



Corticosterone Levels in Sedentary, Wheel, and Treadmill Acclimated Mice following a Bout of Forced Treadmill Running

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Abstract

Introduction: Murine models have been used to study the immune response to exercise under different states of fitness and diets. Our laboratory has previously studied the effect of forced exercise against voluntary exercise and sedentary mice using blood glucose as a measure. However, forced exercise may result in increased corticosterone levels. This may affect glucose levels and subsequent weight change. **Methods:** 5 mice from each of the following groups; forced exercise, wheel running, and sedentary will be placed on a treadmill and forced to run for 30 minutes. Blood will be collected from the mice 2 days prior to exercise, immediately following exercise, and one hour post exercise. **Results and Conclusion:** There was no significant effect on corticosterone or leukocyte levels on mice groups when forced to run on a treadmill.

Background

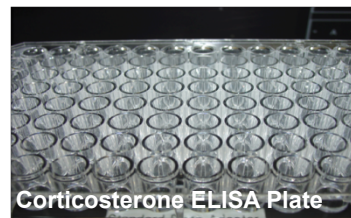
- Corticosterone in mice is the functional equivalent of cortisol in humans.
- A positive stress response has been found in humans after a bout of prolonged exercise. Response was unclear in mice.
- Studies have shown that high plasma cortisol levels in response to a long bout of intense exercise act as a suppressant to lymphocytes in affected tissue. This may raise blood lymphocyte levels.
- Pertinent to our study interests, corticosterone has implications on energy metabolism, immune response, and the circulatory system.

Purpose

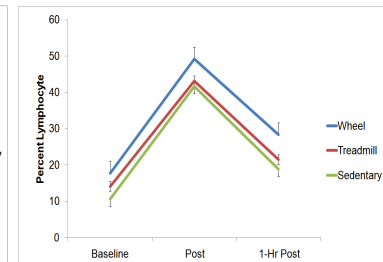
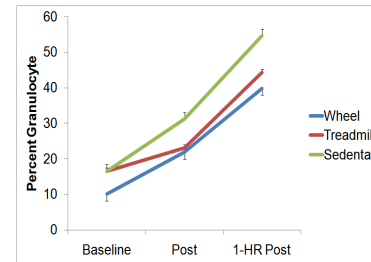
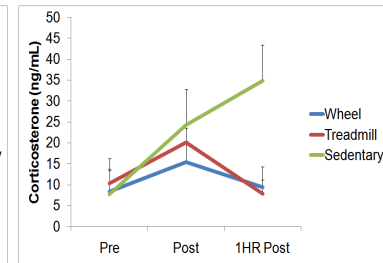
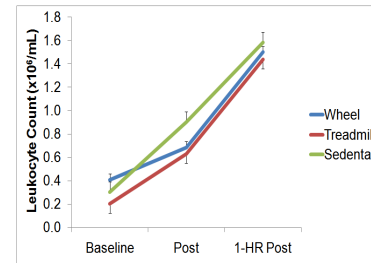
The purpose of this study was to measure the corticosterone levels and leukocyte counts in different acclimation groups of mice when forced to run.

Methodology

- **Animals:** 18-month old, CD-1 mice (Charles River Laboratories; Wilmington, MA).
- **Exercise:** 24-lane mouse treadmill (Jog-a-Dog), 20 m/min. Total exercise time 30-45 min.
- **Blood:** A 35 μ L aliquot of blood was drawn from the saphenous vein and treated with lithium heparin to prevent clotting.
- **Flow Cytometry:** Total leukocyte count was determined using a ViaCount procedure and Granulocytes and Lymphocytes were quantified by forward and side scatter.
- **Corticosterone:** Plasma analyzed using Corticosterone ELISA (AssayMax).
- **Statistical Analysis:** 3 (Group: Sedentary, Wheel, Treadmill) x 3 (Time: Base, Post, 1H) ANOVA with repeated measures on the 2nd factors. Significance was set at $P < 0.05$.



Results



Summary and Future Directions

- Despite their acclimation groups, mice did not show a significant difference in corticosterone response to a forced bout of exercise on the treadmill.
- Further research may be done in measuring corticosterone levels on young mice following a bout of forced treadmill running. Research may also be needed to investigate stress response caused by this method of restraint.

References

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3. Jill A. Kanaley, Judy Y. Weltman, Karen S. Pieper, Arthur Weltman, and Mark L. Hartman. *Cortisol and Growth Hormone Responses to Exercise at Different Times of Day*. *J. Clin. Endocrinol. Metab.*, Jun 2001; 86: 2881 - 2889.

Acknowledgements

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