

Relationship between Cell Adhesion Molecules and Cigarette Smoking Before and After Exercise

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ABSTRACT

Cell adhesion molecules (CAMs) found on endothelial membranes are integral membrane proteins that bind with other cells and promote immune cell transmigration. The responses of CAMs to exercise have not been fully examined in cigarette smokers. **PURPOSE:** The current study investigated the relationship between cell adhesion molecules [soluble vascular cell adhesion molecule-1 (sVCAM-1), soluble intercellular adhesion molecule-1 (sICAM-1), and soluble E-selectin (sE-selectin)] and cigarette smoking before and after a single bout of exercise at different intensities. **METHODS:** Physically inactive (physical activity < 2 days per week) male smokers (N=8, carbon monoxide \geq 16 ppm, smoking history > 2 years, and cigarette smoking > 10 cigarettes per day) and non-smokers (N=10), the ages between 20 and 30, volunteered for the study. Participants exercised on a treadmill for 3 miles at two different intensities in random order (low: 55% and high: 75% of VO_{2max}) on a separate occasion. Overnight fasting blood samples were collected at three different time points [before (PRE), immediately post-exercise (IPE), and 1-hr PE] and analyzed for sVCAM-1, sICAM-1, and sE-selectin. Data were analyzed using a 2 (groups) X 3 (time) ANOVA with repeated measure. The Sidak's pairwise multiple comparisons and a follow-up simple effects test as a post-hoc test were employed if necessary. A p-value was set at < 0.05 for the statistical significance. **RESULTS:** The significant main effect for group indicated that smokers had significantly higher sICAM-1 (137.37 \pm 5.78 ng/mL, p=0.001) than non-smokers (110.45 \pm 5.17 ng/mL). Regardless of exercise intensity, sVCAM-1 at IPE (160.09 \pm 3.88 ng/mL) significantly increased by 21.5% from PRE (145.87 \pm 3.19 ng/mL, p=0.001) and returned to baseline value at 1-hr PE (145.09 \pm 4.39, p=0.006). Similarly, sICAM-1 at IPE (131.73 \pm 4.47 ng/mL) was significantly elevated by 9.7% from PRE (120.06 \pm 3.86 ng/mL, p=0.001) but returned to baseline value at 1-hr PE (119.31 \pm 4.27, p=0.001). There was no change in sE-selectin following exercise. **CONCLUSION:** Exercise may temporarily increase both sICAM-1 and sVCAM-1, but not sE-selectin, which then return to baseline values after 1 hour of exercise. Smokers had significantly higher sICAM-1 as compared with their counterparts, indicating that smokers are more susceptible to inflammatory or cardiovascular diseases.