Effects of LPS stimulation on Microglial Activation in the Hippocampus and Hypothalamus of MMTV-PyMT carrier mice.

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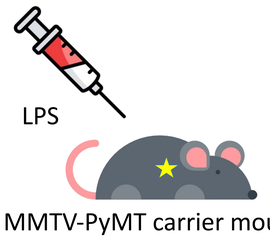
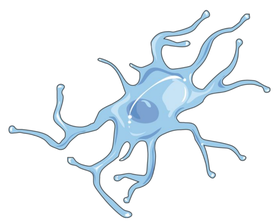
Intro

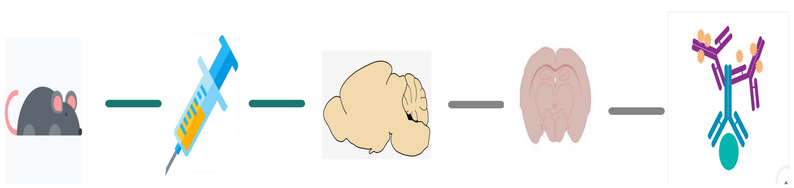
- Microglia are the primary innate immune system cells of the central nervous system (CNS) (Dong et al., 2019).
- Our goal is to research differentialized stress responses in distinct regions of the brain, particularly within mice prone to developing breast cancer.
- We analyzed microglia response profiles in the hippocampus and hypothalamus in MMTV-PyMT carrier mice that have experienced LPS peripheral immune challenge.





Microglia within the hypothalamus will be more vulnerable to LPS stimulation as compared to microglia within the prefrontal cortex because the hypothalamus maintains brain and body homeostasis. Hypothalamic microglia will have a greater increase in activation number and exhibit the M1 activation state (greater soma size and smaller process length).

Methods



Animals
10 MMTV-PyMt mice

Treatment
5receive 0.5mg/kg LPS injection, 5 receive a saline intraperitoneal injection

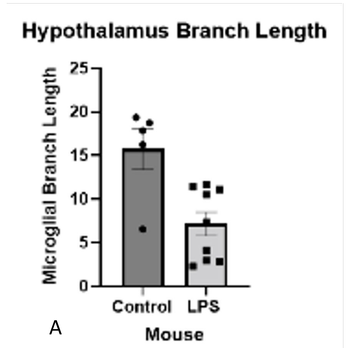
Tissue Collection
Tissue was collected 75-90 min after injection

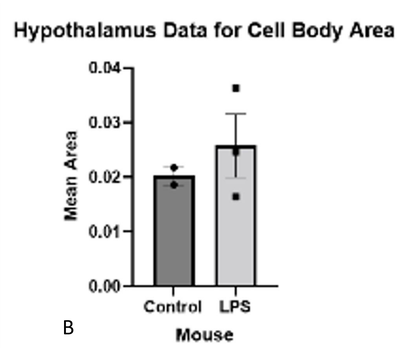
Sectioning
Cryostat was used to produce 40 micron coronal slices

Immunohistochemistry
Tissue was stained with Iba-1 antibody and secondary antibody with fluorescent tag

Results

Microglial response to LPS in the Hypothalamus





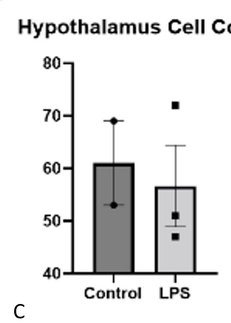
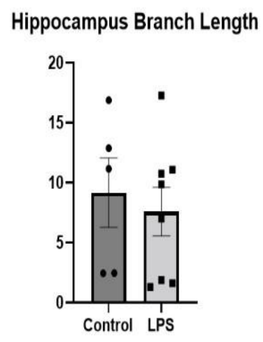
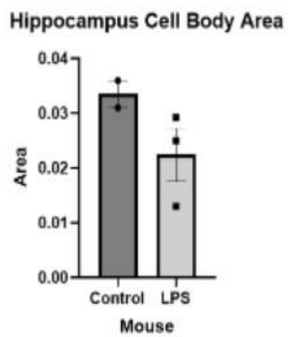


Figure 1. Microglia branch length was significantly larger in the control group rather than the LPS administered group; t(12)= 3.406, p=0.0052 (a). There was an increase in the microglial cell body area after administered LPS (b). Furthermore, there was a decreased microglia cell count in the hypothalamus LPS group (c).

Microglial response to LPS in the Hippocampus





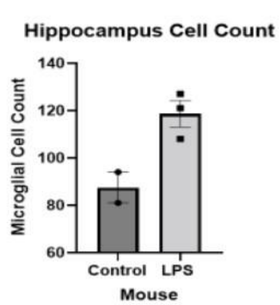


Figure 2. This figure shows the branch length, cell body area, and cell count in the hippocampus for control and LPS-injected mice. The number of cells in the hippocampus for LPS-injected mice is significantly greater than that of control mice (t(3) = 3.578, p = 0.0373).

Conclusions

- LPS mice demonstrated significantly higher microglia cell counts than control mice in the hippocampus
- LPS mice demonstrated significantly shorter branch lengths than control mice in the hypothalamus
- LPS exposure induces activated morphology in microglia, but rarely to a significant extent in the hypothalamus and hippocampus

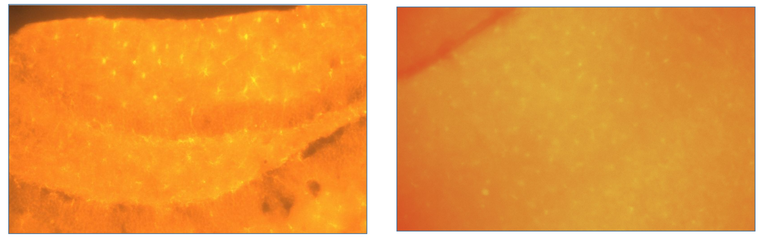


Figure 3. Fluorescent images of hippocampus of mouse 3 (left) and 8 (right) taken at 20x magnification. Mouse 3 was the LPS experimental mouse and demonstrates a greater degree of IBA-1 staining.

Acknowledgments

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