SWACSM Abstract

Effects of Social Jetlag on Exercise-Induced Adaptations in Skeletal Muscle Mitochondrial Content in Mice

AUSTIN R. COOPER, MICHAEL B. DIAL, NIKOLETA VASILEVA, GRECO A. NEBLINA, ELIAS M. MALEK, & GRAHAM R. MCGINNIS

McGinnis Lab; Kinesiology and Nutrition Sciences; University of Nevada, Las Vegas; Las Vegas, NV

Category: Masters

Advisor/Mentor: McGinnis, Graham (graham.mcginnis@unlv.edu)

ABSTRACT

Social jetlag (SJL) occurs when the sleep/wake schedule differs on work days (weekdays) and free days (weekends). Previous studies have shown that individuals with SJL have lower physical fitness and are prone to obesity. While exercise reverses this phenotype (i.e. - via increasing skeletal muscle mitochondrial content), the effects of social jetlag on exercise training adaptations have yet to be shown. **PURPOSE:** To determine how social jetlag impacts skeletal muscle adaptations to exercise training in mice. **METHODS:** Male C57BL/6J mice aged 10-weeks (n=40) were assigned to four groups, with experimental conditions persisting for 6-weeks; control sedentary (C-SED), control with voluntary wheel exercise (C-EX), social jetlag sedentary (SJL-SED), and social jetlag with exercise (SJL-EX). SJL was introduced weekly via 4h shifts in light/dark cycles on weekends. Skeletal muscles (quad, gas, sol) were collected for gravimetric analysis, and assessment of circadian clock gene expression and mitochondrial content. **RESULTS:** Mice with SJL had larger quadriceps (ME-SJL, $p<0.05$), but this effect was lost when normalized to BW. Exercised mice had smaller quadriceps (ME-EX, $p<0.05$), and larger solei (ME-EX, $p<0.05$). No effects of SJL were seen in solei. SJL led to alterations in PER1, PER2, and CRY2 expression (ME-SJL, $p<0.05$ all), while exercise led to reductions in PER2 and CRY2 expression (ME-EX, $p<0.05$), with no interactions reaching significance. Exercise increased OXPHOS complex expression (ME Exercise; C-V, C-III, C-I, all $p<0.05$), which was attenuated by SJL (ME SJL; C-II, C-I, $p<0.05$). We found an interaction in C-IV expression where the exercise-induced increase was blunted in SJL-EX mice ($p<0.05$). **CONCLUSION:** These data suggest that, while exercise has a beneficial impact on mitochondrial content in skeletal muscle, social jetlag prevents some of the exercise-induced improvements, potentially via disruption of the muscle circadian clock.