Sex differences in neuroinflammatory response following systemic pathogen exposure during puberty

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Introduction

Puberty is a critical period of neurodevelopment that is highly vulnerable to **immune stressors**. Systemic pathogen exposure during puberty can activate **microglia** and can have long-lasting effects on brain function, behavior, and future response to stressors. **Sex differences** in the immune response also result in differences in the behavioural and biological effects of pubertal immune stress. Nevertheless, some key aspects about the effects of pubertal immune stress remain unknown:

- Long-term changes in microglial response.
- Sex differences in microglial response.

Objectives

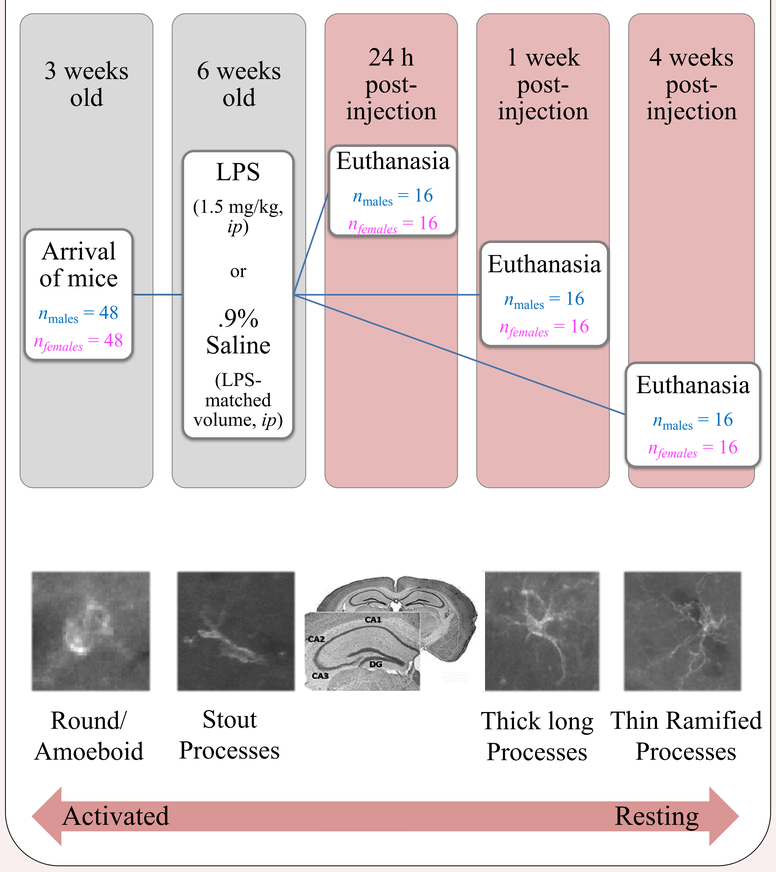
Assess sex differences in microglial responses to systemic pathogen exposure during puberty over time.

Hypotheses

Acute Sickness Responses:
- Sickness Behaviours:
  - LPS > saline
  - LPS ♀ < LPS ♂
- Body Weight Changes:
  - LPS < saline
  - LPS ♀ = LPS ♂

Microglial cell activation:
- LPS > saline
- ♀ > ♂, regardless of treatment
- LPS ♀ > LPS ♂

Methods



Results

Note: * = $p < .05$ ** = $p < .01$ *** = $p < .001$

Figure 1. Sickness scores 48h post-injection

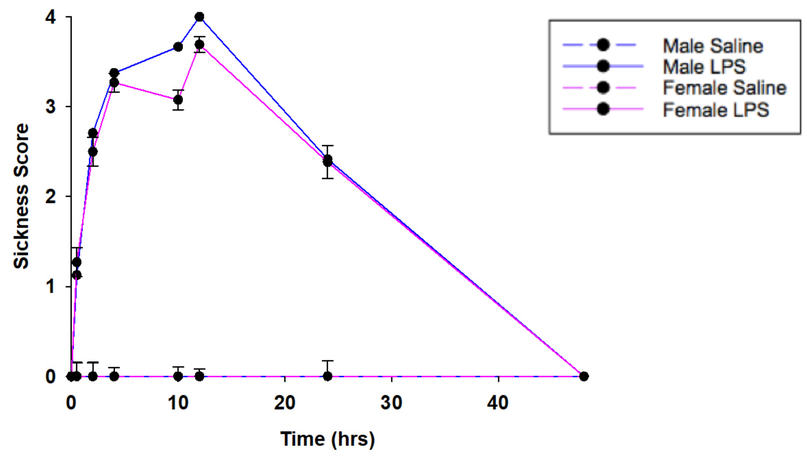


Figure 2. Percentage weight 48h post-injection

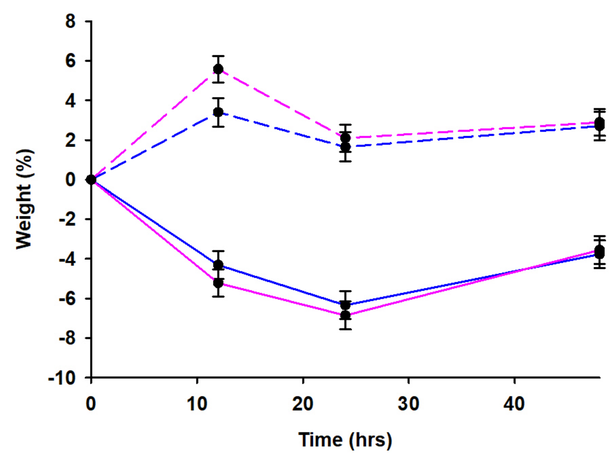


Figure 3. Percentages of microglial cells by activation stage

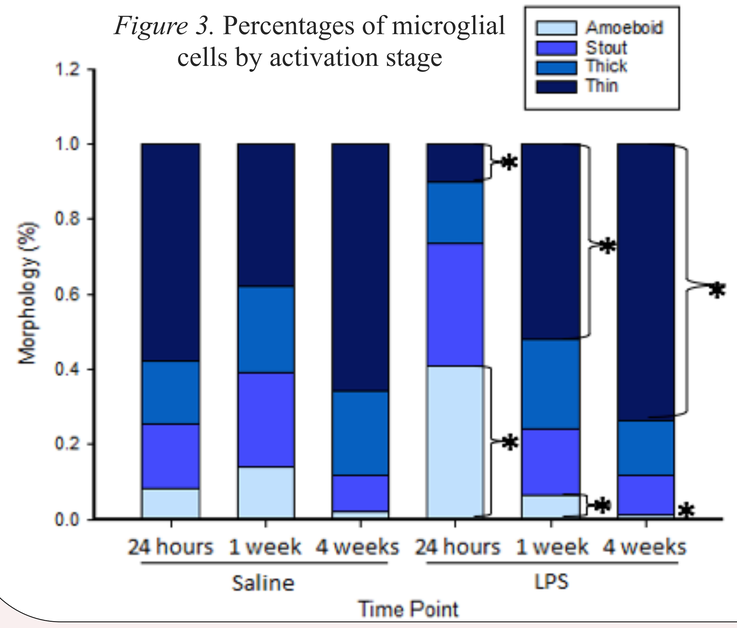
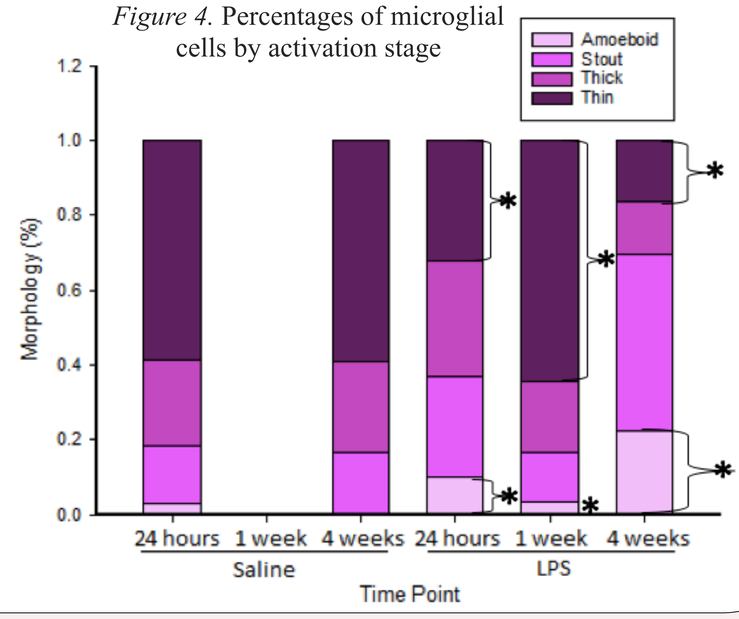


Figure 4. Percentages of microglial cells by activation stage



Conclusion

Sickness Monitoring

- LPS-treated mice displayed significantly more sickness behaviour and weight loss over time than saline controls.
- LPS-treated males showed more sickness behaviour than LPS-treated females.

Microglial Activation

- LPS treatment increased the number of activated microglial cells (amoeboid stage) at 24 hrs only and decreased the number of resting microglial cells (thin ramified stage).
- In females, a similar pattern of results was observed. However, unlike males, microglial cells remained activated 4 weeks after treatment.

Future Directions

- Effect of gonadal hormones on LPS-induced microglial activation overt time.
- Microglial activation of additional brain regions.
- Effects of enduring microglial activation among females on learning and memory.

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