Effect of Voluntary Exercise on Weight Gain and Associated Neuroimmune Signaling in Ovariectomized Rats

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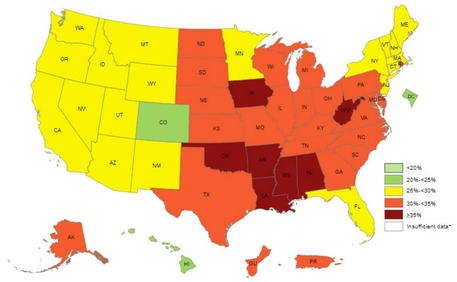
INTRODUCTION

Obesity in the U.S.; adapted from cdc.gov



- Obesity is prevalent in the U.S.
- >35% of adult Oklahomans are obese

Our previous study showed:

- Female rats reliably gain weight after ovariectomy (OVX)
  - Weight gain asymptotes after ~3 weeks
- Neuroimmune signals change during post-OVX weight gain

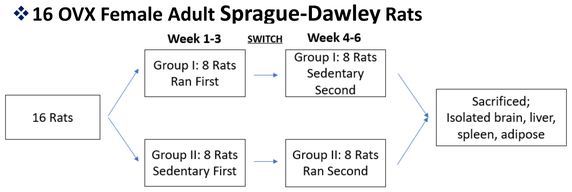
- A sedentary lifestyle contributes to obesity
- Exercise may play a part in decreasing obesity

HYPOTHESES

- The rate of weight gain in OVX rats can be altered by exercise
- Neuroimmune signals associated with obesity in OVX rats can be altered by exercise

METHODS

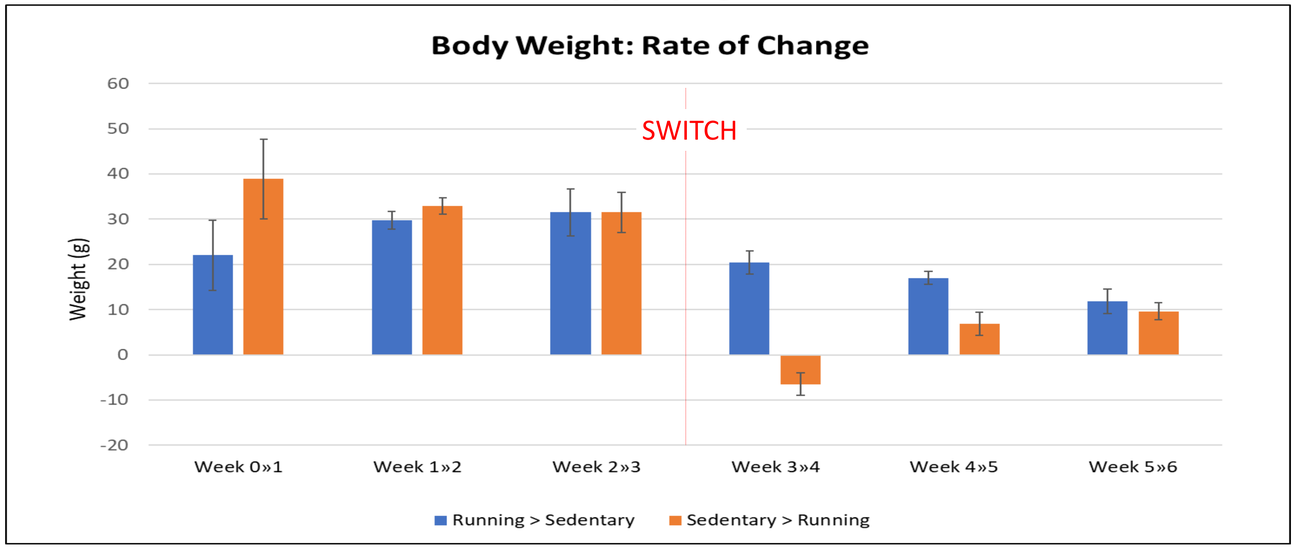
- 16 OVX Female Adult Sprague-Dawley Rats



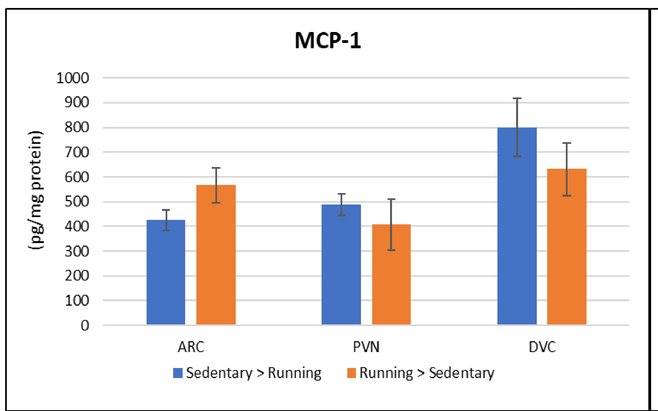
- Weight measured weekly
- Isolated brain tissue from: arcuate nucleus (ARC), paraventricular nucleus (PVN), dorsal vagal complex (DVC)
- ELISAs for IL-6 and MCP-1:
  - n=8 (4 from each group)
- Western blots for GFAP and TLR4:
  - n=8 (4 from each group)
- BCA assays to normalize ELISA levels to total protein in sample

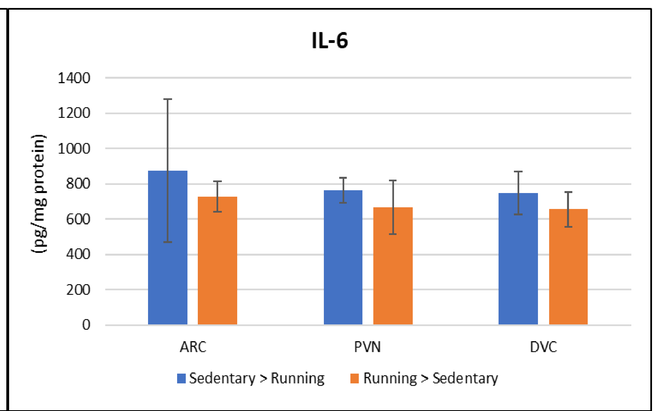
RESULTS

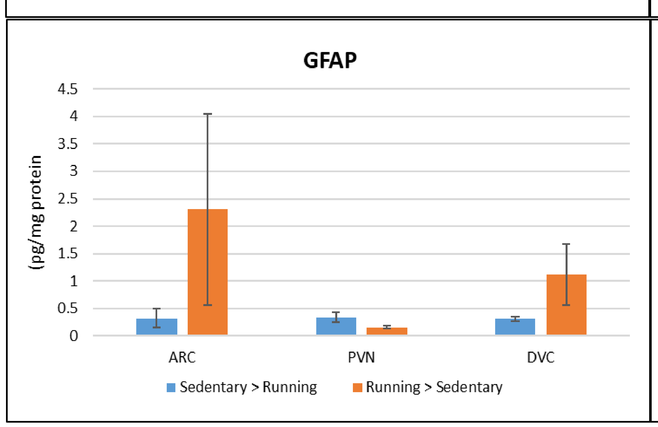
Body Weight

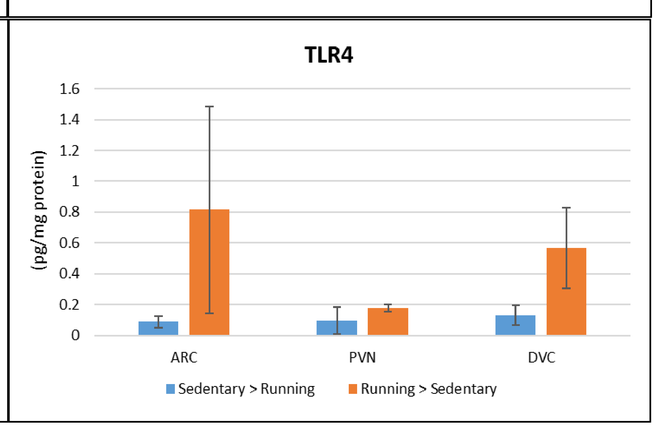


ELISAs/Western Blots









SUMMARY

Body weight

- Rats gained significantly less weight during their first week of running, regardless of whether they ran immediately or 3 weeks after OVX
- S>R group lost weight during the first week after the switch

Neuroimmune signals

- Both TLR4 and GFAP in the DVC were significantly greater in the R>S group
- IL-6 and MCP showed no differences between the two groups

CONCLUSIONS

- Exercise had transient effects to slow post-OVX weight gain but was more effective when it was delayed for 3 weeks
- The effects of exercise were limited to GFAP and TLR4, and were regionally specific
- Exercise and the concomitant slowing of the post-OVX weight gain may reduce innate immune activation in hindbrain areas that respond to stimuli associated with feeding

FUTURE DIRECTIONS

- Investigate circulating levels of IL-6, MCP-1, GFAP, and TLR4
- Examine long term/continuous exercise
- Examine how feeding patterns may affect weight

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