

2014 Annual Meeting

Central States Chapter – American College of Sports Medicine



University of Kansas – Edwards Campus BEST

Conference Center

12604 Quivira Rd. Overland Park, KS 66213



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Theme: Sport Performance

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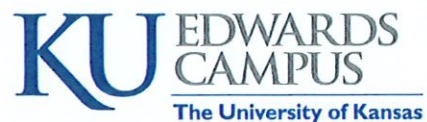


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Meeting Information

Intended Audience

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

Meeting Objectives

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

- Recognize contemporary controversial issues related to sports medicine, exercise science, and health promotion
- Apply knowledge of the effects of difference training paradigms to improve strength and power in sport
- Demonstrate knowledge of the use of new technology to analyze sport performance and training.
- Be able to design and integrate presentation techniques
- Identify new approaches to, and perspectives on, problems in exercise science and sports medicine through interaction among scientists and clinicians in related fields.
- Provide a forum for members and students to present research related to exercise science and sports medicine
- Recognize the importance of research in understanding improvements of athletic performance

ACSM continuing Education Credits (CEC's)

The American College of Sports Medicine's Professional Education Committee certifies that this annual meeting meets the criteria for 10 credit hours of ACSM continuing education credit. Credit is awarded for these CECs by attending the Central States Chapter ACSM Annual Meeting. The Central States ACSM is an approved Provider of CEC for the ACSM. A certificate documenting completion of 10 CEC's is at the back of this program.

Name Badges

Name badges must be worn at all times to gain admittance in the poster session, educational sessions, and ACSM social events. Please hold on to your badge!

Future Meeting Site

The next meeting will be held in October 2015 under the direction of Dr. Michelle Gray, University Arkansas. Exact location to be determined.

Welcome to the Annual Meeting of the Central States Chapter of the American College of Sports Medicine. This year's meeting emphasizes sport performance. The meeting begins with a very exciting presentation on motion capture technologies for sport performance by Dr. Nicole Moodie. Following this will be a very stimulating presentation regarding the role of sport science for American football by Dr. Bert Jacobson from Oklahoma State University. After a short break, Dr. Michelle Grey & Jordan Glenn's presentation will elaborate on the importance of training in the aging athlete. Following Thursday's presentation please check out the poster session in the Conference Hall as students and professionals exhibit their recent research. Be sure to attend the always-lively Student Quiz Bowl where each of the schools in the chapter will be showing their academic prowess in a Jeopardy style competition where the winners will advance to the national completion at the ACSM Annual conference and most importantly bragging rights.

Friday morning we will kick off the day with Meg Stone presenting about important considerations of training females in sport and followed by a presentation by Dr. David Szymanski on how research has contributed to current baseball knowledge. After a short break, the student research award recipients will present their research abstracts in the auditorium.

Lunch will be served in the Conference Hall. During this time Andrea Hudy will be speaking on "Sports Science in the Training Hall". Coach Hudy has coached numerous national championship teams while at the University of Connecticut and the University of Kansas. Her expertise in strength and conditioning is sure to enlighten those interested in coaching and sport performance.

After lunch, professional members should be sure to attend the business meeting while students are encouraged to attend a special presentation employment trends in the fitness industry by Dr. Jason Wagganer and Dr. Jeremy Barnes. After a brief break, Dr. Mike Stone will discuss the role of muscle power in sport performance. Following Dr. Stone's lecture, Dr. Stravoros Kavouras will present on the importance of hydration for sport performance. Enjoy the CSACSM Annual Meeting and Welcome to the University of Kansas – Edwards Campus!

Andrew C. Fry, Ph.D.

Past-President CSC ACSM

**A Special thank you to the Central States ACSM Board of Directors
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**Central States Chapter
Of the
American College of Sports Medicine
FALL 2014 MEETING SCHEDULE**

Thursday, October 23th, 2014

9:00-11:00	Vendor Set-Up	BEST Lobby
9:30-10:30	CSACSM Board Meeting	BEST 315
11:00-12:30	Registration	BEST Lobby
12:30-1:00	Welcome & Introduction	BEST Conference Center
1:00-2:00	Nicole Moodie, PhD Rockhurst University <i>Motion Capture Technologies for Sport Performance</i>	BEST Conference Center
2:00-3:00	Bert Jacobson, PhD, FACSM Oklahoma State University <i>Sport science for American Football</i>	BEST Conference Center
3:00-3:15	Break (Put up posters in Conference Center)	BEST Lobby
3:15-4:15	Michelle Grey, PhD & Jordan Glenn, MS University of Arkansas <i>Aging & Training for Sport Performance</i>	BEST 120
4:15-4:30	Break (Put up posters in Conference Center)	BEST Lobby
4:30 – 6:00	Poster presentations	BEST Conference Center
6:00-6:30	Break	BEST Lobby
6:30 - 7:30	Student Trivia Bowl Presider: Joe Pujol, PhD; FACSM Southeast Missouri State University	BEST Conference Center

Friday, October 24th, 2014

8:00-9:00	Meg Stone, PhD East Tennessee State University <i>Training Females in Sport</i>	Regnier Hall Auditorium
9:00-10:00	David Szymanski, PhD Louisiana Tech University <i>How Research has Contributed to Baseball Performance Knowledge</i>	Regnier Hall Auditorium
10:00-10:15	Break	BEST Lobby
10:15-11:15	Student Research Award Recipient Presentations	Regnier Hall Auditorium
11:15-11:30	Break	Move to BEST Conference Center
11:30-1:00	Lunch	BEST Conference Center
12:15-1:00	Luncheon Speaker Andrea Hudy University of Kansas, KU Athletics Research & Coaching Performance Team <i>Sport Science in the Training Hall</i>	BEST Conference Center
1:00-1:15	Break	BEST Lobby
1:15-2:15	Professional Business Meeting - Andy Fry, PhD, University of Kansas	BEST 135
1:15-2:15	Student Meeting - Jason Wagoner PhD and Jeremy Barnes PhD Southeast Missouri State University <i>Employment Trends in the Fitness Industry</i>	BEST Conference Center
2:15-2:30	Break	BEST Lobby

2:30-3:30	Featured Speaker Michael Stone, PhD East Tennessee State University <i>The Role of Muscle Power in Sport</i>	BEST Conference Center
3:30-4:30	Stavoros Kavouras, PhD, FACSM, FECSS University of Arkansas <i>Hydration for Sport Performance</i>	BEST Conference Center
4:30-4:45	Closing Remarks – Andrew Fry, PhD University of Kansas	BEST Conference Center

Session Presenters



Nicole Moodie, PhD

Dr. Nicole Moodie is an Assistant Professor and Laboratory Director in the Exercise and Sport Science Department at Rockhurst University in Kansas City, Missouri. Dr. Moodie earned a Ph.D. from the University of Kansas, a Master of Science in Education from Baylor University, and a Bachelor of Science from Truman State University. She is certified through both the American College of Sports Medicine and the National Strength and Conditioning Association. She currently serves as the Missouri Representative for the Central States Chapter of the ACSM. Dr. Moodie's current research interests focus on current trends in exercise testing and training. Specifically, Dr. Moodie focuses on the usefulness of motion capture, accelerometry, and mobile applications in athletic testing.



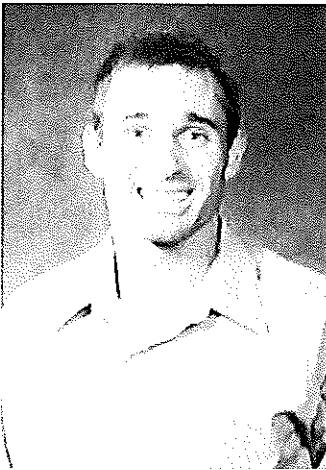
Bert Jacobson, PhD, FACSM

Bert Jacobson is a Regents Professor, a Fellow in the American College of Sports Medicine, and holder of the M.B. Seretean Endowed Professorship in the area of Health and Human Performance. He recently vacated an 11-year administrative appointment where he served as the Head of the School of Educational Studies and as Interim Dean of Undergraduate Studies and Assessment. He has developed several graduate and undergraduate courses such as gerontology, epidemiology, and applied anatomy. He has over 140 refereed publications and a similar number of peer-reviewed professional presentations which have been presented on five different continents. He has also managed grants and contracts worth over \$3.4 million dollars. His work in the area of Health and Human Performance has earned him the Regents' Distinguished Research Award, the Research Excellence Award, the Inventor Recognition Award, Sigma Xi, and the OAHPERD Scholar Award.



Michelle Gray, Ph.D.

Michelle Gray, Ph.D, is currently an Assistant Professor in the Department of Health, Human Performance, and Recreation at the University of Arkansas and Co-Director of the Office for Studies on Aging. She received her Ph.D. from University of Arkansas, M.S. at Ball State University, and B.S. at the University of Tennessee – Chattanooga. Michelle has been a member of the Central States Chapter of ACSM since 2003 and has served as student representative (2005-2007), Arkansas Representative (2011-2013), and President – Elect (2013-2014). Her research interests include resistance training among older adults; more specifically, high-velocity resistance training to prevent sarcopenia and functional decline.



Jordan Glenn, M.S.

Jordan Glenn, M.S., is a doctoral student in the Department of Health, Human Performance, and Recreation at the University of Arkansas. He received his B.S. and M.S. from the University of West Florida. Jordan has been a member of the Central States Chapter of ACSM since 2011. His research interests include 1) working with masters athletes and their ability to maintain longitudinal physical performance and 2) the effects of ergogenic aids and sport supplementation to increase exercise performance.



Meg Stone, FNCSA

Meg Stone is a two time Olympian competing in the discus for Great Britain. Meg competed for the University of Arizona and still holds the NCAA record outdoors in the discus (221ft 3 ins) and the shot (63ft 23/4ins). In 194 she took the position of Head Strength and Conditioning Coach at the University of Arizona working with all NCAA sports but especially Football. Meg was the first woman ever to hold such a position. In 1994 she moved to Texas Tech and held the same position. In 1996 she moved back into full time track and field as the Associate Head Coach at Appalachian State University. In 1999 she returned to her native Scotland to become the National Track and field Coach the first woman in Europe ever to do so. She has coach several Olympians in the jumps throws and sprints both in Great Britain and the USA. While working in the university system she coached many players in the NBA, NFL and MLB. Meg has also worked extensively with road cyclist and the paralympic groups through Carmichael Training Systems in Colorado Springs. Before moving to Johnson City she was the Coaching Manager for the United States Olympic Committee. During 2007 she along with her husband Mike and Dr. Bill Sands published a book titled Principles and Practice of Resistance Training. Recently, she was presented with the prestigious "Legends in the Field Award" by the College Strength Coaches Association the only woman to be so honored. The same month she was made a fellow of the National Strength and Conditioning Association



David J Szymanski, PhD, CSCS*D

David J. Szymanski is an Associate Professor in the Department of Kinesiology and Eva Cunningham Endowed Professor in Education at Louisiana Tech University (LaTech). From 2006-2014 he was the Head Strength and Conditioning Coach for the LaTech Baseball Team. He is a Certified Strength and Conditioning Coach with Distinction, Registered Strength and Conditioning Coach Emeritus, a Fellow, and current Board of Directors member of the NSCA. He received a Ph.D. in Exercise Physiology from Auburn University in 2004. His primary research has focused on ways to improve baseball and softball performance. He formerly was the Exercise Physiologist for the Auburn University Baseball team (2000-2004), as well as the Volunteer Assistant Baseball Coach (1997 & 1999).

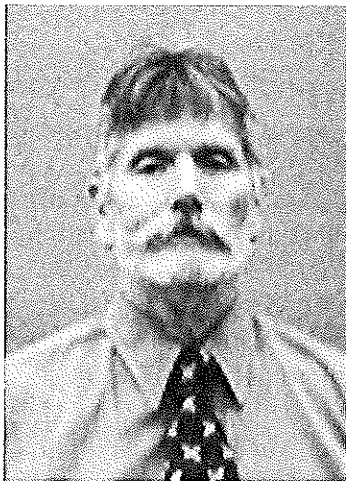
Prior to going to Auburn, Dr. Szymanski was the Assistant Baseball Coach and Weight Room Director at Texas Lutheran University from 1992-1996



Andrea Hudy, MA, CSCS

Andrea Hudy, the Assistant Athletics Director for Sport Performance at the University of Kansas. Hudy came to Kansas after nine and a half years at the University of Connecticut. In all, Hudy was part of eight national championship teams while at Connecticut - two men's basketball, five women's basketball, and one men's soccer. Including the 14 Jayhawks that have been drafted in the NBA, she has worked with 33 former student-athletes who went on to play in the NBA. Hudy was a four-year letter winner in volleyball at Maryland where she graduated in 1994. Hudy earned her bachelor of science degree in kinesiology at Maryland and her master's of art and sport biomechanics degree from Connecticut. She is a certified strength and conditioning specialist by the National Strength and Conditioning Association and a USAW Level I Coach. Additionally, Hudy has her national massage certification.

Michael Stone, PhD, FNCSA



A Nashville, Tenn., native, Stone earned his bachelor's degree in zoology from Florida Tech in 1970, his master's degree in biology from Tennessee Tech in 1974, and his Ph.D. in exercise science from Florida State in 1977. One of the leading minds in research in the field of sport science, Dr. Mike Stone's work has been internationally recognized and is a favorite presenter at events across the nation. Now at East Tennessee State University, Stone has served as the director of the Exercise and Sports Science Lab since August 2005 and continues to remain one of the leading academic minds in the world of strength and power training. A pioneer in the field of coach training, Stone helped establish the Center of Excellence for Sport Science and Coach Education in October of 2008. In conjuncture with the CESSCE, Stone has helped to implement the first Sport Physiology and Performance PhD program in the nation at ETSU.



Stavros A. Kavouras, PhD, FACSM, FECSS

Dr. Stavros Kavouras is an Associate Professor at the University of Arkansas. He is an expert in the area of hydration and its effects on both health and exercise performance. His training includes: Post-doctorate in Human Physiology from Yale University, School of Medicine; Ph.D. in Human Exercise Physiology from the University of Connecticut, and Master of Science in Exercise Physiology and Nutrition from University of Colorado at Colorado Springs.

Dr. Kavouras is the author of more than 80 peer review articles and book chapters and he has given lectures in more than 20 countries around the world. He is the program coordinator for the Exercise Science program and has served as a scientific consultant in the Gatorade Sports Science Institute, Danone/Nutricia Research and the Greek Anti-Doping Organization. Dr Kavouras is a Fellow of the

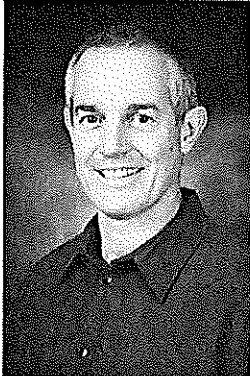
American College of Sports Medicine & the European College of Sports Science and elected member of the American Physiological Society and the American Society of Nutrition.

Student Meeting Presenters



Jason Wagganer, PhD

Dr. Wagganer is entering his fifth year as an Assistant Professor at Southeast Missouri State University, teaching courses within the undergraduate Health Management and graduate-level Nutrition and Exercise Science programs. These courses include Health Perspectives, Research Methods, Exercise Physiology, Kinesiology, Physiology of Conditioning, Exercise in Health and Disease and Cardiovascular Exercise Physiology. His research interests lie in the area of blood lipid and lipoprotein changes with exercise as well as high-intensity interval training in the cardiac rehabilitation setting. In 2000, he obtained the Health/Fitness Specialist Certification offered by the American College of Sports Medicine. Prior to coming to Southeast, Dr. Wagganer was an assistant professor at Greensboro College while completing his PhD at the University of North Carolina at Greensboro.



Jeremy Barnes, PhD

Dr. Jeremy T. Barnes is professor in the Department of Health, Human Performance and Recreation at Southeast Missouri State University. He teaches classes in the BS in Health Management and the MS in Nutrition and Exercise Science Programs. He is certified as a Health/Fitness Specialist by the American College of Sports Medicine. His research interests include body composition assessment and the evaluation of worksite health promotion programs. He has directed health promotion programs in corporate, community and university settings.

Abstracts

Student Oral Presentations

ADDITIVE EFFECTS OF MILD DEHYDRATION AND HYPERTHERMIA ON MOOD IN FEMALES

Jenna M. Burchfield, Matthew S. Ganio, Brendon P. McDermott, Nicole E. Moyen, Cory L. Butts, Keeley Treece, & Matthew A. Tucker. Human Performance Laboratory, Department of Health, Human Performance, and Recreation, University of Arkansas, Fayetteville, AR.

INTRODUCTION: Information regarding effects of dehydration (DY) and heat stress on mood and perceptual measures is controversial since the two conditions could confound one another. **PURPOSE:** To assess the independent and combined effects of mild DY through 24-h fluid restriction and heat stress via passive heating on mood, thirst, and thermal sensation in females. **METHODS:** Eight healthy females (24.3 ± 4.6 y, 162.4 ± 4.2 cm, 77.3 ± 12.9 kg) volunteered in two randomized, repeated-measures trials, both involving passive heating to a 1.0°C core temperature (T_C) increase from baseline. 24-h prior to heat stress, females either remained euhydrated (EU) or became DY via fluid restriction. Upon arrival, percent body mass (BM) change was calculated by comparing their nude BM to a 3-day baseline BM record. EU individuals received fluid during heating to maintain euhydration. Percent BM change and blood (osmolality) and urine (osmolality and specific gravity) biomarkers were measured prior to and throughout testing. Thirst, thermal sensation, and mood (Brunel Mood Scale; BRUMS) were assessed via questionnaires before heat stress, at 0.5°C , and 1.0°C increases in core temperature. **RESULTS:** EU started the heating euhydrated according to BM change from baseline ($-0.4 \pm 0.9\%$), urine specific gravity (U_{SG} ; 1.009 ± 0.007), urine osmolality (U_{OSM} ; 331 ± 241 mOsm/kgH₂O), and plasma osmolality (P_{OSM} ; 286 ± 4 mOsm/kgH₂O). DY participants started heat stress with a BM change from baseline of $-1.2 \pm 0.4\%$, U_{SG} of 1.027 ± 0.004 , U_{OSM} of 1058 ± 130 mOsm/kgH₂O, and P_{OSM} of 290 ± 4 mOsm/kgH₂O. Despite physiological confirmation of dehydration, there were no differences in mood state, thirst, or thermal sensation between EU and DY at baseline ($p > 0.05$). Further the effect of heat stress on these variables was similar between groups. Independent of group, thermal sensation significantly increased with heat stress from baseline to 1.0°C T_C increase (4.6 ± 0.8 to 6.7 ± 0.3 , $p < 0.05$). However, independent of heat stress, DY subjects had significantly decreased Vigor (41.9 ± 3.6 v 37.3 ± 2.3 arbitrary units $p < 0.05$) and increased thirst (3.8 ± 0.5 v 6.6 ± 0.5 , all $p < 0.05$). **CONCLUSION:** These data indicate that DY and heat stress do not additively affect mood or perceptual measures. Although heat stress does not affect mood, emphasis should still be placed on keeping participants hydrated when testing effects of heat stress, as hydration status alone affected Vigor and thirst independently of heating. Heat stress and dehydration were not additive in this setting. Heat stress failed to have an independent affect on mood or thirst measures, but dehydration alone decreased Vigor.

CUTANEOUS VASCULAR AND SUDOMOTOR RESPONSES TO PASSIVE HEAT-STRESS IN SMOKERS AND NON-SMOKERS

Moyen NE, Ganio MS, Anderson HA, Burchfield JB, Tucker MA, Gonzalez MA, & Robinson FB. Human Performance Laboratory, Department of Health, Human Performance, and Recreation, University of Arkansas, Fayetteville, AR.

Convection (cutaneous blood flow) and evaporation (sweating) are the main avenues for heat loss during heat-stress. Although some drugs such as cocaine impair heat loss, it is unknown if nicotine use with smokers leads to thermoregulatory impairments. Specifically, it is not known if smokers have impairments in the onset, sensitivity, and capacity for cutaneous blood flow and sweating during heat stress. **PURPOSE:** To compare cutaneous vascular

and sudomotor (i.e., sweating) responses to passive heat stress between smokers and non-smokers. **METHODS:** 12 regularly smoking (S; 8.8 ± 5.5 cigarettes/day for >4 years) and 14 non-smoking (NonS) males matched for age, body mass, and exercise habits participated (S: 26 ± 8 y, 80.6 ± 21.1 kg; NonS: 28 ± 9 y, 77.2 ± 8.2 kg). Subjects were passively heated until achieving a 1.5°C core temperature (T_c) increase. Forearm local sweat rate (LSR; via ventilated capsule) and skin blood flow (CVC; via Laser Doppler) were continuously recorded. Blood pressure, heart rate, sweat gland activation (SGA), sweat gland output (SGO), T_c , and skin temperature (T_{sk}) were taken at baseline and each 0.5°C T_c increase. LSR and CVC onsets and sensitivities were calculated using mean body temperature (T_b). **RESULTS:** No differences existed between S and NonS for T_c , T_{sk} , T_b , LSR, CVC, SGA, and SGO with each 0.5°C T_c increase (all $p > 0.05$). However, medium effect sizes (ES) suggested S had a lower T_b at the onset of sweating (S = $37.37 \pm 0.21^\circ\text{C}$ vs. NonS = $37.58 \pm 0.32^\circ\text{C}$; ES = 0.66) and vasodilation (S = $37.45 \pm 0.32^\circ\text{C}$ vs. NonS = $37.63 \pm 0.30^\circ\text{C}$; ES = 0.69). LSR plateau (maximal LSR during heating) was significantly lower in S than NonS (0.63 ± 0.31 vs. 0.94 ± 0.21 $\text{mg} \cdot \text{cm}^{-2} \cdot \text{min}^{-1}$, respectively; $p = 0.01$). Maximal CVC was lower in S than NonS (90.6 ± 39.1 vs. 115.7 ± 42.6 arbitrary units/mmHg, respectively; ES = 0.61; $p = 0.13$). The degree of increase in LSR and CVC per $^\circ\text{C}$ increase in T_b (i.e., sensitivities) were not different between groups ($p > 0.05$). **CONCLUSION:** During passive heating, smokers' had an earlier onset for sweating and cutaneous vasodilation but a lower maximal CVC and LSR. Therefore, some aspects of thermoregulation in smokers appear enhanced and some impaired. Future studies should utilize exercise heat-stress to fully understand the physiological differences in smokers and whether or not they are at increased risk for heat illness.

Funding: This project was funded by the University of Arkansas and the Arkansas Biosciences Institute, the major research component of the Arkansas Tobacco Settlement Proceeds Act of 2000.

Student Poster Presentations

To all poster presenters, please hang poster on the board matching the number of the abstract in program.

1. HYDRATION ASSESSMENT THROUGH URINALYSIS: INFLUENCE OF TIME AND STORAGE CONDITIONS

J.D. Adams, Joseph I. Robillard, Catalina Capitan, Evan C. Johnson, & Stavros A. Kavouras, FACSM. Human Performance Laboratory, Department of Health, Human Performance, and Recreation, University of Arkansas, Fayetteville, AR.

Collection of urine samples in human studies involves choices regarding shipping, sample preservation, and storage that may ultimately influence future analysis. Storage conditions, and freezing and thawing of urine samples before analysis may influence the accuracy of measured values. **PURPOSE:** Therefore, the purpose of this investigation was to quantify the effects of storage temperature and duration on hydration assessment measurements. **METHODS:** Twenty eight human urine samples were stored under different conditions (22°C, 7°C, -20°C, and -80°C) for up to 7 days. Urinalysis was conducted after 0, 24 h, 48 h, and 7 days for storage via osmolality (U_{osm}), urine specific gravity (USG), and urine color (U_{col}). **RESULTS:** Urinalysis results of fresh samples were 374 ± 213 mmol/kg, USG of 1.010 ± 0.006 , and U_{col} of 2 ± 1 . U_{osm} was stable when kept up to 7d in 7°C (382 ± 215 mmol/kg, +2.3%; $p > 0.05$), but only for 24 h when stored at 22°C (379 ± 215 mmol/kg, +1.5%; $p > 0.05$). However, U_{osm} significantly decreased over 24 h when left in -20°C (304 ± 217 mmol/kg, -22.9%; $p < 0.05$) and -80°C (275 ± 172 mmol/kg; -27.0%; $p < 0.05$) and throughout the remaining time points. USG was stable for 7d in both 22°C (1.010 ± 0.005 , $\Delta 0.0\%$) and 7°C (1.010 ± 0.005 , $\Delta 0.0\%$). Conversely, USG significantly decreased over 24 h when left in -20°C (1.008 ± 0.006 , -2.0%; $p < 0.05$) and -80°C (1.008 ± 0.005 ; -2.0%; $p < 0.05$) and throughout the remaining time points. U_{col} was stable at 22°C and 7°C throughout 7d (2 ± 1 ; both -16.7%; $p > 0.05$) as well as -20°C (2 ± 1 ; -23.2%; $p < 0.05$) and -80°C for up to 24 h (2 ± 1 ; -29.5%; $p < 0.05$). However, U_{col} significantly decreased after 48 h when left in -20°C and -80°C (2 ± 1 ; both -32.1%; $p < 0.05$). **CONCLUSION:** The results indicated that U_{osm} is stable over for 7 days in 7°C, but only for 24 hour when stored in 22°C. USG is stable over 7 days in both 22°C and 7°C environments. Lastly, U_{col} was stable for 7 days when stored in both 22°C and 7°C environments, but only for 24 h when stored in -20°C and -80°C.

2. THE IMPACT OF DISTANCE RUNNING ON MUSCLE CROSS-SECTIONAL AREA AND ECHO INTENSITY: CASE STUDY

Kazuma Akehi¹ & Matthew Bice¹ University of Nebraska at Kearney, Kearney, NE

Ultrasonography is frequently used to assess the musculotendinous unit (MTU) and architectural characteristics following training and/or injury. This area of study is limited and a relationship between athletic participation and muscular damage is not conclusive. **PURPOSE:** The purpose of this case study was to examine the impact of a half-marathon on lower extremity muscle cross-sectional area (mCSA) and muscle echo intensity (mEI) prior to half-marathon and 24-hour, 48-hour, and 72-hour post-half-marathon. **METHODS:** Two 21-year old female recreational half-marathon runners were volunteered. Prior to the half-marathon, participants' mCSA and mEI on vastus medialis, rectus femoris, vastus lateralis, and biceps femoris muscles at a various level of distance on each muscle (i.e. every 10% of distance from the distal end to the proximal end of each leg muscle) were measured using the diagnostic ultrasound. Following the half-marathon, mCSA and mEI were re-examined at the same levels of distance on each muscle in every 24-hours for 3 days. **RESULTS:** Both subjects' mCSA at each level of distance on each muscle were not significantly changed over time. However, we observed mEI at each level of distance on all muscles decreased about 2-54%, respectively. **CONCLUSION:** Without changing the mCSA at any levels of leg distance on each muscle following the half-marathon race participation, mEIs were decreased on both subjects, which indicated that some degrees of fluid formation within the muscle or muscular damage were observed. Measurement of mEI is possibly an examination tool that clinicians may potentially be able to use to assess muscular damage following athletic participation. Further research is needed to examine a relationship between the volume of athletic participation and its damage on the MTU using ultrasonography in order to develop better

understanding of the impact of the athletic participation and to develop effective therapeutic interventions following the athletic participation. Then, clinicians may be able to keep tracking its recovery on the MTU.

3. THE EFFECTS OF MOTIVATIONAL MUSIC ON A 1.5 MILE RUNNING TIME TRIAL

Jamie Clark Aweau, University of Central Oklahoma, Edmond, Oklahoma

Music is often used by athletes and recreational exercisers as an ergogenic aid for improved performance and endurance of the exercise task. **PURPOSE:** To measure the effects of self-selected motivational music on trained runners during a 1.5 mile maximal intensity running time trial. **METHODOLOGY:** Subjects were 17 trained runners (male = 8, female = 9), age 19-34 ($M = 24.18 \pm 4.9$ years). Each subject self-selected and rated a motivational song to be used as treatment in the running trial. Subjects ran the time trial in an outdoor environment on a paved trail in a public park. The study was conducted as a repeated-measures crossover design in which the subjects were randomly assigned and ran trials with and without motivational music. The variables of performance time, average heart rate, and rating of perceived exertion (RPE) on a scale of 0-10 were measured. The results from the data were analyzed using dependent *t* tests. The alpha level was set at $p < 0.05$. **RESULTS:** On average, the subjects ran the trial significantly faster with music, ($M = 11:52$, $SE = 00:26$) than without music ($M = 12:03$, $SE = 00:27$), $t(16) = 1.808$, $p = 0.0445$, $r = 0.41$. Subjects experienced a higher average heart rate of 4.5 beats per minute faster with the music condition, although the increase was not statistically significant, $t(15) = -1.744$, $p = 0.051$, $r = 0.41$. The subjects' RPE was significantly lower with music ($M = 7$, $SE = 0.28$) than without music ($M = 7.5$, $SE = 0.23$), $t(16) = 2.675$, $p = 0.017$, $r = 0.55$. **CONCLUSION:** The finding that the motivational music condition significantly improved performance time by an average of 11 seconds indicates that the ergogenic qualities of motivational music may give a competitive training edge to runners. The finding that motivational music significantly decreased RPE may support the application of music in enduring high intensity exercise, which is essential as the research on the relationship between high intensity exercise and improved health markers continues to emerge.

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4. THE EFFECTS OF WATER, POWERADE™, AND MONSTER™ ON WATER WEIGHT LOSS DURING CARDIO EXERCISE

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When exercise is done in a heat-challenging environment, sweat loss can lead to a decrement in performance and potentially life threatening illness. **PURPOSE:** The purpose of this study was to determine if the effects of PowerAde™ or Monster™ energy drinks during cardio exercise would attenuate the sweat rate more than just water. **METHODS:** Ten recreationally active female college students at the University of Central Missouri were recruited to perform a cardio exercise routine indoors at normal room temperature that consisted of a 30 minute treadmill run, 15 minute elliptical run and 10 minutes on the stair stepper. Three different 8oz beverages were randomly assigned and ingested by the subjects 30 minutes prior to exercise. Pre to post weight was measured to determine sweat loss. **RESULTS:** The average loss for the water trial was 0.494 ± 0.29 kg; the average loss for PowerAde was 0.553 ± 0.30 kg; the average loss for Monster Energy drink was 0.472 ± 0.30 kg. **CONCLUSION:** The hypothesis was that ingestion of water would increase sweat rate more than Monster or PowerAde. The data collected did not support this hypothesis. Future research should include a higher number of subjects and different populations.

5. A PRELIMINARY EXAMINATION OF MUSCLE QUALITY, SIZE, AND SPINDLE INTEGRITY ACROSS THE ADULT LIFESPAN

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A physiological consequence of aging is the degeneration of skeletal muscle fibers and a reduction in overall muscle quality. These age-related reductions in muscle quality are associated with a decreased force output as well as a reduction in the rate of force development. Previous studies have shown that muscle quality, as determined by ultrasound imaging, is highly correlated to muscular strength in older persons. Another important physiological variable suspected to decrease with aging is the patellar tendon reflex response. This reflex response reflects the integrity of the muscle spindles. It is not known whether the same deleterious effects observed in the extrafusal muscle fibers of older individuals also occur within the intrafusal muscle fibers. **PURPOSE:** The purpose of this investigation was to determine if a relationship exists between muscle quality, muscle size, and age with the magnitude of the patellar tendon reflex. **METHODS:** Twenty five females (mean age = 46 yr, range = 21-88 yr) participated in this study. Transverse panoramic ultrasound images of each subjects' rectus femoris (RF) were obtained using a multi-frequency transducer positioned perpendicularly to the longitudinal axis of the thigh and used to assess cross-sectional area (CSA; cm^2) and muscle quality (gray-scale echo intensity). A series of tendon taps were delivered to the patellar tendon using a custom reflex apparatus, during which torque signals were obtained to quantify the magnitude of the patellar tendon tap reflex (peak torque; Nm). **RESULTS:** Results showed no significant relationship between muscle quality and reflex magnitude ($r = -0.34$, $p = 0.097$), and no significant relationship between age and reflex magnitude ($r = 0.02$, $p = 0.92$). However, a significant relationship between RF muscle CSA and reflex magnitude ($r = 0.425$, $p = 0.034$) was found. **CONCLUSIONS:** It can be concluded from this study that the magnitude of the patellar tendon reflex may be partially dependent on muscle size. However, since muscle mass typically decreases with aging, it is surprising that the reflex magnitude was not also dependent on age. It is possible that intrafusal fibers may not degrade at the same rate as extrafusal fibers.

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6. DOES RAPID COOLING COMBAT FATIGUE?

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Neuromuscular fatigue is a major performance limiter. Finding convenient methods to combat fatigue that do not have negative physical or social ramifications continues to be of importance. Controlling body temperature appears to delay the expected decrements in work output. Cooling gloves are commercially available, but may be cost prohibitive to the recreational athlete. **PURPOSE:** The current investigation examined the effect of localized cooling on a muscular endurance task of the upper extremity. The research goal was to test a low-tech approach to the commercially available vacuum enabled cooling apparatus. **METHODS:** Participants included five (2 men, 3 women) undergraduates, ages 21 -42 years, enrolled in a physiology of exercise course on the OSU Tulsa campus. The experiment required that participants perform two sets of a cadence-restricted, single arm curls to exhaustion using 75% of 1RM under two randomized recovery conditions, thermal-neutral (TN) and rapid palmar cooling (RC). Three minutes of rest were provided between sets; the recovery condition assignment date was randomized and tests occurred four days apart. During the RC recovery condition, ice was applied to the non-lifting palm. Additionally, participants provided systemic and localized ratings of perceived exertion (RPE) after each set of arm curls. A standardized warm up that included both systemic and motor-mimicking activities was performed by each participant. **RESULTS:** Although some participants performed an equivalent number or more repetitions after the RC period, the mean difference (-0.6 reps thermal-neutral vs. +0.4 reps cooling recovery; $F = 0.02302$; $F_{\text{crit}} = 6.3882$, $p < 0.05$), was not statistically significant. RPE was not statistically different between the conditions either. **CONCLUSION:** It was concluded that the simple, low tech cooling methods used in this study was not impactful enough to recommend to the recreational weight lifter. The advantage of delivering palm cooling under a vacuum lies in its ability to inhibit constriction of the arteriovenous anastomoses so cooled blood can continue to flow through the cardiac circuit, lowering core temperature. Maintenance of an optimal core temperature is theorized to delay fatigue. The cooling method utilized in this investigation likely resulted in a reflexive shunting of the blood

away from the skin, and therefore was not effectively cooled. Considerations for future investigations include recruitment of participants with a consistent history of resistance training, cooling of the exercised palm rather than the uninvolved limb, and using a compression or vacuum method to deliver the rapid cooling during recovery.

7. AEROBIC EXERCISE EFFECTS ON SELF-ESTEEM IN SUBJECTS WITH SEDENTARY LIFESTYLES

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Throughout the years, people have looked for many ways to increase their self-esteem. People are turning to exercise as a way to achieve improved self-esteem benefits. **PURPOSE:** The purpose of the study was to determine if aerobic exercise has an acute benefit on self-esteem. **METHODS:** Twenty-seven sedentary individuals (5 females and 22 males) were recruited to participate in this study on self-esteem and exercise. Pre and post self-esteem was measured using a Rosenberg Self-Esteem Assessment. Eleven participants continued normal daily activity while the other 16 participated in 10 bouts of aerobic exercise over a three week span. Bouts of aerobic exercise were valid if they were continuous for thirty minutes, involved moderate perceived intensity, and were verified by the researcher being present. Exercise bouts included running, elliptical training, stair master training, and stationary bicycle training. **RESULTS:** The control group Self-Esteem scores averaged 23.36 ± 3.6 pre, and post scores averaged 23.36 ± 3.3 . The experimental group averages were 21.8 ± 2.9 pre and 26.1 ± 2.3 for post-test scores. **CONCLUSION:** Data indicated that completing 10 bouts of aerobic exercise will increase self-esteem in sedentary college students. An interesting fact that emerged was that all of the subjects participating in routine aerobic exercise had an increase in Self-Esteem according to the Rosenberg test results.

8. DOSE-RESPONSE RELATIONSHIP OF BALANCE TRAINING AND DETRAINING ON BALANCE AND CONFIDENCE

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The number of adults over age 60 is expected to double from 11% to 22% of the population by year 2050. One in three older adults fall per year, expecting to cost \$54.9 billion dollars by 2020. Balance programs are necessary to combat the financial and physical costs of falls. Research has shown improvements in balance after training anywhere from 5 to 13 weeks in a range of 20 minutes to one hour per session. Few studies have examined the consequences of detraining among adults who engage in balance training. **PURPOSE:** The purpose of this study was to examine the differences between adults over age 65 who performed balance tasks once or twice a week. **METHODS:** Participants ($N=7$) were assigned to a one day (OBG) or two day per week balance group (TBG). OBG ($n=3$) and TBG ($n=4$) participants completed 30 minutes of balance tasks each session for six weeks. Balance was measured by the Berg Balance Scale (BBS). The Activities Specific Balance Confidence Scale (ABC) evaluated confidence. Assessments were completed at pre-test, three weeks, six weeks, and three weeks following training (detraining). **RESULTS:** A repeated measures ANOVA did not reveal a significant change between groups over time. After utilizing the Huynh-Feldt correction to adjust for a significant violation of sphericity, results indicated significant changes in balance over time ($p=.037$). A Paired Samples test showed balance improved significantly from three weeks ($M=45.00 \pm 4.40$) to post-test ($M=47.86 \pm 5.37, p=.001$), and pre- ($M=43.70 \pm 5.376$) to post-pest ($M=47.86 \pm 5.367, p=.001$) among all participants. Confidence scores experienced a meaningful decrease from post-test ($M=66.41 \pm 7.03$) to detraining ($M=61.26 \pm 15.63$) quantified by a moderate to large effect size of 0.73. **CONCLUSION:** Balance appears to change over time regardless of training one or two days per week. This data suggests a training period of greater than three weeks is necessary to see improvements in balance, with more significant improvements occurring between three to six weeks of training. While positive effects on balance may be sustained longer than three weeks of detraining, confidence could be negatively impacted in this time period.

9. MITOCHONDRIAL BIOGENESIS AFTER REPEATED BOUTS OF DISUSE

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Muscular disuse affects a great number of people have sedentary lifestyles and/or chronic disease. Disuse has been shown to cause severe muscular atrophy and to disrupt mitochondrial quality. **PURPOSE:** To examine if disuse affects mitochondrial biogenesis, and if resistance exercise following bouts of unloading can promote biogenesis. **METHODS:** Sprague-Dawley rats were subjected to chronic disuse atrophy by hindlimb unloading (28-d, 1HU) followed by ambulatory recovery (56-d) with (1HU+EX) and without (1HU+REC) resistance exercise. To mimic repeated bouts of disuse animals were subjected to a second bout of HU (28-d, 2HU) and again allowed ambulatory recovery with (2HU+EX) or without (2HU+REC) resistance exercise. Control (CON) animals were allowed normal cage activity throughout. Samples were analyzed for *Pgc-1 α* , *Tfam*, *Nrf2* and *Ppara* gene expression by real time RT-PCR. To test if disuse impacted mitochondrial biogenesis regulators a T-Test was performed between CON and 1HU groups, to test impact of reloading and exercise data were analyzed by one-way ANOVA across all groups with α set at $P < 0.05$. **RESULTS:** *Pgc-1 α* expression decreased by 59% ($p = 0.042$) and *Nrf2* by 75% ($p = 0.047$) following disuse (1HU) compared to CON. 1HU+Ex showed a 280% increase in *Ppara* expression ($p = 0.005$) as well as a 278% increase in *Tfam* expression ($p = 0.013$) compared to CON. *Pgc-1 α* , *Ppara*, and *Tfam* displayed a greater increase in expression with exercise recovery (1HU+Ex) than without (1HU+Rec). *Pgc-1 α* showed an 80% increase in expression ($p = 0.05$), *Ppara* showed a 208% increase in expression ($p = 0.01$), and *Tfam* showed a 195% increase in expression ($p = 0.01$) when comparing 1HU+Ex and 1HU+Rec. *Nrf2* decreased by 61% ($p = 0.008$) with 2HU. Expression of other biogenesis markers was not changed in the 2HU group. Neither 2HU+Ex nor 2HU+Rec were able to attenuate the loss of *Nrf2* expression. **CONCLUSION:** A single bout of disuse significantly decreases the expression of *Pgc-1 α* and *Nrf2*. 1HU+Ex promotes mitochondrial biogenesis more than 1HU+Rec. Multiple bouts of disuse decreases the expression of *Nrf2*. 2HU+Ex and 2HU+Rec does not attenuate the loss of *Nrf2* expression. More research needs to be conducted to examine other aspects of mitochondrial quality such as mitochondrial dynamics and autophagy.

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10. HYPERCHOLESTOLEMIA INHIBITS GROWTH RELATED GENE EXPRESSION DURING ACUTE SKELETAL MUSCLE REGENERATION

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Roughly 30% of all Americans are diagnosed with high cholesterol, which is a risk factor for cardiovascular disease. Apolipoprotein E (ApoE) is a ligand for lipoprotein receptors that mediates the uptake of triglycerides, cholesterol, and other lipids into metabolic tissues and organs. Hence, the targeted disruption of the ApoE gene (ApoE-KO) creates a systemic environment high in cholesterol leading to numerous pathophysiological diseases. Skeletal muscle is a highly plastic tissue that has the capability to regenerate and repair after trauma occurs. The systemic environment influences the capacity of skeletal muscle regeneration. Yet, the effect of a high cholesterol environment on skeletal muscle regeneration has not been fully elucidated. **PURPOSE:** To determine if gene expression related to growth is impaired during skeletal muscle regeneration in ApoE-KO mice. **METHODS:** Age-matched female C57/BL6J (B6) mice and ApoE-KO mice (14-15 months old) were randomly administered either a damage-inducing myotoxin (Bupivacaine) into the tibialis anterior (TA, $n = 4-8$) or PBS ($n = 6$). Three days post-injection the TA was excised. Gene expression of growth and regeneration markers was determined by quantitative polymerase chain reaction. Data was analyzed by two-way ANOVA and post hoc LSD test. **RESULTS:** TA muscle wet weight in both B6 and ApoE-KO mice was reduced 9% and 14%, respectively ($p < 0.05$) 3 days post-bupivacaine injection. There was a significant interaction in all gene targets measured ($p < 0.05$). There was a 2-fold increase in *IGF-1* gene expression in B6 mice ($p < 0.05$), but a 65% reduction in ApoE-KO mice 3 days post-bupivacaine injection ($p < 0.05$). *MyoD* gene expression increased 1.5 fold in mice ($p < 0.05$), but was reduced 46% in ApoE-KO mice ($p < 0.05$). There was a 1.9-fold increase in myogenin gene expression ($p < 0.05$), but a 75% reduction in ApoE

mice 3 days post-bupivacaine injection ($p < 0.05$). Cyclin D1 gene expression increased 4-fold in B6 mice ($p < 0.05$), was reduced 43% in ApoE-KO mice ($p < 0.05$). **CONCLUSION:** After skeletal muscle damage occurs, markers of regeneration have been reported to increase. In a high cholesterol environment however, there was an inhibition of gene expression related to growth and regeneration that could negatively impact the recovery process.

The ApoE knockout mice were provided by Rigel Pharmaceuticals.

11. RELATIONSHIPS BETWEEN SEATED MEDICINE BALL THROW AND ISOMETRIC BENCH PRESS KINETICS

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The bench press is an exercise commonly used as a means to improve upper body strength and power. Bench press performance may be assessed by testing 1 RM strength, or by using elaborate laboratory methods such as force transducers or external dynamometers. A simple field test such as a seated medicine ball throw (SMBT) has been used by coaches to assess bench press-like motions for sport performance. **PURPOSE:** To determine the relationships between performance on a seated medicine ball throw (SMBT) with isometric bench press maximum force (F_{max}) and rate of force development (RFD). **METHODS:** Twenty four healthy subjects (15 males, 9 females; $X \pm SD$; age[*yr*] = 21 ± 1.0 ; hgt.[*cm*] = 175.0 ± 10.1) volunteered to perform a 5 second isometric bench press test to determine rate of force development (RFD) and maximum force (F_{max}) while sampling at 500 Hz. Subjects also performed a SMBT with an 8 lb. medicine ball. Subjects held the ball with both hands, brought their hands to the center of the chest and threw the ball as far as possible while keeping the forearms parallel to the ground. The distance was measured from the chest to the point of landing. **RESULTS:** SMBT distance (5.71 ± 1.29 m) exhibited a high correlation to both RFD (1081.5 ± 653.4 Ns^{-1}) and F_{max} (726.2 ± 310.2 N) on the bench press, with $r = 0.8$ and 0.93 , respectively ($p \leq 0.01$). **CONCLUSION:** The results of this study strongly suggest that performance on the seated med ball throw directly correlates with bench press performance, and could be used as an effective and simple evaluation tool. This is of particular value in field environments where proper bench press equipment or technology is unavailable.

12. EFFECTS OF BREATHING COOL AIR DURING EXERCISE IN THE HEAT ON THERMOREGULATION, PERCEPTION AND CYCLING PERFORMANCE

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Limited research exists investigating the physiological effects of breathing cold air during exercise as a method of attenuating increases in core temperature. **PURPOSE:** Determine the effects of breathing cooled air during exercise on physiological, perceptual and subsequent performance responses. **METHODS:** Twelve trained male cyclists (age 26.5 ± 3.6 y, height 1.81 ± 0.05 m, body mass 73.5 ± 7.9 kg, body fat $13.7 \pm 7.0\%$, VO_{2max} 57.6 ± 7.9 ml/kg/min) completed three trials in an environmental chamber ($31^\circ C$, 55% RH) consisting of 75 min cycling at $59.1 \pm 4.8\%$ VO_{2max} , a performance 5 km time trial, and a 15 min cool down. Participants breathed on:off the CoreCooler device (water bottle providing cold air) at a low intermittent (LI) ratio of 1:4 min with inspired air temperature (T_{IA}) of $19.8 \pm 3.7^\circ C$, high intermittent (HI) ratio of 2.5:2.5 min (T_{IA} , $19.4 \pm 4.2^\circ C$), or control (CN) breathing warm air at 1:4 min (T_{IA} , $30.8 \pm 1.6^\circ C$) during cycling and cool down. Gastrointestinal temperature (T_{GI}), heart rate (HR), blood pressure (BP), perceived thirst, thermal sensation, and rating of perceived exertion (RPE) were collected every 15 min during cycling and every 5 min during performance and cool down. **RESULTS:** No differences were found in T_{GI} ($p = .827$), HR ($p = .363$), MAP ($p = .055$), Thirst ($p = .140$), RPE ($p = .056$) between conditions at any time points. The rate of rise in core temperature was not attenuated in LI ($0.014 \pm 0.005^\circ C/min$, $p = 1.00$) or HI ($0.008 \pm 0.005^\circ C/min$, $p = .10$) compared with CN ($0.013 \pm 0.005^\circ C/min$). Systolic BP was greater at 45 minutes of cycling in HI (193.8 ± 20.7 mmHg) versus CN (176.1 ± 15.6 mmHg, $p = .039$). Thermal sensation was lower in LI than CN at the end of performance (CN 6.7 ± 0.7 , LI 6.0 ± 0.7 , $p = .039$) and both LI (CN 4.3 ± 0.8 , LI 3.8 ± 0.7 , $p = .006$) and HI (HI 3.7 ± 0.7 , $p = .006$) were lower at the end of cool down. Performance times were not different following LI (23.7 ± 4.2 min, $p = .279$) or HI (23.6 ± 4.2 min, $p = .192$) compared to CN (24.6 ± 3.9 min). **CONCLUSION:** The utilization of the CoreCooler device at both LI and HI frequencies decreased thermal sensation, however no differences in physiological responses or performance were identified.

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13. HYDRATION HABITS DURING A RECREATIONAL MOUNTAIN BIKE RACE

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PURPOSE: to assess the hydration status and fluid intake during mountain bike race. **METHODS:** Thirteen healthy, recreational cyclists (82.1 ± 10.4 kg) competed a mountain bike race of 14, 29 or 43 km (1.9 ± 0.5 h) in temperate conditions (23.8°C and 71% relative humidity). Body weight and urine samples, thirst, and mouth dryness data were collected before and after the race. Thirst and mouth dryness were assessed via visual analog scales. Subjects were instructed to drink only from their bottles during the race. Fluid ingested was calculated based on the weight difference of their bottle before and after the race. The data were analyzed by paired t-test with JMP pro 11. **RESULTS:** Body weight loss after the race was $-1.7 \pm 1.1\%$. Sweat rate ranged from 0.9 to 2.4 L/h, with a mean sweat rate of 1.4 ± 0.4 L/h. Fluid intake ranged from 0.2 to 1.3 L/h, with a mean fluid intake of 0.6 ± 0.3 L/h. Thirst and dry mouth ratings increased after the race (thirst: 23 ± 13 mm, $p = 0.0001$; mouth dryness 37 ± 30 mm, $p = 0.002$). Before the race 23, 23, and 31% of subjects were hypohydrated, based on urine specific gravity (USG), urine osmolality (UOsm), and color, respectively. After the race 31, 15, and 85% of subjects were hypohydrated based on USG, UOsm and urine color, respectively. Urine osmolality after the race was not correlated with body weight loss during race ($R^2 = 0.10$, $p > 0.05$). **CONCLUSION:** Significant percent of dehydration was observed even in a recreational, short, mountain biking race in a temperate environment with access to fluids during exercise. Also urine hydration markers after exercise while drinking ad-libitum do not reflect changes in hydration state.

14. VALIDATING THE ÅSTRAND-RHYMING SUBMAXIMAL PROTOCOL FOR VO_2 MAX PREDICTION IN RECREATIONALLY ACTIVE INDIVIDUALS

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The Åstrand-Rhyming protocol has been used as a reliable and trusted assessment to predict VO_2 max for over 50 years. **PURPOSE:** The purpose of this study is to determine if the Åstrand-Rhyming protocol is still a valid test in assessment of VO_2 max using modern computerized gas analysis. **METHODS:** Eighteen (18) recreationally active individuals (14 male, 5 female) completed two VO_2 max trials (one predictive sub-maximal and one measured maximal). The first trial was predicted VO_2 max using the Åstrand-Rhyming submaximal protocol and the second trial included measurement of expired gases to determine VO_2 max using the Parvo Medics TrueOne Metabolic system. **RESULTS:** Subjects' mean age, height (cm), and weight (kg) were 19.8 ± 1.6 yrs, 178.1 ± 8.8 cm, and 77.6 ± 13.5 kg. The mean predicted VO_2 max using the Åstrand-Rhyming protocol was 39.1 ± 9.4 ml/kg/min. The mean measured VO_2 max using the Parvo Medics TrueOne Metabolic system was 40.4 ± 7.7 ml/kg/min. A two-tailed t-test revealed that the means were not significantly different. **CONCLUSION:** The data suggests the Åstrand-Rhyming protocol for VO_2 max prediction is valid for recreationally active males and females. Further research needs to be done on different populations and larger subject pools to confirm that the Åstrand-Rhyming protocol is valid for all populations in predicting VO_2 max.

15. SINGLE LEG SQUAT DATA AND VARIABLE CHANGES ON THE GLOBAL POPULATION HEALTH

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A single leg squat is a movement used to help determine a person's everyday function or mobility. Understanding the variables that change as performance increases could help healthcare professionals better understand what exercises are needed to help maintain function and mobility. **PURPOSE:** The purpose was to evaluate data on a large population for single leg squats to better understand what variables change and how they can affect global population health. **METHODS:** Data from three different locations, 4,571 left and right single leg squats were examined. Collection was performed using a marker-less motion capture system which allows for datasets to be combined. The subjects' squat depth was used to determine performance and based from there they were placed into one of four performance zones (0-25%, 25-50%, 50-75%, 75-100%) based off the population's mean (50%). Within zones, 18 variables were tracked. A MANOVA ($p < .01$) was used for statistics. **RESULTS:** Ankle, knee, and hip ROM were significantly different increasing in all groups along with the net joint torque also increasing

significantly at each level. The largest percent change between groups was ROM at the knees. Femoral internal rotation decreased (1-16.95°, 2- 14.99°, 3- 13.77°, 4- 11.28°) while tibial internal rotation increased (1- 4.21°, 2- 5.72°, 3- 7.36°, 4- 14.07°) as depth increased. Both were significant in all groups. Valgus angle had no significant difference in any group. Finally hip abduction increased with depth and was significantly different in all groups. **CONCLUSION:** It is known that ROM increases at the ankle, knee, and hip to attain a deeper squat. Furthermore, valgus angle did not change, and has no impact on performance which is contradictory to previous performance outcomes. However, with femoral rotation decreasing and tibial rotation increasing as depth increased, it should be noted that these variables do contribute to the control of performance and can be lost with valgus by the human eye. This study suggests that these variables should be used when designing a healthcare plan to increase squat depth for global population health. Further research should be done on this movement as well as other movement types for this application.

16. EFFECTS OF DYNAMIC FATIGUE ON MAXIMAL AND RAPID VELOCITY CAPACITIES OF THE LEG EXTENSORS IN COLLEGE-AGED MALES

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Declines in muscular strength and power are commonly reported post workout. However, few studies have investigated the influence of dynamic back squat protocols on maximal and rapid velocity characteristics post fatigue. **PURPOSE:** The purpose of this study was to examine the effects of a low-intensity, fast-velocity and a high-intensity, slow-velocity squat protocol on the post-exercise time course responses on maximal and rapid velocity characteristics of the leg extensor muscles. **METHODS:** Sixteen resistance-trained college-aged (age=22.0±2.6years) men performed 3 isokinetic maximal voluntary contractions (MVCs) of the knee extensors pre- and post-exercise at 0,7,15, and 30 (Post0,...30) minutes after performing either a low-intensity, fast-velocity (LIFV) (5×16 at 40% 1-repetition maximum), or a traditional high-intensity, slow-velocity (TISV) (5×8 at 80% 1-RM) back squat exercise protocol. Maximal and rapid velocity variables were assessed on an isokinetic dynamometer. Participants performed three leg extension maximal voluntary contractions (MVCs) at 240° s⁻¹ and at maximum unloaded velocity (Vmax). Vmax was calculated as the highest velocity attained during the unloaded MVC and RVD was the linear slope of the velocity-time curve for the 240° s⁻¹ (RVD240) and maximum unloaded velocity (RVD-Vmax) contractions. Three separate two-way (2×5) repeated measures ANOVAs (intensity [TISV vs. LIFV] × time [Pre vs. Post0 vs. Post7 vs. Post15 vs. Post30]) were used to analyze all RVD and Vmax variables. **RESULTS:** For RVD240, there was no interaction for intensity × time ($P=0.660$), but there was a main effect for time in which RVD was lower at Post0 ($P=0.001$), no main effect for intensity was present ($P=0.152$). For RVD500, there was no interaction for intensity × time ($P=0.544$), but there was a main effect for time and intensity ($P=0.024 - 0.047$) in which RVD500 was decreased at Post0- Post15 ($P=0.001-0.041$), and the TISV was affected greater than the LIFV. For Vmax, there was no significant interaction for intensity × time ($P=0.485$), nor main effect for intensity ($P=0.083$), but there was a main effect for time ($P=0.013$) in which Vmax was lower at all post fatigue time phases ($P=0.001-0.017$). **CONCLUSIONS:** These findings suggests a dynamic free-weight squat protocol affects Vmax more than the RVD. Additionally, RVD240 observed similar fatigue responses for both intensities, while RVD500 observed similar responses for time, but TISV was affected more than the LISV protocol.

17. COMPARISON OF MAXIMUM SUSTAINED ANAEROBIC POWER OUTPUT BETWEEN MEN'S BASKETBALL AND FOOTBALL

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INTRODUCTION: Athletes that compete in intense anaerobic bouts of exercise expend their energy at a rapid rate and exert a high level of anaerobic power. **PURPOSE:** The purpose of this study was to compare the maximum sustained anaerobic power output between collegiate football and men's basketball. **METHODS:** Sixteen NCAA Division II athletes were recruited to perform three vertical jumps, three broad jumps, and two 30-second Wingate tests. The Wingate test was used as a fatigue factor and for measuring sustained power output by the average watts per second produced. Three trials of vertical jump, broad jump and two Wingate tests were completed by all subjects

without rest between trials. The results were analyzed by measuring the average watts per second for Wingate and the average distance for broad jump and vertical jump and calculated decline from baseline tests. The scores were averaged for each test for each team and an average decrement or improvement was calculated to draw a conclusion. **RESULTS:** Results indicated basketball players maintained a higher sustained anaerobic output through two Wingate tests average decrease 22.5 W/s and 20.53 W/s vs Football 26.8W/s and 27.3W/s. Three jump attempts for both vertical and broad jumps were averaged. Basketball decrease was 2.5 inches and increased by 3.25 inches vs football decreased 4.1 in and 5.1 respectively. **CONCLUSION:** The hypothesis states that if you are a Division II collegiate football player then you will have a higher maximum sustained anaerobic power output than collegiate basketball players. The data did not support this hypothesis therefore suggesting that Division II men's basketball will sustain maximum power output longer than collegiate men's football.

18. EVALUATION OF VERTICAL JUMP TO BETTER UNDERSTAND POPULATION HEALTH APPLICATIONS

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The majority of lower limb movement studies consist of subject pools with small population sets that make large conclusions about a specific movement. Studies are needed which incorporate larger datasets that will provide a better understanding of a specific movement pattern to make more appropriate globalized conclusions. **PURPOSE:** The purpose was to investigate a large dataset of vertical jumps to better understand what variables impact performance. **METHODS:** Using data collected from three different sites, 2,110 vertical jumps were evaluated. Data collection was performed using a marker-less motion capture system which allows for datasets to be combined. The subjects' jump height was used to determine performance and they were placed into one of four performance zones (0-25%, 25-50%, 50-75%, 75-100%) based on the populations mean as 50%. Within these zones, 25 variables were tracked. Those groups were then statistically compared using MANOVA. **RESULTS:** Flexion angles during loading and joint torques produced during the concentric phase progressively increased as jump height increased. Knee loading angle and joint torques (1- Baseline, 2- +84%, 3- +115%, 4- +123%) had the largest percent change between groups. Loading and unloading time progressively decreased, rate of force development increased, ground reaction forces progressively increased at loading and unloading while force distribution between legs decreased (1- 22%, 2- 9%, 3- 6%, 4- 1%) as jump height increased. All variables listed above were significantly different ($p < .01$). **CONCLUSION:** Previous literature shows that increased loading angles yield a higher jump height, which was confirmed in this study. An underlying cause of increased jump height is not only the vertical displacement during loading, but the time elapsed during the loading phase. This decreased time also causes higher ground reaction forces. Increased GRF and rate of force development have also been shown to increase jump height, but the symmetry of the GRF and increased knee kinematics and kinetics have not been connected. With an increase in data size and tracked variables we believe this study design allows for more accurate information to be used to affect population health. Further research should be done on this movement as well as other movement types.

19. MATERNAL BODY COMPOSITION BUT NOT BMI IS RELATED TO INFANT BODY COMPOSITION AT SIX MONTHS

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INTRODUCTION: The rising prevalence of overweight and obesity in children has warranted a need to understand contributing factors to this trend. The fetal programming hypothesis suggests the maternal environment influences offspring obesity development. **PURPOSE:** The purpose was to explore the relationship between both maternal BMI (pre-pregnancy and at six months post-partum) and maternal body composition (percentage body fat (%fat), fat mass (FM) and fat free mass (FFM)) at six months post-partum in relation to infant body composition at six months of age. **METHODS:** Data from 30 mother-infant pairs were analyzed. Women were recruited during pregnancy and maternal pre-pregnancy BMI was calculated using a self-reported body weight and measured height while BMI at six months post-partum was calculated using measured body weight at six months. Maternal body composition was measured using the Bod Pod and infant body composition was measured using the Pea Pod. Pearson correlations were calculated between all variables of interest. **RESULTS:** Neither maternal BMI during pregnancy

or at six months was correlated to infant body composition. Maternal %fat was correlated to infant FM ($r=0.40$; $p=0.03$) while maternal FM trended to significance with infant FM ($r=0.32$; $p=0.08$). Maternal FFM was related to infant FFM ($r=0.423$; $p=0.02$). **CONCLUSION:** Neither maternal BMI measures were correlated to infant body composition at six months. Maternal body composition was related to infant body composition. Maternal body composition measured at 6 months post-partum may be a better predictor of infant body composition at six months of age.

20. HAND-GRIP STRENGTH: A PREDICTOR OF PERFORMANCE INDICIES IN FEMALE MASTERS CYCLISTS

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Hand-grip strength (HG) is a significant predictor of longitudinal functionality and mortality in aging populations. However, this only pertains to the general population of older adults and cannot necessarily be extrapolated to physical performance in masters athletes (MA). The ability to use HG to predict sport-related performance variables would be invaluable to MA as it would alleviate the need for specialized and often expensive testing procedures.

PURPOSE: Therefore, the purpose of this study was to evaluate HG as a predictor of power, torque, and ability to perform work in female MA cyclists. **METHODS:** Twenty-one female MA cyclists (age = 53.3 ± 1.0 years, height = 163.15 ± 1.59 cm, weight = 64.70 ± 2.92 kg) with a minimum of two years competitive cycling experience participated in this study. A hand-held dynamometer was used to assess HG. The dynamometer was sized to the athlete and was then squeezed maximally for 3 seconds. Three trials were performed with one minute rest allotted between trials. A lower-body isokinetic dynamometer was used to evaluate average power, peak torque, and total work performed using a 50-repetition protocol with 240° eccentric/ 180° concentric movement parameters.

RESULTS: Regression analysis revealed that HG was significantly related to measures of average power ($R^2 = .44$, $p = .001$), peak torque ($R^2 = .50$, $p = <.001$), and total work performed ($R^2 = .44$, $p = .001$) on the lower-body isokinetic dynamometer. **CONCLUSION:** Based on current results, we conclude that although HG can predict levels of functionality in aging individuals, these results can be expanded to predict measures of performance in MA. This indicates MA can potentially evaluate the success of training programs and progressions without the requirement of sophisticated and/or expensive laboratory testing procedures. Future research needs to be expanded to include males and other sports as these results are internally valid only to female MA cyclists.

21. THE EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) ON PERIPHERAL FATIGUE OF THE LEG EXTENSORS DURING A THORSTENSSON FATIGUE PROTOCOL

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Transcranial Direct Current Stimulation (tDCS) of the brain has been shown to have profound effects on many physiological and psychological processes, including effects on the autonomic nervous system and fatigue.

PURPOSE: The purpose of this study was to investigate the effects tDCS on parasympathetic and sympathetic nervous system modulation and their influence on a maximum effort fatiguing exercise protocol. **METHODS:** Twenty recreationally active subjects (10 male; 10 female) volunteered to participate in this study. Each individual visited the lab on four occasions. The first visit was a familiarization visit. Visits two through four consisted of a sham treatment, an anodal parasympathetic stimulation treatment, and an anodal sympathetic stimulation treatment, in random order. The subjects sat in a dark, quiet environment for 30-min while receiving the appropriate stimulation. The anode was placed on the T3 area, equidistant between the ear and the CZ point, while the cathode was placed on the contralateral side of the skull, just supraorbital. Following stimulation, the subject completed 50 maximum intensity isokinetic (Biodex medical Systems, Inc., Shirley, New York) leg extensions at an angular velocity of $180^\circ s^{-1}$, followed by passive flexion. Autonomic modulation was quantified using time and frequency domain indices of heart rate variability. The data were analyzed using 1x3 repeated measures ANOVAs.

RESULTS: For the heart rate variability data there were no significant effects for high frequency power ($F_{1,8,33,2} = 0.80$, $p = 0.44$, $\eta^2 = 0.04$), low frequency power ($F_{1,9,35,4} = 0.98$, $p = 0.38$, $\eta^2 = 0.05$), inter-beat interval ($F_{1,8,35,0} =$

0.58, $p = 0.55$, $\text{Eta}^2 = 0.03$), root mean square of successive differences ($F_{2.0,38.0} = 1.32$, $p = 0.28$, $\text{Eta}^2 = 0.07$), variance ($F_{2.0,38.0} = 1.69$, $p = 0.20$, $\text{Eta}^2 = 0.08$), or SD-1 ($F_{2.0,38.0} = 1.32$, $p = 0.28$, $\text{Eta}^2 = 0.07$). Likewise, there was no significant effect of tDCS on mean torque ($F_{2.0,37.5} = 0.73$, $p = 0.49$, $\text{Eta}^2 = 0.04$) or peak torque ($F_{2.0,38.0} = 0.22$, $p = 0.80$, $\text{Eta}^2 = 0.01$). **CONCLUSION:** In contrast to previously published studies, the results of this study showed no effects of tDCS on cardiovascular autonomic modulation or fatigue during high intensity exercise. Discrepancies between these results and other studies may be due to differences in stimulation protocol, brain area of stimulation, and/or exercise modality.

22. COMPREHENSIVE FITNESS ASSESSMENTS IN COLLEGE-AGED MALES AND FEMALES: INCIDENCE OF OVERWEIGHT, OBESITY, AND CARDIOVASCULAR RISK

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Fitness evaluations include a battery of comprehensive tests which exercise physiologists and health care providers can use to predict increased risk of developing hypertension, obesity and/or cardiovascular disease. **PURPOSE:** The purpose of this investigation was to determine the health-related fitness levels of college aged students (17-25 yrs) from 2010 to 2013 and to determine if either group revealed risk factors for future development of hypertension, obesity and/or cardiovascular disease. **METHODS:** College aged students ($n=2,028$; age 17 – 25yrs; males and females) participated in the investigation. Subjects performed the following tests: waist and hip measurements, body composition (Tanita Body Composition Analyzer); muscular strength (hydraulic hand dynamometer); muscular endurance (standard sit-ups and push-ups); and flexibility (sit-and-reach test). Based on data gathered, waist-to-hip ratio (WHR) and body mass index (BMI) were calculated. Statistical analysis of data was performed using SPSS 20. **RESULTS:** There was a significant difference between males and females for all measurements. Therefore, data was divided into sub-groups for further analysis based on age (17-19yrs and 20-25yrs). Males demonstrated a significant difference between 17-19yrs and 20-25yrs, respectively, in: weight (83.2 ± 18.6 vs 85.7 ± 19.2 kg), percent body fat (14.9 ± 8.5 vs 17.1 ± 9.6 %), WHR (0.86 ± 0.07 vs 0.88 ± 0.07), BMI (25.0 ± 5.3 vs 26.3 ± 5.8 kg·m⁻²), diastolic blood pressure (75.9 ± 9.6 vs 77.9 ± 9.7 mmHg), waist measurement (33.9 ± 4.9 vs 35.1 ± 5.4 in.), and hip measurements (39.3 ± 4.1 vs 39.9 ± 4.2 in.). Females demonstrated a significant difference between 17-19yrs and 20-25yrs, respectively, in: weight (67.1 ± 16.1 vs 70.1 ± 19.4 kg), percent body fat (27.4 ± 9.2 vs 29.7 ± 10.3 %), BMI (24.4 ± 5.7 vs 25.6 ± 7.1 kg·m⁻²), push-ups (15.0 ± 9.8 vs 13.2 ± 9.6), waist measurement (31.6 ± 5.4 vs 32.4 ± 6.1 in.), and hip measurements (38.3 ± 4.9 vs 39.4 ± 5.6 in.). As well, when raw data were analyzed, we discovered that 34.3% of females and 43.6% of males included in this investigation were overweight or obese. **CONCLUSION:** The primary findings from this investigation demonstrate that as college-age males and females age: 1) they become more predisposed to and have increased risk factors for the development of hypertension, obesity, and/or cardiovascular disease, and 2) their muscular strength and endurance, as well as flexibility remain unchanged or decrease. Based on these conclusions, the overall physical condition and health-related behaviors of this population need to be addressed to ensure a healthy existence following the collegiate years.

*Authors contributed equally to the project.

23. 60 MINUTES OF MODERATE-INTENSITY WALKING IMPROVES FASTING INSULIN SENSITIVITY IN OVERWEIGHT NON-DIABETIC MEN

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Insulin resistance is associated with inflammation and both are thought to be precursors to type 2 diabetes and cardiovascular disease. Acute exercise can transiently attenuate insulin resistance and reduce systemic inflammation, however, the necessary exercise dose to produce improvements in inactive, non-insulin-resistant individuals is unclear. **PURPOSE:** The purpose of this study was to determine the exercise dose required to improve insulin sensitivity and inflammation in non-diabetic overweight men. We expected to see a dose-response relationship between exercise duration and insulin sensitivity and an association between insulin sensitivity and systemic inflammation. **METHODS:** In a randomized cross-over design, 11 inactive overweight men (BMI = 25-35 kg/m²) completed three trials: two exercise trials (brisk walk on a treadmill at 60% peak oxygen uptake [VO_{2peak}] for 30 and 60 minutes; EX30 and EX60, respectively) and a control trial (60 minutes of passive activity; CON). Following a 12-hour overnight fast, a 10 mL blood sample was taken via indwelling catheter. Metabolic and inflammatory markers collected in the sample included plasma glucose, insulin, C-peptide, IL-6, IL-4, IL-10, IL-1ra, and TNF-alpha. Insulin resistance was determined via homeostatic model assessment (HOMA-IR). **RESULTS:** All individual values in CON were normal with regard to HOMA-IR (<2.2), C-peptide (0.4-2.1 ng/mL), and insulin (<174 pmol/L), while two subjects presented with abnormal fasting glucose (>100 mg/dL). HOMA-IR was significantly lower following EX60 (0.58 ± 0.30) compared to CON (1.48 ± 1.12; p<0.05). HOMA-IR for EX30 (0.75 ± 0.38) was not different (p>0.05) compared to CON or EX60. Plasma insulin was significantly lower after EX30 (3.85 ± 2.41 mU/L; p<0.05) and EX60 (3.60 ± 2.03 mU/L; p<0.05) compared to CON (6.95 ± 4.23 mU/L). There were no differences (p>0.05) between trials for plasma glucose (CON: 5.21 ± 0.32; EX30: 5.03 ± 0.32; EX60: 4.86 ± 0.46 mmol/L). C-peptide was higher in CON (704.0 ± 497.8 pg/mL) compared to EX30 (399.7 ± 155.0 pg/mL; p<0.05) and EX60 (342.6 ± 177.5 pg/mL; p<0.05). There were no significant differences (p>0.05) between trials for IL-6, IL-4, IL-10, IL-1ra, or TNF-alpha. **CONCLUSION:** Thirty minutes of moderate-intensity walking was insufficient to improve insulin sensitivity twelve hours after exercise in a group of overweight, non-diabetic men. Sixty minutes of moderate-intensity activity, however, was effective in improving insulin sensitivity, but had no effect on markers of systemic inflammation.

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24. EFFECTS OF A 14-WEEK HIGH VELOCITY RESISTANCE TRAINING PROGRAM ON BODY COMPOSITION AMONG OLDER ADULTS: A PILOT STUDY

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Previous studies have shown resistance training programs to reduce total body fat mass. **PURPOSE:** The purpose of this study was to evaluate the effects of a high-velocity resistance-training program at two different intensities on body composition of older adults. **METHODS:** The participants of this 14-week pilot study consisted of eight adults over the age of 65. The researchers measured lean tissue mass, fat mass, and total body mass using dual-energy x-ray absorptiometry (DXA) before and after the 14-week training period. Participants were randomly separated into two groups: 30% and 60% of 1 repetition maximum (RM). The training protocol consisted of exercising two days per week, completing eight exercises for three sets of eight repetitions at high velocities. The subjects were instructed to lift the weight as quickly as possible then lower it over 2-3 seconds. **RESULTS:** A two-way repeated measures ANOVA was used to analyze the results. A significant group-by-time interaction was observed for lean tissue mass (p=0.05). The increase in lean tissue mass in the 30% 1RM group approached significance (p=0.06) while a non-significant decrease in lean tissue mass was observed in the 60% 1RM group (p=0.24). No significant changes were observed in fat mass (p=0.43) or total mass (p=0.10). **CONCLUSION:** Researchers concluded that a 14-week community based high-velocity resistance-training program using 30% and

60% of 1RM is sufficient enough to produce significant changes in lean tissue. Future studies should use a larger sample size as well as utilize a broader range of intensities to observe changes in body composition.

25. HIGH POWER RESISTANCE EXERCISE OVER-REACHING CAN BE MONITORED WITH A TRAINING QUESTIONNAIRE

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Overtraining resulting in long-term performance decrements due to high intensity resistance exercise is associated with changes in daily training questionnaires (Fry et al. 1994, 2006). A lesser form of overtraining that can be part of a planned training program is called over-reaching (OR) and results in performance decrements lasting just a few days to a few weeks. **PURPOSE:** To determine if a daily training questionnaire can determine the onset of over-reaching due to high power resistance exercise. **METHODS:** As part of a larger study on dietary supplementation, weight trained males (n=17; X±SD; age=22.8±3.3 yrs) were divided into OR+supplement (SUP; n=8), OR+placebo (PL; n=3), or control (CON; n=6) groups. Both OR groups performed 15 training sessions over 7.5 days, performing 10 x 5 speed squats at 70% BW+1 repetition maximum (RM) each session. Each training and testing session included a questionnaire (Fry et al. 2000) to determine perceptions of soreness, joint discomfort, and motivation to exercise. An abridged version of the Profile of Mood States (POMS) survey instrument was also administered (Myers & Whelan 1998), as well as a questionnaire to determine sleep patterns and other training related variables. **RESULTS:** Vol.-load (reps x wgt) for the OR groups was >28-fold greater than for CON during the OR phase (both OR groups > 146·10³ kg; Con=5.1·10³ kg). Overreaching occurred for both SUP & PL groups as indicated by lower bar velocity at 70% 1 RM at post OR, but was recovered after 1 week. Both OR groups decreased perceptions of recovery >45% during the 15 training sessions (p<.05). The PL group expressed >22% less desire to train during the first 8 training sessions compared to the S group (p<.05). Perceptions of leg and hip soreness for both OR groups was sig. increased as well. Perceptions of difficulty for the OR training sessions sig. increased for both OR groups. No differences were reported in sleep variables (p>.05). No measure from the abridged POMS sig. changed (p>.05). **CONCLUSIONS:** Use of a previously validated overtraining questionnaire appears to be valid for monitoring resistance exercise overreaching as well.

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26. THE LONGITUDINAL EFFECTS OF BETA-ALANINE SUPPLEMENTATION ON TIME TO EXHAUSTION AND LOWER-BODY ISOMETRIC TORQUE IN MASTERS FEMALE CYCLISTS

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Longitudinal supplementation of beta-alanine (BA) increases exercise performance presumably due to increases in the intramuscular pH buffer, carnosine. With regards to BA supplementation, females are more sensitive to carnosine increases and these results are further pronounced in trained muscle. Taking into account the fact that baseline intramuscular carnosine levels also naturally decrease with age, trained, older females may experience the most significant benefits from BA supplementation. However, the effects of BA on exercise performance in female masters athletes (MA) are unknown. **PURPOSE:** The purpose of this study was to examine the longitudinal effects of BA supplementation on cycling time to exhaustion (TTE) and lower-body isometric torque (ISO_{1q}) in female MA cyclists. **METHODS:** Sixteen female MA (age = 53.8 ± 1.5 years, height = 162.63 ± 2.74 cm, weight = 64.39 ± 5.29 kg) with a minimum of 2-years competitive cycling experience participated in this double-blind, randomized study. Participants were randomized into two groups (PLA = 8g dextrose; BA = 800mg + 8g dextrose) before completing TTE evaluation at 120% of pre-determined VO_{2peak} values, and dominant leg ISO_{1q}. Participants supplemented 4 times/day over 4 weeks. TTE and ISO were reevaluated each week over the 4-week intervention. **RESULTS:** There were no initial significant differences between groups for demographic, TTE, or ISO_{1q} variables (p > 0.05). Two-way repeated measures ANOVA revealed that after 4 weeks of BA supplementation, TTE was significantly increased in the BA group compared to PLA (p < 0.05). Univariate analyses indicated that at week 4, participants consuming BA performed significantly better (24% increase from baseline) during TTE compared to PLA (p < 0.01). No differences were observed for TTE during the other intermittent weeks. When comparing ISO_{1q},

no significant differences existed at any time point between the two groups ($p > 0.05$). **CONCLUSION:** Four-weeks of BA supplementation increased cycling TTE in female MA with no effects on lower-body ISO_{1q} . As significant results were not observed until the 4-week time-point, this indicates BA must be loaded a minimum of 4 weeks for positive results to be observed in older, trained females although they may experience more sensitive responses with regards to increases in intramuscular carnosine bioavailability. Future research directions should evaluate the mechanistic properties influencing these positive increases in performance as carnosine concentrations can only be evaluated via muscle biopsy analysis or proton magnetic resonance spectroscopy.

27. PHYSICAL ACTIVITY, BODY WEIGHT AND HYDRATION STATUS

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Proper hydration and fluid replacement are important for optimal health and exercise performance. Higher levels of physical activity requires increased fluid intake due to increased water losses via sweating. However, there is little research on the effect of physical activity on hydration status in free-living conditions. **PURPOSE:** To determine the relationship between hydration status, physical activity, and body weight. **METHODS:** This study involved 9 visits to the Human Performance Laboratory over 22 days. Body weight and urine measurements were taken at all visits. Physical activity was assessed by the International Physical Activity Questionnaire (IPAQ) and hydration status by plasma osmolality (POsm), urine osmolality (UOsm), urine specific gravity (USG), and urine color (UC). From the IPAQ subjects were classified as low, moderate and high physical activity levels and the total amount of physical activity was expressed as $MET \cdot \text{min} \cdot \text{w}^{-1}$. All values represent means across 22 days of measurements except physical activity, which was a mean of three measurements. Participants were excluded if they exercised more than 4 hours a week or if they were on medications that effected fluid balance. One-way analysis of variance was computed to determine differences in hydration status between groups. Additionally, 2-tailed Pearson correlations were computed to determine relationships between all study measurements while using physical activity as a continuous variable (i.e., $\text{met} \cdot \text{min} \cdot \text{w}^{-1}$). **RESULTS:** 44 participants (23 males, 32 ± 11 y, 1.70 ± 0.07 m, 28.7 ± 12.0 %BF 25.7 ± 6.5 $\text{kg} \cdot \text{m}^{-2}$) completed the study; $n = 7$ for low activity ($1,021 \pm 451$ $MET \cdot \text{min} \cdot \text{w}^{-1}$), $n = 30$ for moderate activity ($1,322 \pm 489$ $MET \cdot \text{min} \cdot \text{w}^{-1}$), $n = 7$ for high activity ($4,172 \pm 1,675$ $MET \cdot \text{min} \cdot \text{w}^{-1}$). Hydration status did not differ across all levels of physical activity; UOsm: 736 ± 150 , 659 ± 187 , 538 ± 286 ; POsm: 287 ± 3 , 287 ± 4 , 287 ± 4 ; USG: 1.019 ± 0.005 , 1.017 ± 0.005 , 1.014 ± 0.008 ; and UC: 3.3 ± 0.6 , 3.2 ± 0.6 , 2.6 ± 0.8 , for low, moderate, and high physical activity levels, respectively (all $p \geq 0.091$). Average body weight was significantly correlated with UOsm ($R = 0.439$, $p = 0.003$) and USG ($R = 0.375$, $p = 0.012$) but not POsm ($R = 0.055$, $p = 0.723$). Lastly, body weight was significantly correlated with physical activity $MET \cdot \text{min} \cdot \text{w}^{-1}$ ($R = 0.325$, $p = 0.031$). **CONCLUSION:** No significant differences in hydration status were observed across groups. However, the small numbers of participants in the low and high physical activity levels may have made this comparison difficult. The results show that weight is associated with hydration status and physical activity.

28. COMPARISON OF DIFFERENT LEG PRESS EXERCISE VOLUMES ON THE AKT/MTOR SIGNALING PATHWAY

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PURPOSE: To better understand the types of resistance training protocols that are most beneficial to stimulate muscle hypertrophy, we examined the difference between a single set (SS) of resistance exercise to multiple sets (MS) of resistance exercise on the Akt/mTOR signaling pathway and on the gene expression of insulin-like growth factor-1 (*IGF-1*) and the receptor for IGF-1 (*IGF-1R*). **METHODS:** For this study, sixteen healthy males were divided in to two groups of eight. Subjects in each group received three biopsies: 1) baseline, prior to exercise; 2) 15-minutes post exercise; and 3) 180 minutes post exercise. Subjects in the SS group performed one set of leg press exercise at 80% of their predetermined 1RM to volitional fatigue. Subjects in the MS group performed 2 sets of 10 repetitions and one set to volitional fatigue at 80% of their predetermined 1RM, with 3 minutes of rest between each set. **RESULTS:** There were no differences between groups in the concentration of Akt signaling proteins. Furthermore, there was no difference in *IGF-1* expression. However, there was a greater increase in *IGF-1R*

expression in the SS group compared to the MS group 180 minutes post-exercise. **CONCLUSIONS:** These data indicate that exercise volume may not alter signals associated protein synthesis in recreationally trained individuals.

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29. ABERRANT REGULATION OF MITOCHONDRIAL BIOGENESIS AND CONTENT FOLLOWING LIFESTYLE PHYSICAL ACTIVITY IN WESTERN DIET FED MICE

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The purpose of this study was to examine the gene expressions *Cox4* and *Pgc-1 α* in mice. By looking at these genetic markers we are able to investigate the regulation of biogenesis and mitochondrial quantity affected by aerobic exercise and obesity. **PURPOSE:** To examine the mitochondrial quantity and the regulation of mitochondria biogenesis in obese and lean controls after aerobic exercise. **METHODS:** Forty C57BL6/J male mice beginning at eight weeks of age were separated into two categories twenty on normal chow (NC) and twenty on Western diet (WD, 42% kcal by fat plus 1.5g/kg cholesterol). After four weeks of diet, ten mice from each diet group were allowed physical activity by voluntary wheel running (VWR), while the remaining ten were kept sedentary (SED). Following four weeks of exercise or sedentary lifestyles the mice were euthanized, and mixed fiber gastrocnemius muscles were removed and immediately frozen in liquid nitrogen. The muscle samples were homogenized and RNA isolated, cDNA synthesized, and finally, analyzed for *Cox4* and *Pgc1 α* gene expressions via Real Time PCR. Data were analyzed by 2X2 ANOVA (diet [NC vs. WD] X activity [SED vs. VWR]) with α set at $P < 0.05$. **RESULTS:** *Pgc-1 α* was significantly elevated ($P < 0.05$) in NC VWR, WD SED and WD VWR groups compared to NC SED; relative levels of *Pgc-1 α* were 1 ± 0.45 , 1.64 ± 0.35 , 1.40 ± 0.40 , and 1.49 ± 0.25 for NC SED, NC VWR, WD SED, and WD VWR, respectively. *Cox4* was significantly elevated ($P < 0.05$) by VWR and diet independent of one another, relative levels were 1.00 ± 0.48 , 1.82 ± 1.08 , 1.77 ± 0.61 , 2.27 ± 0.58 for NC SED, NC VWR, WD SED, and WD VWR, respectively. **CONCLUSION:** The body's natural response to exercise is to induce mitochondrial biogenesis, which is shown with *Pgc-1 α* , ultimately improving metabolic health. We see an increase in *Pgc-1 α* gene expression with exercise in NC mice. While WD mice show already increased *Pgc-1 α* gene expression with diet only. *Cox4* gene expression was elevated by WD and increased following training regardless of diet. These data demonstrate aberrant mitochondrial biogenesis and content regulation following WD.

30. THE ACUTE EFFECTS OF A BALLISTIC AND HEAVY EXERCISE ON VERTICAL JUMP PERFORMANCE

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Post-activation potentiation (PAP) refers to the enhancement of muscular performance characteristics as a result of their contractile history. PAP may be elicited at an earlier time interval following ballistic exercise compared to heavy exercise. **PURPOSE:** The purpose of this study was to compare the temporal effects of a jump squat and back squat protocol on vertical jump performance. **METHODS:** Fourteen resistance-trained men (mean \pm SD: age = 22 ± 2.1 yrs., body mass = 86.29 ± 9.95 kg, height = 175.39 ± 9.34 cm, back squat 1-RM = 173.05 ± 24.61 kg) with an average relative full squat of 2.02 ± 0.28 times their body mass participated in this study. In randomized, counter-balanced order subjects performed two countermovement vertical jumps (CMVJs) before and 1 min, 3 min, 5 min, and 10 min after either performing 10 rapid jump squats or 5 heavy back squats. Each subject visited the laboratory on 3 occasions; one familiarization session which comprised 1-RM testing, followed by two testing sessions, separated by at least 72 hours. The back squat protocol (BS) consisted of one set of 5 parallel back squats at 80% 1-RM, whereas the jump squat protocol (JS) consisted of one set of 10 jump squats at 20% 1-RM. Peak jump height (in) using a jump mat, along with power output (W) and velocity (m/s) via a linear transducer were recorded for each time interval. **RESULTS:** There was no significant condition \times time interaction for any of the dependent

variables ($p = 0.066-0.127$). There was no main effect of time for any of the dependent variables for the JS ($p = 0.159-0.283$) or BS ($p = 0.119-0.121$), except for jump height which was significantly lower at 1 min post BS compared to baseline ($p = 0.014$). **CONCLUSION:** Neither the JS nor BS induced PAP during the CMVJ. The BS significantly impaired CMVJ height at 1 min post (-3.74%), while the JS tended to have an insignificant positive effect (0.13-0.65%) during early time intervals (i.e., 1-5 min). Future research should investigate the effectiveness of other ballistic exercises to produce PAP at early time intervals.

31. HYDRATION BIOMARKERS AS PREDICTORS OF CHANGE IN BODY WATER STATUS

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Changes in body water status can be measured by change in body weight and changes in blood or urine concentration. Active dehydration drives urine and blood concentration to shift in parallel. However, the relationship between these two variables may differ during normal daily living when active dehydration is not occurring. **PURPOSE:** The purpose of this research was to define the relationship between plasma and urine osmolality (POsmo, UOsmo, respectively) and to compare the accuracy of plasma osmolality in predicting hypohydration (urine osmolality $>700\text{mosm}$) as an indicator of body water status. **METHODS:** Forty-three healthy, but not athletic ($<4\text{h}$ of physical activity per week) adults (22 males, 21 females; age, 31.8 ± 10.9 y; height, 1.71 ± 0.08 m; body mass, 74.4 ± 18.5 kg; body fat, $28.1\pm 11.6\%$) provided morning urine samples, recorded body mass and provided blood samples on two separate occasions a week apart. The urine and plasma osmolality of the samples as well as the recorded body masses from two visits were evaluated by linear regression and receiver operator characteristic (ROC) analysis to determine predictive accuracy of hypohydration based on urine osmolality (≥ 700 $\text{mmol}\cdot\text{kg}^{-1}$). **RESULTS:** Urine osmolality was weakly related to plasma osmolality on the second visit ($F[1,41] = 4.716$, $p=0.038$, $R^2=0.103$), but not during the first ($F[1,41] = 0.015$, $p=0.905$, $R^2<0.001$). ROC analysis showed that plasma osmolality had an accuracy of predicting hypohydration based on UOsmo of 53% on 1st visit (cut off point 289 $\text{mmol}\cdot\text{kg}^{-1}$, sensitivity: 0.33, and specificity: 0.84), and 64% on second visit (cut-off point: 287 $\text{mmol}\cdot\text{kg}^{-1}$, sensitivity: 0.638, and specificity: 0.65). **CONCLUSIONS:** Plasma osmolality was weakly related to urine osmolality, while plasma osmolality had limited diagnostic ability of detecting hypohydration in free-living non-athletic individuals. Future research should seek to continue to identify markers related to sub-optimal hydration state outside of athletics.

32. THE EFFECT OF ENERGY SHOTS ON HAND STEADINESS AND REACTION TIME

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Energy drinks (EDs) and energy shots (ES) have become popular because they are purported to promote vitality, energy, and enhanced physical performance. **PURPOSE:** The purpose of this study was to assess the effect of a commercial energy shot on hand steadiness and reaction time. **METHODS:** Following IRB approval, 14 college-aged males and 18 females were tested for hand steadiness by holding a stylus in three descending diameter holes (7.92mm, 4.75mm, 2.77mm) for 20s each with a 30s rest between sets. Frequency of stylus to edge hits were measured and recorded. Reaction time was measured using a computerized program. The task included pressing the mouse button at the instance a light switched from red to green. Five trials of five repetitions were given to each subject. Following pre-testing subjects were randomly divided into an experimental group and a control group. The experimental group was given a commercial ES (57 ml) and the control was given a placebo. Following 30 min of inactive resting subjects were tested again. **RESULTS:** One way ANOVAs indicated that the ES group scored significantly ($p<0.05$) poorer on the smallest diameter hand steadiness test than the control group. The ES group scored significantly ($p<0.05$) better on the reaction time tests. **CONCLUSION:** It is possible that reaction time improvement could be beneficial in sports that require quick, reflexive movement. However, the potential adverse psychological and physiological effects warrant discretionary use of such products.

33. BEET THE HEAT – DIETARY NITRATE AND ACUTE HEAT STRESS

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Beetroot juice supplementation (BRJ) is touted to improve performance during scripted exercise [1]. Reported effect amongst others is reduced oxygen consumption while performing a given workload, ultimately suggesting an increase in overall exercise efficiency [1,2,3]. **PURPOSE:** This study investigated whether BRJ (140ml, 8.4mmol NO₃⁻) can reduce the physiological strain associated with performing a 45 minutes simulated military desert march. **METHODS:** Ten healthy non-acclimated males (Age: 24 ± 1 yrs; Body fat: 13.3 ± 1.7%; VO_{2max}: 51.3 ± 1.5 ml/kg/min⁻¹) supplemented with either BRJ (~4.2 mmol NO₃⁻ / 70 ml) or PL (0.4mmol/ NO₃⁻ / 70 ml) utilizing a randomized, double-blind crossover design. After a familiarization trial at ambient temperature (~22° C/30% RH), subjects entered two six-day supplementation periods, each concluded by a 45 min simulated military march (3mph/1% incline, summer uniform [MOPP gear], body armor [6.8kg], and loaded back pack [13.6kg]) in a hot environment (~41° C / 15% RH). Plasma nitrate concentration was assessed at onset and termination of each march. Oxygen consumption (VO₂), carbon dioxide production (VCO₂), ventilation (VE), respiratory quotient (RQ), oxygen saturation (SPO₂), heart rate (HR), rectal (T_{Core}) and skin temperature (T_{Skin}) were measured at 5min intervals. Alongside, standardized scales were employed to measure ratings of perceived exertion (RPE), thermal sensation, and generalized discomfort. Mean body temperature (T_{Body})_[4], and physiological strain index (PSI)_[5] were calculated. A 2-factor [Time*Condition] repeated measures ANOVA was used to discern differences between groups. Significance was set at p ≤ 0.05 and Tukey post hoc were used where appropriate. **RESULTS:** Plasma nitrate content increased during the BRJ condition. Despite RQ there were no significant differences between conditions for all indirect calorimetric and physiological variables. **CONCLUSION:** 6 day BRJ supplementation showed no improvement of thermodynamic efficiency when performing a loaded battle march in hot climatic conditions. The demographics of this cohort exactly emulated those of US military recruits; gear and workload replicated US Army standard operating procedures, and the climatic conditions of desert deployment. As such, data do not suggest BRJ would benefit soldiers in avoidance of exertional heat illness.

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34. BLOOD GLUCOSE KINETICS ARE RELATED TO HYDRATION STATUS IN MEN WITH TYPE II DIABETES MELLITUS

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Daily total water intake (TWI) has been linked to a number of chronic diseases, such as urolithiasis and chronic kidney disease. Additionally, epidemiological and animal model data have tied low TWI to impaired blood glucose regulation. However, the effect of a fluid intake intervention on blood glucose regulation has not yet been observed in humans. **PURPOSE:** Thus, the purpose of the current investigation was to determine if the response to an oral glucose tolerance test (OGTT) was altered by manipulation of hydration status in people with diabetes.

METHODS: Nine men (53±9 y, 94.9± 23.8 kg, 1.75± 0.11 m, 30.0± 4.3 m²·kg⁻², 31.5± 6.5 %BF) who had previously been diagnosed with type II diabetes mellitus (T2DM) (hemoglobin A1C; 6.8±0.9 %) were recruited to take part. Participants completed two OGTTs in a euhydrated and hypohydrated state one week apart in a counterbalanced order. Euhydration was achieved by standard water prescription in line with the dietary reference intakes for water, and hypohydration was achieved through progressive water restriction over three days leading up to the OGTT. Blood samples were taken at time points 0, 15, 30, 45, 60, 90, and 120 min of the OGTT. **RESULTS:** The changes in TWI in the three days before each trial resulted in significantly lower body mass (-1.5±1.5 kg; p = 0.017) and increased urine specific gravity (0.017±0.009; p = 0.001), and plasma osmolality (10±8 mmol·kg⁻¹).

Repeated measures analysis of variance identified a main effect of condition for blood glucose concentration F[1,48]

= 10.772, $p = 0.011$, but not for insulin concentration $F[1,48] = .657$, $p = 0.441$. **CONCLUSION:** Hypohydration elicits an acute, negative effect on the blood glucose response to OGTT in men with T2DM. Although, blood insulin did not change, blood glucose was reduced during the euhydrated trial. This suggests that inadequate TWI hindered insulin sensitivity. Future research should aim to establish if longer periods of fluid restriction result in larger disturbances to blood glucose regulation.

35. THE MEASUREMENT OF BODY COMPOSITION: BEST PRACTICES, PRACTICES IN THE FIELD, AND PROFESSIONAL DISPOSITIONS

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The measurement of body composition is integral to assessing fitness and included in professional competencies outlined by the American College of Sports Medicine and the National Strength and Conditioning Association. Thus, it is incumbent on faculty/programs in exercise science to provide students with experiences to promote the knowledge, skills, and dispositions to assess body composition. While it is customary to include content knowledge and some skills practice in courses like Physiology of Exercise, reflection on dispositions may occur less frequently. **PURPOSE:** The purpose of this study was to address dispositions while reviewing skills for assessing girths and skinfolds. Specifically, students explored the consequences of using techniques for measuring girths and skinfolds that do not comply with approved methods (e.g., measuring over clothing and subtracting the estimated thickness of the clothing and altered limb positioning). **METHODS:** Students reviewed techniques for assessing height, weight, circumferences, and skinfolds that they had previously practiced in other courses and also discussed techniques to promote subject comfort and measurement accuracy. After measuring girths and skinfolds using techniques consistent with those illustrated in their text book, students used specified non-conforming techniques for chest, waist, hip, and thigh girths and for chest, thigh, abdomen, triceps, suprailium, and subscapula skinfolds. They reflected on differences in laboratory reports and discussed professional options for dealing with situations in student and employee roles during which they could feel pressured to use methods that do not conform with best practices. **RESULTS:** Twenty-six students gave informed consent for their data to be included in the analysis. Difference scores (approved minus non-conforming) were calculated for girths, skinfolds, body density, and percent fat. 71.9% of the difference scores were lower for unapproved techniques and 25.3% were higher. Mean girth difference was 0.4 ± 1.08 inches. Mean skinfold difference was -1.63 ± 4.83 mm. **CONCLUSION:** The activity provided students with a concrete understanding of the importance of using measurement techniques associated with best practices. Additionally, their awareness of challenges they may experience in the field was enhanced. A deliberate incorporation of dispositions as well as content knowledge and skills is suggested for classroom activities.

36. DOES MODERATE INTENSITY EXERCISE ATTENUATE THE POST-PRANDIAL LIPEMIC AND AIRWAY INFLAMMATORY RESPONSE TO A HIGH FAT MEAL?

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Purpose: Recent reports suggest that a single high-fat meal (HFM) leads to increased airway and systemic inflammatory markers and triglycerides. However, an acute bout of exercise in the post prandial period has anti-inflammatory and lipid lowering effects. The purpose of this research was to investigate whether an acute bout of moderate intensity physical activity post-HFM would attenuate post prandial lipemia (PPL) and protect against airway inflammation in active individuals. We hypothesized that an acute bout of exercise would attenuate the increase in PPL and airway inflammation after a HFM. **Methods:** Twenty healthy, physically active college-aged participants (13M/7F) completed the study. Subjects were required to undergo DEXA scans, pulmonary function testing and performed an incremental exercise test to exhaustion to determine VO_{2peak} . On the second visit, subjects were randomly assigned to a sedentary condition (CON) ($n=10$, 7M/3F) or moderate-intensity exercise bout (~30-45 min) that expended half of the total calories from the meal (EX; 60% VO_{2peak}) ($n=10$, 6M/4F) 45 minutes after consuming the HFM (63% fat, 10kcal/kg of bodyweight). Blood lipids and airway inflammation measured via exhaled nitric oxide (eNO) were assessed at baseline, 2 hr and 4 hr post-HFM. Sputum differential cell counts were

done to assess airway inflammation at baseline and 4 hr post-HFM. **Results:** Baseline triglycerides (CON= 66.4 ± 34.7 mg/dL; EX= 58.9 ± 20.5 mg/dL) and eNO (CON= 14.3 ± 5.9 ppb; EX= 18.6 ± 9.84 ppb) were not significantly different between conditions ($p>0.05$). Triglycerides increased significantly in the CON 2 hr (~54%, $p=0.018$) and 4 hr (~107%; $p=0.018$) post-HFM and in the EX condition 2 hr (~66%; $p=0.003$) and 4 hr (~119%; $p=0.004$) post-HFM. Exhaled nitric oxide did not significantly increase in the CON 2 hr or 4 hr post-HFM (~17%; $p=0.208$; ~2%, $p=0.763$, respectively) or the EX condition (2 hr= ~10%; $p=0.064$; 4 hr= ~12%; $p=0.167$). Percentage of neutrophils and eosinophils significantly increased ($p<0.05$) 4 hours post-HFM, but did not differ between EX and CON. Independent samples t-tests indicate the EX condition did not attenuate PPL or airway inflammation when compared to CON. **Conclusion:** These preliminary results indicate an acute bout of moderate intensity exercise does not attenuate postprandial airway inflammation or lipemia following a HFM in physically active subjects. However, a novel finding is that active subjects show pulmonary neutrophilia 4 hours after a high fat meal, independent of increases in exhaled nitric oxide or triglycerides

37. DIFFERENTIAL RESPONSES OF SKELETAL MUSCLE MICRORNAs TO RESISTANCE EXERCISE TRAINING IN DIABETES

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MicroRNAs are an emerging post-transcriptional modifier of protein expression. Some microRNAs are tissue specific including miRNA-1, -133, and -206, which are skeletal muscle specific. Skeletal muscle protein synthesis and metabolic health are vital in situations of atrophy and insulin resistance as seen with sarcopenic obesity and type II diabetes, respectively. **PURPOSE:** The purpose of this study was to investigate the changes in muscle specific microRNAs in healthy and diabetic rats and their responses to resistance exercise training (RE) **METHODS:** Zucker rats (16 healthy, 14 diabetic) were sedentary (sed, 8 healthy, 6 diabetic) subjected to a RE protocol (8 healthy, 8 diabetic) involving a high-volume, weighted squat-jump-like movement. After 4 progressive bouts, animals were euthanized and gastrocnemius muscles were removed and later processed for microRNA and mRNA gene targets, various protein contents and protein fractional synthetic rates (FSR). Data were analyzed by 2X2 ANOVA (phenotype [healthy vs diabetic] vs. exercise [sed vs. RE]), correlations were assessed using Pearson's product moment, $\alpha = 0.05$. **RESULTS:** miRNA-1 significantly increased in the diabetic condition ~4-fold ($p<0.05$) with differential responses to RE (no change in healthy vs. ~10-fold in diabetic; $p<0.05$) compared to healthy sed. In healthy groups, no difference was seen with RE on miRNA-133a levels while in the diabetic phenotype miRNA-133a content in RE was 113% greater than sed ($p<0.05$). Compared to healthy sed, miR-133b was about 45% lower in healthy RE, diabetic sed, and diabetic RE groups ($p<0.05$) compared to healthy sed. No significant differences were seen in levels of microRNA-206. miRNA-1 was negatively correlated with FSR in RE groups but not sed. miRNA-133b showed a negative correlation with mitochondrial FSR in healthy but not diabetic animals. **CONCLUSION:** Control of protein synthesis and mitochondrial health is under complex control involving many factors. The alteration of muscle specific microRNAs in diabetes and RE and the relationships to targeted mRNAs suggests that the control of protein expression by microRNAs is at least partially responsible for protein synthetic and metabolic dysfunctions. Further research into the direct mechanisms and microRNA targets is warranted.

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38. RELIABILITY AND RELATIONSHIPS AMONG MAXIMAL POWER OUTPUT DURING SIT-TO-STAND AND VERTICAL JUMP ASSESSMENTS USING A PORTABLE COMMERCIALY-DESIGNED TESTING DEVICE

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Performing vertical jumps (VJs) to assess maximal power output (Pmax) may not be appropriate for all individuals, especially those who are older and more frail. Alternatively, the sit-to-stand (STS) test may be a more practical and functionally-relevant assessment tool for examining Pmax in these types of individuals. Consequently, it may be of great value to examine the reliability of Pmax using a portable commercially-designed testing device in conjunction with the STS, as well as explore the relationships between Pmax as measured during a STS and a VJ. **PURPOSE:** To determine the reliability and relationships among Pmax during VJ and STS assessments using a commercially-designed testing device. **METHODS:** Sixteen healthy, college-aged males (mean±SD: age=24±4yr; height=177±7cm; mass=86±19kg) participated in this investigation. Participants visited the laboratory 2 times, separated by 2-7 days at the same time of day (±2hr). For each visit, participants performed 3 STSs from an adjustable table at 90° (STS90) and 120° (STS120) of knee flexion and 3 countermovement VJs (CMJ) and squat jumps (SJ) in a randomized order. To determine Pmax, the testing device was attached to the posterior portion of a belt fastened around the participants' waistline. Participants performed all STSs and VJs with feet shoulder width apart and hands positioned on the hips. For each STS and VJ, participants were asked to stand- or jump-up as explosively as possible. Reliability for Pmax during the STS90, STS120, CMJ, and SJ were determined using the intraclass correlation coefficient (ICC, model 2,1) and standard error measurement (SEM). Systematic variability was examined using separate one-way repeated measures analyses of variance (ANOVAs). Pearson correlation coefficients (*r*) were used to examine the relationships between Pmax as measured during the STSs and VJs. **RESULTS:** The ANOVAs indicated no systematic variability in Pmax across trials ($P>0.05$). The ICCs and SEM values expressed as a percentage of the mean ranged from 0.958-0.978 and 5.586-6.396% for the STSs and 0.924-0.974 and 4.025-6.534% for the VJs, respectively. In addition, significant positive relationships were observed between Pmax as measured during the STS90, STS120, CMJ, and SJ ($r=0.751-0.962$; $P\leq 0.001$). **CONCLUSION:** The results of the present study reveal that commercially-designed devices may be highly reliable for assessing Pmax during STSs and VJs. STS90 and STS120 exhibited a significant positive relationship with CMJ and SJ, which demonstrates that STS testing may be an effective alternative to vertical jumping for assessing lower-body muscle power.

39. THE USE OF HEAVY SLED DRAGGING TO INCREASE LOWER BODY STRENGTH AND SPEED IN A FOOTBALL PLAYER WITH LUMBAR ISSUES.

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PURPOSE: The back squat has been considered the gold standard for lower body strengthening in college football for many years. However, due to disc injury, many athletes are unable to perform this exercise as the axial loading exacerbates their symptoms. Many athletes have been relegated to machines such as leg press, leg extension, leg curl in attempt to maintain or prevent loss of strength to the legs, but rarely do they have a very high transfer of training due to the nature of requiring no stabilization. This intervention was an attempt to see what the effect of replacing the back squat with a heavy sled pull in terms of improvement in speed development in an individual with disc herniation currently experiencing back pain. **METHODS:** The subject for this study was an NCAA Division I quarterback with disc herniation at L5-S1 and L4-L5. Instead of performing the barbell back squat, the athlete performed sled pulls with a sled that had the ability to add weight to it. The athlete pulled the sled in a walking manner. The athlete was not allowed to run at any point with the sled. The forward lean angle of the athlete was self-determined. The athlete pulled the sled for 8 repetitions of 27.4 meters every week for 6 weeks. The first week, the athlete started with their bodyweight on the sled, approximately 90kg. For every subsequent set, the weight was altered based off of RPE. The desired RPE was an 8, if the RPE was higher, the weight was reduced. If the RPE was lower than 8, the weight was increased. The 39.6m sprint test was done in a pre/post-test design at week 1 and week 6 to assess sprinting speed. **RESULTS:** Over the course of the six weeks, the load on the sled increased from

90kg to 380kg. The mean change in the 39.6m sprint for the entire football team during this period was .02 seconds. The change of the athlete who performed the sled pull was an improvement of .26 seconds. Interestingly, the subject also self-reported being able to throw the ball with greater velocity due to the improved leg strength from pulling the sled; this is important due to his position as a quarterback.

CONCLUSION: The individual who pulled the sled showed a marked increase of strength in this movement, improving strength by 422% in this movement. While neurological adaptations most likely played a major role in this increase, the training effect cannot be discounted. The individual improved their speed significantly, not only for an individual significant improvement, but greater than the team improvement. It is possible that the improvement in running speed is a transfer of trainedness effect due to the fact that the force was being produced horizontally rather than vertically, and other individuals would see similar improvements.

40. MUSCLE POWER DIFFERS IN YOUNG AND OLD SUBJECTS BUT DOES NOT VARY SUBSTANTIALLY ACROSS A BROAD RANGE OF FORCE OUTPUTS IN THE LEG AND CHEST PRESS

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Muscle power is considered the rate of force development and is known to vary with the velocity of movement. The problem is different studies have reported a wide-range of power outputs. **Purpose:** the purpose of this study was to measure the optimal load (weight) to determine muscle power in both the upper- and lower-body. **Methods:** Thirty-six college-aged subjects (18 men and 18 women) and eight older adults (4 men and 4 women) participated in the measurement of lower-body one repetition maximal (1-RM) strength using a pneumatic leg press exercise and then upper-body strength using a pneumatic bi-lateral chest press exercise (A420, Keiser Sport, Fresno, CA). After a short rest (3-5 min) lower and upper body power was assessed by performing 6 repetitions at 30%, 40%, 50%, 60%, and 70% of the measured 1-RM strength in random order. **Results:** Peak power (mean \pm SD) for the leg press and the chest press varied across the forces measured and were greater in the younger than older adults. One-way ANOVA with post-hoc analysis demonstrated there were no significant differences in power measured between 40% to 70% for either the leg or chest press. **Discussion:** The most important finding of this study was that peak power does not vary considerably over a broad range of force outputs suggesting that as load increases the body compensates to maintain maximal power outputs. Power output declines substantially with age and is an important aspect of physical function and the completion of daily activities such as negotiating stairs.

41. DEPRESSION AND PHYSICAL ACTIVITY STATUS OF COLLEGE STUDENTS

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Physical activity has been known to have a positive effect on the overall quality of life of an individual. **PURPOSE:** The purpose of this project was to determine if students who report a diagnosis of depression meet the physical activity guidelines at a different rate than students who are not diagnosed with depression. Literature suggests people who meet the physical activity guidelines may be less likely to have been diagnosed with depression. A secondary purpose was to examine trends over time among students enrolled at a metropolitan university. **METHODS:** Data were collected from the American College of Health Association's - National College of Health Assessment's survey distributed in the spring of 2012 (n = 598) and 2014 (n = 639) at a single university. Data were analyzed by descriptive statistics and cross tabulations. **RESULTS:** The overall percentage of students who met the physical activity guidelines increased from 2012 to 2014 by 2.5%. The survey distributed in 2012 showed that among students who were not diagnosed with depression, 49.6% (n= 242) did meet the physical activity guidelines. For those who were diagnosed with depression, 38.2% (n=42) did meet the physical activity guidelines. Results from the survey distributed in 2014 showed that among the students who were not diagnosed with depression, 51.8% (n=276) did meet the physical activity guidelines. For those who were diagnosed with depression, 35.8% (n=38) did meet the physical activity guidelines. **CONCLUSION:** Students diagnosed with depression were less likely to meet physical activity guidelines than students without diagnosed depression in both 2012 and 2014. While the physical activity rates increased from 2012 to 2014, this increase was only seen among students not diagnosed with depression. In fact, there is a trend toward a decline in physical activity among students diagnosed with depression. These findings

and literature on the benefits of physical activity for people with depression highlight the need for targeted physical activity interventions among college students diagnosed with depression.

42. EFFECT OF HYPOHYDRATION ON DYNAMIC BALANCE IN TYPE II DIABETICS

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Falls are recognized as an important cause of morbidity and mortality. However, no data exist on the effect of hypohydration on dynamic balance in type II diabetics. Type II diabetics may have impaired balance due to complications of diabetic neuropathy. **PURPOSE:** Therefore, the purpose of this investigation was to examine the effects of hypohydration on postural balance in type II diabetics. **METHODS:** 10 type II diabetic males (52 ± 8 y; 94.8 ± 22.2 kg; 6.9 ± 1.0 HbA1c) performed two trials on dynamic postural balance while either euhydrated ($USG < 1.020$) or hypohydrated ($USG \geq 1.020$). Balance was assessed using a Biodex Balance System examining the time in region A, mean deflection (MD), and overall stability index (OSI). Following the balance protocol, blood pressure was measured after 20 min of resting in the supine position. **RESULTS:** USG was lower in euhydrated trial (1.011 ± 0.006) compared to the hypohydrated trial of (1.028 ± 0.006 ; $p < 0.05$). No differences were observed in resting systolic (SBP), diastolic (DBP) or mean arterial pressure (MAP) between the hypohydrated (SBP: 134 ± 16 , DBP: 82 ± 10 , and MAP: 99 ± 12 mmHg) or euhydrated trial (SBP: 133 ± 14 , DBP: 81 ± 7 , and MAP: 98 ± 8 mmHg). There was no difference in time in region A between euhydrated and hypohydrated trials (15.7 ± 4.4 vs. 14.8 ± 5.4 s; $p > 0.05$). Similarly, there were no differences in MD (4.2 ± 2.8 vs. 4.9 ± 3.6) or OSI (3.4 ± 2.1 vs. 3.8 ± 2.8 ; $p > 0.05$). **CONCLUSION:** The results indicated that hypohydration had no significant effect on dynamic postural indices in type II diabetes.

43. EFFECTS OF A COMMERCIAL ENERGY SHOT ON PISTOL STEADINESS IN LAW OFFICERS

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Law officers work long and erratic hours typically leading officers to drink coffee, more recently consume energy drinks/shots. It has been estimated that law officers consume the second most coffee of any profession. However, caffeine consumption has been associated to a decrease hand steadiness which could compromise the accuracy of a pistol shot. Aiming stability has been shown to have a significant correlation to shooting performance. **PURPOSE:** To determine the effect of a commercially available energy shot (ES) on the ability to hold a pistol steady in an aiming protocol. **METHODS:** 10 accredited police officers volunteered to participate in the study. Arm-hand steadiness was measured using a hole/stylus steadiness tester attached to a rubber training gun. A laser was fitted on the gun, as well as a bulls-eye on the metal plate for aiming purposes. Subjects were randomly, on a single-blind, counterbalanced protocol given either an energy shot or a placebo and a week later given the opposite beverage. Steadiness was measured pre and 30 minutes post consumption with 3 sets of 20-second intervals. **RESULTS:** A repeated measures ANOVA with Newman Keuls post hoc test revealed the treatment (ES) significantly ($p = 0.009$) impaired pistol steadiness while the placebo yielded no significant difference. Difference in steadiness for energy shot group and placebo was 7.07 ± 1.94 and -0.30 ± 2.38 respectively. Average daily caffeine intake of the subjects was 413 ± 97.84 mg. **CONCLUSION:** Consumption of the commercial ES containing caffeine, and other stimulants had detrimental effects on pistol steadiness in police officers. The combination of these ingredients are backed with little research regarding a synergistic effect which could have intensified the detriment in steadiness. Further research investigating the decrease in pistol steadiness related to live shooting performance may be warranted.

44. RELIABILITY OF MOTOR UNIT RECRUITMENT THRESHOLD VERSUS MEAN FIRING RATE RELATIONSHIPS DURING SUBMAXIMAL CONTRACTIONS

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PURPOSE: The purpose of this study was to examine the reliability of motor unit (MU) recruitment versus mean firing rate relationships of the vastus lateralis (VL) during 40% and 70% maximal voluntary contractions (MVC). **METHODS:** Eight healthy men (age=21.63±2.39 yrs) and six healthy women (age=19.67±1.37 yrs) volunteered for this investigation. An electromyography (EMG) sensor was placed over the VL. Participants performed 3 isometric maximal voluntary contractions (MVC) followed by isometric trapezoid muscle actions at 40% and 70% MVC calculated from the highest MVC. These procedures were performed twice separated by 3-5 days. Decomposition techniques were applied to the EMG signals to extract action potentials and firing events of single MUs. The recruitment (REC) thresholds and mean firing rate (MFR) were calculated for each MU. Only MUs that were decomposed with accuracies >90% were included for analysis. Linear regressions were performed on REC vs. MFR relationships on MUs with accuracies >90% and MUs excluding accuracies <95%. Reliability statistics were calculated for the slopes and y-intercepts from the REC vs. MFR relationships from the 40% and 70% MVCs. These procedures were performed on the relationships that included MUs with accuracies >90% and again on relationships with the exclusion of MUs with accuracies <95%. Intraclass correlation coefficients (ICC) model "2,1", standard error of the measurements (SEM), and repeated measures ANOVAs were calculated to assess reliability. **RESULTS:** There were no significant differences between days for the slopes and y-intercepts for either contraction or accuracy condition (including MUs with >90% or excluding MUs with <95%) as indicated by the ANOVAs (P>0.05). The ICCs and SEM (expressed as a percentage of the mean, %) from the 70% MVC that excluded MUs with accuracies <95% were 0.91 and 25.00% and 0.79 and 15.58% for the slope and y-intercept, respectively. There was no usable information for the 40% MVC that excluded MUs with accuracies <95%. The ICCs for the 40% and 70% MVCs that included MUs with accuracies >90% were -0.07 and 41.30% and 0.14 and 34.29% for the slopes and 0.56 and 6.86% and 0.38 and 14.39% for the y-intercepts. **CONCLUSION:** The ICCs and SEMs indicated good reliability for slopes and y-intercepts from the 70% MVC when excluding MUs with accuracies <95%, however, with strict accuracy criteria there were no usable MUs for the 40% MVC. Despite that the ICCs were lower when including MUs with accuracies >90%, the SEMs were similar to that of the regressions that excluded MUs with accuracies <95%.

45. ACL BONE-PATELLA TENDON-BONE AUTOGRAPH RECONSTRUCTION EFFECT ON THIGH MUSCLE GROUPS ULTRASOUND IMAGING MEASUREMENTS

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There is little research regarding ultrasound imaging of the muscle fibers and muscle quality for individual muscle groups of the lower extremity following an ACL reconstruction surgery. **PURPOSE:** The purpose of this case study was to determine if ACL bone-patella tendon-bone autograph reconstruction influenced the rectus femoris, vastus lateralis, and biceps femoris deep pennation angle, muscle thickness, and echo intensity measurements following post-ACL reconstruction rehabilitation. **METHODS:** A recreationally active male who received an ACL reconstruction surgery and 8-month post-surgery rehabilitation participated in this study (age=21 yrs, ht=174cm, mass=82.5kg). The subject reported to the laboratory once a week for 12 weeks to obtain ultrasound images with a diagnostic ultrasound of both right and left rectus femoris, vastus lateralis, and the biceps femoris muscles. During image analysis the deep pennation angle (°), muscle thickness (cm), and muscle quality (echo intensity; 0-255 gray scale) were examined. **RESULTS:** The means of the image analysis are displayed in Table 1. No difference observed when comparing ipsilateral circumference across time. **CONCLUSION:** The average deep pennation angle and thickness of each muscle was larger in the right leg than the left leg. Echo intensity measurements showed no difference compared bilaterally. From these results, limitation in musculature pennation angle and thickness

could be a potential cause for a decrease in maximal muscular performance following surgical procedures and rehabilitation of an ACL injury. Further research is needed.

Table 1: The means of average pennation angle, muscle thickness, and echo intensity on both sides of legs

	Right (uninjured)			Left (injured)		
	RF	VL	BF	RF	VL	BF
Pennation Angle (°)	12	11.51	15.13	8.86	10.59	10.95
Muscle Thickness (cm)	2.57	2.26	3.77	2.26	2.18	3.46
Echo Intensity	36.93	30.89	31.71	36.87	36.14	36.85

Note: RF = rectus femoris, VL = vastus lateralis, BF= biceps femoris

46. TESTING MODALITY IS VITAL TO DETECT PERFORMANCE CHANGES IN OVERREACHING RESISTANCE EXERCISE

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Non-functional overreaching (NFOR) is detrimental to resistance exercise (RE) performance. Research concerning sensitive and sport specific methods that identify NFOR is sparse, and inconsistencies of results may be due to differences in testing modalities. **PURPOSE:** The purpose of this study was to compare muscle performance using different testing modalities (dynamic vs. isometric) after high power RE overreaching (OR). **METHODS:** As part of a larger dietary supplementation study, seventeen men (n=17; X±SD; age: 22.8±3.3yrs) were randomly assigned to a supplement (SUPP; n=8; body mass: 88.28±16.7kg; bodyfat: 11.7±6.4%), placebo (PL; n=3; bodymass: 86.66±25.7kg; bodyfat: 12.9±10.8%), or control (CON; n=6; body mass: 76.63±8.4kg, bodyfat: 11.3±6.8%) group. All groups participated in two weeks of normal training. After normal training, SUPP and PL performed OR for one week, while CON continued normal training. External mean power (MP), force (MF), and velocity (MV) were determined for the barbell squat exercise at 70% 1-RM load. Maximum isometric force, and rate of force development were determined using the isometric knee extension exercise on leg-extension machine interfaced with a force transducer. Performance data was collected at baseline (BL), after two weeks of normal training (Pre-OR), after OR phase (Post-OR), and after one week of recovery (POST). A 3x4 (group x time) repeated-measures ANOVA with Fisher LSD post-hoc was used to determine differences between groups and time. Significance was set at p<0.05. **RESULTS:** There were no significant differences in knee extension variables (p>0.05). MF was higher in PL at Post-OR compared to BL and Pre-OR (2037 ± 626N vs. 1626±40N & 1581±92N; p<0.05). MP decreased in SUPP at Post-OR compared to BL and Pre-OR (1300±261W vs 1519±329W & 1524±339W; p<0.05). MV decreased at Post-OR compared to BL and Pre-OR in SUPP (64.8±6.9cm.s⁻¹ vs 78.7±11.3cm.s⁻¹ & 75.3±6.7cm.s⁻¹; p<0.05) and PL (55.7±7.2cm.s⁻¹ vs 70.4±2.9cm.s⁻¹ & 69.0±6.4cm.s⁻¹; p<0.05) groups. There were no significant changes in any performance variables in CON (p>0.05). **CONCLUSION:** Only dynamic RE (barbell squat) was sensitive to detect decreased performance compared to isometric RE (knee extension) in overreached subjects. Similarly, it appears power and velocity are more adversely affected by OR than measures of maximal force.

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47. PHYSICAL TRAINING FOR PARKINSON'S DISEASE: PILOT STUDY

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Due to the variability of symptoms caused by Parkinson's disease (PD), many different types of therapies are employed to combat this chronic condition, often placing a great time burden on patients and their families. Targeted exercise is important in order to maintain functional ability and improve muscular strength and endurance.

PURPOSE: Therefore, the primary purpose of this study was to report changes in pre-to-post testing outcomes on measures of fitness and balance as the result of a combined physical fitness and speech therapy treatment program for individuals with PD. **METHODS:** A group of eight individuals with PD (58-82yrs) volunteered for this study. Participants' initial functional fitness was measured by performance on the Senior Fitness Test (SFT). Initial balance was measured using the MINI-BEST Test (MBT). After initial measurement, a group training program consisting of 60-minute sessions, three times a week for four weeks was administered. Protocol consisted of a warm up, strength and endurance exercises, static and dynamic balance training, and flexibility/cool down. Voice training was administered simultaneously. Modifications were included for individuals to maintain own pace while partaking in group activities. Upon program completion, the SFT and MBT were again assessed to monitor progress. **RESULTS:**

Variables (SFT)	Pre values (N=8)	Post values (N=8)	t	Significance (2 tailed)
Chair stand (reps)	11.813±4.985	15.750±5.632	-2.412	.047
Arm curl (reps)	18.563±3.064	19.875±2.656	-2.458	.044
8 foot up and go (sec.)	6.518±2.221	6.0413±1.948	2.561	.038
Sit and reach (in)	-2.500±5.064	-1.750±4.690	1.256	.250
6 minute walk (yds)	435.325±151.637	457.238±147.369	-1.425	.197

Variables (Balance types)	Pre values (N=8)	Post values (N=8)	t	Significance (2 tailed)
Anticipatory	4.00±1.195	3.75±1.581	.683	.516
Reactive	5.38±.744	5.75±.463	-2.049	.080
Sensory	5.25±1.165	5.25±1.389	.000	1.00
Dynamic	7.25±1.165	8.38±1.061	-3.211	.015
Total Balance	21.88±2.850	23.13±3.643	-1.852	.106

CONCLUSION: Subjects showed improvement in measurements of fitness and balance. More research is needed to determine how much of these changes can be attributed to the combination of voice and physical fitness training as opposed to training for voice and physical fitness separately. Based on the statistical data and participant feedback, this research will continue to be explored.

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48. MEASURING THE EFFECT OF TIME ELAPSED POST-CONCUSSION ON POSTURAL SWAY USING A SMARTPHONE ACCELEROMETER.

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Previous research has indicated a direct correlation between concussion occurrence and increased postural sway variability. This variability has been shown to return to baseline values after an elapsed time of roughly 3-5 days. However, pilot data taken for this study may indicate a longer recovery timeline. **PURPOSE:** Therefore, the purpose of this study was to investigate the effect of time elapsed post-concussion on the variability in postural sway using a smartphone accelerometer app. **METHODS:** A total of 8 student athletes (4 post-concussion, 4 controls) were recruited. Time elapsed post-concussion was recorded via questionnaire. Subjects completed 17 randomized tasks combining standing on either tile or a foam pad in eyes closed, eyes opened, closed base, opened base, or tandem base stances for 20 seconds. A smartphone with an accelerometer app was attached to the small of their back and recorded the subject's net three-dimensional acceleration. Variability in postural sway was quantified as the standard deviation of this net acceleration. **RESULTS:** While no significant differences in postural sway variability

were found between subjects who had at least one concussion and controls ($p > 0.05$), the variability of postural sway as measured by the mean standard deviation of acceleration over all conditions decreased with increasing time elapsed post-concussion (76 + 1 days post-concussion = 0.017 ± 0.013 g, 4015 + 180 days post-concussion = 0.010 ± 0.018 g). Log-transformed data showed a significant negative correlation ($r = -0.979$, $p < 0.05$). Control subjects mean variability was 0.010 ± 0.009 g, effectively showing a return to baseline after 6 months. **CONCLUSION:** As has been shown previously, a significant decreasing trend in postural sway variability in concussion subjects was seen over time. Previous research indicates this variability returns to baseline values after an elapsed time of roughly 3-5 days. Pilot data taken for this study using a smartphone accelerometer app hinted at a longer return to baseline, possibly even as long as 6 months. Further research is needed to develop a comprehensive timeline of recovery from concussion events, particularly when an athlete is attempting to return to competition. This study was partially supported by a Deans Undergraduate Fellowship Grant from Rockhurst University.

49. RELIABILITY OF PORTABLE STRENGTH TESTING FOR ASSESSING MAXIMAL AND RAPID ISOMETRIC TORQUE CHARACTERISTICS IN FRAIL, ELDERLY ADULTS

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PURPOSE: To determine the reliability for maximal and rapid isometric torque characteristics of the leg extensors and flexors in frail, elderly adults using portable strength testing. **METHODS:** Fifteen frail, elderly adults (mean \pm SD age = 88 ± 6 yr; mass = 69 ± 11 kg; height = 157 ± 8 cm) volunteered for this investigation on 2 non-consecutive days at the same time of day (± 2 h). During each visit, participants performed 2 isometric maximal voluntary contractions (MVCs) of the leg extensors and flexors. All MVCs were performed in a seated position on the right leg at a knee joint angle of 90° . Participants were instructed during each MVC to push or pull "as hard and fast as possible" against a load cell attached immediately posterior to the heel for 3-4 s. Isometric MVC peak torque (PT; Nm) was determined as the highest mean 500 ms epoch during the entire 3-4 s MVC plateau. Rate of torque development (RTD; $\text{Nm} \cdot \text{s}^{-1}$) was determined from the linear slope of the torque-time curve over the time intervals of 0-30, 0-50, 0-100, 0-200, and 100-200 ms relative to the onset of torque production (7.5 Nm for the leg extensors; 4 Nm for the leg flexors). Reliability for PT and the RTD variables were determined using the intraclass correlation coefficient (ICC, model 2,1) and standard error of measurement (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 0.504-0.847 and 23.619-55.189% for the leg extensors and 0.716-0.826 and 15.408-32.356% for the leg flexors, respectively (Table 1). **CONCLUSION:** These findings demonstrate that portable strength testing may be a highly consistent and equally reliable assessment technique for measuring maximal and later (> 100 ms) but not early (≤ 100 ms) rapid torque characteristics of the leg extensors and flexors in frail elderly adults.

Table 1. Reliability statistics for peak torque (PT) and rate of torque development (RTD) over the time intervals of 0-30, 0-50, 0-100, 0-200, and 100-200 ms for the leg extensors and flexors.

		PT	0-30	0-50	0-100	0-200	100-200
Leg Extensors	<i>P-value</i>	0.729	0.265	0.348	0.399	0.202	0.389
	ICC _{2,1}	0.847	0.550	0.504	0.560	0.752	0.786
	SEM	11.380	102.253	112.455	90.480	33.087	30.493
	SEM%	23.619	51.141	55.189	53.362	28.901	32.229
Leg Flexors	<i>P-value</i>	0.103	0.416	0.555	0.958	0.801	0.697
	ICC _{2,1}	0.826	0.761	0.785	0.810	0.716	0.719
	SEM	5.019	56.266	60.431	47.048	27.433	17.041
	SEM%	15.408	27.568	28.321	26.926	26.636	32.356

P-value = type I error rate for the one-way repeated measures ANOVA across visits 1 and 2. ICC_{2,1} = intraclass correlation coefficient, model 2,1. SEM = standard error of measurement, expressed as absolute values and percentages of the mean.

50. DIFFERENTIAL RESPONSES TO LEUCINE SUPPLEMENTATION IN YOUNG AND AGED MICE DURING SKELETAL MUSCLE REGENERATION.

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Skeletal muscle regeneration requires the coordination of inflammation, myoblast proliferation and myoblast differentiation. Aging skeletal muscle has a reduced capacity to regenerate from injury. Myogenic regulatory factors (MRFs) such as MyoD and myogenin are necessary for myoblast proliferation and differentiation, respectively, and are highly expressed at the onset of skeletal muscle regeneration. Tumor necrosis factor- α (TNF- α), an inflammatory cytokine, is also highly expressed during skeletal muscle regeneration. Leucine supplementation has been shown to enhance the skeletal muscle regenerative response. The effects of leucine supplementation on regeneration in aged skeletal muscle has not been fully described. **PURPOSE:** To determine how leucine supplementation affects TNF- α , MyoD and myogenin gene expression in young and aged mice during skeletal muscle regeneration. **METHODS:** Young (3 months; n = 27) and aged (24 months; n = 27) female C57/BL6 mice were assigned to one of four groups: uninjured, uninjured + leucine, injured, and injured + leucine. To induce muscle damage, bupivacaine was injected into the tibialis anterior (TA) whereas the uninjured groups received PBS injections. Leucine was given in the drinking water *ad libitum* at a concentration of 1.5%. Three days following injection, the TA was extracted. Quantitative PCR was performed to measure gene expression. **RESULTS:** In the young + no leucine group, there was a 9% decrease in TA mass to tibia length (2.2 ± 0.1 mg/mm vs. 2.0 ± 0.1 mg/mm, $p < 0.05$) whereas, in the young + leucine group there was a 19% decrease in TA mass to tibia length (2.1 ± 0.1 mg/mm vs. 1.7 ± 0.0 mg/mm, $p < 0.05$) 3 days post-bupivacaine injection. In the aged + no leucine group there was an 11% increase TA mass to tibia length (2.0 ± 0.1 mg/mm vs 2.2 ± 0.1 mg/mm, $p < 0.05$) and no change in the aged + leucine group 3 days post-bupivacaine injection. In the young + no leucine group, TNF- α , MyoD and myogenin gene expression increased ($p < 0.05$). MyoD and myogenin gene expression also increased in the young + leucine group ($p < 0.05$), but TNF- α decreased ($p < 0.05$). In the aged + no leucine group, TNF- α , MyoD, and myogenin increased ($p < 0.05$) 3 days post-bupivacaine injection. However, the aged + leucine group had a blunted MyoD and myogenin response ($p < 0.05$) 3 days post-bupivacaine injection. TNF- α remained elevated in the aged + leucine group 3 days post-bupivacaine injection ($p < 0.05$). **CONCLUSION:** Leucine supplementation decreases TNF- α in the young but increases it in the aged group during skeletal muscle regeneration. This increase corresponds with a blunting of the MRF response during regeneration in the aged.

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51. MUSCLE VIBRATION DOSAGE AND THE PATELLAR TENDON REFLEX RESPONSE

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The physiological response to muscle vibration is complex. The repetitive length changes imposed by the mechanical oscillations strongly modulates proprioceptive activity, particularly the activity of the muscle spindles. Accordingly, vibration may represent a useful research tool to manipulate the sensitivity of the muscle spindle reflex arc. However, to truly understand its usefulness as a tool, the complex relationship between vibration dosage and spindle responsiveness requires a better understanding. **PURPOSE:** Thus, the purpose of this investigation was to examine the effects of acute and prolonged vibration on muscle spindle function. **METHODS:** A cross-over study design was utilized to determine the effects of vibration dosage on the patellar tendon reflexes of 20 volunteers (age 24.5 ± 4.6 years). A series of tendon taps were delivered using a custom reflex apparatus, during which surface electromyography, torque, and accelerometry signals were obtained. These signals were used to quantify reflex magnitude and latency for each of the following conditions: 1.) control, 2.) acute (i.e. 1-5 seconds) vibration and, 3.) prolonged (i.e. 20 minutes) vibration. The vibratory stimulus was applied perpendicularly to the distal quadriceps, just superior of the patella, using a percussion hammer set at a frequency of 66 Hz and was removed just prior to the reflex testing. **RESULTS:** When compared to the control condition, the results of the current study revealed that acute vibration did not significantly increase reflex torque magnitude ($p = 0.461$), but did significantly increase reflex latency ($p = 0.022$). Prolonged vibration, however, resulted in a significant depression of reflex magnitude ($p = 0.001$) and an increased reflex latency ($p = 0.0002$). **CONCLUSIONS:** The findings of the current study support the use of prolonged vibration as a means to suppress the muscle spindle reflex arc and lends credence to the contention of a peripheral origin for the altered motor response following prolonged vibration. The findings, in regards to the acute vibration condition, are less clear. It is speculated that the divergent responses for reflex magnitude and latency may indicate an altered composition of, or response to, the composite excitatory post-synaptic potential generated by the tendon tap.

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52. THE CORRELATION OF STANDARD DEVIATION AND NORMALIZED PATH LENGTH USING SMARTPHONE ACCELEROMETER DATA TO MEASURE POSTURAL SWAY POST CONCUSSION

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Smartphone accelerometer applications have become a quick, simple method of collecting clinical data on postural sway in athletes who have experienced a concussion. Normalized path length (NPL) and standard deviation (SD) have been used as measures of variability in alternative postural sway studies. The correlation between the two measures has yet to be established. **PURPOSE:** The purpose of this study was to investigate the relationship between SD and NPL of net acceleration data as a measure of variability in postural sway in collegiate athletes. **METHODS:** 8 individuals participated in this study including basketball, soccer, and lacrosse players, both male and female. Of the subjects, 4 had previously experienced a concussion, while 4 served as controls. Subjects were asked to complete a series of 17 trials composed of differing conditions including, open and closed base, tandem stance and single leg on foam or tile. These trials were completed with the eyes closed and open. Each trial was performed for 20 seconds and recorded using a smartphone accelerometer attached to the waist. NPL and SD of net acceleration were calculated to quantify the variability in postural sway exhibited by each subject. These two measures were then correlated to investigate their relationship. **RESULTS:** The correlation of NPL and SD of net acceleration data using a smartphone accelerometer was significant ($r = 0.977$, $p < 0.05$). While the correlations remained significant when disaggregated ($r = 0.9755$, $p < 0.05$ for concussion, $r = 0.9508$, $p < 0.05$ for controls), there was no significant difference in correlation due to concussion status ($z = -0.25$, $p > 0.1$). **CONCLUSION:** A strong correlation exists between NPL and SD of net acceleration data taken using a smartphone accelerometer. This correlation holds for both concussed subjects and controls. There is no significant difference in the strength of the correlation between the two groups. Therefore, both NPL and SD of net acceleration data can both be considered valid metrics for the measurement of variability in postural sway. Further research will correlate these measures with other indicators of variability in postural sway such as root mean squared and center of pressure data.

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53. FLUID BALANCE OF ADOLESCENT SWIMMERS DURING TRAINING

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While there are a number of studies identifying a high percentage of athletes who start exercise in a hypohydrated state, there is limited data concerning hydration levels in swimming. **PURPOSE:** The purpose of this study was to identify the hydration status of adolescent swimmers during a typical day of training. **METHODS:** Forty-six adolescent swimmers (26 males; age: 12.8 ± 2.3 y; weight: 50.6 ± 13.4 kg) participated in the study. Hydration status was assessed in first morning urine samples as well as immediately before and after practice. Hypohydration was classified by urine osmolality (UOsm >700 mmol/kg). Thirst perception was measured using a visual analog scale (VAS). **RESULTS:** 67% of the swimmers were hypohydrated based on their morning urine sample (USG: 1.021 ± 0.007 ; UOsm: 788 ± 252 mmol/kg). Pre-practice urine samples revealed that 78% of athletes were hypohydrated (USG: 1.021 ± 0.008 ; UOsm: 828 ± 304 mmol/kg). Swimmers consumed *ad libitum* fluid volume of 472 ± 219 ml and acquired sweat losses of 394 ± 268 ml over 120 minutes of practice resulting in a mild decrease in their body weight of $-0.3 \pm 0.6\%$. Thirst perception did not change significantly from pre- (45.5 ± 26.1 mm) to post-practice (55.4 ± 32.5 mm). Post-practice hydration markers indicated that subjects improved their hydration state even while losing body water (USG: 1.018 ± 0.011 ; UOsm: 630 ± 390 mmol/kg). **CONCLUSION:** We conclude that the prevalence of hypohydration among adolescent swimmers is high, as indicated by elevated USG and urine osmolality values both in the morning and prior to practice. Post-swimming urinary markers could be misleading when trying to assess hydration state. Possibly water immersion increases diuresis, by attenuating vasopressin secretion via central volume receptors loading due to the hydrostatic pressure.

54. INVESTIGATING MITOCHONDRIAL AUTOPHAGY AFTER VOLUNTARY WHEEL RUNNING IN WESTERN DIET FED MICE

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Americans are chronically overfed and underactive, leading to a substantial increase in obesity and metabolic diseases. Mitochondrial function and quality are regulated by several processes. Specifically, damaged mitochondria are removed by autophagy, which has been cited as important mechanism in many metabolic and neuronal diseases. Exercise training has previously been reported to enhance autophagy flux in otherwise healthy animals. **PURPOSE:** To evaluate the effects of Western Diet and physical activity on autophagy, specifically with regards to mitochondrial autophagy. **METHODS:** Eight week old wild type C57BL/6/J mice were divided into two groups, normal rodent chow (NC) (54% CHO, 17% fat) and Western Diet (WD) (42% fat plus 1.5g cholesterol/kg) and allowed *ad libitum* consumption of assigned diet for four weeks. After four weeks, animals were further subdivided into Voluntary Wheel Running (VWR) or Sedentary (SED) groups. VWR animals were allowed free access to a running wheel for four weeks, after which all animals were euthanized and gastrocnemius were collected for analysis. Glucose tolerance tests confirmed diabetes in WD-SED animals. Quantitative real-time PCR analysis was used to examine genes of autophagy machinery including *Becn1*, *Atg7* and *Bnip3* (mitochondrial autophagy specific). Data were analyzed by 2X2 ANOVA (diet [NC vs. WD] X activity [SED vs. VWR]) with α set at $P < 0.05$. **RESULTS:** There were no significant differences in gene expression of the autophagy machinery among groups. **CONCLUSIONS:** Neither Western diet nor voluntary wheel running appear to have an effect on gene expression of autophagy machinery after eight or four weeks of intervention respectively. Genetic machinery is only one aspect of autophagy, there are other aspects of autophagy, such as autophagy flux, that have yet to be investigated in this type of model and warrant further investigation.

55. EFFECTS OF HIGH-VELOCITY RESISTANCE TRAINING ON BALANCE OUTCOMES IN OLDER ADULTS: A PILOT STUDY

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High-velocity resistance training is recommended for older adults to improve muscular power; however, the impact on balance outcomes is not well understood. Further, the optimal training intensity for high-velocity resistance training is not known. **PURPOSE:** The aim of this pilot study was to evaluate the effects a community-based, high-velocity resistance training program, at two different intensities, had on balance outcomes among older adults. Changes in self-efficacy, balance confidence, dynamic balance, and forward balance were of main concern. **METHODS:** Eight subjects (> 65 years of age) participated in a high-velocity free-weight resistance training program two days per week for 14 weeks. Subjects completed three sets of eight repetitions for each of the eight upper and lower body exercises, which targeted major muscle groups. All participants were assessed before and after the intervention. Several assessment tools were used including: an Activities-Specific Balance Confidence Scale (ABC) for assessing levels of balance-confidence, the 4-Square Test to determine dynamic balance, a Maximum Step Length Test on the left (MSL) and right (MSR) leg to measure forward balance, and the Self-Efficacy for Exercise Scale (ESE) to evaluate self-efficacy. Subjects were randomly assigned to two different groups working at either 30% of 1-repetition maximum (1RM; $n=4$) or 60% 1RM ($n=4$). ANOVA with repeated measures were conducted for all variables. Due to small sample size, we also calculated univariate effect sizes. **RESULTS:** No significant interaction or main effects were observed in any variable ($p > .05$). However, moderate to large effect sizes were found. In the 30% 1RM group, moderate improvements were observed for ABC ($d= 0.537$) and MSR ($d= 0.696$), while a large improvement was seen in MSL ($d= 1.025$). In the 60% 1RM group, moderate to large improvements were observed in the 4-square test ($d= 0.995$), MSR ($d= 0.627$), MSL ($d= 0.778$), and ESE ($d= 0.861$), while a moderate decrease was observed in the ABC ($d= 0.595$). **CONCLUSION:** A high-velocity resistance training program that utilizes 30% of 1RM appears to be superior at improving balance confidence; whereas, utilizing 60% 1RM seems to be more effective at improving dynamic balance among older adults. Further research, with a larger, more representative sample, is recommended to fully understand the impact of training intensity of high-velocity resistance training on balance outcomes.

56. CORRELATION OF WINGATE ANAEROBIC TEST PEAK POWER AND SQUAT JUMP PEAK POWER IN DIVISION I FEMALE SOCCER PLAYERS

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Peak power (PP) is widely accepted as a measure of an individual's muscular strength and speed, both of which are potential indicators of performance in team sports such as soccer. There are numerous tests that evaluate an athlete's PP production including, but not limited to, vertical jump test (VJ), broad jump test, and Wingate Anaerobic Test (WAnT). Due to the NCAA regulated time limitations athletes may devote to their particular sport each week, both during the season and during the off-season, it is inherent that the Strength & Conditioning Coaches (SCC) select evaluation methods that are both valid and time conscious. Furthermore, SCC should avoid employing multiple tests that evaluate identical measures. **Purpose:** The purpose of the study was to examine the correlation, if any, between PP as measured by both WAnT and the VJ. **Methods:** Following IRB approval, a total of 19 subjects volunteered for the study. All participants were current members of an NCAA Division I Women's soccer team. Subjects reported for a single day of testing. Prior to testing, each subject completed a 5-minute warm-up on a stationary bicycle. Each subject then completed two practice VJs followed by two VJs that were used for data analysis. Upon completion of the VJs, participants then completed a WAnT. **Results:** Peak power measurements from VJ and peak power measured during WAnT were found to be highly correlated with a Pearson correlation of $r = 0.778$ ($p = .000$) and R^2 value of .61. **Practical Application:** Due to the high correlation between peak power values from VJ and WAnT as well as the high variability between the two PP measures, sufficient evaluation of muscular strength and

speed, in regards to PP, can be completed with only one of the aforementioned tests. This research may provide guidance for SCC to reduce time commitments of testing, which is of particular importance with NCAA athletes.

57. PROTEIN EXPRESSION OF MITOCHONDRIAL MRNA TRANSLATION FACTORS IS DRIVEN BY PGC-1 α

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Exercise training enhances aerobic capacity, which is partially due to enhanced mitochondrial biogenesis in the skeletal muscle. The mitochondria contain their own genome encoding 13 proteins necessary for electron transport. PGC-1 α is known to drive exercise-induced mitochondrial biogenesis, partially through activation of mitochondrial transcription factor A (TFAM) which promotes transcription of the mitochondrial genome. However, if PGC-1 α may also serve to promote mitochondrial mRNA translation is currently unknown. **PURPOSE:** The purpose of this study is to examine if PGC-1 α drives the expression of mitochondrial mRNA translation markers. **METHODS:** MCK-PGC-1 α transgenic mice (n = 9, skeletal muscle specific overexpression of PGC-1 α) and wildtype littermates (WT, n = 12) were used. At 12 weeks age mice were euthanized and hindlimb muscles collected. Western blot analysis of gastrocnemius muscle was conducted on mitochondrial mRNA translation factors including translational activator of cytochrome oxidase (TACO1), and mitochondrial translation elongation factor-Tu (TUFM). Data were analyzed by T-test (WT vs MCK-PGC-1 α) with α set at $P < 0.05$. **RESULTS:** TACO1 expression increased by 400 % ($p = 0.02$) in MCK-PGC-1 α compared to WT. TUFM expression increased by 330 % ($p = 0.01$) in MCK-PGC-1 α compared to WT. **CONCLUSION:** These data suggest that PGC-1 α does in fact drive mitochondrial mRNA translation. Exercise has been shown to increase the expression of PGC-1 α , which the study suggests promotes increases in mitochondrial translation proteins.

58. TESTING THE ACCURACY OF THE CALORIE TRACKER ON ELLIPTICALS

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INTRODUCTION: People have used calories as a way to track energy cost of exercise for as long as it has been possible to track them. The purpose of this study was to evaluate the calorie trackers on a Nautilus elliptical trainer to see if it is accurate. **METHODS:** Twenty-four individuals (13 female, 11 male) completed a 30 minute workout (5 minute warm-up, 25 minute exercise) on the elliptical while connected to the ParvoMedics TrueOne Metabolic cart to measure oxygen consumption. **RESULTS:** Subjects' mean age, height (cm), and weight (kg) were 19.5 ± 1.8 , 170.92 ± 11.21 , and 78.02 ± 35.30 respectively. The mean calories burned measured on the elliptical was 262.875 ± 60.6 . The mean calories burned measured by the ParvoMedics TrueOne Metabolic cart was 232.25 ± 67.2 . There was a difference of 30.625 between the two. A paired t-test revealed that the means were significantly different. **CONCLUSION:** The data collected indicates that the calorie tracker on the Nautilus ellipticals are not an accurate form of calorie tracking for workouts.

59. IMMUNOENDOCRINE RESPONSE TO MARINE CORPS MARTIAL ARTS TRAINING

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Military training programs are rigorous and involve periods of intense physical activity in a high psychologically stressful environment. Quantifying the interplay between exposure to acute physical and psychological stress events and the lymphocyte subpopulations in the peripheral circulation may aid the development of training strategies for military and first responder personnel. **PURPOSE:** This study's purpose is to map the trajectory of the immunoendocrine response to training in the Marine Corps Martial Arts Program. **METHODS:** 10 male marines (age 20 ± 1.4 y, body mass 74.76 ± 8.96 kg, height 177.5 ± 7.44 cm) were recruited for participation. Subjects were observed 3 times during a 9-week period. Serial blood samples for cortisol, norepinephrine (NE), epinephrine (EPI) and absolute CD4+ and CD8+ cells were collected before training and during the recovery period (Immediate Post,

15, 30, 45 and 60min). Variables were quantified using summary measures (area-under-the-curve (AUC), time to peak value and peak value) and analyzed using RMANOVAs. Pearson product moment correlations were calculated. **RESULTS:** There were no significant differences across visits for any of the summary or baseline measures. EPI (69 ± 46.54 pcg/ml, 70.6 ± 46.12 pcg/ml, 58.5 ± 42.57 pcg/ml), NE (880.3 ± 670 pcg/ml, 886.4 ± 353.22 pcg/ml, 874.1 ± 578.12 pcg/ml), CD4+ (744.4 ± 182.15 cells/ul, 944.9 ± 326.46 cells/ul, 900.6 ± 217.58 cells/ul), and CD8+ (664.8 ± 204.89 cells/ul, 939.1 ± 443.69 cells/ul, 833 ± 238.8 cells/ul) cells all reached peak values immediately post training. Times to peak value for cortisol (22.02 ± 6.71 mcg/dl, 20.91 ± 5.92 mcg/dl, 19.66 ± 3.85 mcg/dl) were 18, 7.5, and 9 minutes for Visits 1-3 respectively. As the time intervals between blood collections were 15 minutes, these are interpreted as a peak between 15-30min for Visit 1 and peaks between 0-15min for Visits 2-3. For Visits 1 and 2, CD4+ and CD8+ cells were significant correlated (.728, $p=.017$ and .712, $p=.021$). **CONCLUSION:** The lack of significant differences in AUC values across visits suggests the subject's acute physiological responses to the training stress are not attenuated with repeated exposures. The observed decrease in the CD4/CD8 ratio immediately post training is not associated with an immunosuppressive response but is driven by an increase in CD8+ cells. Future research should investigate signaling molecules that may preferentially mobilize CD8+ cells in response to acute stress exposure.

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60. EFFECT OF A COOLING VEST ON PERCEPTUAL, PHYSIOLOGICAL, AND PERFORMANCE MEASURES FOLLOWING EXERCISE IN THE HEAT

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Exercising in a hot environment increases thermal discomfort, raises gastrointestinal temperature (T_{GI}), and potentially leads to heat illness. Limited evidence exists regarding the effect of external phase change cooling modalities on these variables. **PURPOSE:** Examine the effect of the phase change (10°C) Heat Emergency Kit (HEK) on thermoregulatory and perceptual response, and subsequent performance following exercise in the heat. **METHODS:** Twenty-six (13 male, 13 female) individuals (20-27y) participated in two trials (ambient temperature $31.5\pm 1.8^{\circ}\text{C}$, $59.0\pm 5.6\%$ RH). Trials consisted of 30 minutes of volitional games (soccer or Frisbee), treatment (T1) for 15 minutes in random order with HEK (covers chest, back, thighs, neck, and head) or lying in shade (control), an agility test (5-10-5 pro) and a distance run (1500m), and treatment (T2) with same modality as T1. Cooling rates were calculated using T_{GI} (ingestible thermistor) measures over time. Mean skin temperature (T_{SK}) was calculated via thermocouples and heart rate (HR) was recorded via cardiometer. T_{GI} , T_{SK} , HR, and perceptual measures of thermal and thirst sensation were assessed twice during games and every 5 minutes during T1 and T2. Perceived muscle pain was measured before and after games and performance. **RESULTS:** Maximum T_{GI} following games and performance was not significantly different between trials ($p>.05$). Overall cooling rates were significantly greater in T1 control ($0.053\pm 0.026^{\circ}\text{C}/\text{min}$) versus HEK ($0.043\pm 0.020^{\circ}\text{C}/\text{min}$, $p=0.048$), with no differences in T2 ($p=0.63$). There was a significant decrease in T_{SK} when using HEK after 10 (control: $35.3\pm 0.9^{\circ}\text{C}$, HEK: $34.0\pm 0.9^{\circ}\text{C}$, $p=.012$) and 15 minutes (control: $35.1\pm 0.9^{\circ}\text{C}$, HEK: $33.7\pm 0.9^{\circ}\text{C}$, $p=.001$) of T1. Muscle pain was significantly lower for HEK (0.6 ± 0.8) versus control (1.1 ± 1.3 , $p=0.026$) after T2. Thirst was significantly decreased following T2 for control (4.1 ± 1.7) compared to HEK (4.4 ± 1.8 ; $p=.021$). Agility (control: $5.74\pm 0.44\text{s}$, HEK: $5.68\pm 0.47\text{s}$) and distance (control: $7:49.3\pm 1:43.6\text{min}$, HEK: $7:44.6\pm 1:48.3\text{min}$) performances were not significantly different ($p>.05$). **CONCLUSION:** The HEK did not reduce T_{GI} more effectively than lying supine in the shade and therefore cannot be suggested as an effective modality to treat exercise-induced hyperthermia. Perceptual benefits identified that HEK improves comfort following exercise in the heat and that future testing should be done to solidify performance responses.

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61. THE EFFECTS OF SLEEP UPON VO₂MAX, VERTICAL JUMP, PUSHUPS, AND CURL-UPS

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INTRODUCTION: Several studies have shown the effects of exercise on sleep; however, a limited number of studies have examined the effects of sleep upon exercise. **PURPOSE:** The primary purpose of this study was to explore the effects of sleep upon different areas of exercise performance. **METHODS:** Participants were 4 males and 1 female between the ages of 19 and 22. Subjects participated in the same test regimen on two separate occasions, the first having 2 hours of sleep, the second having 8 hours of sleep. Testing consisted of VO₂max, vertical jump, curl-up, and pushup tests. Each test was performed at the same time of day for each trial and subject. **RESULTS:** The mean VO₂max (ml/kg/min) for 2 hours of sleep was 49.5 (SD=6.5) and 48.14 (SD=6.6) for 7 hours of sleep. The mean vertical jump (in) for 2 hours of sleep was 17.8 (SD=3.0) and 19.9 (SD=2.7) for 7 hours of sleep. The mean number of pushups for 2 hours of sleep was 23.4 (SD=13.3) and 31.6 (SD=11.0) for 7 hours of sleep. The mean number of curl-ups for 2 hours of sleep was 38.4 (SD=15.1) and 82.4 (SD=76.3) for 7 hours of sleep. **CONCLUSION:** Based upon these results, sleep does not affect VO₂max, vertical jump, pushups, or curl-ups. Future research should include a larger number of subjects.

62. THE IMPACT OF VODCASTS AND LEARNING STYLES ON ACADEMIC PERFORMANCE IN A HEALTH COURSE

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While traditional classroom lectures are common, video-recorded lectures (vodcasts) are increasingly used as supplemental instruction. Research shows 59% to 91% of students report placing lectures online provided a positive impact on learning. As many as 89% reported multimedia resources assisted their understanding of material. Little research has been completed regarding technological impacts on academic performance when accounting for learning styles. **PURPOSE:** The purpose of this study was to evaluate the impact of vodcasts on academic performance in students with different learning styles in an undergraduate health course. **METHODS:** Participants ($N=91$) were recruited from health courses on the University of Central Oklahoma campus. Three classes were randomly assigned to the Vodcast group (VG) or Control group (CG). Learning styles were assessed by the Felder and Solomon Learning Styles Inventory (LSI). Academic performance was evaluated by pre-and post-test scores on a multiple-choice exam. The VG ($N=57$) had access to five vodcasts. Class time was utilized for discussion and activities. The CG ($N=34$) received traditional classroom lectures. Each group had access to a copy of the PowerPoint lectures. A self-reported questionnaire evaluated student usage. **RESULTS:** Only 17.86% of participants in VG reported watching vodcasts. Sequential learners reported watching videos the more days a week than other learners ($m=0.57 \pm .429$ days). A repeated measures ANOVA revealed no significant differences in academic performance between groups ($p=0.847$). Changes in academic performance approached significance across learning styles ($p=.056$). Moderate to large effect sizes of mean difference scores resulted between visual ($m=20.63 \pm 8.63$) and sensing ($m=31.67 \pm 8.5$, $d=0.53$), sequential ($m=30 \pm 11.55$, $d=0.92$), intuitive ($m=27.43 \pm 8.6$, $d=0.79$), and active learners ($m=28.33 \pm 13.35$, $d=0.68$). Mean differences from pre-to post-test also experienced a moderate to large effect size between reflective ($m=24.2 \pm 14.31$) and sensing ($d=0.62$), reflective and sequential ($d=0.44$), and sensing and intuitive ($d=0.50$) learning styles. **CONCLUSION:** When utilizing vodcasts, it may be beneficial to incentivize watching lectures to encourage adherence. While video technology may not have an impact on a student's ability to perform on a multiple-choice health test, learning styles may need to be taken into account when designing educational experiences.

63. IMPACT OF A PROFESSIONAL NUTRITION PROGRAM ON A FEMALE CROSS-COUNTRY COLLEGIATE ATHLETE: CASE STUDY

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The most basic building block for an endurance athlete is sports-specific training. One very important aspect that is often overlooked in a training program is caloric intake. However, a proper caloric intake can have an impact on body fat percent (%fat) and bone mineral density (BMD). **PURPOSE:** The purpose of this investigation was to assess the effect of a professional nutrition program on %fat and BMD in a track and field female athlete.

METHODS: A 20-year-old female track and field athlete at a Division I University who was at the lower end of normal body weight range and exhibited very low %fat performed a baseline Dual Energy X-ray Absorptiometry (DXA) test prior to attending a four-week off-campus professional nutrition program. After the 4-week professional nutrition program, the subject continued to follow the nutrition advice from the program on her own. In an effort to assess short- and long-term effects, DXA scans were performed at 4-week (immediately post nutrition program), 8-week and 16-week intervals. Total, the subject performed four DXA scans at the completion of this 16 week study.

RESULTS: The professional nutrition program increased the caloric intake for the female in this study. At the 4-week time point caloric intake increased from 2,751 to 3,157 calories, but at 8- and 16-week the caloric intake had returned closer to pre-professional nutrition program intake values, 2,643 and 2,817. BMD increased at the 4-week, 1.192cgm/cm² to 1.197gm/cm², and 8-week time point, to 1.206gm/cm². However, the 16-week time point showed a lower value, 1.169gm/cm², compared to baseline. %fat increased at the 4-week time point from 5.1 to 6.7, then decreased at 8-week to 5.7 followed by a slight increase to 6 at 16-week. **CONCLUSIONS:** The professional nutrition program in this study appeared to be effective in temporarily improving %fat and BMD. The increase in caloric intake during the nutrition program possibly produced a short-term increase in %fat, which consequently could have acted to elicit the increase in BMD (peaking at 8-week). However, the long-term effects of the nutrition program appeared to dissipate as BMD decreased at 16-week and %fat decreased (8-week) and plateaued (16-week).

64. EFFECT OF LIFESTYLE PHYSICAL ACTIVITY AND WESTERN DIET ON GENES CONTROLLING MITOCHONDRIAL TRANSLATION

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Mitochondria-encoded proteins are essential to cellular respiration and metabolic health. These proteins are transcribed and translated from mitochondrial DNA into proteins involved in oxidative phosphorylation. mRNA translation of the mitochondrial genome may be altered by obesity. However, to our knowledge, the effect of Western diet and lifestyle physical activity on gene expression of mitochondrial translation factors has not been assessed. **PURPOSE:** To determine the impact of Western diet-induced obesity on mitochondrial mRNA translation regulators and if physical activity may impact these factors. **METHODS:** C57BL6/J mice (n=40) were placed on a normal chow (~15% fat, n=20) or Western diet (~42% fat + 1.5g/kg cholesterol, n=20) for 4 weeks. After the 4 weeks, half of the normal chow (NC) and Western diet (WD) groups were given access to a running wheel (voluntary wheel running [VWR], 10 NC and 10 WD) while the other half (10 NC and 10 WD) of each group remained sedentary (SED) for another 4 week interval. After the 8 weeks, animals were euthanized and samples were processed for mRNA expression of Mitochondrial Translation Initiation Factors 2 and 3 (mtIF2 and mtIF3), Translational Activator of Cytochrome Oxidase-1 (TACO1) and Mitochondrial Elongation Factor-Tu (TUFM) by qPCR. Data were analyzed by 2X2 ANOVA (diet [NC vs. WD] X activity [SED vs. VWR]) with α set at P<0.05. **RESULTS:** mtIF2 and mtIF3 gene expression were suppressed by Western diet (approx. 50% reduction in WD-SED compared to NC-SED) while TACO1 and TUFM appeared unaffected. No significant effect of VWR was observed for any of the measured variables. **CONCLUSION:** These data suggest that Western diet-induced obesity does not affect the expression of all factors involved in mitochondrial translation. However, significant suppression of genes involved in the initiation phase of mitochondrial translation indicates that Western diet-induced obesity

may disrupt mitochondrial translation in the initiation phase. This disruption may contribute to a decreased number of proteins which are essential to cellular respiration. This suppression may contribute to the decreased oxidative phosphorylation capacity associated with obesity. Lifestyle physical activity does not appear to be a viable way to alter the expression of genes that control mitochondrial translation.

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65. HIGH POWER RESISTANCE EXERCISE OVERREACHING DOES NOT AFFECT TESTOSTERONE AND CORTISOL CONCENTRATIONS

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Overreaching is a lesser form of overtraining, which results in similar performance decrements, but a shorter recovery time. Resistance exercise overreaching protocols have routinely demonstrated performance decrements, however the effects on hormonal measures have differed, depending on the protocol used. **PURPOSE:** To determine the effects of a high power, high volume, moderate intensity resistance exercise protocol on performance and hormonal measures. **METHODS:** Seventeen resistance-trained men (n=17; X±SD; age=22.8±3.3 yrs), were assigned to three groups, control (CON, n=6), overreaching-supplement (SUP, n=8) and overreaching-placebo (PL: n=3) as part of a larger study evaluating the effects of a nutritional supplement on overreaching. All subjects completed four resistance exercise bouts consisting three sets of five repetitions of speed squats using 70% 1RM. In the third week, the CON trained twice more with the same protocol, while SUP and PL trained twice per day for 7.5 days, performing ten sets of five repetitions using 70% 1RM. Subjects were instructed to perform all repetitions with maximal velocity. Blood samples were taken at baseline (T1), before the third week (T2), after the third week (T4) and following a one-week recovery period (T4). Commercially available ELISAs were used to measure serum testosterone and cortisol concentrations. A barbell-attached dynamometer was used to determine back squat mean power and barbell velocity at 70% 1RM. **RESULTS:** CON demonstrated no changes in mean back squat power or velocity at any time point. In contrast, significant differences in barbell velocity and power were observed in SUP and PL at T3. Performance measures returned to T1 values by T4. Despite these performance decrements, no significant changes were observed in testosterone, cortisol or the testosterone/cortisol ratio. Aside from attenuated performance, changes in nocturnal catecholamine release, β_2 adrenergic receptor content, and psychological variables suggest that subjects in the SUP and PL groups experienced overreaching. **CONCLUSION:** The overreached subjects demonstrated significant performance decrements in the absence of hormonal changes. Consequently, the results of this investigation suggest that testosterone, cortisol and the testosterone/cortisol ratio may not be valid measures for diagnosis of resistance exercise overreaching.

66. EFFECTS OF BETA-ALANINE AND CREATINE MONOHYDRATE SUPPLEMENTATION ON ANAEROBIC PERFORMANCE IN TRAINED FEMALE CYCLISTS

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Beta-alanine (BA) supplementation increases the intramuscular pH buffer, carnosine, and is suggested to increase anaerobic exercise performance. When supplemented alongside BA, creatine-monohydrate (CrM) has a synergistic effect for further increasing exercise performance in males; however, these effects have not been evaluated in females. Females experience greater relative increases in carnosine from BA supplementation and these effects are further augmented in trained muscle. Therefore, when combined with CrM, an acute BA dose may produce performance increases in trained females; however, the effects of an acute BA and/or CrM dose on performance in females remain unknown. **PURPOSE:** To evaluate the effects of an acute dose of BA and/or CrM on repeated anaerobic cycling performance in females. **METHODS:** Twelve females (age = 26.6 ± 1.3 years) with at least two years of competitive riding experience (3.92 ± 0.64 years training at 125.83 ± 5.37 miles/week) volunteered to

participate in this randomized, double-blind study. All subjects completed four supplement trials: 1) PLA = 34g dextrose, 2) BA = 1.6g BA + 34g dextrose, 3) CrM = 5.25g CrM + 34g dextrose, and 4) BA-CrM = 1.6g BA + 5.25g CrM + 34g dextrose. Thirty-minutes after supplementation, subjects performed three repeated 30 second Wingate cycling tests with 2-min active rest between each. Fatigue index, mean power, and peak power were measured during each Wingate. Lactate, heart rate, and rating of perceived exertion (RPE) were measured at rest, immediately after each Wingate, and after the completion of each active rest period. All trials were separated by at least 72 hours to ensure that adequate rest was achieved. **RESULTS:** Repeated measures ANOVA revealed no significant effect of supplementation on any of the performance variables during any of the three Wingates ($p > .05$). RPE significantly decreased ($p < .001$) immediately following Wingates 1 and 2, and after each 2-minute rest period for the BA and BA-CrM trials; however, no differences were observed immediately after Wingate 3. **DISCUSSION:** An acute dose of BA and/or CrM did not improve anaerobic performance in young trained female cyclists. Acute supplementation of 1.6g BA did, however, significantly decrease feelings of perceived exertion immediately post Wingate performance and after 2-minute recovery intervals; these decreases in RPE were present despite similar power output and fatigue index across Wingate trials. This study demonstrates that acute BA supplementation can decrease feelings of exertion, but does not improve anaerobic cycling performance.

67. CHANGE IN BODY WEIGHT, URINE OSMOLALITY, AND USG IN FREE LIVING CONDITIONS OVER THE COURSE OF 29 DAYS

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Body weight and hydration markers change greatly during strenuous exercise, especially in the heat. However, in a non-athletic population, changes in body weight and hydration markers may not be so obvious. It's important to classify the normal fluctuation of these measurements for future studies in order to delineate when an intervention results in a change outside of what can be expected during normal daily living. **PURPOSE:** The purpose of this study was to describe the normal fluctuations in body weight and urine hydration markers over the course of 29 days. **METHODS:** Forty-five male and female participants, ranging from 18 to 61 years were measured on 12 separate morning visits over the course of 29 days. All the subjects were apparently healthy and none of them exercised more than 4 hours per week. During each visit, subjects were weighed and provided a urine sample for analysis of osmolality (UOsm) and specific gravity (USG) measurement. The results from these measurements were analyzed using a one-way, repeated measures analysis of variance test to evaluate main effects of time on body weight, UOsm, and USG. Additionally, percent change compared to the first day of testing was calculated for the 11 data points after the first visit, for all variables. **RESULTS:** No main effect of time was observed across the 29 days for any variable (body weight, $p = 0.214$; UOsm, $p = 0.357$; USG, $p = 0.472$). The average percent change for body weight was 0.1% (95% CI: -2.6 to +2.7%), for UOsm, -5.3% (95% CI: -125% to 115%), and USG, -0.3% (95% CI: -1.6 to 1.1%). Each variable showed relative stability over the course of the 29 days. **CONCLUSION:** Fluctuation in body weight and urine hydration markers over the course of the 29 days appeared to be stable.

68. EFFECTS OF DIET-INDUCED OBESITY ON SKELETAL MUSCLE EXTRACELLULAR MATRIX GENE EXPRESSION DURING SKELETAL MUSCLE REGENERATION

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Skeletal muscle has the ability to regenerate from damage; however, recent studies have reported a negative effect of obesity on skeletal muscle regenerative capacity. The extracellular matrix (ECM) contributes to skeletal muscle structure acting as a scaffold for skeletal muscle. Additionally, skeletal muscle serves as a reservoir for proteins and growth factors that promote regeneration. Optimal skeletal muscle regeneration includes inflammation, ECM remodeling, and myofiber growth. Disruptions to any of these processes can negatively affect skeletal muscle regeneration. **PURPOSE:** To determine how diet-induced obesity (DIO) affects ECM remodeling during skeletal muscle regeneration. **METHODS:** Fifty-six male C57BL/6J mice were randomly assigned to two groups; lean diet

(10% fat) and high fat diet (HFD) (60% fat). Within those two groups, mice were randomly assigned to either a PBS (uninjured) group or a bupivacaine (injured) group. Bupivacaine is a myotoxin which induces injury to skeletal muscle. Both groups received injections into the tibialis anterior (TA). Three or 28 days post-bupivacaine injection, the TAs were extracted and PCR reaction was done to quantify ECM-related gene expression. **RESULTS:** The mice on the HFD had a 52% increase in bodyweight compared to the lean control (lean = 25.7 g ± 0.3, HFD = 39.2 g ± 1.4, $p < 0.05$). There was a significant decrease in TA muscle mass to bodyweight ratio in the lean group (1.8 ± 0.06 mg/g vs. 1.7 ± 0.03 mg/g, $p < 0.05$) and the HFD group (1.5 ± 0.1 mg/g, vs. 1.4 ± 0.1 mg/g $p < 0.05$) 3 days post-bupivacaine injection. There was a significant increase in TA muscle mass to bodyweight ratio in lean group (1.9 ± 0.1 mg/g vs. 2.2 ± 0.1 mg/g, $p < 0.05$) and this was not observed in the HFD group (1.3 ± 0.1 mg/g, vs. 1.3 ± 0.1 mg/g) 28 days post-bupivacaine injection. There was a 12-fold and 4-fold increase in collagen-I gene expression in the lean and high-fat groups, respectively 3 days post-bupivacaine injection ($p < 0.05$). There was a main effect of injury to decrease collagen-I gene expression 28 days post-bupivacaine-injection ($p < 0.05$). Collagen-III gene expression increased 3-fold in the lean group and a 19-fold increase in the high-fat group ($p < 0.05$) 3 day post-bupivacaine injection. There were no differences in collagen-III gene expression 28 days post-bupivacaine injection. There was a 70% reduction in the collagen-III/I ratio in the lean injured group, but a 4.5-fold increase in the HFD injured group ($p < 0.05$) 3 day post-bupivacaine injection. **CONCLUSION:** Obesity altered the ECM composition during skeletal muscle regeneration. This could negatively impact the ability of obese muscle to recovery form injury.

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69. DOES VO_{2peak} MODERATE THE ASSOCIATION BETWEEN DIETARY FAT INTAKE AND POST-PRANDIAL FAT OXIDATION?

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Previous evidence suggests individuals with low resting fat oxidation rates may be more prone to the development of obesity and type 2 diabetes. Both exercise training and a high-fat diet are known to independently increase fat oxidation. It is currently unclear whether examining these two lifestyle factors simultaneously might moderate the resultant post-prandial (PP) fat oxidation. **PUPROSE:** The purpose of this study was to determine whether VO_{2peak} moderates the association between dietary fat intake and PP fat oxidation following a high-fat meal. **METHODS:** Twenty-nine healthy young adults (17 M, aged 19-38 yrs) of varying aerobic capacities ($VO_{2peak} = 49.4 \pm 11.1$ ml/kg/min) were randomized to either a moderate-intensity walking (EX, energy expenditure 50% of breakfast kcals) or a sedentary condition. In the EX condition, walking was performed 60min PP. After an overnight fast, all participants consumed a high-fat breakfast (65% fat, 10 kcal/kgbw). Resting metabolic rate was assessed immediately after, and 200min following, consumption of the high-fat meal. Assessments included dietary fat via 3-day food log, VO_{2peak} with a treadmill ramp protocol to exhaustion, indirect calorimetry with a ventilated hood system to determine fat oxidation at 0min and 200min PP, and %body fat via DEXA. **RESULTS:** Dietary fat intake was 798.6 ± 235.4 kcal/day. Fat oxidation at baseline was not different from 200min PP (47.9 ± 16.4 vs. 50.7 ± 17.8 kcal/hr, $p > 0.05$). There was a significant correlation between dietary fat intake and 200min PP fat oxidation ($r = 0.37$, $p < 0.05$) and between VO_{2peak} and 200min PP fat oxidation ($r = 0.62$, $p < 0.01$). Moderation analysis examining the effect of VO_{2peak} on the association between dietary fat intake and PP fat oxidation revealed no significant moderation ($\Delta R^2 = 0.007$, $p = 0.60$). A subsequent linear regression, including VO_{2peak} , dietary fat intake, %body fat, baseline fat oxidation, and energy balance PP (kcals); predicted 79% of the variance in PP fat oxidation (adjusted $R^2 = 0.79$, $p < 0.001$). **CONCLUSION:** VO_{2peak} did not moderate the association between dietary fat intake and PP fat oxidation. When examining additional factors thought to be associated with fat oxidation, however, 79% of the variance in PP fat oxidation could be explained. These results indicate that post-prandial fat oxidation is a complex process with multiple contributing factors.

70. STATIC AND DYNAMIC POSTURAL STABILITY COMPARISONS BETWEEN ANAEROBICALLY TRAINED MALES AND FEMALES

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Previous researchers have examined postural stability performance through the use of static and dynamic balance assessments. Although static postural stability assessments have been shown to be useful for clinical decision-making, dynamic modes of balance may provide a more sensitive and functionally-relevant, sport-related assessment tool for examining postural stability performance in highly trained individuals. However, it is unknown whether these assessments are influenced by gender. **PURPOSE:** The purpose of this study was to compare static and dynamic postural stability between college-aged males and females. **METHODS:** Fifteen males (mean \pm SD: age = 23.5 ± 2.5 yr; height = 176.7 ± 7.4 cm; mass = 87.3 ± 9.5 kg) and 14 females (age = 22.1 ± 1.9 yr; height = 163.6 ± 9.1 cm; mass = 63.1 ± 5.5 kg), who were all anaerobically trained (resistance training ≥ 4 days \cdot wk $^{-1}$ for 2 years), performed static and dynamic postural stability assessments on a commercially designed balance testing unit. Experimental trials were randomized in order and assessed static bilateral assessments for sway index (SI) and dynamic unilateral assessments for overall stability index (OSI), anterior/posterior index (API) and medial/lateral index (MLI) scores. Static balance assessments consisted of 4, 20-s static stance conditions: eyes-open firm surface (EOFS), eyes-closed firm surface (ECFS), eyes-open soft surface (EOSS) and eyes-closed soft surface (ECSS). Dynamic balance assessments consisted of 3, 20-s dynamic balance conditions on each leg in which the platform was allowed to move freely at a spring resistance of 4. Spring resistance levels range between 1 (*least stable*) and 13 (*most stable*). All participants reported being right limb dominant. **RESULTS:** The OSI, API and MLI scores were higher for males ($P=0.005-0.012$) than females for the dominant limb; additionally, API scores were higher for males ($P=0.037$) on the contralateral limb compared to the females. No gender differences were observed during the static balance tests for SI, nor between limbs during the dynamic assessments for OSI, API, or MLI ($P>0.05$). **CONCLUSIONS:** These findings revealed lower stability scores for females and thereby, greater balance performance compared to males during dynamic balance tests for both dominant and contralateral limbs. However, no stability differences were observed between genders during static tests or between limbs for either males or females on dynamic assessments. These findings suggest dynamic stability assessments may be a more effective discriminator than static assessments of balance-related performances between anaerobically trained males and females.

71. FOREFOOT RUNNING: THE CURE TO CHRONIC EXERTIONAL COMPARTMENT SYNDROME?

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Chronic exertional compartment syndrome (CECS) is a cause of leg pain that is frequently undiagnosed. CECS is caused when there is increased pressure within the fascial space. The common symptom associated with CECS is pain in the affected compartment during exertion or exercise. CECS most often occurs in elite athletes, military recruits, and adult recreational runners. **Purpose:** The purpose of this abstract is to inform the audience about chronic exertional compartment syndrome and the use of forefoot running in alleviating the symptoms associated with CECS. **Methods:** The literature review was conducted using CINHALL and PubMed research databases. Inclusion criteria for articles used included: articles that focused on forefoot running with compartment syndrome. **Results:** The results of the studies conducted indicated that upon conclusion of 6 weeks of forefoot technique training there was a decrease in intracompartmental pressure between pre and post intervention measures. Participants reported no symptoms when running 5km 6 weeks after forefoot strike running intervention. The participants reported pain levels less than 1 on a scale of 0-10. **Discussion:** Results show that forefoot strike running training is an effective conservative treatment for CECS and decreases intracompartmental pressure and that pain and disability often associated with CECS were reduced for participants for up to a year. Further tests and studies are needed to provide more information on this topic.

72. MECHANOMYOGRAPHIC MEAN POWER FREQUENCY OF THE VASTUS LATERALIS DURING AN ISOMETRIC TRAPEZOID MUSCLE ACTION

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PURPOSE: This study examined the mechanomyographic mean power frequency (MMG_{MPF})-force relationships for 5 aerobically-trained (AT), 5 resistance-trained (RT), and 5 sedentary (SED) individuals. **METHODS:** Five AT (age=19.20±0.45 yrs), 5 RT (age=25.00±4.53 yrs), and 5 SED (21.20±2.17 yrs) volunteered for this investigation. The AT ran 61±15 miles·wk⁻¹, all but one RT subject were capable of a one repetition maximum back squat ≥ twice their body mass, and the SED did not participate in any structured physical activity for 3 years prior. Each participant was seated on a Biodex isokinetic dynamometer and isometric leg extensor strength assessments were performed on the right leg at a 90° flexion with isometric strength measured using the force signal from a load cell fitted to the Biodex. Participants performed three maximal voluntary contractions (MVC) followed by an isometric trapezoid muscle action at 60% MVC calculated from the highest MVC. An MMG sensor was placed over the vastus lateralis (VL) and thigh skinfolds were collected at the electrode site. The MMG and force signals were simultaneously sampled at 2 kHz and were bandpass filtered (fourth-order Butterworth) at 5-100 Hz. For the linearly increasing and decreasing muscle actions, linear regression models were fit to the log-transformed MMG_{MPF}-force relationships and the slope (*b* term) and anti-log of the *y*-intercept (*a* term) were calculated. An average of MMG_{MPF} was calculated for the entire steady force segment. Separate 2-way mixed factorial ANOVAs (training status [AT vs. RT vs. SED] x segment [linear increase vs. linear decrease]) were used to examine the *b* and *a* terms during the linearly increasing and decreasing muscle actions. Separate 1-way ANOVAs were used to examine MMG_{MPF} during the steady force segment and skinfold thickness among the AT, RT, and SED. When appropriate, follow-up analyses were performed using paired and independent samples *t*-test with Bonferroni corrections. An alpha level was set at 0.05 to determine statistical significance. **RESULTS:** The *b* and *a* terms were not different among training statuses ($P>0.05$) or linearly increasing and decreasing segments ($P>0.05$). The 95% confidence intervals for the *b* terms suggested deceleration in MMG_{MPF} throughout the force spectrum for linearly increasing and decreasing muscle actions. MMG_{MPF} during the steady force segment ($P=0.287$) and skinfold thicknesses ($P=0.142$) were not different among training status. **CONCLUSION:** MMG_{MPF} did not distinguish between training statuses or muscle actions. Higher targeted forces with faster contraction rates may be necessary for MMG_{MPF} to distinguish between training statuses and muscle actions.

73. RELATIONSHIP BETWEEN 24-H VOID FREQUENCY, HYDRATION STATUS, AND INGESTED BEVERAGE COMPOSITION IN HEALTHY MALES

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Void frequency (VF) increases with increased fluid intake; however, the relationship between VF and hydration status with controlled fluid intake is unknown. Further, the influence of different beverage types on VF is unclear. **PURPOSE:** To investigate the relationship between hydration status and VF in healthy males when given a fixed volume of different beverages. **METHODS:** In a randomized order, 32 healthy males (age 23.7 ± 4.9 y; mass 75.9 ± 11.7 kg) completed four weeks of testing consuming various beverage treatments (T_{xt}) over 24-h with total daily fluid intake equal to 35 ml/kg body mass (including fluids from beverages and moisture content of a prescribed diet). T_{xt} were: water only (A), water+caloric cola (B), water+non-caloric cola (C), or water+caloric cola+non-caloric cola+orange juice (D). Volumes of fluid were split evenly between beverages within each 24-h treatment. 24-h urine osmolality (24-U_{osm}), specific gravity (24-U_{SG}), volume (24-U_{vol}) and VF were measured during 24-h of intervention. 24-h urine samples were classified as euhydrated (24-U_{SG} ≤ 1.020 and 24-U_{osm} ≤ 700 mOsm/kg) or hypohydrated (24-U_{SG} > 1.020 and 24-U_{osm} > 700 mOsm/kg). **RESULTS:** As designed, total fluid intake from all sources was the same across treatments (2659 ± 400 ml; $p>0.05$). There were no differences between treatments in 24-U_{osm} or 24-U_{vol} (grand mean: 607 ± 211 mOsm/kg and 1536 ± 593 ml, respectively; $p>0.05$). VF over 24-h was not different between T_{xt} A, B, C, and D (5.2 ± 1.7, 5.3 ± 1.8, 5.6 ± 2.0, and 5.1 ± 1.8, respectively; $p>0.05$). Independent of beverage treatment, VF significantly correlated with 24-U_{SG} ($r = -.47$; $p<0.0001$) and 24-U_{osm} ($r = -.46$; $p<0.0001$). After classifying urine samples as euhydrated or hypohydrated from 24-U_{SG} and 24-U_{osm} values, a receiver operating curve analysis produced an area under the curve of 73.7% with a 95% CI [64.9, 82.5] ($p<0.0001$). A positive classification of hypohydrated could be achieved with a VF ≤ 5, with sensitivity 70.2% and specificity 73.4%. **CONCLUSION:** These results indicate that VF is significantly correlated with hydration status, such that

higher values of 24-U_{SG} and 24-U_{osm} are inversely related to VF. Further, urinary measures of hydration status and VF were not different between beverage treatments, suggesting that ingestion of different beverages does not affect voiding behavior in healthy males.

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74. INVERSE RELATIONSHIP BETWEEN HYDRATION STATUS AND VIGOR WITHIN THE GENERAL POPULATION

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Previous research has shown that acute dehydration can result in changes in mood. However, the effect of hypohydration (i.e., reflected through high urine concentration) on mood in free-living conditions has not been studied. **PURPOSE:** The present study was designed to determine if hydration status was associated with mood. **METHODS:** A group of 44 apparently healthy subjects (n=44, 21 men, 23 women, 32±11 y, 1.70±0.07 m, 74.4±18.1 kg) completed three visits separated by a week. Mood was assessed by Profile of Mood States (POMS) questionnaire during each visit. Hydration was assessed via urine (UOsm) and plasma osmolality (POsm) during the 2nd and 3rd visit. Linear regression analysis was used to compare hydration indices with mood sub-scales and Total Mood Disturbance (TMD). **RESULTS:** UOsm (574±252 mmol/kg) and POsm (287±4 mmol/kg) data were averaged during the 2nd and 3rd visit for each subject. Participants were familiarized to the POMS questionnaire on their first visit. POMS data from the 2nd and 3rd visit were averaged to attain mood ratings for each participant. UOsm and the Vigour-Acuity subscale displayed a significant negative relationship with urine osmolality ($R^2 = 0.11$, $F_{1,41}=5.35$, $b = -0.34$ and $p=0.026$). However, there was no significant relationship between POsm and Vigour Acuity. No other sub-scales or TMD displayed a significant relationship to either urinary or hematological markers of hydration status. **CONCLUSION:** Hypohydration as indicated by increased UOsm was related to decreased vigor in apparently healthy free-living adults. This may suggest that both acute dehydration and hypohydration are related to disposition. Future research should aim to identify if fluid intake or body water conservation drive this relationship.

75. A COMPARISON OF JOINT DIAMETER-BASED AND BIOELECTRICAL IMPEDANCE ANALYSIS TO DUAL ENERGY X-RAY ABSORPTIOMETRY FOR BODY COMPOSITION ANALYSIS IN COLLEGIATE AMERICAN FOOTBALL PLAYERS.

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PURPOSE: Body composition (BC) is a frequently assessed component of health-related fitness. Many different field methods are used to estimate BC including bioelectrical impedance analysis (BIA) and skinfolds. Recently, a portable joint diameter-based body composition assessment system (IBC) has become commercially available for estimating BC. The purpose of this study was to compare the reliability of the IBC system and BIA for estimating percent body fat (%fat) in collegiate Freshmen American football players. **METHODS:** Subjects' %fat was estimated using the IBC and BIA Omron HBF 306 in both the Athlete (A) and Non-Athlete (NA) modes and compared to dual-energy X-ray absorptiometry (DXA), which served as the criterion estimate. Subjects were 22 Freshmen collegiate football players (age 18.23 (0.87) yrs., height 1.73 (0.07) m., body mass 104.8 (20.5) kg. and BMI 29.7 (5.1) kg/m²). The positions played by the subjects varied. Sixteen subjects played an offensive football position while only 5 subjects played a defensive football position. Subjects in the offensive positions included 1 fullback, 2 wide receivers, 4 quarterbacks, 3 tight ends, 2 guards, 2 offensive tackles, 1 center/long snapper, and 1 long snapper. The defensive positions consisted of 1 inside linebacker, 1 outside linebacker, 1 cornerback, 1 strong safety, and 1 nose tackle. **RESULTS:** The HBF-306A [16.4 (5.6) %] and IBC [16.2 (9.6) %] estimates of %fat were significantly different from the criterion DXA estimate [22.2 (9.3) %, $p=0.006$], however, the HBF-306NA [23.3 (7.3) %] estimate was not ($p=0.834$). Additionally, there were significant differences between HBF-306A and

HBF-306NA ($p=0.006$), however, the HBF-306NA and IBC estimates were similar to each other ($p=0.999$). All estimates were highly correlated with the DXA criterion ranging from $r=0.906$ to $r=0.940$. The SEE was 3.3%, 3.2%, and 4.0% for HBF-306A, HBF-306NA, and IBC estimates of % fat, respectively. The average deviation from the line of identity was 7.2%, 3.5%, and 7.2% for the HBF-306A, HBF-306NA, and IBC estimates of % fat, respectively. **CONCLUSIONS:** In this study the IBC estimate did not provide a valid estimate of body composition and underestimated %fat compared to the DXA estimate. Interestingly, the BIA Omron HBF-306 resulted in values similar to that of the DXA in Non-Athlete mode but not in Athlete mode. Thus, we wish to suggest that the BIA Omron HBF-306 in Non-Athlete mode may provide a valid estimate of %fat in Freshmen American football players when the DXA estimate is not feasible. Neither the BIA Omron HBF 306 in either the Athlete or Non-Athlete mode can be recommended for estimating %fat based on this primary analysis.

76. RELIABILITY OF THE TOTAL BODY RECUMBENT STEPPER SUBMAXIMAL EXERCISE TEST

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Submaximal exercise testing presents a practical alternative for measurement of cardio-respiratory fitness in a clinical setting where peak exercise testing may not be feasible. Previously, our lab developed a prediction equation to estimate peak VO_2 using a total body recumbent stepper (TBRS) based on the Young Men's Christian Association (YMCA) protocol. The peak VO_2 prediction equation was cross-validated in a group of healthy adults and in individuals 60-80 years of age. However, we have not yet tested the reliability of the TBRS submaximal exercise test. **PURPOSE:** The purpose of the present study was to determine the reliability of the TBRS submaximal exercise test in healthy adults from 20-70 years of age. **METHODS:** A total of 40 subjects (27 M, 13 F, 39.6 yrs \pm 10.3) were recruited from the Kansas City Metro and surrounding area and screened to determine eligibility. Subjects completed 2 submaximal exercise tests separated by a minimum of 24 hours and a maximum of 5 days. Testing was conducted at similar times of day. Participants were informed not to consume food or drink (except water) within 2-3 hours of the exercise tests and avoid caffeinated products for 6 hours prior to the exercise test. Participants were asked to avoid vigorous physical activity for 24 hours prior to exercise testing. Height, weight, pre-exercise HR and blood pressure (BP) were obtained prior to exercise testing. Data was analyzed using SPSS for test-retest reliability with an intraclass correlation coefficient (ICC) computation. **RESULTS:** We found a significant correlation between predicted peak VO_2 at visit 1 and visit 2 (ICC 2,1 = 0.986, CI = .974-.993). Repeated Measures ANOVA showed no significant difference in predicted values between visits ($p= 0.153$). **CONCLUSION:** These results suggest that the TBRS submaximal exercise test and peak VO_2 prediction equation can be used to reliably predict peak oxygen consumption. This is essential information for clinical professionals who want to provide their patients or clients with information regarding their cardiorespiratory fitness.

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