tasks typology (i.e., cognitive, motor, and combined) on sAA in relation to gender and activity level of older individuals. METHODS: Eighteen master athletes (F=7; M=11), 28 physically active (F=15; M=13) and 33 sedentary (F=14; M=19) older individuals (age classes: 55-64 and 65-84 yrs) were randomly administered a single cognitive task (Random Number Generation task, RNG), a single motor task (habitual walking speed, HWS), and a combined RNG and HWS task (DT). Each task lasted 2:30 min:s and 15-min rest was allowed between tasks. For each task, cotton swabs and collecting tubes (Salivette, Sarstedt, Germany) were used to obtain saliva samples (>0.05 μL) before (PRE), at the end (POST), and at 5-min (POST5) of the recovery phase. A repeated measures ANOVA verified differences (p<0.05) between tasks in relation to gender, activity level, and age. RESULTS: No effects emerged for gender, activity level, and age. Conversely, a main effect (p<0.001) emerged for task. In general, RNG and HWS showed highest values for PRE and lowest for POST5. For DT, highest and lowest values were observed at POST and POST-5, respectively. Post-hoc analysis maintained differences (p<0.05) only for POST-DT (101.1 ± 82.6 U/ml) with respect to POST-RNG (74.8 ± 69.5 U/ml), POST5-RNG (69.9 ± 65.8 U/ml), and POST5-DT (74.5 ± 63.0 U/ml). The area under curve showed highest values for DT (682.8 ± 556.6 AU), intermediate for HWS (635.0 ± 505.6 AU) and lowest for RNG (554.7 ± 475.5 AU), with a difference (p=0.004) between DT and RNG. CONCLUSION: Findings indicate that the task complexity can differentially lead to a stress response in older adults. In particular, a combined motor and cognitive task challenges the older individuals more than single cognitive or motor tasks, independently from their age and activity level. REFERENCES: Sindi et al., 2103. When we test, do we stress? Impact of the testing environment on cortisol secretion and memory performance in older adults. Psychoneuroendocrinology 38, 1388-1396.

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Energy Expenditure During Concurrent Training: Influence Of Intra-session Exercise Sequence And Aerobic Exercise Modality

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PURPOSE: To compare the effects of different intra-session exercise sequences and different aerobic exercise modalities during concurrent training sessions on energy expenditure (EE) in women.
METHODS: Eleven women (22.4 ± 2.3 years) volunteered to participate in this study. The subjects were tested in their dynamic strength (ten maximum repetition test - 10RM) and during maximal incremental test performed in both treadmill and cycle ergometer. After these preliminary tests, four concurrent training sessions were performed in randomized order: strength-run (SR), strength-cycle ergometer (SC), run-strength (RS) and cycle ergometer-strength (CS). The aerobic exercise in each session lasted 30 minutes and was performed at a heart rate equivalent to 95% of the second ventilatory threshold obtained in the specific ergometer. The strength exercise lasted approximately 21 minutes and consisted of 4 sets until failure with the load corresponding to the participants' predetermined 10RM test. The VO2 was continuously evaluated through the portable gas analyzer. To calculate the EE a caloric equivalent of 5.05 kcal.lO2-1 was used. Statistical comparisons between intra-session exercise sequence and modality of aerobic exercise were tested using repeated measures two-way ANOVA (α = 0.05).
RESULTS: No significant differences were found in the EE between the intra-session exercise sequences (RS: 326.1 ± 44.6 kcal vs. SR: 327.0 ± 47.7 kcal and CS: 266.2 ± 29.4 kcal vs. SC: 263.4 ± 30.5 kcal, p >0.05). In addition, considering only the values of EE during 30 minutes of aerobic exercise, the run exercise showed greater EE values than the cycle ergometer exercise in both exercise sequences (RS: 242.28 ± 32.33 kcal; SR: 247.56 ± 33.83 kcal; CS: 185.26 ± 19.41 kcal; SC: 181.57 ± 21.33 kcal, p<0.001). No significant aerobic modality*sequence interaction was verified for these variables.
CONCLUSION: The present study showed that the intra-session exercise sequence during the concurrent training prescription does not influence the EE, independently of modality of aerobic exercise performed.
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Energy System Contribution During Maximal Incremental Test as an Indicator of Endurance Performance

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It has been demonstrated that exercise intensity (i.e. pacing) vary considerably during long-distance events. The contribution of the energy systems is an important factor for determining this variation of intensity and overall performance, suggesting that the interaction between aerobic and anaerobic metabolisms may be decisive in long-distance races. **PURPOSE:** To verify the association between the energy systems contributions during an incremental exercise test (IET) and the performance during a 10-km running time trial. **METHODS:** Thirteen recreational male long-distance runners completed: 1) an IET to exhaustion on a treadmill for determination of the respiratory compensation point (RCP), maximal oxygen uptake (VO_2max), peak treadmill speed (PTS), and energy systems contributions; and 2) a 10-km running time-trial on an outdoor track to determine endurance performance. The fractions of the aerobic (W_{AER}) and anaerobic lactic (W_{ANAE}) metabolisms contribution were calculated for each stage based on the oxygen uptake and the oxygen energy equivalents derived by blood lactate accumulation, respectively. The total metabolic demand (W_{TOTAL}) was the sum of both energy metabolism contributions. **RESULTS:** The results showed that W_{AER} was significantly higher when compared with W_{ANAE} throughout the IET. Endurance performance during the 10-km running was moderately correlated with traditional physiological predictors of the endurance performance such as RCP (r = -0.56; p = 0.04), VO_2max (r = -0.67; p = 0.01) and PTS (r = -0.78; p = 0.00), and moderate-to-highly correlated with W_{AER} (r = -0.85; p = 0.00), W_{ANAE} (r = -0.67; p = 0.01), and W_{TOTAL} (r = -0.83; p = 0.01). The W_{AER}, W_{ANAE}, and W_{TOTAL} were also significantly correlated with the running speed in the middle (between first 400 m and 9600 m) (r = 0.89, 0.76, 0.89; p <0.01) and final (last 400 m) (r = 0.83, 0.69, 0.82; p <0.01) sections of the 10-km running, respectively. **CONCLUSIONS:** These findings suggest that the assessment of aerobic and anaerobic contribution during IET may be potentially useful as an alternative method to predict the distance running performance, especially due its relationship with specific parts of a long-distance race.
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Energy Expenditure during Active Video Games: Single vs Multiplayer mode

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Active video gaming (exergames) provides engaging exercise experiences by combining physical exertion with interactive game play, having the potential to reduce sedentary behavior, increase physical activity, and improve health outcomes. In particular, it has been hypothesized that multiplayer mode should be preferred to singleplayer mode in individuals using exergames as a form of exercise. However, no study investigated these aspects in activity intense high enough to contribute to daily physical activity recommendations.
PURPOSE: To evaluate energy expenditure during Zumba Fitness Rush (ZFR) exergame in single and multiplayer mode.
METHODS: Eleven (Male, M=4; Female, F=7) physically active (engaging in at least 3-day/week of moderate-to-intense physical activity) college students (age: 25±3years; height: 1.7±0.1m; weight: 60.8±14.2kg; BMI: 20.6±1.6) gave their written consent of participation. After 3 familiarization sessions with the 50-min ZFR exergame (lesson 1, middle vesion), participants took part in single (ZFR-S) and one multiplayer (ZFR-M) mode sessions, randomly ordered with at least 2-days between. Oxygen consumption (VO2) was continuously recorded by a telemetric open-circuit measurement system, and energy expenditure was espressed as metabolic equivalents (METs). ANOVA for repeated measures was used to evaluate differences (p<0.05) in relation to playing modes (singleplayer vs multiplayer).
RESULTS: No difference emerged in METs (M: ZFR-S=5.1±1.9; ZFR-M=4.6±1.7; F: ZFR-S=3.9±1.6; ZFR-M=3.7±1.9) and VO2 in relation to body mass (M: ZFR-S=17.8±6.8 ml/Kg/min; ZFR-M=16.0±6.0 ml/Kg/min; F: ZFR-S=13.8±5.5 ml/Kg/min; ZFR-M=13.1±6.6 ml/Kg/min).
CONCLUSIONS: Results from this study showed that ZFR exergame could represent an alternative form of moderate physical activity. Although an effect of number of players could be expected, different player modes did not effect energy expenditure

during ZFR in young male and female individuals. It could be speculated that the rhythm of the music imposes a time constraint to the performer, independently from the presence of other players. Future studies should take into consideration also enjoyable, motivational and psychologycal aspects of single vs multiplayer modes.

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Difference in Caloric Expenditure Measured by Indirect Calorimetry and Estimated by Elliptical Increases Over Time

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Caloric expenditure estimated by cardiovascular exercise equipment is generally accepted as inaccurate by exercise scientists and others in the fitness industry, but there is little research to the extent of the inaccuracy or if inaccuracy increases with exercise time.
PURPOSE: The purpose of this study was to compare caloric expenditure measured via indirect calorimetry to the caloric expenditure estimated by an elliptical machine, specifically if the difference was consistent throughout the duration of the workout.
METHODS: Participants were 30 healthy adults (age: 25.43 ± 7.65 y; height: 1.69 ± 0.09 m; weight: 71.24 ± 15.68 kg). Participants completed 30 minutes of exercise on an elliptical machine consisting of a 5 minute warm-up (intensity less than 65% of estimated maximum heart rate), 25 minutes of moderate intensity exercise (HR of 64-76%), and a 5 minute cool down. Caloric expenditure was recorded every 5 minutes using an indirect calorimetry caloric expenditure measurement tool. A repeated measures ANOVA was used to compare the differences over time. TTests were used as a follow-up and compared consecutive measurements (5 min vs. 10 min, 10 min vs. 15 min, etc.)
RESULTS: The difference between readings increased over time: 5 min - 19.04, 10 min - 44.52, 15 min - 69.68, 20 min - 95.10, 25 min - 120.42. Difference in caloric expenditure was significantly different over time ($F(4,26) = 613.87$, $p < .0001$). There was also a significant difference for each time point comparison (all $p < .0001$)
CONCLUSION: The difference between caloric expenditure measured by indirect calorimetry and estimated by an elliptical machine differs over time with the difference becoming greater over time, with an increase of around 25 calories per 5 minutes of exercise during moderate intensity exercise. This overestimate could lead individuals to assume they are burning more calories than they actually are which could lead to eating additional calories and negating the workout.

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A Comparison of Caloric Expenditure: Elliptical vs. Indirect Calorimetry

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The average individual may rely on the accuracy of an elliptical machine to determine their workout intensity and duration based on calorie goals, but are these reading accurate?
PURPOSE: The purpose of this study was to compare the difference in overall calorie expenditure of an elliptical machine vs indirect calorimetry as well as the differences in males vs. females.
METHODS: Participants were 34 healthy adults (age: 25.03 ± 7.28 y; height: 1.69 ± 0.09 m; weight: 71.28 ± 15.63 kg). Participants completed 30 minutes of exercise on an elliptical machine consisting of a 5 minute warm-up (intensity less than 65% of estimated maximum heart rate), 25 minutes of moderate intensity exercise (HR of 64-76%), and a 5 minute cool down. Caloric expenditure was recorded on both the elliptical and indirect calorimetry machines at the conclusion of the 30 minutes. A dependent TTest was used to compare overall caloric expenditure as measured by the two devices. An independent TTest was used to compare the difference in energy expenditure in males and females.
RESULTS: There was a significant difference in overall caloric expenditure ($T(df=33)= 22.27$, $p < .0001$) comparing elliptical vs. indirect calorimetry. The elliptical (caloric expenditure: 233.32 ± 41.09 calories) were significantly higher than those from the indirect calorimetry device (indirect calorimetry: 105.24 ± 25.83). There was not a significant difference for caloric expenditure difference between males and females ($T(df=32)= 2.01$, $p = .05$). Males showed a smaller difference between the caloric expenditure means (difference: 114.9 ± 31.77 calories) than did females (difference: 137.4 ± 31.77).
CONCLUSIONS: The difference between the energy expenditure recordings of an elliptical and indirect calorimetry is significantly different with the elliptical estimating higher than the indirect calorimetry. In the comparison of the difference in energy

expenditure between males and females, the results showed an approach of statistical significance difference, with males recording smaller differences between the machines than females. The inaccuracy of the calorie reading may lead to the unintentional undertraining of individuals.

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Estimation of Maximum Glycolytic Rate from Capillary Blood at Running Sprints of Different Durations

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The maximum lactate production rate (VLAmax) represents the highest intracellular velocity of lactate production. In the daily performance testing routine the VLAmax has been almost neglected so far because direct measurement by muscle biopsy is difficult if not almost impossible under such conditions. The indirect estimation of delta lactate concentration may offer an useful alternative.
PURPOSE: To quantify empirically the effect of load duration at maximum sprint conditions (SP) on estimations of VLAmax.
METHODS: Ten male competitive sprinters (25 ± 3 yrs, 182 ± 6 cm, 81 ± 8 kg) performed various SP on separate days on an outdoor track (40-300 m; average velocity (vrun) range: 7.5-9.3 m/s) after an individual, not interfered warm-up phase (WU: 20 min). To analyze lactate concentration (BLC) capillary blood samples were drawn from the hyperemiased earlobe pre WU and pre every SP as well as during subsequent passive SP recovery phases (1st - 12th min). SP duration was captured by timing gates. VLA was calculated as: BLCmax - BLCrest / SP time.
RESULTS: Mean BLC pre WU was 1.8 ± 0.9 mmol/l which was lower ($p\leq0.001$) than pre SP with 3.4 ± 1.4 mmol/l. The SP lasted between 4.70-40.20 s, with highest mean peak vrun of 8.8 ± 0.5 m/s (100 m). BLCmax increased with SP distance from 6.7 ± 1.5 mmol/l (40 m) to 18.4 ± 3.0 mmol/l (300 m) ($p\leq0.001$). Depending on SP, VLA between 0.33 and 0.95 mmol/l/s were found. Peak VLAmax of 0.71 ± 0.14 mmol/l/s were observed after 80 m or 100 m SP with 9 to 11 s duration.
CONCLUSION: The VLA results highly depend upon sprint duration. Assuming a total lactate water space of the body of approximately 60 % of the body mass and a muscle mass representing roughly 40 % of the body mass in males, the estimated VLA suggest values well in the magnitude of muscle biopsy data attained after maximal efforts of comparable durations. SP lasting approximately 10 s appear feasible for realistic VLAmax estimations from capillary blood samples.

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Does a Higher Heart Rate Peak Indicate Higher Energy Expenditure During Golf?

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Golf is a popular physical activity that many people find themselves eager to participate in. Playing golf may have great health benefits due to the physical activity involved. The higher the Heart Rate peaks (HRp), made during a swing, achieved by a subject while playing golf, the higher the expected energy expenditure (EE) should be. Purpose: The purpose of this study was to determine if HRp correlate with overall EE. Method: Eleven males with an average age of 20.88 played the front 9 holes of golf on the same course, 6 of the men walked (W) and 5 of the men rode in a golf cart (R). They wore an actigraph accelerometer, a Polar heart rate monitor, and Polar GPS while playing. Their blood pressure (BP) and heart rate (HR) were taken within 5 min before play and 5 min after play. HR was also measured during the entire round every 5 seconds. A correlational analysis was performed of HRp during swings, average HR for entire round, and the overall energy expenditure for the entire round. Results: Average HRp during swings was not correlated with Avg HR during round($r=0.078$; $p=0.831$) or EE ($r= -0.198$; $p=0.583$). Discussion: Th data indicate that there is no correlation between Average of HRp during swings and average HR for the entire round. The data also indicate that there was no correlation between HRp and EE during the entire round. The data suggests that HRp, nor average HR, may be an accurate predictor of one's EE during a sport like golf that involves a wide variation in heart rates during a round. However, further research is warranted, as our population was small in number.

Abstracts were prepared by the authors and printed as submitted.