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Peer-reviewed Research Publications:

1. Spitz, R. W., Gonzalez, A. M., Ghigiarelli, J. J., Sell, K. M., & Mangine, G. T. (2019). Load-Velocity Relationships of the Back vs. Front Squat Exercises in Resistance-Trained Men. *Journal of Strength & Conditioning Research*, 33(2), 301-306.

ABSTRACT: The purpose of this investigation was to describe and compare changes in barbell velocity in relation to relative load increases during the back squat (BS) and front squat (FS) exercises. Eleven National Collegiate Athletic Association Division I baseball position players (19.4 ± 1.0 years; 182.4 ± 6.5 cm; and 87.2 ± 7.4 kg) performed trials at maximum speed with loads of 30, 50, 70, and 90% of their predetermined 1 repetition maximum (1RM) for both BS and FS. Peak and mean velocity was recorded during each repetition using an accelerometer. Differences between exercises and relative loading were assessed by separate 2×4 (condition \times relative load) repeated-measures analysis of variance for mean and peak velocity. In addition, the load-velocity relationship across submaximal loadings in BS and FS were further assessed by calculating their respective slopes and comparing slopes through a paired-samples t-test. No significant condition \times relative load interactions were noted for mean velocity ($p = 0.072$) or peak velocity ($p = 0.203$). Likewise, no significant differences in the slope for BS and FS were noted for mean velocity ($p = 0.057$) or peak velocity ($p = 0.196$). However, significant main effects for relative load were noted for both mean and peak velocity ($p < 0.001$), whereby mean and peak velocity were progressively reduced across all relative loads (i.e., 30, 50, 70, and 90% 1RM) for both the BS and FS. Our results demonstrate that the load-velocity relationships of the BS and FS exercises seem to be similar; therefore, similar approaches may be used with these squat variations when monitoring barbell velocity or implementing velocity-based strength training.

2. Gonzalez, A. M., Mangine, G. T., Spitz, R. W., Ghigiarelli, J. J., & Sell, K. M. (2019). Agreement between the Open Barbell and Tendo Linear Position Transducers for Monitoring Barbell Velocity during Resistance Exercise. *Sports*, 7(5), 125.

ABSTRACT: To determine the agreement between the Open Barbell (OB) and Tendo weightlifting analyzer (TWA) for measuring barbell velocity, eleven men (19.4 ± 1.0 y) performed one set of 2–3 repetitions at four sub-maximal percentage loads, [i.e., 30, 50, 70, and 90% one-repetition maximum (1RM)] in the back (BS) and front squat (FS) exercises. During each repetition, peak and mean barbell velocity were recorded by OB and TWA devices, and the average of the 2–3 repetitions was used for analyses. Although the repeated measures analysis of variance revealed significantly ($p \leq 0.005$) greater peak and mean velocity scores from OB across all intensities, high intraclass correlation coefficients (ICC_{2,K} = 0.790–0.998), low standard error of measurement (SEM_{2,K} = 0.040–0.119 m·s⁻¹), and coefficients of variation (CV = 2–4%) suggested consistency between devices. Positive ($r = 0.491$ – 0.949) Pearson correlations between averages and differences (between devices) in peak velocity, as well as associated Bland-Altman plots, showed greater differences occurred as the velocity increased, particularly at low-moderate intensity loads. OB consistently provides greater barbell velocity scores compared to TWA, and the differences between devices were more apparent as the peak velocity increased with low-to-moderate loads. Strength coaches and athletes may find better agreement between devices if the mean velocity scores are only considered.

3. Gonzalez, A. M., Accetta, M. R., Spitz, R. W., Mangine, G. T., Ghigiarelli, J. J., & Sell, K. M. (2019). Red Spinach Extract Supplementation Improves Cycle Time Trial Performance in Recreationally Active Men and Women. *Journal of strength and conditioning research*. (Epub ahead of print)

ABSTRACT: To examine the effects of short-term red spinach extract (RSE) supplementation on cycling time trial performance, 17 recreationally active men ($n = 9$, 22.2 ± 3.8 years) and women ($n = 8$, 22.8 ± 3.5 years) underwent 2 testing sessions administered in a randomized, counterbalanced, double-blind fashion. Subjects were assigned to supplement daily with 1 g of RSE or placebo (PL) for 7 days priorly and 1 hour before completing a 4-km cycling time trial test. Performance variables (time-to-completion, average power, relative power, cadence, and average speed), subjective measures (perceived exertion and muscle fatigue), heart rate, and blood pressure were assessed during each testing session. Compared to PL, RSE supplementation significantly lowers ($p = 0.017$, $\eta p = 0.24$) post-exercise diastolic blood pressure (66.1 ± 6.1 vs. 70.1 ± 5.0 mm Hg). Red spinach extract supplementation also significantly improved ($p \leq 0.022$, $\eta p = 0.30-0.37$) 4-km completion time (404.6 ± 24.6 vs. 410.6 ± 31.3 seconds), average power (185.9 ± 32.2 vs. 181.6 ± 35.1 W), relative power (2.53 ± 0.44 vs. 2.46 ± 0.40 W·kg), and average speed (35.7 ± 2.2 vs. 35.3 ± 2.5 km·h). In addition, significant trial \times sex interactions ($p \leq 0.022$, $\eta p = 0.30-0.36$) were observed for these performance measures, whereby only women showed significant improvement during RSE compared with PL trials. In conclusion, RSE supplementation significantly reduced time-to-completion, increased measures of power and speed, and lowered post-exercise diastolic blood pressure during a 4-km cycling time trial without altering subjects' perceived exertion or subjective measures of muscle fatigue. Finally, it is possible that women may be more responsive in regard to increasing performance after supplementation.

4. **Gonzalez A.M.** (2019) Emerging ergogenic aids for endurance activity and weight loss. *Dietary Supplementation in Sport and Exercise: Evidence, Safety, and Ergogenic Benefit*. Routledge Press.

Conference Poster Presentations

1. **Gonzalez A.M.**, Accetta M.R., Spitz R.W., Mangine G.T., **Ghigiarelli J.J.**, **Sell K.M.** Effect of short-term red spinach extract supplementation on cycle time trial performance in recreationally active men and women. 2019 ACSM National Conference. Orlando, FL.

2. Pinzone A.G., **Gonzalez A.M.**, Bram J., Salisbury J.L., Lee S., Mangine G.T. Effect of multi-ingredient pre-workout supplementation on repeated sprint performance in recreationally-active men and women. 2019 ACSM Fall Greater New York Regional Chapter Conference. New York, NY.

Professional Presentations:

1. **Gonzalez A.M.** Nutritional supplementation for muscle building and performance. NSCA New Jersey State Clinic. Sparta, NJ. May 18, 2019.

Jamie Ghigiarelli, Adam Gonzalez, & Katie Sell –

Exercise Science and Sports Science

Peer-reviewed Research Publications

1. **Gonzalez, A. M., Sell, K. M., Ghigiarelli, J. J., Spitz, R. W., Accetta, M. R., & Mangine, G. T.** (2018). Effect of Multi-Ingredient Supplement Containing Satiereal, Naringin, and Vitamin D on Body Composition, Mood, and Satiety in Overweight Adults. *Journal of dietary supplements*.

ABSTRACT: The purpose of this investigation was to examine the effects of 28 days of a dietary supplement on body composition, mood, and satiety in overweight adults. Twenty healthy adults (25.5 ± 3.8 years; 87.3 ± 20.7 kg; 169.9 ± 10.6 cm; 29.9 ± 5.1 body mass index) participated in this randomized, double-blind, placebo-controlled investigation. Ten participants were provided with a dietary supplement containing 178 mg satiereal, 100 mg naringin, and 2,000 IU vitamin D3 daily (SUPP), and ten participants were provided a placebo (PL) for 28 days. Baseline (PRE) and post (POST) assessments included body mass, BMI, and waist circumference measures. In addition, participants provided self-reported food records and completed study questionnaires twice weekly. Questionnaires consisted of profile of mood states, visual analog scales, modified trait food-cravings questionnaire, and a modified state food-cravings questionnaire. No significant differences were noted between groups for total calorie or macronutrient intake ($p = 0.65-0.92$), body mass ($p = 0.34$), BMI ($p = 0.24$), or waist circumference measures ($p = 0.56-0.94$). In addition, no significant differences between groups were observed for mood states, subjective measures of food cravings, or feelings of anxiety, fullness, bloating, hunger, craving, and stress ($p > .05$). In conclusion, 28 days of a dietary supplement containing satiereal, naringin, and vitamin D3 did not have any detectable beneficial effects on body-weight management.

2. Kelly, C. F., Gonzalez, A. M., Spitz, R. W., Sell, K. M., & Ghigiarelli, J. J. (2018). Effect of hip abduction maximal voluntary isometric contraction on lumbar motion and power output during the back squat. *International Journal of Kinesiology and Sports Science*, 6(1), 1-6.

ABSTRACT: Background: Post-activation potentiation (PAP) is a neuromuscular phenomenon that has been shown to augment muscular force generating attributes as well as neural and sensory recruitment. While PAP has demonstrated to acutely enhance muscular performance during high-intensity activities, the effect of PAP on lumbopelvic kinematics under load remains unknown. Objectives: The purpose of this study was to examine the potential PAP effect of a hip abduction maximal voluntary isometric contraction (MVIC) on lumbar motion and power output during the barbell back squat. Methods: Nine resistance-trained men (22.9 ± 2.3 y; 85.0 ± 13.8 kg; 174.3 ± 5.1 cm) performed a set of 5 repetitions of the barbell back squat using 80% one-repetition maximum with and without a hip abduction MVIC prior to performance. Experimental and control trials were randomized and counterbalanced among participants. MVIC was carried out via manual long-lever hip abduction. During the back squat exercise, lumbar motion analysis was performed using wireless motion-sensor technology, and power output was assessed via an accelerometer. Results: No significant differences were observed between trials for lumbar flexion range of motion (ROM) ($p=0.32$), lumbar flexion maximum deviation ($p=0.32$), lumbar lateral flexion ROM ($p=0.81$), lumbar lateral flexion maximum deviation ($p=0.98$), lumbar rotation maximum deviation ($p=0.70$), average peak power ($p=0.98$), or average mean power output ($p=0.99$) during the squat protocol. Conclusions: Implementation of a manual long-lever hip abduction MVIC prior to the back squat exercise did not significantly alter lumbar motion or augment power output in resistance trained males.

3. Gonzalez, A. M., Spitz, R. W., Ghigiarelli, J. J., Sell, K. M., & Mangine, G. T. (2018). Acute effect of citrulline malate supplementation on upper-body resistance exercise performance in recreationally resistance-trained men. *The Journal of Strength & Conditioning Research*, 32(11), 3088-3094.

ABSTRACT: To investigate the effect of citrulline malate (CM) supplementation on upper-body resistance exercise performance, 12 recreationally resistance-trained men (21.4 ± 1.6 years; 163.0 ± 46.2 cm; 85.0 ± 12.4 kg) underwent 2 testing sessions administered in a randomized, double-blind fashion. During each visit, participants were provided either 8 g of CM or a placebo (PL) 40 minutes before beginning a standardized warm-up and initiating a barbell bench press resistance exercise protocol consisting of 5 sets of 15 repetitions at 75% 1 repetition maximum with 2-minute rest intervals. Participants were instructed to complete as many repetitions as possible until either reaching 15 repetitions or muscular failure. Total number of repetitions performed and power output were recorded for each set. Subjective measures of energy, focus, fatigue, and perceived exertion, along with muscle thickness of the triceps brachii, were assessed before and after exercise. Significant ($p \leq 0.05$) main effects for time were observed for all variables except for subjective feelings of energy ($p = 0.085$). A group \times time interaction ($F = 2.86$, $p = 0.034$, $n_2 = 0.21$) was observed for repetitions performed, where participants performed more ($p = 0.015$) repetitions on set 3 during PL (5.7 ± 1.2 repetitions) compared with CM (4.6 ± 1.2 repetitions). However, during set 4, participants tended ($p = 0.089$) to perform more repetitions during CM (4.8 ± 1.8 repetitions) compared with PL (4.3 ± 1.3 repetitions). No other differences were observed between trials. Supplementation with 8 g of CM 40 minutes before the barbell bench press resistance exercise protocol did not increase exercise performance,

augment the muscle swelling response to training, or alter subjective measures of focus, energy, and fatigue in recreationally resistance-trained men.

4. **Ghigiarelli, J. J., Pelton, L. M., Gonzalez, A. M., Fulop, A. M., Gee, J. Y., & Sell, K. M.** (2018). Effects of a 6-Week Bench Press Program Using the Freak Bar in a Sample of Collegiate Club Powerlifters. *The Journal of Strength & Conditioning Research*, 32(4), 938-949.

ABSTRACT: Powerlifters train using specialty bars for unstable load (UL) training. For the bench press, the acute effects of UL are mixed, with few studies that examine training interventions. The purpose of this study was to examine the effects of a 6-week bench press training program that uses the Freak Bar (FB) as compared to a traditional barbell (TB) on maximum bench press, peak force, and peak impulse. Seven men and 3 women (21 ± 2.0 years, 172.2 ± 2.9 cm, and 95.3 ± 20.3 kg) were required to bench press 2 days per week as part of a structured program. On the second bench press day, the FB and TB groups performed 3-position pause bench presses at 60–70% one repetition maximum (1RM). One repetition maximum, peak force, and peak impulse were measured before test and after test after the 6-week program. Peak force and peak impulse were tested at 3 bench positions, including the presticking, sticking, and poststicking points, defined by the distance of the barbell from the chest. Posttraining 1RM for the FB group and TB group increased 6.7% (6.78 ± 1.6 kg, $p = 0.006$) and 4.3% (4.5 ± 2.7 kg, $p = 0.23$), respectively, with no significant differences between the groups ($p = 0.589$, $\eta^2 = 0.044$). There were no significant differences between the groups at each bench position for peak force ($p = 0.606$) or peak impulse ($p = 0.542$). Freak Bar can be an alternative for improving maximum strength and peak force but is not significantly better than TB training when performing the 3-position pause bench press.

5. **Sell, K. M., Prendergast, J. M., Ghigiarelli, J. J., Gonzalez, A. M., Biscardi, L. M., Jajtner, A. R., & Rothstein, A. S.** (2018). Comparison of Physical Fitness Parameters for Starters vs. Nonstarters in an NCAA Division I Men's Lacrosse Team. *The Journal of Strength & Conditioning Research*, 32(11), 3160-3168.

ABSTRACT: The purpose of this study was to present a fitness profile of Division I male lacrosse players and compare the fitness attributes across different positions and starting status. Forty-one Division I men's lacrosse players (19.6 ± 1.6 years, 82.5 ± 9.5 kg, 182.0 ± 5.4 cm) volunteered to participate in the study. Fitness attributes assessed included aerobic fitness (1.5-mile run), muscular strength (1 repetition maximum bench press, squat, and hang clean), grip strength (hand dynamometer), explosive power (vertical jump), agility (3-cone drill, pro-agility), body composition (7-site skinfold), and speed (20- and 40-yard sprint). All testing was conducted by a certified strength and conditioning coach and occurred at the conclusion of pre-season training. The only significant difference across positions was for body mass, whereby defensemen were significantly heavier than attacking players ($p < 0.05$). Starters were significantly faster on the 3-cone drill, 20- and 40-yard sprint, and jumped significantly higher on the vertical jump compared with nonstarters ($p < 0.05$). Attributes pertaining to anaerobic fitness (speed, agility, and explosive power) may be better predictors of starting status than aerobic fitness in men's NCAA Division I lacrosse players. This differs from previous research on men's club lacrosse players where a difference in aerobic fitness and body composition was shown between starters and nonstarters. The normative data presented in this study may assist strength and conditioning coaches in the development of sport-specific training programs and motivate athletes toward achieving sport-specific fitness goals by helping identify areas of weakness before the start of the season.

6. **Sell K.M., Ghigiarelli J.J., Gonzalez A.M., Taveras K.** (2018). Heart rate variability and energy expenditure during resistance training in men. *Journal of Australian Strength and Conditioning*, 26: 21-27, 2018.

ABSTRACT: The purpose of the study was to compare heart rate (HR), heart rate variability (HRV) and energy expenditure (EE) across three resistance training (RT) protocols - strongman training (ST), traditional hypertrophy training (HT), and a mixed strongman and hypertrophy training (MST), in trained young men. Seven resistance trained men (24.9 ± 3.6 y; 87.1 ± 10.5 kg; 175.7 ± 3.9 cm) volunteered to participate in a ST, HT, and MST RT session. For each training session, participants completed three sets of 4-5 specific exercises to muscle failure. Exercise HR, HRV indices and EE (total, EET; per minute of exercise EEmin) were measured using a Polar heart rate monitor (Polar Electro Inc., Lake Success, NY) during each RT session. HRV indices included R-R Interval (RRI), RRI standard deviation (RRI SD), low frequency (LF), high frequency (HF), LF to HF ratio, and root-mean RMSSD. The HT session generated significantly lower EET than both ST and MST ($p = 0.04$), but there was no significant difference in EEmin, HR or HRV indices between training sessions. The acute RT sessions performed in the current study evoked a high level of autonomic stress and EE. The lack of significant difference between each acute training session suggests no significant difference in physiological stress (as measured by HR and HRV indices)

between HT or ST training protocols in resistance-trained young men. This study also highlights the high-level of autonomic nervous system stress experienced during high intensity RT, suggesting sufficient rest and recovery is necessary following acute RT sessions similar to those in this study prior to the next training session.

7. Daou, M., Sassi, J. M., Miller, M. W., & **Gonzalez, A. M.** (2019). Effects of a Multi-Ingredient Energy Supplement on Cognitive Performance and Cerebral-Cortical Activation. *Journal of dietary supplements*, 16(2), 129-140.

ABSTRACT: This study assessed whether a multi-ingredient energy supplement (MIES) could enhance cerebral-cortical activation and cognitive performance during an attention-switching task. Cerebral-cortical activation was recorded in 24 young adults (12 males, 12 females; 22.8 ± 3.8 yrs) via electroencephalography (EEG) both at rest and during the attention-switching task before (pretest) and 30 min after (posttest) consumption of a single serving of a MIES (MIES-1), two servings of a MIES (MIES-2), or a placebo (PL) in a double-blinded, randomized crossover experimental design. EEG upper-alpha power was assessed at rest and during the task, wherein d' ($Z[\text{hit rate}] - Z[\text{false alarm rate}]$) and median reaction time (RT) for correct responses to targets on attention-hold and attention-switch trials were analyzed. For both d' and RT, the Session (MIES-1, MIES-2, PL) \times Time (pretest, posttest) interaction approached statistical significance ($p = .07$, $\eta^2p = 0.106$). Exploring these interactions with linear contrasts, a significant linear effect of supplement dose on the linear effect of time was observed ($ps \leq .034$), suggesting the pretest-to-posttest improvement in sensitivity to task target stimuli (d') and RT increased as a function of supplement dose. With respect to upper-alpha power, the Session \times Time interaction was significant ($p < .001$, $\eta^2p = 0.422$). Exploring this interaction with linear contrasts, a significant linear effect of supplement dose on the linear effect of time was observed ($p < .001$), suggesting pretest-to-posttest increases in cerebral-cortical activation were a function of supplement dose. In conclusion, our findings suggest that MIES can increase cerebral-cortical activation and RT during task performance while increasing sensitivity to target stimuli in a dose-dependent manner.

8. Mangine, G. T., **Gonzalez, A. M.**, Townsend, J. R., Wells, A. J., Beyer, K. S., Miramonti, A. A., ... & Hoffman, J. R. (2018). Influence of baseline muscle strength and size measures on training adaptations in resistance-trained men. *International journal of exercise science*, 11(4), 198.

ABSTRACT: The influence of baseline strength or muscle size on adaptations to training is not well-understood. Comparisons between novice and advanced lifters, and between stronger and weaker experienced-lifters, have produced conflicting results. This study examined the effect of baseline muscle strength and size on subsequent adaptations in resistance-trained individuals following a traditional high-volume, short-rest resistance training protocol. Fourteen resistance-trained men (24.0 ± 2.7 y; 90.1 ± 11.7 kg; 169.9 ± 29.0 cm) completed pre-training (PRE) ultrasound measurements of muscle cross-sectional area (CSA) in the rectus femoris (RF), vastus lateralis (VL), pectoralis major, and triceps brachii (TRI) prior to strength assessments (e.g., one-repetition maximum strength bench press and back-squat). Post-training (POST) assessments were completed following 8-wks (4 d-wk⁻¹) of resistance training. Comparisons were made between stronger (STR) and weaker (WKR) participants, and between larger (LGR) and smaller (SMR) participants, based upon PRE-muscle strength and size, respectively. When groups were based on upper-body strength, repeated measures analysis of variance indicated a significant group \times time interaction where greater improvements in bench press strength were observed in WKR ($12.5 \pm 8.6\%$, $p = 0.013$) compared to STR ($1.3 \pm 5.4\%$, $p = 0.546$). Within this comparison, STR also possessed more resistance training experience than WKR (mean difference = 3.1 y, $p = 0.002$). No other differences in experience or adaptations to training were observed. These data suggest that following a short-duration training program (8-weeks), baseline size and strength have little impact on performance gains in resistance-trained individuals who possess similar years of experience. However, when training experience is different, baseline strength may affect adaptations.

9. La Monica, M. B., Fukuda, D. H., Wang, R., **Gonzalez, A. M.**, Wells, A. J., Hoffman, J. R., & Stout, J. R. (2018). Maintenance of Vagal Tone with Time-Release Caffeine, But Vagal Withdrawal During Placebo in Caffeine-Habituated Men. *Journal of Caffeine and Adenosine Research*, 8(2), 59-64.

ABSTRACT: Objective: This study aimed to determine the effects of a time-release caffeine (TR-CAF) supplement and caffeine abstinence on heart rate variability (HRV) in habitual users. Methods: Ten caffeine-habituated (>200 mg per day) men (25.9 ± 3.2 years; 1.81 ± 0.08 m; and 92.9 ± 9.9 kg) performed three trials, each separated by 1 week. During each trial,

participants randomly consumed either 194 mg of caffeine in a multi-ingredient supplement containing TR-CAF; an instant-release caffeine supplement (CAF); or placebo (PL). HRV was assessed for 10 minutes in the supine position at baseline (BL), and every hour after supplementation for 8 hours. Time-domain [average heart rate, mean standard deviation of all normal-to-normal (NN) intervals (SDNN), and root mean square of differences between adjacent NN intervals (RMSSD)] and frequency-domain [low frequency (LF), high frequency (HF), total power (TP), LF/HF, and an index of parasympathetic nervous system (PNS = HF/TP)] measures were recorded. A two-way (trial \times time) repeated-measures analysis of variance was used to assess all HRV parameters. Results: A significant interaction was noted for PNS ($p = 0.039$). There was a significant difference between trials 1-hour post-ingestion, but post hoc analysis noted a trend between CAF and PL ($p = 0.079$). However, at 6 hours, post-ingestion post hoc analyses revealed higher PNS influence during both TR-CAF (0.84 ± 0.06 , $p = 0.039$) and CAF (0.84 ± 0.07 , $p = 0.005$) compared to PL (0.79 ± 0.05). There was a significant main effect of time for PNS index during the PL condition only, but no subsequent differences were noted from BL in post hoc analyses. Conclusions: Both caffeine supplements maintained parasympathetic influence within the autonomic nervous system, while PL appeared to result in the potential for vagal withdrawal over an 8-hour span.

10. Mangine, G.T., Van Dusseldorp, T., Feito, Y., Holmes, A., Serafini, P., Box, A., & Gonzalez, A.M. (2018). Testosterone and cortisol responses to five high-intensity functional training competition workouts in recreationally active adults. *Sports*, 6(3), 62.

ABSTRACT: To determine the salivary steroid response to high-intensity functional training (HIFT) competition workouts, saliva samples were collected from ten recreationally trained male and female competitors during a 5-week (WK1–WK5) international competition. Competitors arrived at their local affiliate and provided samples prior to (PRE) their warm-up, immediately (IP), 30-min (30P), and 60-min (60P) post-exercise. Samples were analyzed for concentrations of testosterone (T), cortisol (C), and their ratio (TC). Generalized linear mixed models with repeated measures revealed significant main effects for time ($p < 0.001$) for T, C, and TC. Compared to PRE-concentrations, elevated ($p < 0.05$) T was observed at IP on WK2–WK5 (mean difference: $135\text{--}511 \text{ pg}\cdot\text{mL}^{-1}$), at 30P on WK3 (mean difference: $81.0 \pm 30.1 \text{ pg}\cdot\text{mL}^{-1}$) and WK5 (mean difference: $56.6 \pm 22.7 \text{ pg}\cdot\text{mL}^{-1}$), and at 60P on WK3 (mean difference: $73.5 \pm 29.7 \text{ pg}\cdot\text{mL}^{-1}$) and WK5 (mean difference: $74.3 \pm 28.4 \text{ pg}\cdot\text{mL}^{-1}$). Compared to PRE-concentrations, elevated ($p < 0.05$) C was noted on all weeks at IP (mean difference: $9.3\text{--}15.9 \text{ ng}\cdot\text{mL}^{-1}$) and 30P (mean difference: $6.0\text{--}19.9 \text{ ng}\cdot\text{mL}^{-1}$); significant ($p < 0.006$) elevations were noted at 60P on WK1 (mean difference: $9.1 \pm 3.0 \text{ ng}\cdot\text{mL}^{-1}$) and WK5 (mean difference: $12.8 \pm 2.9 \text{ ng}\cdot\text{mL}^{-1}$). Additionally, TC was significantly reduced from PRE-values by 61% on WK1 at 60P ($p = 0.040$) and by 80% on WK5 at 30P ($p = 0.023$). Differences in T, C, and TC were also observed between weeks at specific time points. Although each workout affected concentrations in T, C, and/or the TC ratio, changes appeared to be modulated by the presence of overload and workout duration. During periods of elevated training or competition, athletes and coaches may consider monitoring these hormones for consistency and as a means of assessing workout difficulty.

11. Mangine, G. T., Redd, M. J., Gonzalez, A. M., Townsend, J. R., Wells, A. J., Jajtner, A. R., ... & Fukuda, D. H. (2018). Resistance training does not induce uniform adaptations to quadriceps. *PLoS one*, 13(8), e0198304.

ABSTRACT: Resistance training may differentially affect morphological adaptations along the length of uni-articular and bi-articular muscles. The purpose of this study was to compare changes in muscle morphology along the length of the rectus femoris (RF) and vastus lateralis (VL) in response to resistance training. Following a 2-wk preparatory phase, 15 resistance-trained men ($24.0 \pm 3.0 \text{ y}$, $90.0 \pm 13.8 \text{ kg}$, $174.9 \pm 20.7 \text{ cm}$) completed pre-training (PRE) assessments of muscle thickness (MT), pennation angle (PA), cross-sectional area (CSA), and echo-intensity in the RF and VL at 30, 50, and 70% of each muscle's length; fascicle length (FL) was estimated from respective measurements of MT and PA within each muscle and region. Participants then began a high intensity, low volume (4 \times 3–5 repetitions, 3min rest) lower-body resistance training program, and repeated all PRE-assessments after 8 weeks (2 d \cdot wk $^{-1}$) of training (POST). Although three-way (muscle [RF, VL] \times region [30, 50, 70%] \times time [PRE, POST]) repeated measures analysis of variance did not reveal significant interactions for any assessment of morphology, significant simple (muscle \times time) effects were observed for CSA ($p = 0.002$) and FL ($p = 0.016$). Specifically, average CSA changes favored the VL ($2.96 \pm 0.69 \text{ cm}^2$, $p < 0.001$) over the RF ($0.59 \pm 0.20 \text{ cm}^2$, $p = 0.011$), while significant decreases in average FL were noted for the RF ($-1.03 \pm 0.30 \text{ cm}$, $p = 0.004$) but not the VL ($-0.05 \pm 0.36 \text{ cm}$, $p = 0.901$). No other significant differences were observed. The findings of this study demonstrate the occurrence of non-homogenous adaptations in RF and VL muscle size and architecture following 8 weeks of high-intensity

resistance training in resistance-trained men. However, training does not appear to influence region-specific adaptations in either muscle.

12. **Sell, K.,** Needham, C., & Frasier, S. (2018). Physical activity, physical fitness and perceived fitness and exercise behaviors in firefighters. *Journal of Exercise Physiology Online*, 21(3), 146-157.

ABSTRACT: The purpose of this study was to examine the association between perceived health and fitness with measured physical fitness and exercise behaviors in firefighters. One hundred and seven active-duty male firefighters completed the assessments of aerobic fitness, muscular strength and endurance, body composition, and flexibility. The firefighters ranked perceived physical fitness and exercise behaviors (PPFEB), perceived weight and body fat (PWBF), perceived overall health (POH), and self-reported frequency of aerobic activity (FAA), self-reported frequency of strengthening exercises (FSE), and self-reported stretching exercises (FSTE). Significant differences across levels of PPFEB, PWBF, and POH were observed for flexibility and body composition only. Significant associations were observed between PPFEB and frequency of FAA, FSE, and FSTE, between PWBF and FSTE, and between POH and FAA. Regular physical fitness assessments may help strengthen the association between measured physical fitness and PPFEB, PWBF, and POH and, consequently, help firefighters to develop functional training programs that will help address their personal exercise and fitness goals.

Conference Poster Presentations

1. Spitz RW, **Gonzalez AM, Ghigiarelli JJ.** Validation of a velocity based training device for measurement of barbell velocity during resistance exercise. 2018 ACSM Spring Greater New York Regional Chapter Conference. Flushing, NY.

2. **Gonzalez AM, Spitz RW, Ghigiarelli JJ, Mangan GT.** Movement velocity during the back and front squat exercises at selected percentages of one-repetition maximum in resistance-trained men. 2018 NSCA National Conference. Indianapolis, IN.