ALTERATIONS IN CIRCULATING CELL ADHESION MOLECULES AFTER REPEATED BOUTS OF EXERCISE INDUCED MUSCLE DAMAGE

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Introduction: An initial bout of eccentrically biased exercise induces damage to the involved musculature. However, when this exercise is repeated within several weeks, there is significantly less damage; this adaptation is referred to as the repeated bout effect. One hypothesis that attempts to explain this phenomenon is related to dampening of acute inflammation after the initial bout (1). The exact nature of the dampening of the response is not clear, but may be related to altered trafficking of white cells. Since cell adhesion molecules (CAMs) are central in this process, there may be an alteration in expression of CAMs in response to bout 2. Interactions between leukocytes and endothelial cells through specific adhesion receptors play a crucial role in the development of inflammatory infiltrates. Therefore, the purpose of this study was to compare levels of CAMs before and after repeated bouts of downhill running.

Methods: 6 healthy untrained males were required to run for 1 h down a -13.5% treadmill grade at a pre-determined speed, on 2 occasions separated by 14 d. Venous blood was drawn before, after and at 3, 6, 9, 12, 24, 48 and 72 h after. Proteins from the Immunoglobulin superfamily ICAM-1 (CD54) and VCAM-1 (CD106), and the selectins (E- (CD62E), L- (CD62L), and P- (CD62P)) were assessed using commercial ELISA kits (R & D Systems). A randomized block design was used to assess differences between bouts (p<.05); data was analyzed for the initial 12 h period and also for the subsequent 24 h periods.

Results: During the initial 12 h, there was a run effect (p=.0003) for L-selectin, with levels for RUN1 (1339 +/- 23 pg/mg) being 10% higher than for RUN2 (1211 +/- 23 pg/ml). There was also a run effect for ICAM-1 (p=.05) during the initial 12 h period with values for RUN1 (371 +/- 7 pg/mg) being 6% higher than for RUN2 (350 +/- 7 pg/mg). There was a more pronounced difference in ICAM (p=.009) during the subsequent 24 h periods with values for RUN1 (363 +/- 8 pg/mg) being 8% higher than for RUN2 (333 +/- 8 pg/mg).

Discussion: The overall changes demonstrated reduced levels of soluble L-selectin and ICAM-1 after the second bout of downhill running. Studies have shown that when L-selectin is cleaved from the surface of neutrophils this alters the ability of these cells to interact with endothelial venules and migrate into inflamed tissue (2). Reduced levels of ICAM-1 may also reduce infiltration of leukocytes into inflammatory foci, by reducing the number of leukocytes rolling along the endothelial surface (3). These events could help explain the reduced activation of neutrophils seen after a second bout of eccentrically biased exercise (1) and support the hypothesis that the repeated bout effect represents, in part, a dampened inflammatory response.

1. Pizza et al., J Appl. Physiol. 80:47, 1996