0.83	0.77	0.84
%SEM	38.45	26.67	20.95	16.78	12.90	9.31	10.00	7.98	7.86	6.75

45. RESTING METABOLIC RATE AND THE EFFECTS OF UPPER AND LOWER EXTREMITY RESISTANCE TRAINING

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PURPOSE: To examine the effects of a 6 week upper or lower body resistance training protocol on resting metabolic rate in college age subjects. **METHODS:** Seven subjects (3 trained; 4 non-trained) (age, 22.43 ± 2.22 years; height, 169.99 ± 9.61 cm, weight 80.69 ± 9.67 kg) volunteered for this investigation. RMR was assessed via indirect calorimetry 3 days prior to training and 3 days following the completion of their resistance training protocol. Subjects were randomly assigned into either an upper extremity (lat pull-down, bicep curl, tricep extension, chest press, shoulder press) or a lower extremity (modified squat, modified lunge, leg press, leg extension, leg curl) group. Exercise intensity was performed at 50% of 1-RM for weeks 1-2, 60% at weeks 3-4 and 75% at weeks 5-6. Subjects performed the assigned exercises two times each week for the first three weeks, and three times each week for the last 3 weeks. **RESULTS:** No significant differences were observed in RMR for the upper extremity resistance trained ($p=.66$) or the lower-extremity resistance trained ($p=0.28$) groups. **CONCLUSION:** These findings suggest that 6 weeks of upper or lower extremity resistance training does not alter RMR in college aged individuals.

46. IMPACT OF LOWER EXTREMITY MOBILITY ON INJURY RATE AMONGST DIVISION 1 COLLEGE FOOTBALL PLAYERS

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Movement efficiency can be defined as an action through a range of motion with the least amount of internal resistance possible. This improvement in range of motion can lead to an improved performance and a reduced risk for injury. **PURPOSE:** The purpose of this study was to determine whether or not a long term and consistent mobility protocol focusing on lower extremity range of motion would reduce the rate of lower body injury amongst Division I football players. **METHODS:** Student athletes performed a specific 11-movement mobility protocol prior to all training sessions. Musculature of the hips, thighs, and lower legs were targeted for flexibility improvement. Both active static stretches and active-isolated stretches were implemented to improve lower body joint mobility. The routine consisted of four active static stretches performed for 30-60 seconds each. Then seven active-isolated movements were performed for 6-12 repetitions each. Each repetition was held two seconds. All stretches were performed with a partner and under the supervision of a coach in order to ensure proper technique was being used by both participants and to encourage maximal effort was put forth. Prior to each football season, mobility of the athletes was assessed. Pass/Fail standards were established for the hips and both hamstrings mobility tests. The numbers of individuals who passed each test and the number of lower body injuries that occurred on the two-deep roster during each season were recorded. An injury was determined by a trauma significant enough to prevent an athlete from participation in a game. These data sets were then compared from the 2007-2010 football seasons. **RESULTS:** Analysis of the data revealed that a greater proportion of the athletes passed the mobility test season to season. The Chi-Square goodness of fit tests revealed that there was only a significant difference in injury rate between the 2007 and the 2010 seasons, with 34 games missed and 9 games missed respectively ($\chi^2 = 3.98, p < .05$). However, there was a trend toward a lower proportion of players being injured each season (21% - 2007, 14% - 2008, 12% - 2009, and 9% - 2010) as mobility improved. **CONCLUSION:** The results of this study suggest that improved flexibility may reduce the occurrence of injury and that evaluation of joint mobility may be useful in identifying potential injury risk factors.

47. Anaerobic Power Output in College Division 2 Athletes

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The Wingate anaerobic test is considered to be an accurate measure of anaerobic capacity of an individual. This test may indicate how well an individual metabolizes energy for anaerobic work. **PURPOSE:** The purpose of this study was to develop updated norms of mid-western division 2 college athletes for peak power (PP) mean power (MP), and fatigue index (FI) on the Wingate anaerobic test using advanced technology (RacerMate® Velotron). Athlete's represented 12 different sports; volleyball, baseball, softball, men and women's basketball, men and women's track and cross country, soccer, bowling and wrestling in addition to PE majors. **METHODS:** A total of 337 athletes participated in their respective preseason weeks. After signing IRB approved informed consent, each subject's height and weight was measured, and percent body fat was determined by bioelectrical impedance (Inbody520, Biospace Inc, CA). Subjects were guided through the Wingate procedures, given a 5 minute warm-up with 2-3, 10 sec sprints. A 5 second sprint before the calculated resistance was dropped ($.075\text{kg} \cdot \text{kg}^{-1}$); then 30 seconds was allowed to complete the resisted sprint. Peak Power (PP) and Mean Power (MP) in both watts and watts/kg were recorded in addition to fatigue index. **RESULTS:** The data indicate that football athletes have the highest PP ($1604.9 \pm 289.0\text{W}$), MP ($787.7 \pm 95.6\text{W}$) and FI ($41.6 \pm 9.9\text{W} \cdot \text{sec}^{-1}$). Men's track and cross country produced the highest MP relative to body weight ($8.4 \pm 7.0\text{W} \cdot \text{kg}^{-1}$) and women's track and cross country produced the lowest FI ($10.7 \pm 2.8\text{W} \cdot \text{sec}^{-1}$) **CONCLUSION:** Based on the current data, these results provide norms for comparison of peak anaerobic power and mean anaerobic power in division 2 college athletes (See table below).

Sport	N	Ht (cm)	Wt (kg)	PP (W)	PP (W/kg)	MP (W)	MP (W/kg)	FI (W/sec)
Volleyball	27	175.2	72.6	776.6	10.7	503.1	7.0	14.7
Baseball	42	179.0	87.7	1158.9	13.3	682.6	7.8	23.9
Women's Basketball	12	163.9	72.8	816.6	11.0	545.5	7.3	14.8
Men's Basketball	16	188.0	89.6	1133.9	12.6	719.7	8.0	23.0
Softball	17	162.8	72.7	634.9	9.5	400.4	6.0	12.5
Wrestling	53	174.8	83.1	981.7	12.2	617.2	7.7	19.2
Women's Track and CC	11	155.1	58.7	637.2	10.9	412.5	7.0	10.7
Men's Track	17	179.9	71.1	896.2	12.7	597.3	8.4	15.8
Golf	15	181.3	77.7	981.0	11.8	612.6	8.3	20.5
Soccer	38	166.4	61.7	670.9	11.0	422.6	7.0	12.6
Football	75	183.4	102.6	1604.9	15.8	787.7	8.0	41.6
Bowling	14	173.5	75.8	962.0	12.4	575.0	7.7	20.1

48. THE EFFECTS OF VERBAL ENCOURAGEMENT ON VO₂ MAX TESTING

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The measurement of maximal oxygen consumption is a standard testing procedure for assessing functional capacity. During graded exercise testing, the subject is asked to continue exercise beyond maximal effort until the imposed pace can no longer be maintained. **PURPOSE:** The purpose of this study was to examine the influence of verbal encouragement on the attainment of maximal oxygen consumption (VO₂ max) on recreationally active college students. It was hypothesized that verbal encouragement would significantly increase VO₂ max as well as total run time. **METHODS:** Recreationally active college students (6 men and 3 women) performed two VO₂ max test on a Trackmaster treadmill. The criteria for reaching a VO₂ max included attainment of 3 of the following criteria: a plateau of VO₂ during the test, an RER over 1.1, a heart rate within 11 beats of a participant's age predicted maximum heart rate, and an RPE of at least 17. All subjects participated in two trials (constant verbal encouragement (CE) and no encouragement (NE)).

RESULTS: VO₂ max was not shown to be significantly different for either group (mean ml/kg/min NE = 50.62 ± 13.35 vs. CE = 52.24 ± 13.5 ml/kg/min). However, total run time did show a significant increase (NE = 8:59 ± 0:08 vs. CE = 9:58 ± 0:10). **CONCLUSION:** The data supported the hypothesis that total run time would significantly increase, but did not support the hypothesis that VO₂ max would increase.

Supported by University of Central Missouri

49. INSULIN STIMULATED BLOOD FLOW IS BLUNTED AT REST IN INDIVIDUALS WITH TYPE 2 DIABETES

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In healthy subjects, insulin stimulated vasodilation and a resultant increase in blood flow is responsible for up to 40% of insulin stimulated glucose disposal in muscle following a meal. Individuals with type 2 diabetes (T2D) have a blunted ability of insulin to stimulate glucose disposal in skeletal muscle suggesting that they may also have impaired insulin stimulated blood flow. However, to date, no studies have measured the femoral blood flow responses following consumption of a meal in this population. **Purpose:** The purpose of this study was twofold. First, we examined the blood flow responses in T2D during an oral glucose tolerance test (OGTT). Second, to provide insight into the ability of insulin to directly stimulate blood flow in the absence of a number of hormones normally released with glucose ingestion, a hyperinsulinemic-euglycemic clamp was performed. **Methods:** First, we examined T2D (n=11, Age=53.4 yrs, BMI=33.7 kg/m²) during a 2 hour OGTT with concomitant measures of femoral artery blood flow. Second, we examined T2D (n=4, Age=55 yrs, BMI=36.4 kg/m²) during a 2 hour insulin clamp with concomitant measures of femoral artery blood flow. During both visits subjects arrived to the lab after fasting for 12 hours and a 24 hour refrain from exercise and alcohol. **Results.** Peak femoral artery blood flow did not change in the T2D during the OGTT or insulin clamp (+0.8 ± 5.2 % and -4.2 ± 7.7 %, respectively). Systemic insulin concentration during the last 45 mins of the OGTT and insulin clamp mirrored postprandial levels (49.8 ± 3.3 and 58.9 ± 3.8 IU/mL). Systemic glucose concentrations during the last 45 mins of the OGTT were 363.7 ± 3.9 mg/dL. Systemic glucose concentrations during the insulin clamp were maintained at the levels that they were when subjects entered the lab. **Conclusions:** Blood flow did not increase in individuals with T2D in response to the OGTT or insulin clamp. These preliminary results suggest that the T2D display impaired insulin stimulated blood flow responses.

50. ANTHROPOMETRICS, GRIP STRENGTH, BMI AND ROCK WALL CLIMBING SUCCESS IN FEMALE ATHLETES

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Faculty Sponsor: Steven Burns, Ph.D.

This Study tests the theory if whether upper-body, lower-body, or core strength is better for rock climbing. **Purpose:** The purpose of this study was to determine which Sport, volleyball, softball, or cheerleading produced a body type most suitable for the fastest climbing time up the rock wall. **Methods:** We tested female cheerleaders, volleyball players and softball players from the University of Central Missouri to test our theory. There were ten females from each athletic squad. All the athletes were between the ages of 18 and 22. Measurements of each subject's height, weight, grip-strength, percent body fat and arm span were taken prior to each subject climbing the rock wall for speed. **Results:** The volleyball players had the highest grip strength, height, and arm-span and the lowest percent body fat. The softball players had the lowest right hand grip strength, however the second highest grip-strength in the left hand, height, arm span and percent body fat. The cheerleaders had the second highest right hand grip strength; however the lowest left hand grip-strength, arm span, and height. The average times were the fastest for the volleyball players, with the softball closely behind. The cheerleaders had the slowest climbing time. **Conclusion:** the data collected showed the volleyball players having the fastest climbing speed along with the highest height, longest arm-span and strongest grip strength. **Key words:** *Rock Wall, Anthropometrics, Athletes*

51. Gender Differences in Leg Length, Q-Angle, Navicular Drop, and Tibial Torsion of College Age Subjects

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Purpose: The objective of this study was determine whether gender differences exist in skeletal structures. **Methodology:** A convenience sample of 24 males (age=22.46yrs \pm 2.41; height (HT)= 68.06in \pm 3.50; weight (WT)=186.75lbs \pm 49.84) and 34 females (age=21.50yrs \pm 1.73; HT=66.05in \pm 2.61; WT=138.98lbs \pm 20.98) was chosen from a large Midwestern university in the United States. Leg length (LL), Q-Angle, Navicular Drop (ND) and Tibial Torsion (TT) were measured for each subject. Data was analyzed using a one-way ANOVA. **Results:** Analysis yielded significant differences between TT ($p < .001$), LL ($p = .001$) and Q-Angle ($p = .005$), however no significant difference was found in ND ($p = .189$) and LL/HT ratio ($p = .601$). Males had significantly longer LL (94.68cm \pm 6.37) and TT (19.79° \pm 5.74) compared to females (LL=89.72cm \pm 4.56; TT= 13.29° \pm 4.29), however women had significantly large Q-angles (9.03°) than males (7.50°). **Conclusion:** This study validated studies that have stated that females have larger Q-angles than males. While lateral rotation of the tibia occurs at sexual maturation, males tend to have a great rotation of the tibia than females. Further investigation is required to determine why males have greater lateral rotation than females.

52. EFFECT OF COFFEE ON DUAL- TASK PERFORMANCE

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PURPOSE: The purpose of this study was to investigate whether coffee had an effect on dual-task performance. **METHODS:** Twenty- three (8 female/15 male; 25 ± 3.4 yrs) healthy college-aged individuals participated in this study. Participants were recruited from exercise science and engineering departments of WSU. Each participant attended three sessions (Familiarization, Baseline and Experimental). Before each session, participants were asked to abstain from consuming all caffeinated beverages the night before testing, and a reminder was also sent to them the day before each session. The dual- task assessment was completed during all three visits, this consisted of testing cognition (Stroop color-word test/ N-back test) while measuring balance (modified CTSIB) at the same time. The modified CTSIB test consist of four, 30 second tests; Condition 1; eyes open on a firm surface, Condition 2; eyes closed on a firm surface, Condition 3; eyes open on a foam surface, Condition 4; eyes closed on a foam surface reporting the Stability Index as the average position of the participant's body from center. In Conditions 1 and 3, subjects were asked to stand on the balance machine with eyes open and responded to Stroop color-word test by naming the color of the word –which appears in a color not donated by the name- on the screen in front of them. In Conditions 2 and 4 of balance test, N-back test was completed with eyes closed and participants responded by saying 'yes' when a word read aloud was again read aloud two words previously. Additionally, on the Experimental visit participants were asked to consume one cup of brewed coffee (12 oz) that contain 240 mg caffeine, and after 30 minutes the dual- task assessment was repeated. Statistical analysis was done using paired sample t-test. Significance was set at $p \leq 0.05$. **RESULTS:** Data shows that the dual- task assessment designed here had a significant difference between Condition 1 ($p= 0.018$) and Condition 3 ($p= 0.013$) at Baseline compared to Familiarization. Moreover, after receiving coffee the results of all dual- task assessments indicated that there were no significant difference between Baseline and Experimental ($p= 0.063$; $p= 0.390$; $p=0.992$; $p= 0.204$). **CONCLUSION:** The data of this study suggests that the dual-task assessment designed for this experiment requires a Familiarization visit. In addition, coffee consumption appears to provide a significant improvement on cognitive performance of Condition 1 and 3, but it does not report any significant effect on dual- task performance.

53. ENDOTHELIAL FUNCTION IN CHILDREN: EFFECTS OF DIETARY FAT INTAKE AND PERCENT BODY FAT

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Early detection of cardiovascular disease (CVD) risk factors in children could reduce disease related mortality later in life. When measured by reactive hyperemia peripheral arterial tonometry (RH-PAT), endothelial dysfunction is a non-invasive and reliable predictor of potential vascular complications in adults.

PURPOSE: The purpose of this study was to determine whether endothelial function in children was related to two possible predictors of dysfunction, usual dietary fat intake and percent body fat. **METHODS:**

Eighteen healthy children ages 10-18 (females 50%, average age = 14 yrs) participated in the study. Percent fat mass was measured using dual energy X-Ray absorptiometry. Endothelial function was measured by RH-PAT with the Endo-PAT2000 (Itamar Medical). An average of two fasting endothelial function scores obtained at visits spaced at least 48 hours apart was used for data analysis. With the participant lying supine in a 72-75 degree F room, pneumatic probes were placed on each forefinger and a blood pressure cuff on the testing arm. Five minutes each of baseline, occlusion, and post-occlusion pulse pressure measurements were recorded and used to calculate endothelial function as a reactive hyperemia index (RHI) value. Usual dietary fat intake was obtained using the Block Kids 2004 Food Frequency Questionnaire online which analyzed 77 foods consumed over the "last week" and reported as percentage of total energy intake. Bivariate and multivariate linear regression analyses were used to determine the associations among variables.

RESULTS: The mean values (mean±SD) for the sample variables were: RHI= 1.86 ± 0.48 arbitrary units, percent body fat= 22.37 ± 9.3 and percent dietary fat intake= 33.22 ± 5.1 % per day. RHI was not significantly related to dietary fat intake ($p=0.48$, $\beta=0.01$, $R^2=0.03$) or body fat ($p=0.27$, $\beta=0.01$, $R^2=0.08$) when considered separately, or when included with both of these variables in a multivariate model ($p=0.89$, $p=0.27$ respectively). However, when sex was included as a covariate within the model, sex was found to be significantly associated with RHI ($p=0.04$, $\beta=0.43$, $R^2=0.34$). Girls had higher RHI (2.04 ± 0.30) than boys (1.63 ± 0.39 , $p=0.03$). **CONCLUSION:** Neither diet nor body composition were directly associated with endothelial function, contrary to the working hypothesis. However, sex is associated with endothelial function in children with the RHI value in females being higher than in males. The higher endothelial function in females has been shown in adults and may be related to hormonal differences, but should be further investigated in children as they progress through puberty, a phase of extreme hormonal fluctuation.

Supported by the University of Oklahoma Health Science Center Vice President of Research Seed Grant

54. THE EFFECTS OF INTERMITTENT FASTING (FASTING THE MONTH OF RAMADAN) ON ANTHROPOMETRIC AND BLOOD VARIABLES.

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Muslims fast one month each year during the month of Ramadan. Many studies have been conducted on fasting during the month of Ramadan; however, their results were varied. Furthermore, few studies have been conducted on hormones levels during Ramadan and these studies had vastly inconsistent results. It is important to note that none of these studies controlled or even monitored physical activity. **Purpose:** The purpose of this study is to examine the effect of fasting during the month of Ramadan on anthropometric and blood variables. This study will determine if intermittent fasting will affect body weight, body composition, blood lipid profile, and glucose and insulin hormones. **Methods:** Ten healthy male aged (28.33 ± 5.93 years, 71.32 ± 8.74 kg, 169.7 ± 5.5 cm) participated in this study. The subjects were randomly selected from the Islamic center in Lawrence, Kansas. Weights, height and body composition of all subjects were recorded at days 1 (D1), 10 (D10) and 28 (D28) of fasting Ramadan. Blood was collected and then analyzed by labcorp. Physical activities were measured by using An Actigraph physical activity monitor. All data was analyzed using a 2x2 repeated measures ANOVA ($p \leq 0.05$). **Results:** There was significant decrease in body weight (D1= 71.19 kg, D10= 70.52 kg and D28= 71.04 kg) and free fat mass (D1= 56.18 kg, D10= 55.15 kg, and D28= 55.55 kg) after 10 days of intermittent fasting whereas they returned back to almost the Pre-Ramadan at the end of Ramadan. There was no significant difference in data of Fat Mass and the percentage of body fat. Moderate physical activity and Energy expenditure were significantly decrease at the end of Ramadan. While Light, Hard and Very Hard activity did not show significant differences. Triglycerides, Total cholesterol, LDL, HDL, and VLDL did not show significant differences. The ratio of HDL to LDL was significantly increased at the end of fasting Ramadan compare to 10 days of fasting at $P > 0.002$. Fasted Glucose level was significantly increased at the end of Ramadan compare to the Pre-Ramadan at $P > 0.038$, but was still within normal/health range. Furthermore, Insulin was significantly increased at the end of Ramadan compared to 10 day of intermittent fasting. **Conclusion:** These results show a trend towards positive associations with the level of total cholesterol and LDL decreasing approximately 9mg/dl and 8 mg/dl respectively at the end of the month. However, intermittent fasting may result in a decrease in insulin sensitivity. Overall, these findings indicate no health risk for fasting during the month of Ramadan.

55. THE INFLUENCE OF OFF-THE-SHELF ORTHOTICS ON STATIONARY VERTICAL GROUND REACTION FORCE AND VERTICAL STIFFNESS.

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Current evidence in regards to the use of off-the-shelf orthotics is not conclusive. Some suggest that standard shoe insoles quickly break down and provide little biomechanical support. It is also reported that off-the-shelf orthotics reduce joint stiffness and promote proper biomechanical support. **PURPOSE:** Given these differences, the purpose of this study was to examine the immediate changes off-the-shelf orthotics have on stationary vertical ground reaction force, vertical stiffness, and peak velocity in subjects with pes planus. **METHODS:** Nineteen subjects (N=10 males, age=21.25±1.83yrs, ht=177.55±5.55cm, mass=83.38±14.62kg; N=9 female, age=20.22±2.28yrs, ht=161.71±3.11cm, mass=60.30±6.06kg) with no lower extremity acute injuries in the last 6 months but diagnosed with a positive navicular drop test on both feet were recruited. Subjects that met these inclusion criteria were then assigned to a treatment order. Subjects either wore off-the-shelf orthotics in running shoes (treatment 1) or a standard shoe insole (treatment 2). Patients then stood on both legs in the center of a force plate where a cable from a TENDO analyzer was secured to belt just superior to the subject's iliac crest. Subjects were then instructed to perform 2 practice standing vertical jumps followed by 3 maximal vertical jumps with a 60 second break between each jump. Following each jump, ground reaction force for initial jump, landing, and vertical displacement from center of mass were examined. To ensure consistency, subjects were instructed to place both hands on their hips to eliminate any accessory movement. Following the third vertical jump, subjects sat on a chair for 5 minutes prior to receiving the second treatment. **RESULTS:** Off-the-shelf orthotics did not influence the stationary vertical ground reaction force for the initial jump ($t_{19}=2.71, P=.77$) or for the landing ($t_{19}=12.18, P=1.00$). The off-the-shelf orthotics also did not influence vertical stiffness ($t_{19}=16.03, P=1.00$) or peak velocity ($t_{19}=14.86, P=1.0$). **CONCLUSION:** In comparing standard shoe insoles to off-the-shelf orthotics it does not appear that they influence stationary ground reaction tasks for jumping and landing nor do they influence vertical stiffness, or peak velocity.

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