SWACSM Abstract

Effects of Time-Restricted Exercise on Training Induced Adaptations in Mice

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ABSTRACT

Recent studies have shown that the time of day that exercise is performed can alter the physiological and molecular response. However, very few studies have investigated the longitudinal effects of time-of-day dependent training. Identification of an optimal exercise timing could lead to subsequent exercise prescriptions to elicit specific adaptations based on desired outcomes in healthy or disease populations.
PURPOSE: The purpose of this study was to determine if voluntary exercise performed at different times of day would alter the physiological response to training. **METHODS**: Male C57BL/6 mice (Jackson Labs) housed on a strict 12:12 light dark cycle performed 4 weeks of voluntary exercise training on a wireless running wheel, in a time-of-day dependent manner. Mice were allocated to three groups (n = 10/group): 1) Sedentary (locked wheel), 2) Early Active Phase exercise (EAP; wheel unlocked during the first half of the dark/active phase), or 3) Late Active Phase exercise (LAP; wheel unlocked during the second half of the dark/active phase). Endurance capacity was tested via graded exercise tests (GXTs) at baseline, 2- and 4-weeks. Body weight was recorded at the same times. **RESULTS**: We found the EAP mice accrued significantly more voluntary exercise compared to LAP mice (7.34 ± 0.55 km/session vs 4.70 ± 0.38 km/session, $p < 0.001$). Interestingly, EAP and LAP mice both improved on the GXT to a similar extent, and both performed significantly better than SED mice (537.2 ± 68.3 m, vs 467.6 ± 27.7 m, vs 262.7 ± 15.3 m, respectively; $p < 0.05$). Throughout the training period, SED and EAP mice gained similar amounts of weight, while LAP mice gained less weight (1.4 ± 0.2 g, vs 0.4 ± 0.4 g, vs 1.3 ± 0.3 g, respectively). **CONCLUSION**: Based on these findings, mice preferentially perform nearly 50% more exercise during the early active phase compared to the late active phase. However, no significant difference exists in the GXT performance between EAP and LAP mice. These findings suggest that LAP exercise may confer similar adaptations with substantially lower volume.