

Can a Dynamic Warm-up Reduce the Magnitude of Immune Perturbation Following Vigorous Aerobic Exercise?

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ABSTRACT

Exercise transiently increases several leukocyte populations in peripheral blood in an intensity-dependent manner, with numbers returning to baseline or lower during recovery. This mobilization of immune cells is explained in part by sympathetic activity and the release of stress hormones (catecholamines and cortisol). The literature examining immune responses to exercise has by and large failed to control for the presence of a warm-up prior to the experimental bout. Gradually increasing exercise intensity over a period of minutes may reduce the stress of the exercise bout and thus may influence the immune response to a given exercise protocol. **PURPOSE:** To compare the mobilization of leukocyte subpopulations following a bout of high intensity aerobic exercise with and without a dynamic pre-exercise warm-up. **METHODS:** 8 physically active adults (4 women, 27±4 years) cycled 30 minutes at 80% heart rate maximum with and without warm-up in a randomized, counter-balanced order. Warm-up was provided immediately prior to the exercise, and involved increasing wattage by 10% each minute for 10 minutes starting at 10% of desired exercise intensity. Blood collected pre-, post- and 1-hour post- exercise was analyzed by flow cytometry to characterize cell populations. Differences in cell concentrations across time points and conditions were assessed by maximum likelihood linear mixed models. **RESULTS:** Exercise transiently increased lymphocyte concentration in blood, and the number and proportion of late differentiated CD8 T cells (main effects of time; $p < 0.001$). Inclusion of warm-up diminished these post-exercise increases in lymphocytes (pre- to post- change with warm-up: 45±19 cells/microliter, representing a 17% increase; change with no warm-up: 93± 11 cells/microliter, a 42% increase; $p < 0.05$) and in late differentiated CD8 T cells (pre- to post- change with warm-up: 1±5 cells/microliter representing a 2% increase; change with no warm-up: 10±4 cells/microliter, a 46% increase; $p < 0.05$). **CONCLUSION:** Inclusion of a dynamic warm-up prior to vigorous aerobic exercise lessens the exercise-induced mobilization of lymphocytes and late differentiated T cells. Athletes should include a dynamic warm-up to reduce immune perturbations during high intensity exercise.