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Circulating Angiogenic Cell and Microparticle Response to Prolonged Sitting

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Prolonged sitting increases the risk for cardiovascular disease. However, markers of vascular repair and damage such as circulating angiogenic cell (CAC) populations and microparticles (MP) have not been characterized with prolonged sitting or sitting with intermittent activity. **PURPOSE:** To examine the effects of 3h of sitting with or without calf raises on CD34⁺, CD62E⁺, and CD31⁺/42b⁻ MP populations which are linked to endothelial activation, apoptosis and CAC paracrine activity, respectively, and CD14/31⁺, CD3/31⁺, and CD34⁺ CACs which are linked to endothelial repair. **METHODS:** After familiarization, sedentary subjects (n=18) sat still for 180 minutes (control condition) or sat for 180 minutes but performed 10 calf raises every 10 minutes (experimental condition) in a random order. Blood samples were obtained at baseline and at 180 minutes for analyses. CACs and MPs were isolated and analyzed using multicolor fluorescent flow cytometry. Data were analyzed with repeated measures ANOVA and are presented as mean \pm standard error. **RESULTS:** There was a main effect of sitting to decrease CD34⁺ MPs (119 \pm 36 vs. 106 \pm 30 events/ μ l, p<0.01) and CD62E⁺ MPs (51 \pm 29 vs. 34 \pm 16 events/ μ l, p<0.001) regardless of condition. There were no significant differences in CD31⁺/42b⁻ MPs (49 \pm 5 vs. 38 \pm 12 events/ μ l), CD14/31⁺ cell frequency (85 \pm 3 vs. 87 \pm 2 % of parent), or CD3/31⁺ cell frequency (52 \pm 3 vs. 50 \pm 2 % of parent population) after sitting or between conditions. **CONCLUSION:** Contrary to our hypothesis, a three-hour bout of sitting with or without calf raises was not sufficient to affect CAC numbers. Furthermore, sitting decreased MP markers linked to endothelial activation and CAC paracrine activity, and calf raises did not ameliorate these changes. Future studies assessing longer durations of sitting with a more potent stimulus (e.g., intermittent walking) should be done to further understand the effects of sitting on the CAC and MP response.