Acute High Intensity Treadmill Exercise Increases Appetite and NPY/AgRP and TH Neuron Activity in Untrained Female Mice

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Background/Hypothesis

- Exercise is commonly prescribed as a means for weight loss, however, exercise programs have mixed success rates.
- Exercise intensities differentially modulate appetite and appetite-regulating neurons in the hypothalamus.
- This study examines the effects of different acute treadmill exercise intensities on appetite regulation in female mice.

Hypothesis: Higher exercise intensities will yield increased food intake in female mice, due to increases in NPY/AgRP neuron activity in the arcuate nucleus.

Methods

- 11-18 week old untrained, fasted female mice participated in a randomized crossover trial of sedentary, low, moderate, and high intensity acute treadmill exercise with food intakes measured at 1, 2, 3, 6, 12, 24, and 48 hours post-exercise.
- Immunohistochemical detection for cFOS to determine changes in NPY/AgRP, POMC, TH, and SIM1 neuron activity in response to exercise was performed.
- An additional cohort of mice were perfused with PBS and formalin 3 hours post-exercise, and brains were extracted.

Moderate and High Intensity Exercise Increases Food Intake in Fasted Females

- Cumulative post-exercise food intake.
- Food intake by time intervals.
- 48 hour cumulative food intake.

Conclusions

- These results indicate that moderate and high intensity exercise increase 24 hour food intake post-exercise in female mice.
- NPY/AgRP and TH neuron activity is elevated 3 hours post-exercise, explaining the increases in food intake.
- The increases in food intake following moderate and high intensity exercise possibly explains the low success rates of exercise-focused weight loss programs.
- Low intensity exercise may be a useful exercise regimen due to the absence of compensatory increases in appetite.

Future Directions

- Observing trained female mice to determine the effects long-term exercise has on appetite regulation.
- Studying female mice in the fed energy status versus the fasted energy status to determine if varying the energy status has an effect on appetite regulation.
- Determine the role specific workouts may have on appetite regulation, such as high intensity interval training.