

At the Same Relative Intensity, Post-Exercise Increase of Circulating Cytotoxic T Cells is Not Affected by Resistance Exercise Volume, Treadmill Speed or Grade

SETH M. RINEHART AND MELISSA M. MARKOFSKI

Department of Health & Human Performance; University of Houston; Houston, TX

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Advisor: *Markofski, Melissa (mmarkofs@central.uh.edu)*

ABSTRACT

Cancer and viral-infected cells can be killed by cytotoxic (CD3+CD8+) T cells. The circulation of these cells in the body is increased in response to a single session of walking on a treadmill (TM) or resistance exercise (RE). However, it is unknown if certain variables such as TM grade, TM speed, or RE volume may have a significant impact on the exercise-induced increase of circulating cytotoxic T cells. The **PURPOSE** of this study is to compare, at the same relative intensity, the influence of TM grade, TM speed, and RE volume on the exercise-induced increase in cytotoxic T cells in older adults. **METHODS:** Healthy older adults (BMI 24.8±0.7m·kg⁻²; Age 63±1.0yrs; VO₂ 40.1±2.8mL·kg⁻¹·min⁻¹) from a range of physical activity backgrounds walked on a treadmill for 30 minutes at 60-70% of their HR_{max}, based on the HR reserve method. Participants self-selected their TM speed, while grade of TM was adjusted to ensure participants were within their HR range. For the RE single bout, participants completed 3 sets of 8-12 repetitions at 70% of their 1RM on stacked-weight machines, also lasting approximately 30 minutes. Blood samples were collected pre-exercise (pre) and immediately post-exercise (post). These blood samples were immediately analyzed to determine cytotoxic T cell counts (CD3+CD8+) using flow cytometry (Miltenyi MACSQuant Analyzer 10). A linear mixed-effects model was used to assess the relationship between predictor variables (TM grade, TM speed, RE volume) on outcome variable (cytotoxic T cell difference between pre and post exercise), with and without potential covariates. All analyses were done in R (version 4.0.2) and data are reported as mean±SE. **RESULTS:** Circulating cytotoxic T cells increased in response to TM (43.3±11.9 cells/μL; p=0.0014) and RE (65.8±15.1 cells/μL; p=0.0002) bouts prescribed at the same relative intensity (TM: 60-70% HR_{max}; RE: 70% 1RM). When examining exercise-induced T cell increases based on absolute exercise prescription variables, TM grade (R²= 0.0005; p>0.05) or speed (R² = 0.012; p>0.05) did not contribute to increased cell counts. When examining RE, total volume lifted (4119±273kg) was also not important (R² = 0.016; p>0.05). Numerous covariates such as age, BMI, relative body fat, and weight were not significant contributors to the model. **CONCLUSION:** This work supports that at the same relative exercise intensity, TM speed, TM grade, and RE volume do not influence the exercise-induced increase in cytotoxic T cells. Instead, modifying relative exercise intensity may be required to cause different exercise-induced responses. Future studies should examine additional immune cell types and subtypes to confirm if the results reported in this study apply to other immune cells.