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Determining the Relationship Between Exercise Intensity and Lymphocyte Mobilization During Cycling Exercise

INTRODUCTION: Exercise elicits a robust leukocytosis, elevating key effector lymphocytes within the circulation. Following exercise, lymphocytes rapidly egress the circulation, and animal models indicate this egress may increase tumor trafficking and infiltration. We sought to define associations between lymphocytes and exercise intensity during cardiopulmonary exercise testing.
METHODS: Nine healthy participants were recruited for cycling exercise trials. Participants completed a VO2max test and returned to the laboratory three times over eight weeks to complete submaximal trials at wattages corresponding to 60%, 70%, and 80% of their VO2max in five minute stages. An intravenous catheter was inserted into the antecubital space, and blood was drawn at rest and each stage. Blood was analyzed for lactate concentrations and assessed via an automated hematology analyzer to determine lymphocyte concentrations. One way ANOVAs were utilized to assess changes across exercise intensities, and Pearson's correlations were utilized to determine associations between variables.
RESULTS: Participants (23.5 ± 2.6 yrs; 5M, 4F) had a BMI of 24.2 ± 3.0 kg/m2 and VO2max of 40.6 ± 5.4 mL/kg/min. Total lymphocyte counts significantly increased from rest to 60% VO2max (2.3 ± 0.54 to 2.9 ± 0.65 x109/L; $p<0.0001$), 60% to 70% VO2max (2.9 ± 0.65 to 3.5 ± 0.86 x109/L; $p<0.0001$), and 70% to 80% VO2max (3.5 ± 0.86 to 4.1 ± 1.1 x109/L; $p<0.0001$). Heart rate, lactate, and RPE significantly increased from rest to each stage of the protocol ($p<0.0001$). Considering all exercise intensities, lymphocyte mobilization was significantly correlated with heart rate ($r=0.50$; $p<0.0001$), lactate concentrations ($r=0.68$; $p<0.0001$), and RPE ($r=0.57$; $p<0.0001$).
CONCLUSION: Lymphocytes increased linearly with exercise intensity, and were strongly associated with heart rate, lactate, and RPE. These findings are important for considering exercise intensity prescriptions in patients to maximize potential immune related anti-tumor effects during exercise.

Keywords

Exercise Intensity, Immunology, Hematology, Lymphocytes

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

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