

Undergraduate Abstracts

Poster 1

A COMPARISON BETWEEN SQUAT AND DEADLIFT CONCENTRIC VELOCITY AND POWER

Abigail Boushard*¹, Kathryn Blomenkamp*¹, Christopher A. Fahs‡¹, Lindy M. Rossow‡¹, Chad M. Kerksick‡² ¹Lindenwood University Belleville, Belleville IL; ²Lindenwood University, St. Charles, MO

The average concentric velocity (ACV) of barbell exercises can be used to adjust training loads (autoregulation). The velocity ranges used for autoregulation can vary and research is needed to clarify the load-velocity relationship for each exercise. Anthropometric factors and training history may also affect the load-velocity relationship. **PURPOSE:** To compare the ACV of the squat and deadlift over a spectrum of relative loads and to determine the influence of training age, training frequency, limb length, and relative strength on ACV for the squat and deadlift. **METHODS:** One-repetition maximum (1RM) for the squat and deadlift was assessed in fifty-one individuals (33 males, 18 females). Height, body mass, and femur length were measured while training age and frequency were obtained via questionnaire. ACV was measured during warm-up sets and 1RM attempts using a TENDO Power and Speed Analyzer. Relative 1RM was calculated as the 1RM divided by body mass. Average power (AP) was calculated as the load (kg) multiplied by 9.81 m/s² multiplied by the ACV. Paired samples t-tests were used to determine differences in ACV and AP between the squat and deadlift. Pearson's product moment correlations were used to determine relationships between variables. **RESULTS:** ACV values were significantly ($p < 0.05$) greater for the squat compared to the deadlift at loads $\geq 55\%$ 1RM including the 1RM (0.26 ± 0.08 vs. 0.22 ± 0.10 m/s; $p = 0.004$). AP values were significantly greater ($p < 0.05$) for the deadlift compared to the squat at loads $\leq 55\%$ 1RM but similar at loads $\geq 65\%$ 1RM including the 1RM (321 ± 134 vs. 317 ± 141 watts/kg; $p = 0.844$). Squat 1RM ACV was significantly related to relative strength ($r = -0.297$; $p = 0.033$). Deadlift 1RM ACV was significantly related to relative strength ($r = -0.308$; $p = 0.028$) and training frequency ($r = -0.489$; $p < 0.001$). **CONCLUSION:** These data suggest velocity ranges used for autoregulating training loads should not be used interchangeably for the squat and deadlift. Deadlift velocity ranges appear to lower than squat velocity ranges for the same relative loading. Velocity ranges for both exercises may need to be reduced as a trainee's relative strength increases.

Poster 2

CALORIC AND MACRONUTRIENT CHANGES ACROSS AN ENTIRE WOMEN'S BASKETBALL SEASON

Currier B^{*1}, Zanders BR¹¹, Rodriguez A¹¹, Harty P¹¹, Smith C¹¹, Stecker R¹¹ and Kerksick CM¹¹, FACSM. ¹Exercise and Performance Nutrition Laboratory, School of Health Sciences, Lindenwood University, St. Charles, MO USA

PURPOSE: The purpose of this study was to identify changes in dietary intake across an entire women's basketball season. **METHODS:** On five different occasions across an entire season, female collegiate basketball players (19.8 ± 1.3 years, 173.9 ± 13.6 cm, 74.6 ± 9.1 kg, 27.1 ± 3.2 % fat, 53.9 ± 6.4 mL/kg/min, n=13) completed four-day food and fluid records in addition to sleep and meals consumed to assess changes in dietary status. DEXA was used to assess body composition at baseline. All dietary intake data was averaged per day and represented as absolute intake and normalized to body mass in kilograms. Data was analyzed using one-factor repeated measures ANOVA. **RESULTS:** Absolute ($2,425 \pm 218$ kcals, $p = 0.72$) and normalized (32.7 ± 3.7 kcals/kg, $p = 0.79$) daily caloric intake did not change across the season. Absolute (273 ± 19 , $p = 0.29$) and normalized (3.7 ± 0.40 g/kg, $p = 0.13$) daily carbohydrate intake did not change across the season. Carbohydrate intake experienced non-significant reductions during the middle part of the season in comparison to other parts of the season. Absolute (87.1 ± 10.2 grams, $p = 0.07$) and normalized (1.17 ± 0.16 g/kg, $p = 0.07$) daily protein intake both tended to change across the season. Post-hoc analysis revealed that protein intakes late in the competitive season were significantly lower ($p = 0.02$) than early in the competitive season. Absolute (100.9 ± 17.0 grams, $p = 0.10$) and normalized (1.37 ± 0.25 g/kg, $p = 0.32$) daily fat intake did not change across the season. **CONCLUSIONS:** Across an entire women's basketball season, mean changes in caloric as well as macronutrient intakes were reported. While non-significant, average reported caloric intake levels were 150 – 180 kcals/day lower during the middle of the season when compared to the beginning and the final weeks of the season. Moreover, self-reported carbohydrate (3.7 ± 0.4 g/kg/day) and protein (1.17 ± 0.16 g/kg/day) were much lower than recommended values for competitive strength and power athletes for carbohydrate and protein (5 – 6 g/kg/day and 1.4 – 1.6 g/kg/day, respectively). A number of areas seem to exist where focused nutrition education can take place to help the athletes and coaches better understand when dietary intake may be compromised throughout an entire women's basketball season.

Poster 3

MECHANOMYOGRAPHIC AMPLITUDE-FORCE RELATIONSHIPS FOR THE VASTUS LATERALIS ARE ALTERED FOLLOWING 10 WEEKS OF AEROBIC CYCLING

S. Feng^{*1}, M.A. Trevino¹², J.D. Miller¹¹, A.J. Sterczala¹¹, and T.J. Herda¹¹

¹University of Kansas, Lawrence, KS, ²Armstrong State University, Savannah, GA

It has been suggested the mechanomyographic amplitude (MMG_{RMS})-force relationship may characterize motor unit (MU) recruitment and firing rate behavior of muscle. A log - transformation of this relationship has differentiated aerobically- from resistance-trained and sedentary individuals. To date, it remains unclear when alterations in MU behavior occur following aerobic training. **PURPOSE:** The purpose of this study was to examine the effects of 10 weeks of aerobic cycling training on absolute maximal aerobic capacity (VO_{2MAX}), maximal strength (MVC) for the leg extensors, and the MMG_{RMS}-force relationships for the vastus lateralis (VL). **METHODS:** Thirteen sedentary individuals (mean \pm SD, age = 22.31 \pm 5.34 yrs) completed 40 aerobic cycling training sessions over 10 weeks. Weeks 1 – 3 consisted of 30 mins of cycling at 70% of heart rate reserve (HRR), whereas, weeks 4 – 6 and 7 – 10 were 40 mins at 75% and 80% of HRR. Pre – and post-testing included VO_{2MAX}, and MVC on an isokinetic dynamometer followed by a submaximal (70% relative to pre-training MVC) linearly increasing muscle action of the leg extensors. Prior to testing, an MMG sensor was placed over the VL and the MMG and force signals were simultaneously sampled at 2 kHz and were bandpass filtered (4th order Butterworth) at 5-100 Hz. For the linearly increasing muscle action, linear regression models were fit to the log-transformed MMG_{RMS}-force relationships and the slope (*b* term) was calculated. Separate paired samples *t*-tests were used to examine absolute VO_{2MAX}, MVC, and the *b* terms. An alpha level was set at 0.05 to determine statistical significance. **RESULTS:** There was a significant increase ($P < 0.001$) in absolute VO_{2MAX} (Pre=2.41 \pm 0.82 ml/min, Post=2.75 \pm 0.88 ml/min) following 10 weeks of aerobic cycling training. For MVC, there was no significant difference ($P = 0.442$) from pre- (150.17 \pm 46.38 Nm) to post-training (147.30 \pm 48.46 Nm). The *b* terms significantly increased ($P = 0.039$) following 10 weeks of aerobic cycling training (Pre=0.502 \pm 0.209 m s⁻²/Nm, Post=0.601 \pm 0.222 m s⁻²/Nm). **CONCLUSION:** Ten weeks of aerobic cycling improved maximal aerobic capacity with no significant change in maximal strength. However, greater *b* terms for the MMG_{RMS}-force relationships likely indicated increased motor unit recruitment to match pre-training absolute torques.

**This work was supported in part by a National Strength and Conditioning Association Foundation (NSCAF) Graduate Research Doctoral Grant.*

Poster 4

THE EFFECT OF A FOUR WEEK TAI CHI PROGRAM ON BALANCE AND FALL PREVENTION IN MIDDLE-AGED ADULTS

Elle Fredrickson^{*1}, Kira Eddy^{*1}, Danielle Hemingson^{#1} ¹Baker University, Baldwin City, Kansas

As individuals age the likelihood that they will suffer a fall increases dramatically due to a number of reasons. Nearly 50% of those individuals will then suffer recurrent falls contributing to a multitude of health problems, as well as an increased need for costly long-term care, and a decreased sense of self-sufficiency. **PURPOSE:** The purpose of this study was to determine whether a shortened exercise plan utilizing Tai chi will have an impact on balance as it relates to fall prevention in middle-aged adults. **METHODS:** A total of eight adults (1 male, 7 female) between the ages of 40-60 years old completed the study. The study consisted of pre and post-testing as well as two thirty-five minute Tai chi sessions per week for four weeks. Pre and post-testing involved a verbal fall risk questionnaire and Y-Balance testing to assess participant's relative fear of falling in their daily lives and general balance scores from the Y-Balance test. **RESULTS:** Accumulative results from the Y-Balance test showed significant improvement at the conclusion of the Tai chi program ($P=0.005$). Despite physical improvements in balance, there was very little difference in participant response to the fall risk survey completed before and after testing. **CONCLUSION:** A four week Tai chi program shows considerable success in the enhancement of balance in middle-aged adults.

Poster 5

NCAA TRACK & CROSS COUNTRY COACHES: A PROFILE OF EDUCATIONAL BACKGROUND, PAST ATHLETIC EXPERIENCE, AND JOB SATISFACTION SURVEY

Joe Linder^{*1} and Danielle Hemingson^{†1}, ¹Baker University, Baldwin City, KS

PURPOSE: The purpose of this study was to examine relationships between NCAA track and cross-country coaches' educational background, athletic experience, and differences among Divisions I, II, and III. **METHODS:** A survey was sent via Google Docs to 519 track and/or cross-country coaches in the NCAA. Fifteen conferences in each division were chosen randomly as the sample population. Out of 519 surveys sent 112 participants responded resulting in a 21.6% response rate. **RESULTS:** A chi-squared test ($X^2 = 0.408$, $p=0.8153$) showed no significant relationship between division and field of study. An ANOVA test ($F=1.289$, $p=0.259$) showed no significant relationship between division and job satisfaction. A chi-squared test ($X = 5.6441$, $p=0.1303$) showed no significant relationship between divisions and past athletic experience. Utilizing odds ratios predicted those who coach in Division I are 2.22 times more likely to have a degree in the field of education than in exercise science or a related field. Moreover, coaches who received an All-Conference competition status as athletes were 2.86 times more likely to be coaching in Division I than a coach who reached the All-American status as an athlete, and 1.86 times more likely than those who achieved Professional status as an athlete. **CONCLUSION:** No significance was found between divisions and field of study, divisions and job satisfaction, or divisions and past athletic experience. However, it is predicted those who coach Division I are more likely to have a degree in the field of education or have achieved All-Conference competition status as an athlete.

Poster 5

DEVELOPMENT AND VALIDATION OF THE “GORILLA RUN TEST”

Lane C. Madison¹, Kylie J. Brown¹, Nicholas B. Drake¹, Derek A. Crawford¹, and Michael. J. Carper¹. ¹Applied Physiology Laboratory. Department of Health, Human Performance and Recreation, Pittsburg State University, Pittsburg, KS, USA

Maximal oxygen consumption (VO₂max) testing is widely used in laboratories and requires expensive pieces of equipment. There are numerous prediction equations used to determine VO₂max, but none are based on the anaerobic treadmill test (AnTT). **PURPOSE:** The purpose of this investigation was to develop and validate a regression models to predict maximal oxygen consumption (VO₂max) from AnTT time. **METHODS:** A total of 100 college-aged males and females participated in this investigation. Subjects performed a VO₂max treadmill (TM) test utilizing the Bruce protocol. A metabolic cart was used for collection of expired gases and determination of VO₂max. 48 hours later subjects performed an AnTT where the treadmill was set at a 20% grade and speed was determined based off their VO₂max classification (males: 8mph trained, 7mph untrained; females: 7mph trained, 6mph untrained). Time to exhaustion and VO₂max were collected during this test. Reliability of VO₂max estimates were compared to Bruce VO₂max values using interclass correlation coefficients (ICC) while Bland-Altman (BA) plots were used to determine the agreement (presence of bias and number of values falling within $\pm 2SD$ limits of agreement, LOA) between the two methods of VO₂max determination. **RESULTS:** Separating trained (N=43) and untrained (N=57) subjects, significant correlations are present between VO₂max and AnTT time (trained: $r=.622$, $p=.000$; untrained: $r=.541$, $p=.000$). Regression equations for both groups (trained: $y=38.82+0.23*x$; untrained: $y=28.64+0.2*x$) demonstrate moderate reliability (trained: ICC=.718, $p=.000$; untrained: ICC=.629, $p=.000$) for estimating individuals' VO₂max based on AnTT time. BA plot analysis reveal no significant bias from the line of equality for either equation (trained: mean=.18, $p=.793$; untrained: mean=-.05, $p=.929$) and acceptable agreement between the two methods (95% of values within LOA). **CONCLUSION:** Based on these results, we have created reliable regression models to predict VO₂max from AnTT times that are in agreement with direct assessment during the Bruce protocol. These models need to be tested using a unique sample to confirm this agreement and to identify standard error of the estimates in order to determine their validity for use in practice.

Poster 6

CHARACTERISTICS OF FEMALE COLLEGIATE ICE HOCKEY PLAYERS

Jessica Moon^{*1}, ¹Lindenwood University Belleville, Belleville, Illinois

PURPOSE: The purpose of this research is to examine the physical characteristics and fitness levels of ACHA Division 1 collegiate female hockey players by examining data collected from various fitness tests including vertical jump, anaerobic step test, the Cooper Run test, anaerobic cycling (Wingate) and body composition testing (BodPod). **METHODS:** Twelve ACHA female hockey players visited the lab on three separate visits to complete the three day testing protocol. On the initial visit, percent body fat was assessed using the BodPod (BP). Also height as well as weight, blood pressure, age, sit and reach, vertical jump (using the Vertec), and anaerobic power output through the anaerobic step test were assessed. On day two, the athletes performed a 1.5 mile aerobic run (Cooper Run Test). On day three, an anaerobic cycling test (Wingate) was performed. **RESULTS:** The following results were collected: percent body fat as assessed by BP ($29.7 \pm 8.2\%$), height (162.3 ± 6.2 cm), weight (70.6 ± 12.1 kg), resting systolic blood pressure (118.9 ± 6.4 mmHg), resting diastolic blood pressure (76.8 ± 6.4 mmHg), age (21.3 ± 4.2 years), sit and reach (32.5 ± 6.4 cm), vertical jump (18.7 ± 3.1 inches), anaerobic step test (46.5 ± 12.6 steps; mean power 254 ± 72 watts), aerobic capacity (VO_2 max) as assessed by the Cooper Run Test (46.6 ± 10.3 ml⁻¹*kg⁻¹*min). The Wingate mean power was (3743 ± 981 Watts) and total repetitions were (45.7 ± 4.7 repetitions). **CONCLUSION:** These tests present a unique fitness profile for an understudied group of athletes. This profile can be useful for coaches, players and trainers within this sport, ACHA Div.1 Women's Ice Hockey.

Poster 7

ACCURACY AND RELIABILITY OF A CONSUMER-GRADE ACTIVITY TRACKER AMONG OLDER PEOPLE: A PILOT STUDY

Catherine Patrick^{*1}, Michael A. Smith¹, Antonio Harris^{*1} and Melissa Powers¹. ¹University of Central Oklahoma, Edmond, Oklahoma

Activity trackers are popular devices used to track and encourage physical activity; although the accuracy of activity trackers among older people is unknown. **PURPOSE:** The purpose of this pilot study was to evaluate the accuracy and reliability of step counts from a consumer-grade activity tracker by comparing step counts to a research-grade accelerometer and video recording. **METHODS:** Seven volunteers (mean age = 69.57±3.65 years) agreed to participate. Two participants did not complete the second round of testing. Researchers collected height, weight, and age. The activity tracker and accelerometer were set-up using manufacturer's procedures. Participants wore the activity tracker and accelerometer as they walked 96 meters around an indoor gym floor at their normal walking pace. The walk was also video recorded to determine observational step count confirmed by two researchers. The same procedures were repeated on a second, non-consecutive day. Data collected from the activity tracker were compared to the accelerometer and observed step count. In addition, step counts from the first walk were compared to step counts from the second walk. **RESULTS:** At the first walk, the activity tracker was found to significantly underestimate step counts by 18.86 steps when compared to the observed step count, $t(6) = -3.27, p = .017$. The activity tracker step count was not different than the accelerometer step count. At the second walk, no differences in step counts were observed between the activity tracker and the accelerometer or the observed step count ($p > .05$). In addition, no differences in step counts were observed between walk 1 and walk 2 using the activity tracker, accelerometer, and observed step count. **CONCLUSION:** Although preliminary, these data indicate fair accuracy and good reliability of a consumer-grade activity tracker when compared to the accelerometer and observed step count. We suggest this pilot study be extended to include additional participants and comparisons of other activity trackers. Activity trackers are widely used to measure physical activity, but their accuracy and reliability remains questionable especially among older people. Additionally, new products and upgrades are made available so quickly that research on the accuracy and reliability of these devices is difficult to obtain.

Poster 8

CANCER CACHEXIA: METABOLIC CHANGES IN CARBOHYDRATE METABOLISM OF THE LIVER

Sarah M. Ramey*¹, Megan E. Rosa-Caldwell¹, Jacob L. Brown¹, David E. Lee¹, Richard A. Perry¹, Wesley A. Haynie¹, Aaron R. Caldwell¹, Tyrone A. Washington¹, Michael P. Wiggs², Nicholas P. Greene¹ ¹University of Arkansas, Fayetteville, Arkansas; ²Univeristy of Texas at Tyler, Tyler, Texas

One negative side effect of cancer that dramatically affects cancer prognosis and progression is the development of cancer cachexia. Cancer cachexia is defined as cancer-associated muscle wasting. This is thought to be at least partially mediated by increased energy expenditure and is responsible for the death of 20-40% of all cancer patients. Although the liver is known to be the predominant regulator of whole body metabolism, there is little known about its relationship to the development of cancer cachexia. **PURPOSE:** The purpose of this exploratory study was to investigate alterations in liver metabolism by examining measures of glycogen storage throughout the progression of Lewis Lung Carcinoma (LLC) induced cancer cachexia. **METHODS:** C57BL/6J mice were injected with 1×10^6 LLC Cells in the left posterior leg, and the control group with phosphate buffered saline (PBS). The experimental groups included PBS, 1wk, 2wk, 3wk, and 4wk of cancer progression with 10-16 in each group. Sections of liver (n~8/group) were cut and periodic acid-Schiff (PAS) stain for glycogen was completed. Images were analyzed for total area of stain as well as intensity of stain using NIS-Elements imaging software. A Welch's one-way analysis of variance was used to determine differences between groups, a Tukey post hoc was used to determine differences between means. Significance was denoted at $p < 0.05$. **RESULTS:** 4wk animals had ~30% larger livers compared to all other groups with no other differences detected (~1000mg compared to ~1300mg, $p < 0.05$). However, there was no statistical differences detected between groups on either PAS area stained (~50% across groups, $p > 0.05$) or intensity of stain (Arbitrary Intensity Unit ~30 across groups, $p > 0.05$). Furthermore, neither glycogen area nor intensity correlated with liver size ($r = 0.12$ and $r = 0.16$ respectively). **CONCLUSION:** Differences in liver sizes are not attributable to glycogen storage. Though there were no differences in glycogen content, the increase in liver size suggests disruption of other processes in the liver. For future projects, we will further investigate mechanisms for liver hypertrophy in order to determine the relationship between the liver and cancer cachexia progression.

**This study was supported by The Arkansas Bioscience Institute and National Institutes of Health R15AR069913.*

Poster 9

THE EFFECTS OF 10 WEEKS OF CONTINUOUS CYCLING ON MUSCLE ACTIVATION OF THE VASTUS LATERALIS

Stephanie. A. Sontag^{*1}, Michael A. Trevino¹², Adam J. Sterczala¹¹, Jonathan D. Miller¹¹, and Trent J. Herda¹¹. ¹University of Kansas, Lawrence, KS; ²Armstrong State University, Savannah, GA

Differences in motor unit (MU) control strategies have been reported as a function of chronic training. The effects of aerobic training on cardiovascular markers are well understood; however, less is known regarding the effects on neuromuscular behavior. **PURPOSE:** This study examined the effects of 10 weeks of continuous cycling training on maximal aerobic fitness (VO_{2MAX}), maximal strength (MVC) of the leg extensors, and the electromyographic amplitude (EMG_{RMS})-force relationships for the vastus lateralis (VL). **METHODS:** Thirteen sedentary individuals (mean \pm SD, age = 22.31 ± 5.34 yrs) completed 40 aerobic cycling training sessions over 10 weeks. Weeks 1 – 3 consisted of 30 mins of cycling at 70% of heart rate reserve (HRR), whereas, weeks 4 – 6 and 7 – 10 were 40 mins at 75% and 80% of HRR. Pre- and post-training, participants performed (1) incremental cycling to determine relative VO_{2MAX} and maximal HR, and (2) MVC on an isokinetic dynamometer followed by a submaximal (70% relative to pre-training MVC) linearly increasing muscle action of the leg extensors. An EMG sensor was placed over the VL prior to strength. For the linearly increasing muscle action, linear regression models were fit to the log-transformed EMG_{RMS} -force relationships and the slope (b term) was calculated. Separate paired samples t -tests were used to examine relative VO_{2MAX} , MVC, and the b terms. Alpha was set at 0.05. **RESULTS:** There was a significant increase ($P < 0.001$) in relative VO_{2MAX} (Pre= 34.38 ± 6.89 ml/kg/min, Post= 39.87 ± 7.30 ml/kg/min) following 10 weeks of continuous cycling training. For MVC, there was no significant difference ($P = 0.442$) between pre- (150.17 ± 46.38 Nm) and post-training (147.30 ± 48.46 Nm). In addition, there was no significant difference ($P = 0.901$) for the b terms (Pre= 1.099 ± 0.188 μ V/Nm; Post= 1.106 ± 0.214 μ V/Nm) from the EMG_{RMS} -force relationships. **CONCLUSION:** Ten weeks of continuous cycling training improved maximal aerobic capacity while maximal strength for the leg extensors was unaffected. The EMG_{RMS} patterns of response (b terms) during an increasing muscle action were not different between pre- and post-testing and, thus, muscle activation for the VL was unchanged following 10 weeks of continuous cycling training.

**This work was supported in part by a National Strength and Conditioning Association Foundation (NSCAF) Graduate Research Doctoral Grant.*

Poster 10

THE INFLUENCE OF WALKING SPEED ON HIP MUSCLE ACTIVITY AND LUMBOPELVIC MOVEMENT

Kate Tarver^{*1} & Kaitlin Gallagher^{#1}, ¹University of Arkansas, Fayetteville, Arkansas

Prolonged standing induces low back pain (LBP) in at least 50% of study participants. It is hypothesized that people who develop LBP during standing have high gluteus medius co-activation; however, there is no research on how interventions, such as intermittent walking breaks, influence co-contraction. **PURPOSE:** Examine the effects of different walking speeds on gluteus medius co-contraction. **METHODS:** Three males and two females (21-25 years) have participated in this study. The exclusion criterion includes any previous low back or hip injury, surgery and an allergy to rubbing alcohol. Electromyography (EMG) of bilateral gluteus medius were recorded during a baseline standing trial (0 mph), and three randomly ordered walking trials at three different set speeds of 1, 2, and 3 mph. Each trial was 1-minute, with the last 30 seconds recorded. Co-activation was assessed on the EMG using a cross correlation index (CCI). A one-way repeated measure ANOVA with a within factor of walking speed was run on the gluteus medius CCI. A Tukey post hoc test will be run on any significant main effects. **RESULTS:** There was a significant main effect of walking speed on CCI ($p < 0.0001$). When walking at 1 mph, the CCI was -0.72 ± 0.07 . This was significantly different from the 0 mph (0.58 ± 0.19 , $p < 0.0001$), 2 mph (0.38 ± 0.28 ; $p = 0.0019$) and 3 mph (-0.37 ± 0.20 ; $p = 0.0016$) conditions. There was no significant difference between the 2 and 3 mph conditions ($p = 0.9993$). **CONCLUSION:** Based on the CCI values, all walking speeds demonstrated a tendency towards reciprocal firing of the gluteus medius muscles. The 1 mph had a higher CCI, which could be because of the very distinct stance and swing phases of walking or the need to walk at a slower than desired pace. As the speed increased, reciprocal firing was still evident, but not to the extent seen at 1 mph. During constrained standing tasks, the gluteus medius muscles were co-contracting, denoted by a positive CCI. As a result, walking did cause reciprocal firing of the gluteus medius muscles, indicated by a negative CCI. Further research that combines these results with lumbar spine movement will help reveal potentially beneficial walking speeds for the reduction of prolonged standing induced LBP.

**This study was funded through a University of Arkansas Honors College Research Grant.*

Poster 11

CHANGES IN LIVER FIBROSIS DURING THE PROGRESSION OF CANCER-CACHEXIA IN MICE

Kyle W. Turner*¹, Megan E. Rosa-Caldwell¹, Jacob L. Brown¹, David E. Lee¹, Richard A. Perry¹, Wesley A. Haynie¹, Tyrone A. Washington¹, Michael P. Wiggs², Nicholas P. Greene¹

¹University of Arkansas, Fayetteville, Arkansas; ²Univeristy of Texas at Tyler, Tyler, Texas

Cancer is one of the most widespread and deadly diseases in recent history. Cancer-cachexia is a systematic, metabolic disorder that greatly disrupts the patient's energy balance, causing uncontrollable weight and skeletal muscle loss. This cancer-induced cachexia is one of the major causes of cancer-related death. As the primary metabolic organ controlling energy balance, the liver is likely involved with the progression of cancer-cachexia. However, very little research has investigated the liver's involvement in the progression of cancer-cachexia. **PURPOSE:** The purpose of this study was to observe changes in liver fibrosis during the progression of cancer-cachexia. **METHODS:** C57BL/6J mice were injected with 1×10^6 lewis lung carcinoma cells in the hind flank and cancer was allowed to progress for 1, 2, 3, or 4 wks. Control animals were injected with sterile phosphate buffered saline solution (PBS) and harvested with 4 wks animals, creating five groups (CON, 1, 2, 3 or 4wks cancer progression, n=10-16/group). Livers were harvested and ~8 samples/group were analyzed for collagen deposition and measures of mitochondrial content. Results were analyzed by one-way ANOVA as well as regression analysis. When differences were found, a Tukey-Kramer post hoc was used to determine differences among means, significance was determined at $p < 0.05$. **RESULTS:** Liver weights normalized to tibia length were ~30% larger in 4wks animals compared to all other groups ($p < 0.05$). Sirius red staining for collagen indicated that collagen area increased over time in an exponential fashion ($r^2 = 0.78$), with 4wks having statistically greater collagen deposition than all other groups. Preliminary analysis (n=4/group) of COX-IV content in the liver suggested no change in mitochondrial content. **CONCLUSION:** The liver is clearly affected by the progression of cancer-cachexia, becoming much larger and more fibrotic. It can be inferred that this fibrotic damage may also exacerbate the energy balance problems caused by cancer-cachexia. Therefore, further research needs to be conducted in this area to more thoroughly understand the liver's role in this pathology.

**This study was supported by The Arkansas Bioscience Institute and National Institutes of Health R15AR069913.*

Poster 12

MEASURED VS PERCEIVED HYDRATION STATUS IN RECREATIONALLY ACTIVE COLLEGE-AGED STUDENTS

Kaitlin M. Welter^{*1}, Jason D. Waggener^{#1}, and Jeremy T. Barnes^{#1}, ¹Southeast Missouri State University, Cape Girardeau, MO

Adequate hydration is important for good health and athletic performance. Water helps regulate bodily functions as well as maintain fluid balance. Objective measures of hydration status include urine specific gravity (USG) and a professional's analysis of urine color (UC), while subjective measures include self-evaluation of perceived hydration status and visual analysis of UC. **PURPOSE:** To compare actual (i.e., USG and professional analysis of UC) to perceived (i.e., pre- and post-urine sample self-evaluation and visual analysis of UC) hydration status in recreationally active college-aged participants. **METHODS:** Participants (n=109; males=58, females=51; age 22.31±3.81 years) were asked to self-evaluate perceived hydration status on a 1-10 scale two times. The first was upon arrival to the lab (i.e., pre-) and the second after looking at a specimen cup of their mid-stream urine sample (i.e., post-). From the same urine sample the researcher (professional) measured USG (PEN-Wrestling digital refractometer; Atago, Bellevue WA) and determined UC using the 1-8 color scale commonly used to assess hydration status (National Athletic Trainers' Association Position Statement: Fluid Replacement for Athletes). All data were analyzed using SPSS (v23). **RESULTS:** A Pearson Product Moment Correlation showed a positive relationship between USG and; perceived self-evaluated pre- [$r(109)=.218$, $p<.05$] and perceived self-evaluated post-urine sample [$r(109)=.332$, $p<.001$]. A positive relationship between USG and post-urine sample self-evaluation UC identification [$r(109)=.311$, $p<.01$] and professional analysis of UC and self-evaluated UC [$r(109)=.701$, $p<0.001$]. Additionally, a paired sample t test showed a significant decrease (i.e., more dehydrated) from pre- vs. post-urine sample self-evaluated perceived hydration status [$t(108)=-2.3$, $p<0.05$]. **CONCLUSIONS:** Participants' were somewhat able to perceive their own hydration status (i.e., pre-urine sample), as linked to measured USG. However, based upon post-urine sample self-evaluation and analysis of UC, perceived hydration status improved (i.e., more dehydrated) after looking at their urine sample. These findings strongly support that seeing urine color is a much better indicator of hydration status compared to self-perception.

Poster 13

ENERGY EXPENDITURE CHANGES ACROSS A COLLEGIATE WOMEN'S BASKETBALL TEAM

Zanders BR¹, Harty P¹, Stecker R¹, Rodriguez A¹, Currier B^{*1}, Smith C¹ and Kerksick CM¹, FACSM. ¹Exercise and Performance Nutrition Laboratory, School of Health Sciences, Lindenwood University, St. Charles, MO USA

PURPOSE: To assess changes in energy expenditure across an entire NCAA division II collegiate women's basketball season. **METHODS:** Female collegiate basketball players (19.8 ± 1.3 years, 173.9 ± 13.6 cm, 74.6 ± 9.1 kg, 27.1 ± 3.2 % fat, 53.9 ± 6.4 mL/kg/min, n=13) were outfitted on five different occasions throughout the entire competitive season with heart rate activity monitors for four consecutive days to determine activity energy expenditure. The five monitoring periods were broken down in phases that correlated to the time of the season. Phase I: beginning of the season, phase II: early-middle of season, phase III: mid-late, phase IV: end of the competitive season. Dietary logs, sleep, soreness and recovery surveys were completed on the days when the monitors were worn. At the beginning and end of the competitive season, resting metabolic rate assessments were completed while body composition was determined using DEXA. Data was analyzed using one-factor repeated measures ANOVA. **RESULTS:** Resting metabolic rate was determined to be $1,829 \pm 185$ kcals/day (32.7 ± 3.7 kcal/kg/day). Estimated total daily energy expenditure tended to change throughout the season ($p = 0.059$). Post-hoc analysis revealed that phase III, energy expenditure levels tended to be less than phase I ($3,064 \pm 361$ vs. $2,850 \pm 159$, $p = 0.087$) and phase IV being less than phase I ($2,674 \pm 216$, $p = 0.001$). Mean changes in activity energy expenditure decreased non-significantly across the season ($p = 0.17$). Physical activity levels (TDEE / REE) also tended to change over the season ($p = 0.060$). Phase III (1.62 ± 0.15 , $p = 0.077$) tended to be less while phase IV (1.52 ± 0.17 , $p = 0.001$) was significantly less than phase I (1.75 ± 0.27). Energy balance experienced statistically non-significant reductions ($p = 0.64$), with phase IV energy balance tending to be less ($p = 0.074$) than phase I. Energy availability (kJ/kg FFM) was calculated and did not change statistically ($p = 0.81$). The average number of meals (3.7 ± 0.7 , $p = 0.025$) changed while the average hours of sleep non-significantly increased (6.5 ± 0.41 , $p = 0.16$). **CONCLUSIONS:** Across the season, energy expenditure levels in NCAA division II female collegiate basketball players decreased, but this was countered with a reduction in energy intake. Consequently, energy balance levels were positive at all points, but also decreased as the season progressed as did energy availability levels. Finally, female collegiate basketball players averaged 6.5 hours of sleep and 3.7 meals per day, both representing areas of improvement from a health and recovery perspective.

Masters Abstracts

Poster 14

PERCEIVED PHYSICAL LITERACY IN COLLEGE AGED STUDENTS

Victor Andrews¹, ¹Kansas State University, Manhattan, Kansas

Individuals who fail to acquire adequate competencies in regards to physical activity may develop barriers that limit physical activity later in life. Physical literacy(PL) is a descriptive that is used to measure one's competence, confidence, and motivation in regards to physical activity. The goal of PL is to have all youth to be considered competent by 12 years of age in order to allow them to be physical active throughout their life-course. **PURPOSE:** To investigate the perceived physical literacy levels of college aged students. **METHODS:** The Physical Literacy Self-Assessment was distributed to college aged students to measure perceived PL through e-mail and social media. **RESULTS:** 94 college students responded (21 ± 3 years, 38 male, 56 female). SPSS vs 24 was used for frequency analysis and two independent samples t-test. Perceived PL scores were then divided into 4 graded categories: Very Low, Low, High, Very High. 49% of respondents were placed in the "Very High" category, 47% of respondents were categorized at "High", 3% of respondents were categorized as "Low", 1% of responded was categorized as "Very Low". The results indicate that there is no statistically significant difference between the PL score for male and females (t= 1.881, p= 0.63). **CONCLUSION:** The goal of PL is to have all individuals meet the criteria to be considered "Very High". Individuals graded into categories other than "Very High" are considered in need of further education and support until they are perceived to be competent in all elements of PL. PL is still a new concept within the USA. Further research is needed to better understand PL within the USA population and relationships with current physical education levels in college aged populations.

PARENTAL PERCEPTION OF SELF-ESTEEM AND COMPETENCE CHANGES IN THEIR CHILDREN WHILE LEARNING TO BICYCLE

Kelly D. Barns¹, Jason D. Waggener¹, Anthony J. Faber¹, and Thomas J. Pujol¹, FACSM.
¹Southeast Missouri State University, Cape Girardeau, MO.

iCan Bike, a subdivision of the iCan Shine organization, started in 2007 and serves a variety of individuals with special needs and/or disabilities, with the primary objective of learning to ride a typical two wheeled bicycle. Each iCan Bike camp consists of one 75-minute session per day, totaling 375 minutes for the week. To date very few, if any, studies have assessed the effects learning a new skill (i.e., learning a bicycle) have on self-esteem or competency, especially in individuals with special needs and/or disabilities. **PURPOSE:** To assess the perceived self-esteem and competency scores measured by the Rosenberg Self-Esteem Scale (RSES) and Pearlin Mastery Scale (PMS) of participants in an iCan Bike camp. The recorded results were the guardian's perceived perception of their participant's self-esteem and competency. **METHODS:** Questionnaires containing the RSES (10 questions) and PMS (7 questions) were completed by the guardian of participants in the iCan Bike camp. A paired samples t test was conducted to compare pre- vs. post-camp scores using Statistical Package for the Social Sciences (SPSS) (v23.0, Armonk, NY: IBM Corp.) **RESULTS:** The iCan Bike sample consisted of 156 participants with 64.7% (n=101) males and 35.3% (n=55) females. A total of 63.5% of participants learned to independently ride a bicycle. Based upon questionnaire responses (i.e., guardians), a significant increase was observed for the PMS from pre- (23.04±4.56) vs. post-camp (25.25±4.83) [$t(155) = -4.41, p < .001$]. However, the RSES mean pre- (30.35±4.03) vs. post-camp (30.92±3.09) was not significantly different. **CONCLUSIONS:** Guardians indicated a significant increase in their participant's competence but not self-esteem after attending an iCan Bike camp. The success rate of this study (63.5%) was lower than the iCan Bike's advertised rate of 80%, which may be a primary reason for the lack of change in self-esteem scores. Overall, more research needs to be completed on individuals with special needs and/or disabilities and the effects of gaining new skills on self-esteem and competency.

Poster 16

EFFECTS OF CYCLING CADENCE ON PHYSIOLOGICAL VARIABLES

Daniel J. Blackwood¹; John W. Farrell¹; Rebecca D. Larson¹

¹University of Oklahoma, Norman, OK

The rate of muscular contractions during cycling can be modified by increasing or decreasing pedaling revolutions. The manipulation of cadence (revolutions per minute, rpm) may lead to alterations in the physiological response at a given work rate and cadence selection may affect overall cycling performance. **PURPOSE:** Therefore, the purpose of this study was to assess the relationships between cadence selection and accumulated energy (AE), time to exhaustion (TTE), and VO₂peak. **METHODS:** 20 individuals age 18-45 participated in the current study. Participants were grouped into two groups, cycling experience (CE=8) and no cycling experience (NCE=12). Subjects in both groups each completed 3 graded exercise tests (GXT) at 3 different cadences over the course of 3 visits. The initial GXT (visit 1) was at a self-selected (SS) cadence and the subsequent 2 visits consisted of a GXT at either a Low (55-70 rpm) or High (100-115 rpm) cadence. The cadence for visits 2 and 3 were randomly selected. A two-way repeated measures ANOVA was used to determine if significant differences existed between groups as well as between cadences. **RESULTS:** A significant group by condition interaction was present. Significant group differences existed for AE (CE 196.17 ± 57.95 vs. NCE 100.67 ± 37.00), TTE (CE 1368.67 ± 207.37 vs. NCE 990.11 ± 174.64) and VO₂peak (CE 47.71 ± 8.21 vs. NCE 36.16 ± 4.87). Significant differences were observed between the High and Low cadences for AE (High 135.53 ± 66.14 vs Low 156.28 ± 66.97) and TTE (High 1123.42 ± 285.69 vs. Low 1218.167 ± 254.32). Significant differences were also observed between the High and SS cadences for AE (High 135.53 ± 66.14 vs SS 153.4 ± 66.68) and TTE (High 1123.42 ± 285.69 vs. SS 1196.58 ± 254.28). No significant differences were observed between the Low and SS cadences for AE and TTE (p>0.05). No significant differences were observed at the different cadences for VO₂peak. **Conclusion:** Cadence selection appears to have a significant effect on TTE and AE, but no effect on VO₂peak. These findings suggest that selecting a higher cadence will lead to earlier development of fatigue and volitional exhaustion compared to that of lower cadences. This indicates that improper cadence selection could have a detrimental effect on cycling performance and should be individualized.

Poster 17

EVALUATION OF IN-SCHOOL PHYSICAL ACTIVITY DURING RECESS, P.E., AND ACADEMICALLY-RELATED MOVEMENT ACTIVITIES

Robert Booker¹, Riley Galloway¹, Trisha Doering¹

¹Department of Kinesiology, Missouri State University, Springfield, MO

PURPOSE: Schools provide ample opportunity to address physical inactivity patterns, which have been established as a crucial risk factor of health concerns. As evidence of associations between morbidity and progression of childhood obesity to adult obesity expand along with the inverse relationship between school year and physical activity (PA), an urgency remains for schools to implement mandatory policies addressing the accumulated moderate-to-vigorous physical (MVPA) activity per week. The purpose of this study was to quantify in-school PA levels among elementary students during recess, P.E., and academically-related movement activities (ARMA) and determine if state-wide recommended levels of MVPA are being met. **METHODS:** Third through sixth grade students (N=71) volunteered to participate in the evaluation of PA levels during recess, P.E., and ARMA. Accelerometry data was obtained to quantify the amount of PA being achieved. Data collection commenced at the beginning of and ceased at the end of each school day for five consecutive days. Accelerometers were used to provide tri-axial movement analysis according to 5-second 'epochs' to quantify levels of PA. A one-way ANOVA was employed to examine PA between grades. **RESULTS:** Of the weekly recess minutes offered (332.39 ± 24.49), 31% was classified as MVPA while 35.44% was completely sedentary. Combining sedentary and light accounted for 68.09% of the total time. Of the weekly P.E. minutes offered (72.75 ± 31.29), 23.83% was classified as MVPA while 41.44% was completely sedentary. Combining sedentary and light accounted for 72.8% of the total time. Of the weekly ARMA minutes offered (14.93 ± 17.65), 15% was classified as MVPA while 35.37% was completely sedentary. Combining sedentary and light accounted for 63.5% of the total time. Percentages significantly increased across each category after omitting 6th grade due to inflation. **CONCLUSION:** Overall, students failed to achieve recommended amounts of MVPA during school hours and recommended amounts of P.E. of at least moderate intensity although there was opportunity to achieve both. This research provides insight to PA levels and potential health status of children during school hours, which confirms the need for enhanced attention to meeting state standards of school-related PA.

Poster 18

THE EFFECT OF A SIT-STAND WORKSTATION ON BLOOD LIPID PROFILES

Kyler Daugherty^{#1}, Larissa Boyd^{#1}, & Jacilyn Olson^{#1} ¹University of Central Oklahoma, Edmond, Oklahoma

Prolonged sitting at the workplace coupled with a sedentary lifestyle is an equation for increased risk of cardiovascular disease. The use of sit-stand workstations (STS) not only decreases the amount of time that is spent sitting at the workplace, but previous research has found meaningful improvements in blood lipid profiles following workstation interventions. **PURPOSE:** The purpose of this study was to observe changes in blood lipid profiles over a six-month time frame between a group that utilized STS and a non-workstation group. **METHODS:** Faculty and staff from the University of Central Oklahoma were recruited via e-mail. Participants were randomly assigned to a treatment (TG) or control group (CG). Participants in the TG were given a workstation following baseline testing and expected to stand approximately 2 hours per day at their desk. Blood glucose (BG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and Total Cholesterol (TC), were measured by a lipid analyzer at baseline and six months. Participants were required to fast for at least 12 hours prior to completing a blood lipid profile. Researchers used a lancet to collect 5 μ L of blood for analysis. A repeated-measures ANOVA was utilized to analyze differences between and within groups. **RESULTS:** The BG of both groups significantly ($p = .00$) decreased from baseline testing (CG = 91.29 ± 2.40 mg/dL⁻¹ to 86.071 ± 2.36 mg/dL⁻¹; TG = 97.39 ± 2.12 mg/dL⁻¹ to 90.11 ± 2.08 mg/dL⁻¹). The HDL and LDL did not significantly change between or within the two groups. The TC was also found to have no significant difference, but a meaningful improvement was observed between the two groups with the TG decreasing in TC from 189.82 ± 7.48 mg/dL⁻¹ to 185.06 ± 7.64 mg/dL⁻¹ ($d = .13$), and the CG increasing in TC from 177.36 ± 8.24 mg/dL⁻¹ to 181.29 ± 8.42 mg/dL⁻¹ ($d = .18$). **CONCLUSION:** This study found that a six-month intervention using a STS significantly decreases BG in both the TG and CG from baseline. Also, meaningful improvements were observed in TC in the TG.

Poster 19

PERCEIVED EXERTION AS A MONITORING STRATEGY DURING CROSSFIT®: USEFUL OR USELESS?

Nicholas B. Drake^{†1}, Derek A. Crawford^{†1}, and Michael J. Carper^{†1}. ¹Applied Physiology Laboratory. Department of Health, Human Performance and Recreation, Pittsburg State University, Pittsburg, KS, USA

Facing harsh criticism of potentially causing injury, CrossFit® (CF) may benefit from the inclusion of appropriate monitoring strategies. Rate of perceived exertion (RPE) is a monitoring strategy commonly used for both quantification and modulation of workloads during exercise and sports training. Despite its widespread use in CF investigations, the validity of RPE as a monitoring strategy in CF training remains untested. **PURPOSE:** To assess the utility of RPE as a monitoring strategy during CF training. **METHODS:** Six males (height, 182.8±8.6 cm; weight, 84.3±12.4 kg; and age, 25.0±5.4 years) participated in three weeks (5 days/week) of CF training. Following each training session, RPE, workout duration (Dura), and immediate post-exercise heart rate (THR) were recorded. Dura and THR were used to quantify the workload (WL) for each session. Means for RPE, Dura, THR, and WL were calculated for week 1 and week 3 of training. The Profile of Mood States (POMS) questionnaire was administered pre-week 1 and post-week 3. A repeated measures MANOVA with Tukey post-hoc adjustments was used to assess differences in training session variables between weeks 1 and 3. Linear regression of mean RPE and WL were compared between weeks 1 and 3. POMS outcomes were compared between weeks 1 and 3 using magnitude-based inferences of each subscales' minimum clinically important difference (MCID). **RESULTS:** There are increases in mean session THR (%Δ=+6.2%; F=1.19, *p*=0.324), Dura (%Δ=+17.3%; F=4.55, *p*=0.086), and WL (%Δ=+23.9%; F=8.14, *p*=0.036) from week 1 to 3. In contrast, mean session RPE decreased (%Δ=-4.9%; F=1.42, *p*=0.183) between these weeks. RPE was a better predictor of WL during week 3 compared to week 1 (week 1: *r*=0.364, *R*²=13.5%, *p*=0.048; week 3: *r*=0.614, *R*²=37.7%, *p*=0.001; Δ*R*²=+24.2%). For POMS outcomes, total mood disturbance (2.69 foldΔ; 87.6% likelihood), tension-anxiety (3.13 foldΔ; 90.7% likelihood), and vigor-activity (3.25 foldΔ; 94.9% likelihood) subscales most likely highlight meaningful negative changes. **CONCLUSION:** RPE has the potential to be a useful monitoring strategy for incorporation into CF training. Questions still remain as to whether or not RPE is sensitive enough to detect early signs of overreaching during CF training.

**This project was funded through an Independent Faculty Research Award provided by the Council for Research and Discovery at Pittsburg State University.*

Poster 20

THE EFFECTS OF CADENCE ON TORQUE ASYMMETRY

Ashley N. Fox¹, John W. Farrell III¹, Rebecca D. Larson¹

¹University of Oklahoma, Norman, OK

Bilateral asymmetry in peak crank torque has been observed in both cyclist and non-cyclist. However, the relationship between exercise intensity, cadence rates, and bilateral asymmetry is not fully understood. Additionally, a need for establishment of normative values for bilateral asymmetry still exists. **PURPOSE:** Therefore, the purpose of the current study was to examine bilateral asymmetry in peak crank torque during 3 graded exercise tests (GXT) at 3 different cadence zones. **METHODS:** 20 subjects, 10 females and 10 males, participated in this study. Subjects were classified to either a cycling trained group (CT, n=8) or no-cycling trained group (NCT, n=12). Over the course of 3 visits subjects, both groups performed 3 GXTs at 3 different cadence zones. Cadence zones consisted of Self-Selected (SS), High (100 to 115 rpm), and Low (55 to 70 rpm). The first GXT was performed at the SS cadence with the remaining two being performed either at High or Low cadence, which was randomly assigned. Peak crank torque was measured using a dual power meter on cycle ergometer, and calculated as the absolute difference between the lower limbs. Peak crank torque was assessed at the initial stage (IS), the stage in which the onset of blood lactate accumulation (OBLA) occurred, and the stage in which peak power output (PPO) was achieved for the 3 different GXTs. Two way repeated measures ANOVA was used to determine if significant differences between groups and conditions existed. **RESULTS:** Significant group by condition interactions were present. No significant condition differences were present between all cadences zones (IS, OBLA, or PPO) ($P > 0.05$). No significant group differences were present at IS or OBLA. However, significant group differences were present at PPO (CT 7.69 ± 5.61 vs. NCT 4.42 ± 4.47). **CONCLUSION:** The findings of the current study suggest that torque is unaffected by cadence selection at IS, OBLA, and PPO. The current study also showed that significant differences did not exist between the CE and NCE in torque asymmetry until PPO. This finding suggests that at PPO cyclist may be altering their kinematics in order to maintain desired cadences or power outputs more so than non-cyclists. Therefore, further research is needed to understand the potential effect on cycling performance.

Poster 21

NEUROMUSCULAR RECRUITMENT AND VERTICAL JUMP PERFORMANCE FOLLOWING ANTAGONIST STRETCHING

Daniel A. Garten¹, Adam Bruenger¹, Thomas Lowder¹, Michael Gallagher¹

¹University of Central Arkansas, Conway, Arkansas

Limited research has investigated the effects of stretching of antagonist musculature on agonist muscle activity and functional performance. The results of two previous studies have shown that stretching of the hip flexors prior to countermovement jumps increased average jump height.

PURPOSE: The primary purpose of this study was to determine if hip flexor stretching prior to countermovement jumps causes acute changes in antagonist and agonist muscle activity. The second purpose was to evaluate the relationship between muscle activity and the changes in vertical jump height and power.

METHODS: Nine physically trained participants (Male; age: 23yr \pm 4yr; ht: 69.4in \pm 3.6in; wt: 78.2kg \pm 12.5kg; body fat%: 8.7% \pm 1.9%) performed testing in a single session. Participants performed three vertical jumps on a force platform prior to and after performing three 1-minute stretches of the iliopsoas per leg. Muscle activity of the dominant leg gluteus maximus, biceps femoris, iliopsoas, and erector spinae were recorded via electromyography and normalized to maximal voluntary isometric contraction muscle activity.

RESULTS: Results showed no significant change ($p > 0.05$) in muscle activity of the erector spinae group, gluteus maximus, biceps femoris, or iliopsoas. Significant increases were found in passive hip extension range of motion ($t(8) = -2.53$, $p = 0.03$), and significant decreases found in subsequent jump height ($t(8) = 2.73$, $p = 0.02$), peak power ($t(8) = 2.73$, $p = 0.02$), and mean power ($t(8) = 2.72$, $p = 0.02$). **CONCLUSION:** These results contradict previous research and indicate that further research needs to be performed to determine the effects of antagonist stretching prior to power performance. These contradictions in results can potentially be attributed to small sample size, differences in stretch duration compared to previous studies, or timing of pre- and post-testing.

THE ACUTE EFFECTS OF A MULTI-INGREDIENT PRE-WORKOUT SUPPLEMENT ON EXERCISE PERFORMANCE

Patrick S. Harty^{#1}, Jacob L. Erickson^{#2}, Michael Cameron^{#2}, Clayton Camic^{#2}, Scott Doberstein^{#2}, Joel Luedke^{#2}, & Andrew R. Jagim^{#1} ¹Lindenwood University, St. Charles, Missouri; ²University of Wisconsin–La Crosse, La Crosse, Wisconsin

The use of dietary supplements to enhance exercise performance has long been a popular strategy for active individuals. A newer category of dietary supplements referred to as multi-ingredient pre-workout supplements (MIPS) has gained increased attention among active individuals. While several studies support the use of MIPS to increase exercise performance in males, limited data exist regarding effectiveness in female populations. **PURPOSE:** The purpose of this study was to examine the acute effects of ingesting a MIPS on exercise responses and subjective measures of energy, focus, and fatigue in recreationally active females. **METHODS:** Fifteen recreationally-active females (Mean \pm SD, 21.5 \pm 1.7 yrs, 165.3 \pm 5.3 cm, 61.6 \pm 5.1 kg) participated in a randomized, double-blind, placebo controlled study. Subjects completed baseline and two experimental testing sessions in a cross-over design. After height and weight were assessed, subjects completed a 5-repetition maximum (5RM) test for the bench press (BP) and back squat (BS) exercises during baseline testing. During the experimental testing sessions, participants were randomly assigned to ingest either 1 serving of a MIPS or placebo and performed a repetition to failure test for both BS and BP at 85% 5RM and were later assessed for differences in anaerobic power using a counter-movement vertical jump test and a sprint test on a force-treadmill. Subjective measurements of energy, focus, and fatigue were assessed using a 5-point Likert scale. Paired samples t-tests were used to assess differences in muscular endurance and anaerobic capacity between each condition. A repeated measures analysis of variance (ANOVA) was used to assess differences in Likert scale scores between treatment conditions. **RESULTS:** A significant main effect for condition was observed for BP repetitions ($p=0.037$) and total work during the treadmill sprint ($p=0.039$) following ingestion of the MIPS. A significant condition x time interaction for focus was observed with the supplement treatment exhibiting improved focus at 80-minutes post ingestion ($p=0.046$). **CONCLUSION:** It appears that acute MIPS consumption improves upper body muscular endurance and anaerobic capacity while improving subjective feelings of focus following high-intensity exercise in recreationally active females.

**Funding for this project was provided by the International Society of Sports Nutrition and MusclePharmTM as part of an unrestricted education grant.*

CHANGES IN BODY COMPOSITION FOLLOWING A 6-MONTH STANDING WORKSTATION INTERVENTION

Monisha Maharjan¹, Cara Daniels^{*1}, Jacilyn Olson¹, Melissa Powers¹, & Larissa Boyd¹;
¹University of Central Oklahoma Edmond, OK.

INTRODUCTION: Prolonged sedentary behavior may be associated with mortality and other health risks. Research shows a correlation between adiposity and uninterrupted sedentary time, supporting efforts for increasing workplace activity. **PURPOSE:** The purpose of this research was to determine if body composition changed following a 6 month intervention using sit-to-stand workstations (STS). **METHODS:** Participants included staff and faculty members of the University of Central Oklahoma. Participants ($N=31$) were randomly assigned to a treatment group (TG; $n=16$) and a control group (CG; $n=15$). TG participants given a STS and instructed to stand at least 2 hours during work hours. Dual-energy X-ray Absorptiometry (DXA) was used to determine total mass (lbs.), fat mass (lbs.), lean mass (lbs.), body fat (%), and bone mineral density (g/cm^2) at baseline and 6 months of the intervention. A repeated-measures ANOVA was used to analyze data. **RESULTS:** No significant differences between or within groups were found ($p>.05$). Effect sizes were minimal. Small improvements occurred in most variables in the TG, but only for lean mass in the CG. Descriptive statistics can be found in Table 1. **CONCLUSIONS:** Standing for at least 2 h/d may provide modest benefits to body composition. Future research should examine changes over a longer treatment time and more closely monitor actual time spent using the STS.

Table 1

Descriptive Statistics for Body Composition Variables

Variable	Treatment Group		Control Group	
	M	SD	M	SD
BF Pre (%)	35.24	7.03	36.54	7.68
BF Post (%)	34.93	7.83	36.62	7.61
BMD Pre (g/cm^2)	1.16	0.10	1.16	0.09
BMD Post (g/cm^2)	1.16	0.11	1.16	0.09
TM Pre (lbs.)	161.93	28.92	148.40	40.23
TM Post (lbs.)	161.76	28.49	155.19	31.88
FM Pre (lbs.)	55.40	16.08	56.22	20.99
FM Post (lbs.)	54.99	17.27	56.48	20.70
LM Pre (lbs.)	100.74	19.82	93.14	15.05
LM Post (lbs.)	101.00	19.57	93.22	14.61

BF% = body fat percentage; BMD = bone mineral density; TM = total mass; FM = fat mass; LM = lean mass; % = percentage; lbs. = pounds; g/cm^2 = grams per centimeter

**This project was funded by the University of Central Oklahoma, Research and Sponsored Programs office*

DETERMINING THE APPROPRIATE TIMING OF ADMINISTRATION OF COMPUTERIZED NEUROCOGNITIVE TESTING FOLLOWING MAXIMAL EXERTION- PRELIMINARY ANALYSIS

Samantha A. Mohler^{†1}, Cory L. Butts^{†1}, Zachary J. Sebghati^{*1}, Katie L. Stephenson-Brown^{†1}, & R. J. Elbin^{†1} ¹Department of Health, Human Performance and Recreation, University of Arkansas, Fayetteville, Arkansas

Computerized neurocognitive testing (CNT) is part of the recommended multi-faceted approach to sport-related concussion assessment. Prior research suggests maximal exertion negatively affects CNT scores. However, this relationship is not clearly defined in the literature nor has a suggested clinical wait time following maximal exertion been proposed. **PURPOSE:** To identify the appropriate timing of the administration of CNT following maximal exertion in healthy college-aged students. **METHODS:** A prospective, random cross-over, repeated measures design was used for this study. Eighteen participants ($M = 22.4$, $SD = \pm 2.3$ years) were administered CNT once a week for four consecutive weeks. During three visits, a VO_2 max treadmill test was completed before CNT. Following the VO_2 max testing participants were prescribed no rest, 10 minutes, or 20 minutes rest before taking CNT. One of the four visits served as a control (baseline) as individuals did not complete a VO_2 max test before taking CNT. All visits were randomly ordered to reduce practice effects. **RESULTS:** The results from a series of one-way repeated measures ANOVAs revealed significant within-group differences for visual memory ($Wilks \lambda = .45$, $F [3,15] = 6.01$, $p = .007$, $\eta^2 = .55$) and total symptoms ($Wilks \lambda = .58$, $F [3,15] = 3.60$, $p = .04$, $\eta^2 = .42$). Post-hoc comparisons revealed that immediate ($p = .05$), ten minutes ($p = .01$) and twenty minutes ($p = .002$) were all significantly worse than baseline scores. In addition, there were significantly higher symptom scores at immediate ($p = .004$), ten minutes ($p = .015$), and twenty minutes ($p = .016$) compared to baseline symptoms. There were no significant differences for verbal memory ($Wilks \lambda = .74$, $F [3,15] = 1.8$, $p = .199$, $\eta^2 = .26$), visual motor memory ($Wilks \lambda = .70$, $F [3,15] = 6.01$, $p = .136$, $\eta^2 = .30$), and reaction time ($Wilks \lambda = .79$, $F [3,15] = 1.3$, $p = .310$, $\eta^2 = .21$). **CONCLUSION:** Sports medicine professionals should wait at least 20 minutes before administering CNT following maximal exertion.

BIOELECTRICAL IMPEDANCE ANALYSIS VERSUS SKINFOLD CALIPERS BODY FAT PERCENTAGE MEASUREMENTS IN AMERICAN FOOTBALL PLAYERS

Michelle L. Otte¹, Lucas K. Shrum¹, Kelly D. Barns¹, Kurt W. McDowell¹, Chelsey R. Gegg¹, Ryan D. Napoli¹, Ryan J. Johnson¹, Jeremy T. Barnes¹, Thomas J. Pujol¹, FACSM, & Jason D. Wagganer¹, ¹*Southeast Missouri State University, Cape Girardeau, MO*

Bioelectrical impedance (BIA) and skinfold (SKF) measurements are commonly used to assess body fat percentage (BF%) (i.e., fat vs. lean mass). There are many different quick and cost efficient methods of estimating body fat via BIA (i.e., hand held equipment such as the OMRON Fat Loss Monitor HBF-306C) or SKF (i.e., Lange SKF calipers). BIA and SKF calipers report similar accuracy ranges (i.e., $\pm 3.5\%$) if used by a trained technician and the subject has a normal hydration status. Other factors that can affect the accuracy of SKF assessments include lack of training and poor technique, incorrect site location, and/or an overly obese or extremely lean participant. Both methods of measurement are used in various field settings such as collegiate athletics due to reliability, ease of use, and affordability. **PURPOSE:** The purpose of this study was to compare college-aged American Football players BF% as measured by the OMRON Fat Loss Monitor HBF-306C compared to that estimated using Lange SKF calipers and the Jackson and Pollock formula. **METHODS:** Each participant (male=88; age=19.78 \pm 1.30 yrs; wt=105.82 \pm 22.82 kg; ht=183.67 \pm 6.20 cm) had BF% assessed, in the early morning, via the OMRON Fat Loss Monitor HBF-306C (in the Athletic mode) in the standing position. Body density was calculated based on measurements taken at three sites (i.e., chest, abdominal and thigh) using Lange SKF calipers. Then an ethnically appropriate equation was used to convert body density to body fat percent. **RESULTS:** A paired samples t-test indicated the OMRON Fat Loss Monitor HBF-306C BF% (18.50 \pm 6.50) was significantly higher than the Lange SKF calipers BF% (16.81 \pm 6.74) (p=.001). **CONCLUSIONS:** While the two modes of BF% were significantly different, they were within the manufacturer stated accuracy range. While the exact reason for this difference is unknown, some factors could be related to the bilateral (i.e., both hands) measurement via BIA compared to the unilateral (i.e., right side only) measurements taken by the calipers, hydration status, extremely high or low body fat, and/or human error. More research needs to be done comparing different modes of BF% amongst an athletic population.

THE EFFECT OF A COMMERCIALIZED ENERGY SYSTEM TRAINING PROGRAM ON COLLEGIATE DIVISION I BASKETBALL PLAYERS

Seth M. Sievers¹, Ryan J. Johnson¹, & Jason D. Wagganer¹. ¹Southeast Missouri State University, Cape Girardeau, MO.

Heart rate (HR) has been shown to be a valid and reliable indicator of exercise intensity. Using heart rate to dictate exercise intensity and recovery time is a very popular means of training. It provides a more direct method of determining level of exertion than other widely used methods such as running speed or Rate of Perceived Exertion (RPE). While there are many ways to accurately measure heart rate, wearable monitoring systems (i.e., Polar®, Fitbit®, etc.) are easy to use and affordable. **PURPOSE:** The purpose of this study was to examine the effectiveness of utilizing heart rate training zones (as opposed to simply using body weight, speed, or RPE) to determine optimal recovery/exercise intervals in female collegiate basketball players during the off-season. **METHODS:** Division I women's basketball players (n=10, Wt: 71±16.67 kg) performed a twelve week off-season (i.e., summer) conditioning program, focused on repeated short-distance sprints, with HR assessed by a commercialized wearable monitoring system (Polar Team 2 System). Sprint training consisted of ten minutes of twenty meter down-and-back sprints, with repeats conducted every time HR dropped to 130 beats per minute (bpm). Body weight, vertical jump, power output, standing long jump, ten-yard sprint, four jump score (including ground time) were assessed before and after the program. **RESULTS:** Paired sample t tests showed a significant increase in body weight (2.59±18.37 kg, p=0.011), vertical jump (2.21±4.98 cm, p =0.039), power output (229.86±305.77 W, p=0.005), four jump test power factor (0.28±0.16, p=0.01), and decrease in four jump ground time (-0.052±0.26 sec, p=0.013). **CONCLUSION:** The short-distance repeated sprint conditioning program was shown to increase strength and power outcome measures in collegiate female basketball players using a target recovery HR (i.e., 130 bpm) supported by past research. Though previous research on college-aged athletes is scarce and relatively inconclusive, this study yielded promising results for the future of heart rate training zone training as a means of improving strength and power outcomes.

THE EFFECT OF VARIABLE RESISTANCE TRAINING USING WEIGHTED CHAINS ON MUSCULAR STRENGTH AND POWER

Richard A. Stecker^{#1}, Charles R. Smith^{#1}, Patrick S. Harty^{#1}, Brad T. Gieske^{#1},
Jonathan N. Mike^{#1}, Scott Richmond^{#1}, Chad M. Kerksick^{#1} ¹Lindenwood University, St.
Charles, MO

Strength and power are crucial attributes for nearly all types of athletes. Resistance training using chain-loaded barbells has become popular as a means to increase strength and power production. **PURPOSE:** The purpose of this study is to compare the effects of weighted-chains on muscular strength and muscular power during the bench press exercise. **METHODS:** A total of 11 recreationally active men (26.8 ± 5.9 yrs, 181.9 ± 5.1 cm, 91.4 ± 11.7 kg, 20.6 ± 3.4 % fat) completed 4-weeks of training using one of three styles of bench press (BP) (60% 1RM, n = 3; 40% 1RM, n = 4; or weighted chains, n = 4) to assess changes in strength, power, and velocity. To measure power participants were tethered anteriorly to a linear position transducer and performed five explosive push-ups while maintaining hand contact to the floor. Upon completion of the first testing session each study participant was matched according to baseline strength levels to one of the three training groups. Participants completed a supervised 3-day per week resistance training program for 4-weeks with each training session separated by at least 48 hours. The training groups performed 5 sets of 5 reps BP with one of the following intensities: 60% of 1RM, 40% of 1RM, or 60% of 1RM with 20% from weighted chains. All participants completed the same accessory lifts. **RESULTS:** A two-way mixed factorial ANOVA (group x time) with repeated measures on time revealed no significant differences from baseline at two and four weeks of training for BP 1RM ($p = 0.87, 0.82$; respectively), average push-up power ($p = 0.19, 0.21$; respectively), peak push-up power ($p = 0.55, 0.12$; respectively) and peak push-up velocity ($p = 0.39, 0.21$; respectively). A significant difference was found in average push-up velocity among all groups ($p = 0.008$), with a Tukey Post-Hoc finding significance between the weighted-chains and 60% 1RM group within 2-weeks ($p = 0.006$). **CONCLUSION:** Over a 4-week period, no differences in upper-body strength and power were observed between the groups. Average push-up velocity was shown to increase after 2-weeks of training using weighted chains in comparison to training at 60% 1RM. Further research is needed with a larger sample size, longer training protocol, and other intensity and volume prescriptions to better determine the impact of resistance training using this approach.

COMPARISON OF MUSCLE ACTIVITY DURING A RING MUSCLE UP AND BAR MUSCLE UP

Cody W. Walker¹, Adam Brunger¹, Steven Tucker¹, Rock Lee¹

¹University of Central Arkansas, Conway, Arkansas

The muscle up (MU) is a variation of a common gymnastics movement that combines a pull up and a dip. It has been used in high intensity body weight programs as a way to train pulling and pushing movements and can be performed on a bar or a set of rings. The difference in muscle activation (MA) between a bar muscle up (BMU) and ring muscle up (RMU) is not clear.

PURPOSE: Therefore, the purpose of this study was to compare the MA of selected shoulder and arm muscles during a BMU and RMU. **METHODS:** Ten active males (27.6 ± 7.9 years) volunteered to participate in this study. Participants performed 5 repetitions of each style of MU (BMU and RMU) in randomized order. Muscle activation of the upper trapezius (UT) and lower trapezius (LT), serratus anterior (SA), pectoralis major (PM), latissimus dorsi (LD), triceps brachii (TB), biceps brachii (BB), and forearm flexors (FF) was measured using electromyography (EMG). The EMG signals were normalized to the subject's maximal voluntary isometric contraction. A 2 X 2 ANOVA (ring vs bar, pull phase vs push phase) with repeated measures was performed for each muscle. Least significant differences (LSD) post hoc were performed when a significant interaction effect occurred. **RESULTS:** The RMU significantly ($p < 0.005$) elicited more muscle activation in the UT ($p=0.007$), BB ($p=0.001$), and FF ($p=0.001$) during the pull phase. The RMU also significantly ($p < 0.005$) elicited more muscle activation in the TB ($p=0.025$) and BB ($p=0.001$) during the push phase. **CONCLUSION:** Although the RMU and BMU are performed in similar patterns, there are different muscle activations. The RMU creates a more unstable environment that increases muscle activation of smaller muscle groups such as the biceps brachii and forearm flexors. From these results, the best training progress would be to teach and train the BMU after larger muscle groups are trained through pulling exercises and then teach and train the RMU after the smaller muscle groups are trained.

PHYSICAL ACTIVITY BETWEEN GENDERS IN ELEMENTARY SCHOOL STUDENTS: ARE THERE DIFFERENCES?

Kaytlyn Wells¹, Riley Galloway¹, Robert Booker¹

¹Department of Kinesiology, Missouri State University, Springfield, MO

As the obesity epidemic has continued to rise in recent years, research shows that children are not incorporating physical activity (PA) into their daily regimen. Ridgers et al., (2006) demonstrated that children obtain 5-40% of the total recommended daily moderate-to-vigorous physical activity (MVPA) during structured physical education, while the rest is to come from recess or outside of school. Due to children being at school for a significant amount of their total waking hours, it is imperative for them to engage in PA during school hours. **PURPOSE:** The purpose of this study was to quantify the amount of time elementary children engaged in MVPA during PA opportunities such as recess and P.E. Of special interest is to determine any gender differences during the PA offered during school hours. **METHODS:** Fourth grade students from eight public schools wore accelerometers during school hours for one week while each classroom teacher logged information relative to the PA setting and duration of opportunity. **RESULTS:** PA data was collected using an accelerometer for fourth grade students (N=149) from various elementary schools. MVPA per school day was measured and gender comparison resulted in boys achieving significantly more minutes of MVPA as compared to girls (22.7 ± 9.5 and 17.1 ± 6.6 minutes, respectively) ($p < 0.001$). Similar results were found for MVPA per week between boys and girls (101.0 ± 38.9 and 79.7 ± 31.9 minutes, respectively) ($p < 0.001$). Girls spent a significantly higher portion of the week engaging in sedentary activities as compared to boys (1465.1 ± 204.1 and 1375.5 ± 236.9 minutes, respectively) ($p = 0.014$). Of the average 29.5 minutes of recess per day, girls accumulated significantly more sedentary minutes (12.9 ± 9.4 , $p = 0.009$). Of the total weekly 133.1 ± 58.8 minutes of recess, only 28.6 ± 19.1 minutes were MVPA (21.5%). **CONCLUSION:** Regardless of gender differences, overall levels of MVPA did not meet the recommended 30 minutes per day. These results provide further evidence to the rise of obesity and further support the need of PA state mandates to promote healthier lifestyles with increased levels of PA. In addition to the failure of meeting the recommended levels, there were significant differences between genders. This furthers the need to provide structured PA during school hours.

Poster 30

THE EFFECT OF ACUTE SUPPLEMENTATION OF SODIUM BICARBONATE AND CAFFEINE ON ANAEROBIC RUNNING PERFORMANCE

Kyle Witherbee¹, Brad Gieske¹, Mary Altepete¹, Scott Richmond¹, & Chad Kerksick¹,
FACSM, ¹Lindenwood University, Saint Charles, Missouri

Sodium bicarbonate (NaHCO₃) and caffeine are two sport supplements that have been widely explored for their possible ergogenic effects during exercise. Few studies have looked at sodium bicarbonate and caffeine supplementation together and no studies have included a running test.

PURPOSE: The purpose of this study was to examine the effects of sodium bicarbonate and caffeine, both independent and synergistically, on a field-based intermittent sprint test.

METHODS: Three men and ten women, of recreational fitness level, completed this research study. All participants were administered a medical history checklist, informed consent, and scored above the 70th percentile, according to ACSM guidelines, for gender and age-matched VO_{2max} norms. On four separate visits, participants consumed a masked supplement solution in randomized order consisting of either 300mg/kg NaHCO₃, 5mg/kg caffeine, 300mg/kg NaHCO₃ + 5mg/kg caffeine, or placebo (NaCl added to mimic taste) and then performed a 150-yard shuttle test 1-hr post-ingestion. The test consisted of participants running to markers spaced every five yards, from 0 to 25, in ascending order and returning to the start line each time. This sequence is done for 30 seconds, followed by 30 seconds of rest for six bouts. Distance covered was recorded from the last 5-yard marker crossed in 30 seconds. Variables of RPE, blood lactate, and heart rate were measured after the 2nd, 4th, and 6th run. **RESULTS:** A one-way ANOVA showed no differences in total distance, RPE, or heart rate ($p > .05$) between all groups. Blood lactate showed an improvement with NaHCO₃ supplement compared to the placebo condition after the second and final running bouts ($p = .002$, $p = .020$ respectively). A difference was also present in blood lactate with NaHCO₃ + caffeine versus the placebo condition after the second running bout ($p = .018$). **CONCLUSION:** Based on the preliminary findings of this study, ingestion of sodium bicarbonate, caffeine, and sodium bicarbonate with caffeine had no effect on athletic performance measured by an anaerobic running test.

SUPPLEMENTATION WITH A MULTI-INGREDIENT PRE-WORKOUT SUPPLEMENT DOES NOT ENHANCE BODY COMPOSITION OR METABOLISM IN FEMALES

Hannah Zabriskie¹, Clayton L. Camic², Carl Foster³, Anna Nelson³, Brooke Zajac³, Kaela Hoecherl³, Joel Luedke³, Jacob Erickson⁴, Andrew R. Jagim¹ ¹Lindenwood University, St. Charles, MO ²Northern Illinois University, DeKalb, IL ³University of Wisconsin – La Crosse, La Crosse, WI ⁴Mayo Clinic Health Systems, Onalaska, WI

Multiple ingredient pre-workout supplements (MIPS) are purported to induce acute metabolic and physiological changes that may result in favorable body composition improvements, such as lower body fat percentage and increased lean body mass, over time. However, little research has been conducted on the effects and safety of MIPS in female populations. **PURPOSE:** The purpose of the study was to examine the long-term effects of MIPS ingestion on metabolism, body composition, and clinical health measures in recreationally active females. **METHODS:** Nineteen recreationally active females completed the randomized, double blind, placebo control study. Resting heart rate and blood pressure, blood lipids, body composition, and resting metabolic rate were recorded before and after a seven-week resistance training program while consuming either a MIPS or placebo daily. **RESULTS:** No significant group by time interactions were observed for body fat percentage ($p=0.66$), fat free mass ($p=0.87$), fat mass ($p=0.63$), or resting metabolic rate ($p=0.52$). No differences were detected in clinical health measures such as resting heart rate ($p=0.43$), systolic blood pressure ($p=0.18$), diastolic blood pressure ($p=0.20$), or blood lipid panel measurements ($p>0.05$). **CONCLUSION:** This study suggests that consumption of MIPS does not enhance body composition or metabolic rate in recreationally active females. There is no evidence that daily MIPS use over several weeks results in adverse health effects.

**This study was co-funded through an unrestricted education grant from the International Society of Sports Nutrition and MusclePharm Corporation (Denver, CO).*

Ph.D. Abstracts

Poster 32

COMBINED EFFECTS OF HYPOHYDRATION, MUSCLE DAMAGE, AND EXERTIONAL HYPERTHERMIA ON BIOMARKERS OF ACUTE KIDNEY INJURY

Cory L. Butts¹, Aaron R. Caldwell¹, Samantha A. Mohler¹, Matthew S. Ganio¹, FACSM, Nicholas P. Greene¹, Stavros A. Kavouras¹, FACSM, Brendon P. McDermott¹, FACSM;
¹University of Arkansas, Fayetteville, AR

Dehydration, exertional hyperthermia, and muscle damage commonly occur in athletic, military, and occupational settings, yet, their combined effects on biomarkers of acute kidney injury are not well understood. **PURPOSE:** Investigate the combination of dehydration, muscle damage, and exercise in the heat on biomarkers of renal stress. **METHODS:** Six male participants (age 24±5 y, ht 1.79±0.05 m, body mass 74.9±6.3 kg, body fat 14.5±4.1%) completed two trials, one euhydrated (EU; fluid replacement ≤2% body mass loss) and one hypohydrated (HY; fluid restriction 24-h prior to and throughout exercise), separated by ~28 days. Trials consisted of muscle damaging unilateral eccentric knee flexion, 60 minutes of treadmill running (~60% VO₂max) in the heat (33 °C, 54% RH), and 30 minutes of passive recovery. Participants were provided a rehydration protocol in both trials and returned 24-h later for a follow-up visit. Data were analyzed using two-way repeated measures analysis of variance with Bonferroni corrected post-hoc tests. **RESULTS:** Urine osmolality when HY was greater pre- (HY 1045±102, EU 612±142 mOsm/kg; $P < 0.01$) and post-trial (HY 1007±105, EU 503±205 mOsm/kg; $P < 0.01$), but not 24-h post (HY 543±310, EU 545±404 mOsm/kg; $P = 0.98$). Serum osmolality was also different pre-trial (HY 301±5, EU 290±5 mOsm/kg; $P = 0.02$), but was similar 24-h post (HY 295±4, EU 293±3 mOsm/kg; $P = 0.25$). Isometric strength was reduced in both conditions immediately (mean $\Delta = -33.6 \pm 27.9$ N·m, $P = 0.03$) after eccentric exercise. Rectal temperature increased to a greater degree when HY (2.11±0.60 °C) compared to EU (1.65±0.44 °C; $P = 0.01$). Plasma neutrophil gelatinase-associated lipocalin (NGAL) increased independent of condition (pre- 59.9±7.3, post-exercise 77.6±12.0 ng/mL, $P < 0.01$), but was not different between trials ($P = 0.84$). However, percent changes from baseline in plasma NGAL were greater when HY (19.1±7.5%) compared to EU (6.1±11.2%), regardless of time ($P < 0.01$). **CONCLUSION:** Exercise in the heat with muscle damage increased renal strain when HY and resulted in greater changes in plasma NGAL, a biomarker of acute kidney injury. These preliminary findings suggest that improper fluid consumption prior to and during exercise may augment renal stress, yet the long-term consequences of these detriments require further investigation.

**Supported by funding from Central States ACSM Student Grant Award*

PROLONGED STANDING INCREASES LOWER PERIPHERAL ARTERIAL STIFFNESS INDEPENDENT OF WALKING BREAKS

Aaron R. Caldwell¹, Benjamin T. Harris^{*1}, Megan E. Rosa-Caldwell¹, Marcus Payne¹, Bryce Daniels¹, Kaitlin M. Gallagher¹, Matthew S. Ganio¹, FACSM. ¹University of Arkansas, Fayetteville, AR.

Prolonged sitting creates an atherogenic environment that causes reductions in arterial function. Standing desks have been promoted as a healthy alternative to sitting, but the cardiovascular benefits of standing desks have not been thoroughly investigated. Physical activity, such as taking walking breaks, increases shear stress, and thereby prevents sitting-induced reductions in arterial function. Therefore, walking breaks, even when compared to standing may provide cardiovascular benefits. **PURPOSE:** First, to observe changes in arterial stiffness, as assessed by pulse wave velocity (PWV), with a 2 hour bout of standing. Second, to determine if short, intermittent walking bouts provide a comparative advantage to standing alone. **METHODS:** 20 apparently healthy adults (BMI = 22.9 ± 3.2 kg/m²; Age = 21 ± 5 years old) stood for 2 consecutive hours while being assessed for heart rate (HR), mean arterial pressure (MAP), and central (C_{PWV}), upper peripheral (U_{PWV}), and lower peripheral (L_{PWV}) PWV before, during, and after the standing bout. Subjects participated in two trials in a randomized order. In one trial, the subjects stood at a standing desk immobile for 2 hours. In the other trial, subjects performed 5-minute walking breaks after every 25 minutes of standing for a total of two hours of standing with 4 walking breaks. A repeated measures ANOVA utilized for statistical analyses. **RESULTS:** There was no time by trial interaction for any measure of arterial stiffness ($p = 0.82$, $p = 0.21$, and $p = 0.15$; for C_{PWV}, U_{PWV}, and L_{PWV} respectively). However, from beginning to end of each trial L_{PWV} increased 85 ± 126 cm/s independent of trial (i.e., main effect of time; $p < 0.001$). There was a non-significant tendency for greater increases in L_{PWV} during the standing (120 ± 142 cm/s) versus the walking trial (50 ± 127 cm/s; $p = 0.15$). There were no differences regarding HR or MAP ($p > 0.05$) **CONCLUSION:** Standing for 2 hours leads to increases in peripheral arterial stiffness. Walking breaks during 2 hours of standing did not significantly attenuate these changes. However, the suggestive evidence ($p=0.15$) for walking breaks to improve L_{PWV} suggests that future studies should investigate longer duration trials and/or longer walking breaks that are applicable to occupational settings, such as assembly-line work.

**Supported by funding from Southwest Center for Occupational and Environmental Health NIOSH Pilot Project Research Training Program*

EFFECTS OF UNSTABLE LOAD TRAINING ON PERFORMANCE

Nicholas Cullen-Carroll¹, Rebecca D. Larson¹, and Jason Campbell¹

¹University of Oklahoma, Norman, Oklahoma

Unstable load training combines traditional resistance exercises with an irregular load apparatus and can include equipment such as bands, chains, plates, dumbbells, kettlebells, and oscillating barbells. Unstable loads have demonstrated an increase in EMG compared with traditional loads. Due to the nature of sport being a variety of open and closed chain activities with arrays of stable and unstable loading parameters, this style of training may result in changes in performance. **PURPOSE:** To determine the practical contributions of unstable load training toward the performance of the vertical jump and the back squat in college-aged players.

METHODS: Eight male collegiate rugby athletes were randomly assigned to either a traditional back squat training group (TBS, n=4) or unstable back squat training group (UBS, n=4). Pre and post-testing included a 3-repetition maximum (3RM) in the back squat and 3 maximum countermovement jumps using dual force plates. All subjects performed progressive overload training for 9 resistance training sessions which were separated by 48 hours of recovery. Each training session included a 15-minute dynamic and movement specific warm-up followed by a prescribed intensity ranging from 72.5-92.5 %, a prescribed number of repetitions between 3-5, and a prescribed number of sets from 3-5. Participants were given 2-4 minutes of rest between sets. Repeated measure analysis of variance (ANOVA) was used to determine the training effects. A-priori significance was set at $p < 0.05$. **RESULTS:** Between group comparisons for 3RM back squat revealed no statistical difference ($p > 0.05$). Within groups comparisons elicited statistical improvements for UBS (pre: 146.5 ± 38.91 kg; post: 160.5 ± 35.82 kg; $p = 0.013$) and TBS (pre: 140 ± 20.41 kg; post: 150 ± 17.07 ; $p = 0.047$). Between and within group comparisons for concentric peak force, peak power, flight time, and countermovement jump height conveyed no statistical difference ($p > 0.05$). **CONCLUSIONS:** Unstable load training in the back squat seems to be an effective alternative for increasing back squat performance similar to using traditional loads in male collegiate rugby players and may help satisfy exercise variety in program design. More research is warranted utilizing a larger battery of performance test and a greater number of subjects.

EXPLORING YOUTH SPORT PARENTS' PERCEPTIONS OF LONG-TERM EFFECTS OF CONCUSSION AND CHRONIC TRAUMATIC ENCEPHALOPATHY

Nathan R. D'Amico¹, R.J. Elbin¹, A. P. Kontos² ¹University of Arkansas, Fayetteville, AR; ²University of Pittsburgh Medical Center, Pittsburgh, PA

PURPOSE: To explore youth sport parent perceptions of the long-term effects of sport-related concussion (SRC) and chronic traumatic encephalopathy (CTE). **METHODS:** A 22-item online survey was emailed to a convenience sample 5,366 youth sport parents in Colorado, Alaska, and Arkansas. The survey items consisted of demographic questions and other items assessing parents' perceptions of the long-term effects of SRC and concerns about CTE. **RESULTS:** There were 692 responses from youth sport parents ($M = 41$ years, $SD = 9.19$ years), yielding a response rate of 13% (692/5,366). The average age of the parents' child was 11 years ($SD = 3.52$ years), and 42% (686/1637) of the children played in youth soccer, followed by basketball (15%, 241/1637) and baseball (8%, 122/1637). Ninety-seven percent (667/689) of youth sport parents believe that there are long-term effects of SRC, 77% (528/686) have talked with their child about SRC, 77% (533/690) indicated concern that their child will sustain a SRC during youth sport participation, 46% (318/689) claim to know about CTE, and 39% (267/690) have considered not allowing their child to participate in youths sport due to concerns regarding long-term effects of SRC or CTE. In addition, 72% (487/679) of youth sport parents believe that tackle football has the highest risk for SRC, followed by soccer (31%, 208/679), ice hockey (26%, 176/679), lacrosse (23%, 158/679), and basketball (17%, 117/679). Forty-four percent (300/692) of youth sport parents get most of their information about SRC from the media and 57% (391/692) heard about CTE from the media. Among the children of the parents surveyed, 7% (47/688) have considered not playing youth sports due to concerns regarding long-term effects of SRC or CTE, 9% (63/686) have expressed concerns regarding long-term effects of SRC or CTE, 3% (18/688) have quit or been forced to quit playing youth sports due to SRC, and 1% (9/690) have stopped playing youth sports due to fear regarding long-term effects of SRC or CTE. **CONCLUSION:** The majority of youth sport parents believe that there are long-term effects of SRC and are concerned about CTE. There is a need to disseminate more information on the benefits and risks of youth sport participation as well as emerging treatment and rehabilitation options for SRC.

EVALUATION OF ASYMMETRY IN POWER PRODUCTION DURING CYCLING

John W. Farrell III¹, Daniel J. Blackwood¹, Brain A. Pribble¹, & Rebecca D. Larson¹

¹University of Oklahoma, Norman, OK

Levels of asymmetry have been previously reported during cycling for both force and crank torque. However, these measurements are not currently being used as performance indicators in cycling, leading to a need for the evaluation of asymmetry in power production. **Purpose:** Therefore, the purpose of the current study was to evaluate the presence of asymmetry in power production during cycling. The effects of exercise intensity and cadence selection on asymmetry were also evaluated. **Methods:** 21 subjects, ages 18-45, participated in the study. Subjects were assigned to either a Cycling Experience (CE, n=9) or No Cycling Experience (NCE, n=12) group. All subjects performed three graded exercise test (GXT) using a cycle ergometer on three separate visits at three different cadence zones. Cadence zones consisted of: Self Selected (SS), High (100 to 115 rpm), and Low (55 to 70 rpm). Subjects performed the first GXT at the SS cadence while the cadence for the second and third was randomly selected. Power output for each lower limb was assessed using a dual power meter. Power output asymmetry was calculated as the absolute difference between limbs at the initial stage (IS), the stage in which the onset of blood lactate accumulation (OBLA) occurred, and at the stage in which peak power output (PPO) occurred. Two way repeated measures ANOVA was used to determine if significant differences existed between groups and conditions. **Results:** Significant group by condition interactions were present. There were no significant differences between cadence selection at IS, OBLA, or PPO ($P > 0.05$). However, significant differences were observed between groups at IS (CE 8.70 ± 15.1 vs. NCE 2.87 ± 2.62), OBLA (CE 9.73 ± 14.3 vs NCE 4.31 ± 3.20), and PPO (CE 12.21 ± 14.4 vs. NCE 5.48 ± 3.57). **Conclusion:** Cadence selection was not significantly related to the level of asymmetry for power output during cycling, but significant differences did exist between the groups for power asymmetry. Cycling performance is closely related to the ability to produce higher power outputs in an efficient manner, so levels of asymmetry in power production could lead to performance decrements. Further research is needed to understand this relationship as well as potential training interventions to reduce levels of asymmetry observed during cycling.

EFFECTS OF 100% ORANGE JUICE CONSUMPTION ON HYDRATION MEASURES FOLLOWING EXERCISE IN THE HEAT

Melani R. Kelly¹, Dawn M. Emerson¹, Evan J. Landes¹, Evan R. Barnes^{*1}, Philip M. Gallagher¹ ¹University of Kansas, Lawrence, Kansas

INTRODUCTION: In comparison to commonly consumed carbohydrate electrolyte beverages (CEB), 100% orange juice (OJ) has a similar carbohydrate content, less sodium, and an increased amount of potassium, vitamins, and minerals, making it a viable option for hydration.

PURPOSE: To investigate 100% OJ, water (W), and CEB on hydration measures following exercise in the heat. **METHODS:** A randomized controlled, single blind design determined the effects of OJ, W, and a CEB on urine specific gravity (Usg), fluid volume (Fvol), urine volume (Uvol), heart rate (HR), blood pressure (BP), and core temperature (Tc). Participants (n = 26, 20 male, 6 female, age: 22.1 ± 3.3 years; weight: 72.9 ± 10.0 kg; height: 174.3 ± 7.9 cm; VO₂max: 48.8 ± 7.3 mL/kg/min) consumed 237 mL of assigned beverage on 5 consecutive days following 80 minutes of cycling at 70% of their VO₂max in a hot, humid environment ($30.1 \pm 0.2^\circ\text{C}$, $51.6 \pm 4.0\%$ relative humidity). Dependent measures were taken pre-, during, post-, and 1 hour post-cycling (1hr). **RESULTS:** There were no significant differences between conditions at any time point (pre-, during, or post-cycling) for Usg, Fvol, Uvol, HR, BP, or Tc. Further, there were no significant differences in dependent measures pre-cycling between conditions for Days 4-8. All participants began exercise euhydrated (Usg = 1.011 ± 0.00) and did not significantly change to post-cycling but significantly increased from post- to 1hr post-cycling (1.009 ± 0.01 to 1.013 ± 0.00 , $P < .001$). Overall, participants excreted significantly less urine during 1hr rest compared to during exercise (778.0 ± 283.3 mL to 476.3 ± 228.3 mL, $P < .001$). Overall, HR significantly increased pre- to post-cycling (76.0 ± 12.2 bpm to 141.3 ± 9.7 bpm, $P < .001$), and significantly decreased from post-cycling to 1hr (76.1 ± 7.8 bpm, $P < .001$). Likewise, systolic BP significantly increased pre- to post-cycling (120.9 ± 8.4 mmHg to 131.7 ± 8.8 mmHg, $P < .001$) and significantly decreased from post-cycling to 1hr (118.3 ± 8.1 mmHg, $P < .001$). Tc significantly increased pre- to post-cycling ($36.7 \pm 0.3^\circ\text{C}$ to $37.6 \pm 0.3^\circ\text{C}$, $P < .001$) and decreased during 1hr ($36.9 \pm 0.2^\circ\text{C}$ $P < .001$). **CONCLUSION:** Consuming 8 ounces of 100% OJ on multiple days after intense exercise in the heat maintained hydration, cardiovascular, and core temperature levels similar to using W or CEB.

**This study was funded by a grant from the Florida Department of Citrus (#STE0075600).*

EFFECTS OF TOPICAL CARNOSINE-BASED GEL ON LACTATE PRODUCTION DURING A MAXIMAL RESISTIVE SPRINT PERFORMANCE

Eric M. Mosier¹, Andrew C. Fry¹, Chaise M. Seasholtz¹, Thomas Bachert^{*1}.

¹University of Kansas, Lawrence, KS.

PURPOSES: Carnosine is a dipeptide molecule synthesized from beta-alanine and L-histidine that has an imidazole ring that is able to buffer protons and may be able to attenuate blood lactate accumulation. This study determined the effects of a transdermal carnosine-based gel (gel) on blood lactate (HLA) concentrations and exercise performance variables during resistive sprinting.

METHODS: Healthy and recreationally active men (n=8; $\bar{X} \pm SD$; age=21.5±1.7 yrs, height=1.82±0.13 m, weight=82.6±11.4 kg) and women (n=10; age=19.8±1.0 yrs, height=1.71±0.05 m, weight=62.6±7.4 kg) performed on two separate visits, a 25 sec maximal sprint on a Woodway Force 3.0 treadmill (Waukesha, WI) against a resistive force equal to 18% body weight. On each visit, subjects applied 10 mL of either Placebo or Gel on the thighs, shanks, gluteal, torso, and arm musculature, with each condition performed in a random order. Each subject provided blood samples at Baseline (arrival), Pre (60 min after applying Gel or Placebo), and Post (5 min post sprint). Samples were analyzed with a Lactate Plus blood lactate analyzer. Two-way repeated measures ANOVAs (sex x condition) for each performance measure, and 3-way repeated measures ANOVAs (sex x condition x time) were performed on HLa concentrations. Post-hoc analyses used paired samples *t*-tests with Bonferroni corrections ($p \leq 0.05$). **RESULTS:** Results are shown in the table. The performance measures indicated no differences between condition (Gel vs. Placebo) except for work for females ($p=0.46$). As expected, HLa was significantly greater at Post compared to Baseline and Pre ($p < 0.01$) for both males and females. **CONCLUSION:** These results indicate that, for the most part, resistive sprint performance and the accompanying HLa concentrations for both males and females was unaffected by use of the transdermal carnosine-based gel.

Effects of LactiGo Gel on Sprint Performance and Lactate Production

Sex Condition	Females Gel	Females Placebo	Males Gel	Males Placebo
Distance (m)	74.91 ± 8.11	74.62 ± 5.90	96.86 ± 7.86	96.02 ± 7.85
Velocity (m/s)	Mean	2.98 ± 0.32	2.97 ± 0.24	3.85 ± 0.32†
	Peak	3.74 ± 0.39	3.71 ± 0.30	4.78 ± 0.39†
Power (W)	Mean	392.57 ± 90.06	315.30 ± 131.68	723.25 ± 136.58†
	Peak	1393.66 ± 681.86	1407.42 ± 422.74	2408.28 ± 369.67†
Force (N)	Mean	169.32 ± 28.69	167.02 ± 28.87	223.16 ± 28.98†
	Peak	264.31 ± 58.52	368.04 ± 66.85	530.06 ± 50.78†
Work (J)	27818.14 ± 6018.80*	29090.31 ± 46.36.44*	48176.54 ± 9168.20†	48084.77 ± 8858.56†
Lactate (Hla)	Baseline	1.42 ± 0.62	1.51 ± 0.32	1.44 ± 0.37
	Pre	2.39 ± 2.55	1.83 ± 0.54	1.53 ± 0.36
	Post	13.33 ± 3.11‡	12.45 ± 2.96‡	14.10 ± 2.39‡

Females = 10, Males = 8. *Denotes statistically significant Gel vs. Placebo ($p < 0.05$) †Denotes statistically significant between sex ($p < 0.05$). ‡Denotes statistically significant from Baseline and Pre ($p < 0.05$).

RELIABILITY OF ULTRASONOGRAPHY IN EXAMING PENNATION ANGLE OF THE BICEPS FEMORIS AT DIFFERENT JOINT POSITIONS

Lauren E. Pacinelli¹, William C. Hawkins², Ryan M. Thiele¹, John P. Vardiman¹

¹Kansas State University, Manhattan, KS ²University of Southern Indiana, Evansville, IN

PURPOSE: Determine the reliability of ultrasonography (US) measurements of pennation angle (PA) of the biceps femoris (BF) at different knee joint positions. Joint positions included 90°, mid- (Mid_{ROM}), and end-range of motion (ROM) (End_{ROM}). **METHODS:** Seventeen healthy, college aged females (mean±SD: age=21.12±0.78; mass=61.34kg±18.55kg; height=165.41cm±7.66cm) volunteered for this investigation on 2 non-consecutive days at the same time of day (±2h). During each visit, participants were placed in a supine position, with the right hip and knee joints at 90° of flexion against a horizontal support, with restraining straps across the left limb. Full ROM was assessed with manual goniometry, starting from the initial 90° hip/knee joint angles and passively extending the lower limb to the point of patient self-reported End_{ROM}. US measurements were recorded at 90°, Mid_{ROM}, and the End_{ROM} joint positions. US images of the right BF were obtained utilizing a portable ultrasonography device with a linear-array probe. US settings were enhanced to improve image quality, including the gain (50dB), depth (8cm), and frequency (12MHz). All US images were scanned in a longitudinal position at 50% of the distance between the greater trochanter and the lateral joint line of the knee. PAs were measured from the muscle fascicles to the deep fascia of the muscle using a third party image analysis software. Reliability for PA calculations were determined using intraclass correlation coefficient (ICC, model 2,1) and standard error of measurement (SEM) also reported as a percentage (SEM%). Systematic variability was examined using separate one-way repeated measures analyses of variance (ANOVAs). **RESULTS:** The ANOVAs indicated no systematic variability in any of the dependent variables (P>0.05). The ICCs and SEM values expressed as a percentage of the mean ranged from 0.311-0.735 and 11.75-26.41% for PA measurements of the BF. **CONCLUSION:** These findings demonstrate that longitudinal ultrasonography may be consistent and a moderately reliable assessment technique for measuring PA in practical joint positions (90°) but not as the muscle fascicles become lengthened (Mid_{ROM} and End_{ROM}).

AUTOGRAPH AND PHYSICAL ACTIVITY IMPROVE FORCE RECOVERY FROM VOLUMETRIC MUSCLE LOSS

Richard A. Perry¹, Wesley S. Haynie¹, Katarina A. Bejarano¹, John T. Kim¹, Kevin Roberts¹, Jeffrey C. Wolchok¹, Nicholas P. Greene¹, & Tyrone A. Washington¹,

¹University of Arkansas, Fayetteville, Arkansas

Skeletal muscle has a great ability to regenerate from damage. Still, regenerative capacity can be exceeded with extreme tissue loss, also known as volumetric muscle loss (VML). Causes of VML include munition explosions and excision of tumors (i.e. sarcomas). Patients suffering from VML do not fully recover force output in the affected limb. Adequate interventions have not been established to fully reverse this loss of function. Recent studies show that replacement tissue (i.e. autograph) into the VML defect site plus external growth stimuli (i.e. physical activity) show promise for optimizing force recovery in VML. **PURPOSE:** The purpose of this study is to evaluate the role of an autograph and physical activity on force output in a rat model of VML. **METHODS:** Fifteen Sprague-Dawley rats underwent VML. VML was caused by removing a defect equaling 20% of the tibialis anterior (TA) weight from the middle portion of the left TA. The defect was sutured back in to the defect site (autograph) shortly after removal. The right limb acted as a contralateral control. One week post-VML, the TAs were harvested from seven rats. The remaining eight rats were divided into cage or wheel activity groups. For two weeks post-VML, wheels were locked for both weeks (cage activity) or unlocked for the second week (wheel activity). Two weeks post-VML, TAs were harvested. All animals underwent electrophysiology immediately before harvest. Tissue was processed for histology to analyze cross-sectional area (CSA). Student's t-test was conducted on all variables. **RESULTS:** At one week post-VML, force output in the left TA ($1.1 \text{ N/kg} \pm .08 \text{ SE}$) was 48% of the right TA ($2.3 \text{ N/kg} \pm .12 \text{ SE}$) ($p < 0.05$). With the addition of activity during the second week post-VML, force output in the left TA ($1.8 \text{ N/kg} \pm .17 \text{ SE}$) was 67% of the right TA ($2.7 \text{ N/kg} \pm .09 \text{ SE}$) ($p < 0.05$). After two weeks of normal cage activity post-VML, force output in the left TA ($1.1 \text{ N/kg} \pm .14 \text{ SE}$) was 41% of the right TA ($2.7 \text{ N/kg} \pm .15 \text{ SE}$) ($p < 0.05$). One week post-VML, CSA ($684 \mu\text{m}^2 \pm 42 \text{ SE}$) was 66% of CSA two weeks post-VML ($1015 \mu\text{m}^2 \pm 147 \text{ SE}$) ($p < 0.05$). CSA is similar between both groups two weeks post-VML. **CONCLUSION:** Wheel activity increases force output compared to cage activity following VML despite hypertrophy occurring in both groups. Therefore, hypertrophy is not the sole factor of increased force output two weeks post-VML.

**This study was funded by NIH R15AR064481.*

Poster 41

AN EVALUATION OF THE FOOT TAPPING TEST (FTT) IN A HEALTHY POPULATION

Brian A. Pribble¹, Daniel J. Larson¹, Christopher D. Black¹, FACSM, Daniel J. Blackwood¹, Jacob Rookard^{*1} and Rebecca D. Larson¹ ¹University of Oklahoma, Norman, Oklahoma

Simple in nature, the foot tapping test (FTT) has potential as an objective measure of upper motor function. Despite this, the reliability of the FTT has not been well identified. Furthermore, it is uncertain as to how to best measure the FTT as number of foot taps may vary upon counting methods. In order to make the FTT more clinically relevant, more research must be done on the FTT in healthy individuals in order to determine if it is a reliable measure of foot tapping ability.

PURPOSE: The purpose of the study was to investigate reliability measures of the FTT in a healthy population using a variety of different measurement and counting methods. By identifying the reliability of the different measurement methods we hope to be able to make recommendations for future FTT research. **METHODS:** 20 healthy individuals, ages of 18-31, completed a series of foot tapping trials over 4 visits. While seated, subjects tapped their foot repeatedly for 10 seconds while researchers counted the number of foot taps. The starting foot was randomized for each visit and tested twice with the shoes ON and twice with shoes OFF (giving 8 trials per visit * 4 visits = 32 trials per subject). The number of foot taps was determined for each trial with visual inspection, video playback (slowed and normal speed), and with the use of a force plate. The mean values of the FTT trials were compared across days, dominant vs. non-dominant foot, the shoes ON/OFF conditions, and with the different counting methods. **RESULTS:** Significant differences were found in foot tapping rates in the shoes ON (mean: 54.3 taps) vs shoes OFF (mean: 53.4 taps) and dominant (mean: 53.2 taps) vs. non-dominant (mean: 51.1 taps) foot analyses ($p < 0.05$). Furthermore it was found that a significant difference in the mean number of foot taps existed between visit 1 (mean: 51.2 taps) and visits 2, 3, and 4 (mean: 54.3, 53.5, and 46.7 taps respectively) ($p > 0.05$). It was found that the FTT exhibited high test-retest reliability (Pearson $r > 0.80$) and high Cronbach's alpha (alpha > 0.80) across the live, slowed video counts, and force plate measurements for both the shoes ON and shoes OFF trials. **CONCLUSION:** It was found that the FTT exhibits a high level of reliability across the live, slowed video, and force plate measures with both the shoes ON and shoes OFF. Given the observed reliability, the use of force plate with the FTT offers an attractive alternative to live counting or video playback methods.

DIFFERENCE IN PHYSICAL ACTIVITY BETWEEN CHILDREN WITHOUT SIBLINGS AND WITH SIBLINGS

Chelsea L. Smith¹, Emily Guseman², Laura Hubbs-Tait³, Jennifer Graef¹, Sandra Arnold¹, Allen Knehans¹, & Susan B. Sisson¹, FACSM ¹University of Oklahoma Health Sciences Center, ²Ohio University, ³Oklahoma State University

Children without siblings, singletons, have higher rates of obesity than children with siblings, non-singletons. Physical activity, such as increased moderate-to-vigorous physical activity (MVPA) and decreased sedentary behavior, can curb excess weight gain early in life.

PURPOSE: The purpose of this study is to examine the differences in physical activity and sedentary behavior between singleton and non-singleton children. **METHODS:** Mothers of singleton children ages 5.0-7.9 years old and mothers of non-singleton children ages 5.0-7.9 years old with a sibling between the ages of 2.0-4.9 years old in their primary household were recruited. Height, weight, and waist circumference (WC) of child were objectively measured. Mothers reported demographic characteristics of the child and self, and completed a questionnaire on their physical activity. Children wore an accelerometer at the ankle for at least 5 full days while parents recorded daily activities and time spent in away from home care (such as child care or kindergarten). Body mass index (BMI) was calculated, and BMI and WC percentiles were calculated for age and sex. MVPA and sedentary behavior per hour were calculated using accelerometer cut points and total wear time. **RESULTS:** 40 mother-child dyads (8 singletons and 32 non-singletons) participated. On average mothers were 34.7 years old, employed full time (62%), married (80%), and the child's biological mothers (97%); while children were 6.16 years old and predominantly white (75%). Singletons had a higher BMI percentile (74.9 ± 19.2) and waist circumference percentile (73.2 ± 19.8) compared to non-singletons (52.9 ± 28.6 , $p=0.02$; 52.8 ± 21.3 , $p<0.01$). In individual models, singletons did not differ in time away from home care ($p=0.60$) or in their mother's average MET minutes per week compared to non-singleton children ($p=0.90$). After adjusting for child BMI percentile and month of wear, singletons spent 3.03 less minutes per hour in MVPA ($p<0.01$) and 3.98 more minutes per hour in sedentary behavior compared to non-singletons ($p=0.01$). **CONCLUSION:** In this sample, singletons had a higher BMI percentile and were less active compared to non-singletons. Investigation into differences in singleton/non-singleton families, including family health behaviors, may support understanding of the mechanism.

THE INFLUENCE OF ACTIVITY TRACKERS ON PHYSICAL ACTIVITY, CARDIORESPIRATORY ENDURANCE, BODY COMPOSITION, AND EXERCISE MOTIVATION

Michael Smith¹, Melissa Powers^{1,2}, Larissa Boyd^{1,2}, & Thomas Hancock^{1,2} ¹University of Oklahoma, Norman, Oklahoma; ²University of Central Oklahoma, Edmond, Oklahoma

PURPOSE: The purpose of this research was to examine the influence of activity trackers on physical activity (PA), cardiorespiratory endurance (CRE), body fat percentage (BF%), and exercise motivation. **METHODS:** Forty-eight healthy volunteer participants ages 18-72 who did not achieve more than 3000 metabolic equivalent of task minutes (METmin) per week of physical activity (PA) were recruited to participate in a 12-week walking intervention. Participants were given the International Physical Activity Questionnaire (IPAQ), exercise motivation inventory (EMI-2) survey, tested for anthropometric measures, and tested for CRE at baseline and final testing. Participants were divided into an activity tracker group and a control group. **RESULTS:** Thirty-four participants (female = 29, male = 5) completed the full 12-week study. Analyses revealed no significant differences between the treatment and control groups for PA, CRE, BF%, or motivation from baseline to final testing. There were significant improvements in PA measured by the IPAQ for both groups from baseline ($M = 1042.71$ METmin, $SD = 882.57$) to final testing ($M = 3499.35$ METmin, $SD = 2931.34$), $F_{(2, 64)} = 17.374$, $p = .000$; however, step counts did not improve for either group from baseline to final testing. Mean difference in step counts were 1,897 steps and 1,614 steps for the testing and control groups respectively. There were significant improvements in CRE for both groups from baseline to final testing (Mean difference = $2.24 \text{ ml O}_2/\text{kg} \cdot \text{min}^{-1}$), $F_{(1, 29)} = 13.016$, $p = .001$. **CONCLUSIONS:** Analyses revealed that the walking program may have been effective for improving PA and CRE, but that activity trackers did not provide any additional benefits. The conclusion is that activity trackers alone may not be an effective tool for the improvement of PA, CRE, BF%, or motivation.

**Funding for this research provided by the University of Central Oklahoma Research, Creative, and Scholarly Activities (RCSA) grant.*

Poster 44

BODY COMPOSITION AND MUSCULAR PERFORMANCE FOLLOWING 8-WEEKS OF RESISTANCE-TRAINING AND PROTEIN SUPPLEMENTATION: PILOT STUDY

Matthew S. Stone^{1,2}, Michelle Gray^{1,2}, Austin Toups^{*1,2}, Jordan Rezac^{*1,2}, Dominique Blake^{*1,2}, Jake Blalock^{*1,2} ¹University of Arkansas – Exercise Science Research Center, Fayetteville, Arkansas; ²University of Arkansas – Office for Studies on Aging, Fayetteville, Arkansas

Increased protein intake in the diet decreases fat mass (FM) and increases lean mass (LM). Resistance training increases LM, as well as increases muscular strength. Together, protein supplementation and resistance exercise work synergistically when taken prior to or following exercise. **PURPOSE:** The purpose of this pilot study was to investigate the effects 8 weeks of protein supplementation and Autoregulatory Progressive Resistance Exercise (APRE) training had on measures of body composition and muscular performance. **METHODS:** Untrained males ($n = 22$; 42.1 ± 7.1 years) participated in this pilot study. LM and FM were measured via Dual Energy X-ray Absorptiometry (DEXA), while strength was measured utilizing one repetition maximum (1RM), and endurance measured using maximum repetitions completed (REPS) at 75% 1RM for the bench and leg press. Subjects were randomly placed into one of four groups: control (CON), protein (PO), APRE, or protein plus APRE (PAPRE). Subjects repeated testing for the DEXA, 1RM, and REPS every four weeks for 8 weeks. Both PO and PAPRE groups ingested 25g of supplemental protein twice daily. Subjects in the exercise groups completed a resistance training program, 3 days per week, for 8 weeks, or 24 training sessions. **RESULTS:** Repeated measures ANOVA indicated a significant group by time interaction for LM, bench press 1RM, and leg press 1RM ($p < .05$). LM increased by 4% ($+2.3 \pm 0.2\text{kg}$) in the PAPRE group, while increases in bench and leg press 1RM were 23% ($+14.7 \pm 0.7\text{kg}$) and 50% ($+132.1 \pm 13.9$ kg), respectively. There were no other group by time interactions for any of the variables assessed ($p > .05$). LM ($p < .05$), bench press 1RM ($p < .001$), and leg press 1RM ($p < .001$) indicated a significant time effect ($+0.93 \pm 0.02\text{kg}$, $+6.3 \pm 0.9\text{kg}$, and $+68.2 \pm 2.5\text{kg}$, respectively). Body fat percentage showed a trend for decreasing over time ($p = .05$), while FM was significantly reduced over the 8-week training period ($p < .05$). Bench press increased 20% ($+13.0 \pm 2.0\text{kg}$) from baseline for the APRE group, while leg press increased 13% ($+32.9 \pm 7.3\text{kg}$), 18% ($+43.1 \pm 8.5\text{kg}$), and 20% ($+64.6 \pm 28.8\text{kg}$) for CON, PO, and APRE groups, respectively. **CONCLUSION:** The synergistic effects of protein plus exercise can be seen with the PAPRE group out-performing all other groups given the significant increases in LM and muscular strength over 8 weeks.

EFFECTS OF INCREMENTAL RESISTANCE TRAINING PROGRAM ON QUALITY OF LIFE IN OLDER ADULTS

Majid M. Syed-Abdul^{1,2}, Chrissa L. McClellan³, Elizabeth J. Parks¹, Stephen D. Ball^{1,2}

¹Department of Nutrition and Exercise Physiology, ²MU-Extension, ³Department of Physical Medicine and Rehabilitation, School of Medicine, University of Missouri, Columbia, Missouri.

With aging, quality of life (QOL) can be negatively affected due to changes in body weight (BW), body fat (BF), lean mass (LM), bone mineral density (BMD), nerve health, and cardiovascular health - all of which may result in frailty, poor diet, lack of sleep quality, and declining memory. Incremental resistance training (iRT), in which resistance is increased progressively through successive training events, may help to improve QOL in adults. However, the effects of iRT in older adults have not been studied. **PURPOSE:** The purpose of this study was to test whether iRT will improve mental and physical characteristics that contribute to QOL in older adults. **METHODS:** Men and women (n=241) were screened over 2y to recruit 30 participants [age: 61.2 ± 4.2 y, BMI: 31.4 ± 5.2 kg/m²] who underwent an 8-wk program of iRT. A subset [n=10, 64.9 ± 6.0 y, BMI: 32.6 ± 5.7 kg/m²] also completed nerve conduction studies (NCS). Body composition, flexibility, balance, muscle strength, NCS, heart rate, blood pressure (BP), blood oxygen saturation (SpO₂), pulse, and blood concentrations of aldolase, glucose and lipids were measured pre- and post-iRT. Additionally, food intake, sleep (Pittsburg Sleep Quality Index), memory (Montreal Cognitive Assessment, MoCA, and the Self-Administered Gerocognitive Evaluation, SAGE-1) and QOL surveys were administered. **RESULTS:** Although not the primary goal of the program, participants lost BW (mean \pm SEM, 87.1 ± 4.0 to 86.0 ± 3.9 kg, $P=0.001$) and BF% (39.5 ± 1.3 to 38.6 ± 1.2 , $P=0.007$) and increased LM% (57.8 ± 1.2 to 58.4 ± 1.1 , $P=0.04$). All measurements of flexibility ($P<0.01$) and balance ($P=0.04$) improved significantly. Dominant-hand strength also tended to increase ($P=0.06$). Systolic BP (130 ± 3 to 125 ± 3 mmHg, $P=0.02$), blood glucose (117 ± 3 to 115 ± 3 , $P=0.05$), and aldolase (6.7 ± 0.4 to 4.3 ± 0.5 U/L, $P<0.001$) improved significantly. BMD, lipid biochemistries and NCS did not change. Additionally, sleep (6.9 ± 1.0 to 5.9 ± 0.9 , $P=0.03$), memory (MoCA: 26.3 ± 0.5 to 28.2 ± 0.4 , $P=0.001$; SAGE: 19.4 ± 0.4 to 20.3 ± 0.4 , $P=0.04$), and QOL (64.8 ± 1.7 to 69.9 ± 1.5 , $P=0.001$) scores improved significantly. **CONCLUSION:** An 8-wk iRT program improves factors that contribute to QOL in older adults. Such programs should be advocated to support mental and physical function in adults as they age.

*MU Extension and Department of Nutrition and Exercise Physiology

Professional Abstracts:

Poster 46

A COMPARISON BETWEEN BENCH PRESS AND OVERHEAD PRESS CONCENTRIC VELOCITY AND POWER

Christopher A. Fahs^{†1}, Lindy M. Rossow^{†1}, Chad M. Kerksick^{‡2} ¹Lindenwood University
Belleville, Belleville IL; ²Lindenwood University, St. Charles, MO

Measuring average concentric velocity (ACV) during barbell exercises can be used for autoregulation of training loads; however, research is needed to clarify the load-velocity relationship for different barbell exercises. Training age, frequency, relative strength and limb length may influence the ACV on an individual basis. **PURPOSE:** To compare the ACV of the bench press (BP) and overhead press (OHP) over a spectrum of relative loads and to determine the influence of training age, frequency, relative strength, and limb length on ACV for the BP and OHP. **METHODS:** BP and OHP one-repetition maximum (1RM) was assessed in fifty-one individuals (33 males, 18 females). Height, body mass, and humerus length were measured while training age and frequency were obtained via questionnaire. ACV was measured during warm-up sets and 1RM attempts using a TENDO Power and Speed Analyzer. Relative 1RM was calculated as the 1RM divided by body mass. Average power (AP) was calculated as the load (kg) multiplied by 9.81 m/s² multiplied by the ACV. Paired samples t-tests were used to determine differences in ACV and AP values between the BP and OHP. Pearson's product moment correlations were used to determine relationships between variables. **RESULTS:** ACV values were significantly ($p < 0.05$) greater for the OHP compared to the BP at all submaximal loads (35-95% 1RM) as well as the 1RM (0.24 ± 0.09 vs. 0.18 ± 0.07 m/s; $p < 0.01$). AP values were significantly greater ($p < 0.05$) for the BP compared to the OHP at loads $\leq 85\%$ 1RM but similar at 95% 1RM (228 ± 113 vs. 219 ± 118 watts; $p = 0.405$) and the 1RM (156 ± 81 vs. 146 ± 78 watts/kg; $p = 0.371$). Neither BP nor OHP 1RM ACV were significantly ($p > 0.05$) related to humerus length, training age, or training frequency. Only BP 1RM ACV was significantly related to relative strength ($r = -0.399$; $p = 0.003$). **CONCLUSION:** These data suggest velocity ranges used for autoregulating training loads should not be used interchangeably for the BP and OHP; ACV values for the OHP are greater than for BP at the same relative loads. Velocity ranges for the BP may need to be reduced as a trainee's relative strength increases.

VIDEO CONFERENCING BASED HEALTH COACHING IS EFFECTIVE FOR INDUCING WEIGHT LOSS AND IMPROVING METABOLIC MARKERS

Kelly E. Johnson^{†1,2}, Michelle K. Alencar^{†3}, Kathryn E. Coakley^{†4}, Damon L. Swift^{†5}, Christine M. Mermier^{†2}, Len Kravitz^{†2}, Fabiano T. Amorim^{†2}, and Ann L. Gibson^{†2}, FACSM. ¹Department of Physical Therapy, University of Saint Mary, Leavenworth, KS, ²Department of Health, Exercise, and Sports Sciences, University of New Mexico, Albuquerque NM, ³Department of Kinesiology, California State University Long Beach, Long Beach, CA, ⁴Department of Nutrition and Dietetics, University of New Mexico, Albuquerque NM, ⁵Department of Kinesiology, East Carolina University, Greenville, NC.

One way to improve patient lifestyle behavior change is using health coaching (HC). Most HC interventions have been delivered through telephone, web-based chatting, or face-to-face instruction. Despite the potentially positive impact of group-based HC by video conferencing (VC) on weight loss and metabolic health, individualized VC sessions have not been studied.

PURPOSE: To assess changes in physical activity, body mass, metabolic markers (fasting blood, insulin, glucose, hemoglobin A1c [HbA1c], and HOMA-IR), and mobile health (mHealth) device adherence in obese adults randomized to an in-person (IP) HC, VC HC, or control group (CG) using an individualized multidisciplinary (i.e. M.D., registered dietitian and exercise physiologist) health coaching approach. **METHODS:** Thirty adults (body mass index [BMI] ≥ 30 kg/m²) were randomly assigned to three groups (VC, IP, or CG, n=10 per group). Participants received a body weight scale and step-tracking accelerometer watch (Withings, Inc., Cambridge, MA, USA) to synch with their personal smartphones and apps. Participants assigned to VC and IP received weekly HC individualized based on data uploaded over the 12-week intervention. Steps/day and body weight loss were analyzed via analyses of covariance (ANCOVA).

Between-group ANOVAs analyzed post-intervention changes in weight (kg), blood glucose, insulin, HbA1c, and HOMA-IR. **RESULTS:** Weight loss was significant for VC (8.80 \pm 3.5kg; 7.7%), but not for IP (2.4 \pm 1.6kg; 3.4%) or CG (2.4 \pm 3.1kg; 3.5%). Steps/day were higher for VC compared to IP at week 4 and higher for VC than CG at weeks 6, 8, 9, and 11 ($p \leq .05$). No between-group differences were found for any metabolic markers. However, there was a within-group decrease for HOMA-IR ($p \leq .05$) for VC. **CONCLUSION:** Our innovative, multidisciplinary, telemedicine health coaching delivered through video conferencing led to more favorable changes in weight loss, physical activity (steps/day), and HOMA-IR than in-person or no health coaching. VC may be an economical approach to improve health and promote behavior change in obese adults. Future studies using VC health coaching in group and individualized formats, and for other population subgroups, are needed to investigate impacts of weight loss on other health outcomes.

EFFECTS OF RESISTANCE EXERCISE TRAINING ON DOXORUBICIN-INDUCED CARDIOTOXICITY

Keith Pfannenstiel^{#1} and Reid Hayward^{#2} ¹Department of Health, Physical Education, and Recreation, Emporia State University, Emporia, Kansas, USA; ²School of Sport and Exercise Science and the University of Northern Colorado Cancer Rehabilitation Institute, University of Northern Colorado, Greeley, Colorado, USA

In recent decades cancer survivorship has steadily increased; however, the adverse side effects associated with chemotherapy treatment can diminish a patient's overall quality of life. One of the most effective and widely used chemotherapeutic agents is doxorubicin (DOX). Though highly effective, its use is limited by a dose-dependent cardiotoxicity. While it is known that exercise preconditioning with endurance training models provide a cardioprotective effect to DOX treatment, little focus has been placed on the effects of a resistance training (RT) model on DOX-induced cardiac dysfunction. **PURPOSE:** The purpose of the study was to determine the effects of a 12-week RT model on DOX-induced cardiac dysfunction to determine if any cardioprotective effects are a result of a reduction in lipid peroxidation and to determine if any cardioprotective effects are a result of a preservation of the cardiac myosin heavy chain (MHC) isoform distribution. **METHODS:** Ten-week-old male Sprague-Dawley rats were randomly selected to undergo 12 weeks of RT or remain sedentary (SED). Twenty-four hours following the completion of the exercise training or sedentary period, animals received a 12.5 mg/kg bolus intraperitoneal injection of DOX or a bolus intraperitoneal injection of 0.9% saline. Five days following injection, animals were sacrificed. Cardiac function was assessed both in vivo and ex vivo and the left ventricle tissue was used to assess lipid peroxidation, as measured by malondialdehyde (MDA) + 4-hydroxyalkenals (HAE) and percentage of β -MHC. **RESULTS:** The DOX treatment induced cardiac dysfunction when measured both in vivo and ex vivo. The RT provided a cardioprotective effect, evident by significant increases in end systolic pressure, left ventricular developed pressure, and the maximal rate of developed pressure. No significant difference existed between RT+DOX and SED+DOX in lipid peroxidation; however, RT did attenuate the α - to β -MHC shift that occurs with DOX treatment. **CONCLUSION:** These data suggest that 12 weeks of the RT model used provided cardioprotection against DOX-induced cardiac dysfunction and may be a result of preservation of the cardiac MHC isoform distribution.

STRENGTH AND STEP ACTIVITY AFTER ECCENTRIC RESISTANCE TRAINING IN THOSE WITH INCOMPLETE SPINAL CORD INJURIES

Whitley Stone¹, Sandra Stevens², Dana Fuller², & Jennifer Caputo². ¹ University of Central Missouri, Warrensburg, Missouri. ² Middle Tennessee State University, Murfreesboro, Tennessee.

Individuals with spinal cord injuries often experience general weakness in the lower extremities that undermines daily step activity. **PURPOSE:** Investigate the efficacy of eccentrically biased resistance training on lower extremity strength and physical activity of individuals with spinal cord injuries. **METHODS:** Individuals with long-standing incomplete spinal cord injuries ($N = 11$) capable of completing a 10 meter walk assessment trained two times per week for 12-weeks on a lower body eccentric resistance training machine. All participants who completed the familiarization period finished the training. It was hypothesized that the outcome variables (eccentric strength, isometric strength, and daily step physical activity) would improve as a result of the training intervention. **RESULTS:** Eccentric strength ($F(1.27, 12.71) = 8.42, MSE = 1738.35, H-F p = .009$) and isometric strength ($F(1.97, 19.77) = 7.10, MSE = 11.29, H-F p = .005$) improved as a result of the training while daily step activity did not change ($F(2.00, 18.00) = 2.73, MSE = 216,836.78, H-F p = .092$). **CONCLUSIONS:** Eccentric resistance training improved eccentric and isometric strength. These physiological adaptations may translate to improved gait mechanics, but further study is required to identify this potential crossover effect.

EFFECTS OF AGING ON MIDDLE CEREBRAL ARTERY BLOOD FLOW DYNAMICS DURING MODERATE INTENSITY EXERCISE

Jaimie L. Ward^{#1}; Jesse C. Craig^{#2}; Yumei Liu^{#1}; Jason-Flor V. Sistante^{#1}; Eric D. Vidoni^{#3}; David C. Poole^{#2}; Sandra A. Billinger^{#1} ¹Univeristy of Kansas Medical Center, Kansas City, Ks; ²Kansas State University, Manhattan, Ks; ³University of Kansas Alzheimer's Disease Center, Fairway, Ks

Cerebral blood flow (CBF) velocity is known to increase during an acute exercise bout. Valuable information has been seen not only in the increased CBF velocity at steady state but also in the dynamic exercise response. The kinetics of this CBF response has been shown to fit a time delay (TD) + exponential model. The dynamic response of CBF velocity from rest to exercise remains unclear, and the response profiles of the cerebral vasculature have not been characterized across age. **PURPOSE:** Because the responsiveness of vasomotor control degrades with advancing age, we tested the hypothesis that older subjects would evince a slower and reduced CBF response to exercise. **METHODS:** Fifteen healthy young (age 25 ± 3 years) and fifteen healthy older (age 69 ± 4 years) adults participated in this study. Each completed a 90 second rest followed by a 6 minute moderate intensity exercise bout on a recumbent stepper at a prescribed step rate and resistance. Heart rate, end tidal CO₂, beat-to-beat blood pressure, and middle cerebral artery velocity (MCA_v) were recorded throughout rest and exercise. Baseline (BL) and criterion kinetics measurements for response amplitude (AMP), time delay (TD), time constant (τ), mean response time (MRT, TD + τ), and rate constant (RC, AMP/ τ) were established for all 30 participants. **RESULTS:** The MCA_v at rest was higher in younger than in older (63 ± 2 vs 47 ± 2 cm/s, $P < 0.001$). Younger adults also had a higher response amplitude from rest to steady state exercise (19 ± 2 vs 11 ± 2 cm/s, $P = 0.002$). As hypothesized, the time constant (τ) in the older subjects was significantly longer (slower) than for the younger subjects (47 ± 8 vs 30 ± 3 s, $P = 0.04$) which led to a substantially reduced RC for the increase in MCA_v in the older adults versus their younger counterparts. **CONCLUSION:** CBF kinetics analyses reveals a marked impairment in the cerebrovascular response to exercise in older individuals and has potential to evaluate the efficacy of therapeutic interventions designed to improve cerebrovascular function in elderly and patient populations.