RESULTS: No differences were observed between anaerobic trained and untrained individuals for any variable. When collapsed across groups, a significant increase in lymphocyte count was evident in the immediate post exercise condition compared to all other measurement points (P<0.05). A similar response was observed for lymphocyte migration (P<0.05).

CONCLUSIONS: No differences were noted across condition for apoptosis. While a difference in the lymphocyte apoptotic response between aerobically trained individuals has been reported, the present results indicate that this response cannot be extended to an anaerobically trained group. As apoptosis can be induced through an oxidative stress mechanism, it is possible that anaerobic exercise does not provide a sufficient stimulus in this regard.

1935 Board #130 June 2 9:00 AM - 10:30 AM
Lymphocyte Apoptosis in Smokers and Non-Smokers Following Different Intensity of Exercises and Relation with Lactate
Kyung-Shin Park, Yang Lee. Texas A&M International University, Laredo, TX. Email: kpark@tamia.edu

Since smokers have antioxidant imbalance and immune suppression exercise, as a stressor, may disturb their immune function. It is known that lactate production is associated with loss of mitochondrial membrane potential which may elevate lymphocyte apoptosis in blood.

PURPOSE: 1) to examine the exercise intensity where lymphocyte apoptosis is significantly increased in smokers and non-smokers, 2) to find out whether lymphocyte apoptosis is associated with level of lactate.

METHODS: Fourteen healthy untrained smokers (≥ 1 pack year, n=7) and non-smokers (n=7) aged 18 to 26 (smokers: 20.67±9.6 vs. non-smokers: 20.17±26, Mean ± SE) were recruited. Each subject conducted three treadmill runs at different intensities randomly. Running distance for all three runs was equivalent to 30 minute run at 70% \( V_{O_{2max}} \). Lymphocyte apoptosis and level of lactate were analyzed at rest (Pre), immediately after (Post), and 1 h following (1 h post) each run. Data was analyzed using two way repeated measures ANOVA. The Pearson \( r \) was calculated to examine the relation between lymphocyte apoptosis and level of lactate at post.

RESULTS: Smokers showed higher lymphocyte apoptotic index than non-smokers at Post in 60% (12.5±0.62% vs. 9.97±0.51, \( p<0.008 \)) and 70% \( V_{O_{2max}} \) running trials (17.53±0.57% vs. 15.6±0.41, \( p<0.018 \)). There was no significant difference of lymphocyte apoptosis in smokers and non-smokers at Post in 80% \( V_{O_{2max}} \) run. All post values showed significantly higher level of lactate as compared to Pre and 1 h post, but there was no significant difference between smokers and non-smokers. The strong positive relationship between lymphocyte apoptotic index and level of lactate was detected (\( r=0.739 \), smokers vs. \( r=0.793 \), non-smokers).

CONCLUSIONS: Smokers tend to have higher lymphocyte apoptosis than non-smokers following runs at 60% and 70% \( V_{O_{2max}} \) but not following a run at 80% \( V_{O_{2max}} \). An increase in lymphocyte apoptosis following a run at 60% \( V_{O_{2max}} \) indicates that lymphocyte apoptosis can be increased following moderate intensity exercise as well as at high intensity. Since lactate and lymphocyte apoptosis at post were increased in dose-dependent manner to exercise intensity, it is suggested that an increase in lactate production during exercise might contribute to the increase in lymphocyte apoptosis.

1936 Board #131 June 2 9:00 AM - 10:30 AM
Effect Of HSV-1 Infection On The Frequency Of Senescent T-cells And Their Exercise-induced Mobilization
Emily CP LaVoy, Austin B. Bigley, Guillaume Spielmann, Jerrald L. Rector, Mark R. Morrison, Richard J. Simpson. University of Houston, Houston, TX. Email: eclavoy@uh.edu

Acute exercise mobilizes highly-differentiated memory T cells and senescent T cells into the blood compartment, which could have important implications for post-exercise immune surveillance. This response differs in individuals with latent cytomegalovirus (CMV) infection (a member of the herpesvirus family), but it is not known if other latent herpesviruses, such as herpes simplex virus type 1 (HSV-1), also influence this exercise-induced immune response. As HSV-1 infects 50% of the US population, this could have important implications for many athletes.

PURPOSE: To examine the effects of an acute bout of exercise on the frequency of senescent, naïve, and memory T cells in HSV-1 infected and non-infected participants.

METHODS: Eleven HSV-1 infected and twelve non-infected healthy men (mean ± SD: Age: 28±5 yrs; \( V_{O_{2max}} \): 40.6±10.2 ml x kg-1 x min-1) cycled at 85% of their estimated maximum power for 30 min. Blood samples were collected before, immediately after, and 1h after exercise and mononuclear cells were isolated using density gradient centrifugation. Cells were labeled with monoclonal antibodies to identify proportions of naïve (CD28+CD57-), memory (CD28+CD57+), and senescent (CD28-CD57+) subsets of CD3+CD4+ and CD3+CD8+ T cells using four-color flow cytometry. HSV-1 serostatus was determined by an ELISA test. Main effects for exercise and serostatus, and exercise x serostatus interaction effects, were detected using maximum likelihood linear mixed models.

RESULTS: A main effect for exercise was found on the proportions of naïve (-7%), senescent (+62%), and memory (+34%) CD4 T cell subsets, as well as naïve (-25%) and senescent (+44%) CD8 T cells immediately after exercise (p<0.05). A main effect for HSV-1 serostatus on memory (CD28+CD57+) CD4/CD8 T cells (-22% and -21% respectively) was also found (p<0.05). No interaction effects between HSV-1 serostatus and exercise were found.

CONCLUSIONS: Latent HSV-1 infection leads to a decrease of the memory T cell subset. However, unlike other herpesviruses (i.e. CMV), latent HSV-1 infection does not influence the relative response of senescent or memory T cells to acute exercise. This indicates that individuals with and without latent HSV-1 infection have a similar lymphocyte mobilization in response to exercise.
METHODS: Twelve recreationally active males completed 8 consecutive days of cycling in 38° C for ~90 min at ~45%VO2max. Lymphocytes were collected pre- and post-exercise on days 1 and 8 of HA. Pre-exercise lymphocytes were heat shocked in vitro for 20, 40, or 60 min at 37, 41, 43, or 45° C to analyze apoptotic responses to heat, and post-exercise samples were analyzed to determine apoptotic responses to exercise.

RESULTS: After HA, participants exhibited improved thermotolerance. They experienced a resting plasma volume expansion of 6.29±6.18%, increased sweat loss (p<0.001), and decreased heart rate, core temperature, and skin temperature at all time points on day 8 of HA (p=0.046; p=0.023; and p=0.002, respectively). HSP72 mRNA increased during exercise on days 1 and 8 (4.08±3.76 and 3.80±1.72 fold, respectively), and resting HSP72 mRNA levels increased 2.11±1.21 fold from days 1 to 8 (nonsign.). There was no change in in vitro apoptosis due to HA (p=0.385); however, there was an interaction of the time x temperature design used to treat cells (p=0.000), with 45°C being most lethal at all time points. There was no change in apoptosis due to exercise or HA (p=0.870 and p=0.683, respectively).

CONCLUSIONS: Whole body HA did not reduce lymphocyte apoptosis and apoptotic responses were not related to the HSP72 mRNA levels. Under the conditions tested, improved thermotolerance at the organism level was not associated with improved thermotolerance at the cellular level.

1938 Board #133 June 2 9:00 AM - 10:30 AM
Acute And Chronic Effects Of Exercise On Salivary IGA And URTI In Post Menopausal Women

Carole A. Sloan, Hermann -J. Engels, FACSM, Mariane M. Fahlman, FACSM, Hossein N. Yarandi, Jean E. Davis. Wayne State University, Detroit, MI.

Email: csloan@hfcc.edu

Methods: Thirty-two post menopausal women were randomized to a 16-week home-based, walking program (5 days/week, 30-min/session, intensity 75% of HRmax) or an experimental control group. Before and after the intervention, each subject underwent a maximal exercise treadmill test to determine VO2max and timed, whole unstimulated saliva samples were collected both at rest before and immediately after completion of each VO2max test to determine absolute SIgA concentrations, saliva flow rates (SFR), and SIgA secretion rates (S-SIgA) (Fahlman et al., 2001). In addition, throughout the study duration, each subject completed standard weekly URTI symptomatology research logs.

Results: The 16-week walking program resulted in a significant improvement (+10.4%) of VO2max (ml/kg/min) (p<0.01). Repeated measures ANOVA revealed a marked increase (+37.4%) in resting S-SIgA (p<0.05), rise (+36.2%) in SFR in the exercise group following training. Independent of study group, both before and after the intervention, resting S-SIgA (-32.3%) and SFR (-29.3%) were noticeably reduced (p<0.01) following acute maximal exercise. Neither VO2max testing nor the moderate intensity training intervention had an effect on absolute SIgA concentrations (p>0.05). Moreover, the number of URTI incidences were the same (control: 4; exercise: 4) and the duration per incidence (control: 5.3±1.5 days; exercise: 6.2±2.2 days) over the 16-week intervention period were similar between study groups (p>0.05).

Conclusion: These findings in post menopausal women support that S-SIgA and SFR are reduced immediately following maximal exercise. Moreover, a 16-week moderately intense walking program can increase S-SIgA without affecting URTI susceptibility in this population.

1939 Board #134 June 2 9:00 AM - 10:30 AM
Effects Of A 9 Months Exercise Training On Inflammatory Markers In Type 2 Diabetic Patients

Antina Schulze, Joachim Thiery, Martin Busse. University of Leipzig, Leipzig, Germany.

Email: a.schulze@uni-leipzig.de

Methods: 33 type 2 diabetes patients (63.8±9.9 years) with insulin regimen had a 9 months rehabilitative exercise training two times/week. Plasma levels of C-reactive protein, tumor necrosis factor alpha, interleukin-6, and specific diabetic and training parameters were measured at baseline, after three, six and nine months.

Results: Rehabilitative training resulted in a significant increase in TNF-alpha (12.27±7.93 vs. 15.12±9.58, p<0.002 after 6 months and 14.89±9.25pg/l, p<0.001 after 9 months). Interleukin-6 was reduced, significantly after 3 months (4.37±3.02 vs. 3.92±6.8pg/l), whereas s-CRP remained unaffected. Hba1c (6.4±0.76 vs. 6.5±1.03%) also remained unchanged. Marked changes were seen in endurance capacity (103% increase), and exercise blood pressure (145.3±14.4 ; 74.9±6.7 vs. 137.5±17.6 ; 67.2±6.5 torr after 9 months), and blood pressure at rest (142.4±19.2 ; 81.6±11.2 vs. 135.6±17 ; 76.7±9.8 torr).

Conclusions: Nine months of moderate rehabilitative exercise training in type 2 diabetes patients with insulin regimen had no relevant overall effect on s-CRP, and IL-6. In contrast TNF-a markedly increased throughout the 9 months training period. The training program though had significant beneficial effects on the cardio-circulatory response.

1940 Board #135 June 2 9:00 AM - 10:30 AM
The Frequency Of Highly Differentiated And Senescent Blood T-cells Following Two Different Endurance Training Programmes

Craig M. Neal1, Richard J. Simpson2, Frankie F. Brown1, J Austin. B. Bigley2, Guillaume Spielmann2, Angus M. Hunter1, Stuart D. R. Galloway1. 1University of Stirling, Stirling, United Kingdom. 2University of Houston, Houston, TX.

Email: craig.neal@stir.ac.uk

The frequency of highly differentiated and senescent T-cells may increase following intensive periods of endurance training, predisposing an individual to a greater risk of infection due to a shrunken naïve T-cell repertoire. Although the frequency of highly differentiated and senescent T-cells in blood has been shown to increase after acute high intensity exercise, the chronic effect of different endurance training programmes on the frequency of highly-differentiated and senescent T-cells in blood is unknown.