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Undergraduates' Suggestions Of Exercises For Individuals With Vestibular Syndrome

Fernando Morales Vilha Júnior¹, Ricardo Schaffeln Dorigueto², Cristiane Akemi Kasse², Vagner Raso³. ¹Americas' University, Sao Paulo, Brazil. ²Anhanguera University, Sao Paulo, Brazil. ³Integrado University Medical School, Campo Mourao, Brazil.

PURPOSE: The purpose of this study was to analyze students' suggestions regarding the frequency, intensity, time, and type of exercises for individuals with vestibular syndrome.

METHODS: This study is a stratified random sample of 1,035 undergraduate students. They reported in order of priority the three most appropriate types of exercise for individuals with vestibular syndrome with their frequency (days·wk⁻¹), time (min·day⁻¹), and intensity (light, moderate, or vigorous).

RESULTS: Female (N=466, 45%) and male (N=569, 55%) students aged 17-55 (27.35 ± 7.64 years) were majoring in exercise science. Two out of every three students had never heard about vestibular syndrome (N=711, 69%). Most students self-rated their knowledge in vestibular syndrome below five (0-10) (N=851, 82%). More than six out of every ten students did not know how to suggest exercises for individuals with vestibular syndrome (N: 657, 64%). The remaining students (N: 378, 36%) suggested 54 types of activities (e.g., dancing), exercises (e.g., balance), and martial arts (e.g., Tai Chi). In order of priority, walking (WK, N: 198, 19%), aquatics (AQ, N: 22, 2%), as well as balance, resistance, and stretching (BRS, N: 20, 2%) were the most prevalent suggestions. The frequency and duration were similar for WK (3.1 ± 1.7 days·wk⁻¹ for 34.8 ± 14.4 min·day⁻¹), AQ (2.9 ± 1.6 days·wk⁻¹ for 34.5 ± 11.2 min·day⁻¹), and BRS (2.5 ± 0.9 days·wk⁻¹ for 36.5 ± 13.6 min·day⁻¹). Students suggested light intensity for WK (N: 217, 21%) and moderate intensity for AQ (N: 244, 24%) and BRS (N: 224, 22%). Their exercise suggestions were based on the improvement of activities of daily living (N: 319, 31%), general principles of exercise prescription (N: 208, 20%), and pathophysiology (N: 111, 11%).

CONCLUSION: Most undergraduate students majoring in exercise science neither know how to suggest exercises nor have enough knowledge about vestibular syndrome. Exercise suggestions seem to arise from a health promotion perspective that may not be sufficient to support the disease management.

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Changes In Foot-tapping Kinematics Following Dry-needling In Persons With Multiple Sclerosis

Brian A. Pribble¹, Bobbette Miller², Shirley James², Chris Black, FACS¹, Rebecca Larson¹. ¹University of Oklahoma, Norman, OK. ²University of Oklahoma - Health Sciences Center, Oklahoma City, OK. (Sponsor: Dr. Chris Black, FACS)

Multiple Sclerosis (MS) is an autoimmune disorder characterized by axon demyelination and inflammation of the brain and spinal cord. In persons with MS (PwMS) a slowing or impairment of nerve signal transmission can elicit symptoms such as pain, weakness, fatigue, impaired coordination/balance, and spasticity. Although the symptoms of MS are well documented, assessment and treatment remain an arduous task. While dry-needling and functional electrical stimulation may offer relief from symptoms of MS; testing is needed to determine its effectiveness. The foot-tapping test (FTT) has been used in PwMS to assess changes in central drive and may prove a useful measure in the present study.

PURPOSE: To assess the changes in FTT kinematics following dry-needling and functional electrical stimulation in PwMS.

METHODS: Thirteen PwMS (7 females & 6 males) underwent dry-needling of the involved gastrocnemius combined with walking with functional electrical stimulation. The less impaired leg served as the control. FTT kinematics were assessed pre and post intervention using a force plate, allowing calculation of the number of foot-taps (#FT) and the median area under the curve (AUC), peak force (PF), time-to-peak (TTP), time-to-base (TTB), total tap time (TTT), %TTP, and %TTB. Pre and post intervention results were compared using Wilcoxon signed-rank tests.

RESULTS: Following intervention, there was a significant increase in #FT in the involved [Pre: 20.7 ± 8.4 — Post: 23.9 ± 7.6 taps (p=0.02)] and control [Pre: 26.2 ± 7.3 — Post: 30.1 ± 7.3 taps (p=0.01)] limbs. No significant change was noted in the involved limb's AUC (Pre: 8.7 ± 8.2 — Post: 8.0 ± 4.5), PF (Pre: 36.1 ± 19.5 — Post: 40.8 ± 14.0 N), TTT (Pre: 0.35 ± 17.6 — Post: 0.34 ± 11.5 seconds), %TTP (Pre: 40.4 ± 4.9 — Post: 42.0 ± 3.4%), and %TTB (Pre: 59.6 ± 4.9 — Post: 57.9 ± 3.4%) (p>0.05), or in the non-involved limb's AUC, PF, TTT, %TTP or %TTB (p>0.05).

CONCLUSIONS: A significant increase in foot-taps occurred in both limbs following treatment. Despite not achieving significance, a trend towards an increased PF, decreased TTT and %TTB was seen in both limbs. This may suggest treatment benefited foot plantar and dorsi flexor function and that kinematic data may be a useful addition to the FTT in PwMS.

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Aerobic Exercise Training And The ΔVO₂/ΔWR Relationship In Women With Systemic Lupus Erythematosus

Nathan Camarillo¹, Bart Drinkard¹, Sarfaraz Hasni², Leighton Chan¹, Randall Keyser, FACS¹, Lisa MK Chin¹. ¹National Institutes of Health Clinical Center, Bethesda, MD. ²National Institute of Arthritis and Musculoskeletal and Skin Diseases, Bethesda, MD. (Sponsor: Randall Keyser, FACS)

Systemic lupus erythematosus (SLE) is an autoimmune disease that causes chronic inflammation in numerous organ systems, resulting in reduced quality of life. A common clinical feature of this disease is severe fatigue, which may be partly related to physical deconditioning and diminished cardiorespiratory fitness. Changes in oxygen uptake (ΔVO₂) and work rate (ΔWR) relationship during incremental exercise (i.e., ΔVO₂/ΔWR slope) can provide insight into the efficiency of the cardiorespiratory system's ability to respond to changing work requirements. The ΔVO₂/ΔWR slope has not been examined in patients with SLE, and the effect of exercise training on this population's ΔVO₂/ΔWR slope has not yet been investigated.

PURPOSE: To examine changes in the ΔVO₂/ΔWR slope following the completion of a 12-week aerobic exercise training program in patients with SLE.

METHODS: Fifteen women with mild SLE disease activity underwent a 12-week exercise training program comprised of three 30-minute vigorous-intensity (70-80% of heart rate reserve) treadmill walking sessions each week. Prior and subsequent to the exercise program, patients performed an incremental treadmill cardiopulmonary exercise test (CPET). Plateaus at the start and end of the ΔVO₂/ΔWR data were excluded to obtain an accurate representation of the slopes. A paired t-test evaluated pre- and post- ΔVO₂/ΔWR slopes, and Pearson's correlations were used to observe significant relationships with other CPET outcomes.

RESULTS: A significant difference between ΔVO₂/ΔWR slope before and after training was not observed, even though 12 of the patients (80%) had slight increases in their slopes following exercise training (Pre: 5.02 ± 0.57; Post: 5.43 ± 0.69; p=0.09). Correlations between the change in the ΔVO₂/ΔWR slope and the change (post-pre) in the following performance variables were observed: Δ peak VO₂ (r=0.70, p<0.01), Δ peak VCO₂ (r=0.78, p<0.01), Δ peak ventilation (r=0.56, p=0.03) and Δ peak heart rate (r=0.64, p=0.01).

CONCLUSIONS: In these women with SLE, a majority saw a slight increase in their ΔVO₂/ΔWR slopes. A greater change in the ΔVO₂/ΔWR slopes was related to a greater magnitude of change in several peak CPET variables. This may suggest improvements in cardiorespiratory system efficiency following vigorous exercise training in women with SLE.

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Nine Months Of Exercise Changes The Impact Of Twelve Months Of Detraining In Functional Capacity And Hemodynamic Profile Of Older Adults?

Luis Leitão¹, Moacir Marocolo², Ana Figueira¹, Teresa Figueiredo¹, Ana Pereira¹, Hugo Louro³. ¹ESE-IPS, Setubal, Portugal. ²Universidade Federal de Juiz de Fora, Juiz de Fora, Brazil. ³ESDRM-IPS, Rio Maior, Portugal.

Exercise is a relevant intervention to reduce risk factors of cardiovascular diseases and improves the performance of activities of daily living in older women. Detraining periods (DT) are common after community exercise programs for older adults. These interruptions promote declines in health profiles of older women and are depended on interruption duration.

PURPOSE: To evaluate the effects of nine months of combined exercise before nine months of DT in promoting different effects in hemodynamic profile and functional capacity of older women that do not exercise.

METHODS: Twenty-one older women (EG: $n = 21$, 69.2 ± 2.1 years) followed a nine-month multicomponent exercise program before a twelve-month detraining period, and 14 older women (CG: $n = 14$, 71.3 ± 2.6 years) maintained their daily routine, had assessed (before and after a exercise program and after twelve months of detraining time) functional capacity (FC) through Rickli and Jones battery test, blood pressure (BP) and resting heart rate (HR_{rest}) through a Omron Digital Blood Pressure Monitor HEM-907.

RESULTS: After nine months of exercise EG improved FC, BP and HR_{rest} ($p < 0.05$), while CG maintained their baseline values ($p = \text{NS}$). Twelve months of DT promoted declines in BP (Systolic BP: 5.12%, $p < 0.05$; Diastolic BP: 4.54%, $p < 0.05$) and in FC (Cardiorespiratory 6 minute walk test: -24.32%, $p < 0.01$; lower body strength: -16.2%, $p < 0.01$; agility: 6.7%, $p < 0.05$) of EG.

CONCLUSIONS: Exercise resulted in a better FC and hemodynamic profile of EG before DT compared to CG but, DT declined all the benefits of exercise in hemodynamic and FC values.

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Lower Subendocardial Viability Ratio With Aging In Women Is Dependent On Cardiorespiratory Fitness

Nicholas A. Carlini, Ryan M.T. Cloud, Matthew P. Harber, FACSM, Bradley S. Fleenor. *Ball State University, Muncie, IN.*

Low subendocardial viability ratio (SEVR), an index of myocardial supply and demand, and cardiorespiratory fitness (CRF) both decline with age and are associated with increased CVD risk in apparently healthy adults. Yet, the association between CRF and SEVR with aging has not been established.

PURPOSE: To determine the influence of CRF on SEVR with aging in apparently healthy men and women. We hypothesized higher CRF will be associated with a greater SEVR with aging in men and women.

METHODS: Two hundred and sixty-two (126M/136F, age range 20-84 years) individuals underwent measures of CRF [maximal O_2 consumption ($\text{VO}_{2\text{max}}$)] and SEVR (pulse wave analysis, PWA). A 2-way analysis of variance (ANOVA) was used to compare vascular and cardiac characteristics between young (< 45 years) and MA/O (≥ 45 years) men and women. Bivariate correlations assessed the relation between SEVR, age, and CRF in men and women. Partial correlations were used to assess the relation between SEVR and age, which were adjusted for traditional CVD risk factors, medications, and CRF.

RESULTS: MA/O adults had higher brachial systolic blood pressure (bSBP), brachial pulse pressure (bPP), central systolic blood pressure (cSBP) and end-systolic pressure (ESP) (main effect of age, $p < 0.05$, all). Compared to men, women had higher resting heart rate (HR), augmentation index @ HR 75 (AIx@75) and ejection duration (ED) (main effect of sex, $p < 0.05$, all). SEVR was negatively correlated with age ($r = -0.29$) and positively correlated with CRF ($r = 0.53$) in women (both, $p < 0.05$) but was not correlated in men (both, $p > 0.05$). SEVR remained correlated with age in women independent of CVD risk factors and medications (all, $p < 0.05$) but not when CRF was added to the model ($r = 0.16$, $p > 0.05$).

CONCLUSION: These findings suggest that a higher CRF with aging in females may preserve SEVR, which was not observed in males. These emphasize the importance of maintaining or achieving higher CRF with aging in females to lower CVD risk and highlight the necessity of performing sex-specific analyses.

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Exercise-induced Oxidative Stress During Exercise And Recovery In Hot Condition

Allan H. Goldfarb, FACSM¹, Junyong Lee¹, Travis Anderson¹, William M. Adams, FACSM², Laurie Wideman, FACSM¹. ¹Univ., of North Carolina Greensboro, Greensboro, NC. ²United States Olympic & Paralympic Committee, Colorado Springs, CO.

Acute exercise of sufficient intensity and duration can result in oxidative stress (OS), characterized by elevated blood OS biomarkers. Unfortunately, the time course for the change in OS and its recovery (RC) has not been adequately determined in most studies.

PURPOSE: This study investigated the pattern change in blood OS biomarkers (low density lipoproteins oxidized (LDL_{ox}) and glutathione ratio (oxidized glutathione (GSSG) to total glutathione (TGSH) during a 1 h bout of cycling and a 1 h RC period, compared to a rest condition. It was hypothesized that the blood OS biomarkers would be elevated within the first 30 min of exercise based on the predicted intensity with the OS biomarkers returning to baseline during RC.

METHODS: Ten males (mean(SD)); age, 24.4 (1) yrs; mass, 75.3 (2.1) kg; height 175.9 (1) cm; $\text{VO}_{2\text{max}}$, 50.0 (1.8) $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) arrived at 1800 h on two occasions and completed; an exercise (Ex) (70-75% max power output) or rest (RE) condition in a hot environment (40°C and 30% relative humidity), in a randomized order. Blood was sampled every 15 min during EX and at min 15, 30 and 60 mins during RC. Plasma LDL_{ox} and both reduced (GSH) and oxidized (GSSG) forms of glutathione status were assessed. Repeated measures ANOVAs (2 conditions x 4 times [EX] and 2 conditions x 4 times [RC]) determined if differences in LDL_{ox} , and GSSG/TGSH ratio occurred with an alpha set a priori $p < .05$.

RESULTS: Mean HR for RE was 73 ± 3 bpm vs 165 ± 3 for EX overtime. Mean cycling power output was 151 ± 9 W during EX. There was no main effect for condition ($p = 0.054$) or time ($p = 0.061$) or interaction (time by condition) effect ($p = 0.074$) for LDL_{ox} during EX. The GSSG/TGSH ratio increased at 30 minutes regardless of condition (12.5% compared to 5% at 0 minutes in chamber). The GSSG/TGSH ratio had a main effect for time to increase at 60 min RC independent of condition ($p = 0.02$).

CONCLUSIONS: The results did not support our hypothesis of an exercise-induced OS. Our findings were likely impacted by 1) the environmental conditions inducing a high heat stress at rest, 2) delayed recovery due to the high heat stress in combination with dehydration during recovery, and 3) and small sample size which could not overcome the large interindividual variability in LDL_{ox} values.

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A Reliable Treadmill Running Protocol For Inducing Significant Thermal Strain

Toby Mundel¹, Michael Mann², Simon Gilmour³, Jasmine Thomson³. ¹Massey University, Palmerston North, New Zealand. ²Universal College of Learning, Palmerston North, New Zealand. ³Fonterra Research and Development Centre, Palmerston North, New Zealand.

PURPOSE: To determine the test-retest reliability of a 60-min treadmill running protocol under conditions of ambient heat stress when trials are spaced greater than four weeks apart, indicative of interventions (e.g., training, heat adaptation, dietary) that require longer than the typical 1-week duration in the literature.

METHODS: Nine trained males (age: 31 ± 8 y; $\text{VO}_{2\text{max}}$: 60 ± 6 $\text{mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) undertook a 15-min self-paced time-trial pre-loaded with 45 min of running at 70% of their individual ventilatory threshold (11.2 ± 0.3 $\text{km} \cdot \text{h}^{-1}$) in a heat-stressful environment ($30 \pm 1^\circ\text{C}$; $53 \pm 5\%$ relative humidity), and repeated this twice more following 40 ± 14 and 36 ± 13 days, respectively, with pre-trial standardization of diet and exercise for 48 h.

RESULTS: Total (11.2 ± 0.3 km, $p = 0.58$) and 15-min self-paced (2.9 ± 0.2 km, $p = 0.22$) distance covered was not different between trials. The coefficient of variation (CV) decreased from $4.9 \pm 3.1\%$ between the first two trials to $2.1 \pm 2.0\%$ between the last two trials. Repeated measures of the change in core temperature during the first 45 min ($\Delta 2.1 \pm 0.3^\circ\text{C}$) yielded bias and limits of agreement (LoA) of $-0.08 \pm 0.35^\circ\text{C}$ and standard error of measurement (SEM) of 0.13°C , considerably more reliable than the same measures of baseline core temperature ($36.9 \pm 0.2^\circ\text{C}$; LoA = $0.23 \pm 0.46^\circ\text{C}$; SEM = 0.22°C). Mean heart rate during the first 45 min (166 ± 10 beats $\cdot \text{min}^{-1}$) yielded LoA of 4 ± 10 beats $\cdot \text{min}^{-1}$ and SEM of 3 beats $\cdot \text{min}^{-1}$, whilst mean VO_2 during the first 45 min (3.58 ± 0.33 L $\cdot \text{min}^{-1}$) yielded LoA of 0.07 ± 0.11 L $\cdot \text{min}^{-1}$ and SEM of 0.01 L $\cdot \text{min}^{-1}$.

CONCLUSION: We demonstrate that a 60-min treadmill running protocol under heat-stressful conditions is reliable when considering the most commonly accepted limit of $< 5\%$ CV, reinforced by the physiological responses during the protocol being more reliable than their baseline measures.

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