3267 Board #885 May 29 2:30 PM - 4:00 PM
Seasonal Variation In Sunlight Exposure, Nitric Oxide Metabolites, And Blood Pressure
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A reduced exposure to ultraviolet (UV) radiation in winter can decrease 25-hydroxyvitamin D (25(OH)D) levels, increase cardiovascular risk factors, and inhibit athletic performance. Exposing skin to UV in the laboratory has also been shown to release nitric oxide (NO) metabolites into the circulation; molecules known to regulate multiple cardiovascular and metabolic processes. However, it is presently unclear whether NO availability is influenced by the seasonal variation in UV exposure.

PURPOSE: To compare UV exposure, serum 25(OH)D, plasma nitrate and nitrite, and blood pressure between the summer and winter months.

METHODS: Thirty-four healthy adults (21 males) residing in Scotland (~55.8°N, 4.1°W) were monitored for 7 days in the summer (June - August) and winter (December - February) in a randomised order. Participants wore a personal UV monitor on the wrist throughout each monitoring phase before visiting the laboratory to provide a venous blood sample and to have blood pressure measured. Serum levels of 25(OH)D were measured using an enzyme-linked immunosorbent assay and plasma nitrate and nitrite analysed using gas-phase chemiluminescence.

RESULTS: Total UV-A exposure was higher in summer (17 ± 21 J/cm²) compared to winter (2.5 ± 3.0 J/cm²; P<0.001). Plasma nitrate did not differ between seasons (P=0.57) but nitrite (137 ± 31 nm) and serum 25(OH)D (22 ± 8 ng/ml) were lower (both P<0.001) in the winter compared to summer (200 ± 56 nM and 35 ± 13 ng/ml, respectively). Blood pressure was higher in winter (systolic 126 ± 13 mmHg; diastolic 76 ± 9 mmHg) than in summer (systolic 119 ± 11 mmHg; diastolic 67 ± 8 mmHg; both P<0.001). UV-A exposure was positively associated with plasma nitrite (R=0.41, P<0.01) and 25(OH)D (R=0.43, P<0.01). Plasma nitrite was negatively associated with systolic (R=−0.5, P<0.01) and diastolic blood pressure (R=−0.4, P<0.01).

CONCLUSIONS: In a similar fashion to 25(OH)D, circulating levels of plasma nitrite, a marker of NO bioavailability, appear to be influenced by seasonal variations in UV exposure. The negative association between nitrite and blood pressure suggest that a reduced level of NO may increase cardiovascular risk factors in the winter months.

3269 Board #890 May 29 2:30 PM - 4:00 PM
Sex And Fiber-type Differences: Vascular ATP-sensitive K⁺ (KATP) Channels Support Critical Speed And Intersitial PO₂
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(Glibenclamide (GLI), prescribed to Type II diabetes patients, enhances insulin release by inhibiting pancreatic K_ATP channels. K_ATP channels support maximal aerobic capacity (VO2max) and blood flow during treadmill running in male rats. Whether high-intensity exercise tolerance (i.e. critical speed, CS) and muscle O2 delivery-utlization matching (inteststitial PO2, PO2i) is impaired, and whether sex differences exist in K_ATP function, are unknown.

PURPOSE: We hypothesized that systemic inhibition of K_ATP channels via GLI would decrease VO2max and CS, while local inhibition would decrease contracting PO2i and blood flow within fast-twitch oxidative (mixed gastrocnemius (MG)) and slow-twitch oxidative (soleus (SOL)) muscles with females (F) and F+OVX expressing the greatest reduction.

METHODS: Male (n=12), female (n=10, proestrus) and ovariectomized female (F+OVX; n=12) Sprague-Dawley rats with and without GLI (10 mg kg⁻¹ in DMSO i.p.), VO2max and CS were assessed using state-of-the-art techniques on a motorized treadmill. PO2i was determined, before and after GLI superfusion (5 mg kg⁻¹), via phosphorescence quenching (EQ) in the exposed MG and SOL muscles during electrically-induced contractions and blood flow by fluorescent-labeled microspheres (15 μm).

RESULTS: GLI decreased VO2max in female (71.5 ± 1.0 vs 67.9 ± 1.5) and F+OVX (76.8 ± 1.4 vs 74.4 ± 1.4; p<0.05 for both) but not males (81.5 ± 2.0 vs 80.8 ± 2.0 mL O2 min⁻¹ kg⁻¹; p>0.05). CS was reduced equivalently in all groups (8-11%; p<0.05). GLI reduced MG blood flow (female: 49 ± 9 vs 34 ± 5; male: 50 ± 5 vs 35 ± 4) and PO2i (female: 7.3 ± 0.5 vs 6.1 ± 0.5; male: 8.9 ± 1.1 vs 7.2 ± 0.5, but not SOL, of female and male rats (p>0.05). Conversely, in F+OVX, PO2i was reduced in the SOL (14.5 ± 1.5 vs 10.2 ± 1.1; p<0.05), but not MG.

CONCLUSION: These data support the role of vascular K_ATP channels in exercise tolerance (i.e. CS) by matching O2 delivery-utilization with ovariectomy shifting K_ATP channel effects from fast- to slow-twitch muscles.

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3270 Board #91 May 29 2:30 PM - 4:00 PM
Dose-response Impact Of Resistance Training Frequency On Arterial Stiffness
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(No relationships reported)

Arterial stiffness (AS) has been shown to underpin the development and progression of many cardiovascular diseases. Regular exercise promotes favorable changes in arterial health; however, investigations on the impact of resistance training (RT) alone on AS have shown mixed results. Moreover, the frequency design in which an RT program is completed on a weekly basis (i.e., the ‘weekend warrior’ approach) may impact overall changes to arterial health.

PURPOSE: We sought to examine the dose response impact of RT frequency over a 4-week period on arterial stiffness and blood pressure in college-aged resistance trained individuals.

METHODS: Twenty-seven resistance trained males (n=16) and females (n=11) were randomized into three training groups differing in weekly RT frequency: a) 1-day (1D) per week (n=8), b) 2-days (2D) per week (n=9), or c) 3-days (3D) per week (n=9). Resistance training exercises included: dumbbell chest press, seated cable row, leg press, calf raise, lateral pulldown, seated shoulder press, seated leg extension, and prone leg curl. Exercises were completed either two (3D), three (2D), or six (1D) sets of 10 repetitions at 65% 1-repetition max, depending on group. Arterial stiffness indices (augmentation index (AIX75), pulse pressure (PP), and augmentation pressure (AP)) were measured at baseline, midpoint, and after completing the 4-weeks using the Sphygmocor XCEL. A two-way (group x time) ANOVA with repeated measures was employed to examine differences in AS indices between groups.

RESULTS: Total weekly load volumes were similar (p = 0.996) across groups. There were no differences between 1D, 2D, and 3D for AIX75 (p = 0.429), PP (p = 0.666), and AP (p = 0.247).

CONCLUSION: Given no differences between groups, a total weekly load volume of RT can be completed in a single weekly session or across multiple sessions without any negative or favorable impact on AS.

3271 Board #92 May 29 2:30 PM - 4:00 PM
Pulse Wave Velocity And Pulmonary Function Testing As Markers Of Cardiovascular Disease In Females
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(No relationships reported)

PURPOSE: To assess the association of dynamic lung function, namely forced vital capacity (FVC) and forced expiratory volume in 1 sec (FEV1) and diffusing capacity for carbon monoxide with markers of cardiovascular disease in a cohort of asymptomatic female smokers. Cardiovascular disease is a major health problem worldwide, poor lung function has been associated with