



Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 1st – 2nd, 2019
Conference Proceedings

International Journal of Exercise Science, Volume 9, Issue 8



Sex Differences in Endothelial Progenitor Cells and Circulating Endothelial Cells in Response to Acute Exercise

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Acute exercise provides a stimulus for improving the function and health of the endothelium by initiating release of endothelial progenitor cells (EPCs). However, this may also result in endothelial stress through the shedding of endothelial cells into circulation (CECs). The ratio of EPCs/CECs may serve as a unique indicator of vascular health but sex differences in the ratio of EPCs/CECs in response to acute aerobic exercise are unknown. **PURPOSE:** To determine whether there are sex differences in the EPC and CEC response to a single bout of submaximal treadmill running. **METHODS:** Subjects were healthy physically active men (n=14) and women (n=10) between the ages of 18-29 years. Maximal oxygen consumption (VO_{2max}) was assessed and 48 hours later, participants performed 30 minutes of treadmill running at 70% of their individual VO_{2max} . Fasted blood was obtained before and 30-minutes after the treadmill exercise. Peripheral blood mononuclear cells were isolated, FcR blocked and immunostained with antibodies specific to CD34-FITC, KDR-PE, CD146-PECy7 and CD45-PerCP, and fixed in paraformaldehyde. The forward-side-scatter plot was used to identify the lymphocyte and monocyte gates from a total of 5,000 events/sample using a flow cytometer. Total CD34+ and KDR+ cells, EPCs (CD34+/KDR+) and CECs (CD146+/CD45-) were quantified. **RESULTS:** For CD34+, KDR+ cells, and EPCs there was no main effect for exercise or sex nor a sex*exercise interaction ($P>0.05$ for all). Regardless of sex, CECs increased from 45.2 ± 9.7 events to 66.7 ± 18.7 events after the acute exercise bout ($P=0.027$). CECs were higher in women compared to men at baseline (73.6 ± 20 vs. 26.9 ± 5.5 events) and after acute exercise (121.6 ± 43 vs. 31.4 ± 6.2 events), although this did not reach statistical significance ($P=0.318$). There was no main effect for exercise, sex, or a sex*exercise interaction for the EPC/CEC ratio ($P>0.05$ for all). **CONCLUSIONS:** A single bout of aerobic exercise increases CECs, but this is independent of sex. The lack of mobilization of EPCs in response to acute exercise suggests that other repair mechanisms may play a stronger role in maintaining the balance between endothelial repair and damage in younger physically active adults.

Supported by Towson University Faculty Development and Research Committee