Adenovirus (AdV) infection is a common cause of morbidity and mortality in pediatric patients after hematopoietic stem cell transplantation (HSCT). The adoptive transfer of virus-specific T cells (VSTs) expanded from healthy donors is often used to treat AdV infections after HSCT; however, current cell manufacturing processes are costly and time-consuming and failure to restore immunity in some patients may be due to insufficient cell numbers being expanded ex vivo. We have shown that a single bout of exercise increases the manufacture of T cells recognizing herpesviruses, but it is not known if AdV-specific T cells are also exercise responsive.

**PURPOSE:** To determine if a single exercise bout mobilizes AdV-specific T cells to the bloodstream and augments their ex vivo expansion in response to viral peptide stimulation.

**METHODS:** Eight healthy volunteers (32-24 yrs) completed 30 min of steady state cycling 10-15% above the individual blood lactate threshold. Peripheral blood mononuclear cells (PBMCs) were isolated before (PRE) and immediately after (POST) exercise. A fixed number of PBMCs from PRE and POST were pulsed with synthetic peptides specific for AdV (hexon and penton) and expanded in a gas permeable 96- well plate for 8 days in the presence of growth cytokines (IL-4, IL-7 and IL-15). The number of AdV-specific T cells in the PBMCs (Day 0) and the expanded cell lines (Day 8) were enumerated in an MIF-γ ELISPOT assay. Wilcoxon signed-rank tests were used to compare the number and proportion of AdV-specific T cells PRE and POST.

**RESULTS:** Exercise did not significantly increase the number or proportion of hexon- or penton-specific T cells at Day 0 (p>0.05); however, the total numbers of hexon- and penton-specific T cells at Day 8 were significantly higher (p=0.043; p=0.018, respectively) in POST compared to PRE, with 43±9% more hexon and 90±8% more penton-specific cells generated after exercise.

**CONCLUSIONS:** While exercise did not preferentially mobilize AdV-specific T cells into circulation, it markedly augmented the manufacture of these cells. This indicates that exercise boosts the manufacture of AdV-specific T cells without the need for changes in their numbers or proportions. A single bout of exercise appears to be an effective and economical adjuvant to augment the expansion of VSTs from healthy donors for immunotherapy.

**CONCLUSION:** We conclude that long duration (1.5h) exercise enhances NK cell cytotoxicity independently of HLA expression and that high intensity exercise augments NK cell expansion rate without lowering activating receptor expression or cytotoxicity.

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Robust immunity is essential for further human exploration of the solar system beyond Earth’s orbit. Immune dysregulation and latent viral reactivation has been documented in astronauts during and after spaceflight, but the effects of long duration missions on the functional properties of NK-cells are not known.

**PURPOSE:** To determine the impact of a 6-month mission to the International Space Station (ISS) on the phenotype and function of NK-cells.

**METHODS:** Four healthy cyclists performed a 30-minute bout of cycling exercise at +15% of ventilatory threshold velocity (LONG) and a 30-minute bout of running exercise at +15% of ventilatory threshold velocity (SHORT) on separate days. Blood samples obtained before, immediately after, and 1h after exercise were used to expand purified NK cells (PBMCs) were isolated before (PRE) and immediately after (POST) exercise. A fixed number of PBMCs from PRE and POST were pulsed with synthetic peptides specific for AdV (hexon and penton) and expanded in a gas permeable G-EX for 8 days in the presence of growth cytokines (IL-4, IL-7 and IL-15). The number of AdV-specific T cells in the PBMCs (Day 0) and the expanded cell lines (Day 8) were enumerated in an IFN-γ ELISpot assay. Wilcoxon signed-rank tests were used to compare the number and proportion of AdV-specific T cells PRE and POST.

**RESULTS:** Exercise did not significantly increase the number or proportion of hexon- or penton-specific T cells at Day 0 (p>0.05); however, the total numbers of hexon- and penton-specific T cells at Day 8 were significantly higher (p=0.043; p=0.018, respectively) in POST compared to PRE, with 43±9% more hexon and 90±8% more penton-specific cells generated after exercise.

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