Effect of Peripheral Inflammation on Microglia in the Dentate Gyrus and Primary Motor Cortex of MMTV-PyMT Carrier Mice

Ogugua Nwaezeigwe, Regan Shoemaker, Analise Ney, Lauren Bedard, Matthew Davis

Microglia are highly dynamic, innate immune cells of the central nervous system (CNS), whose phenotypical activation states exist on a spectrum. There is little knowledge about the effect of peripheral inflammatory challenges on the activation states and morphology of microglia in male MMTV-PyMT carrier mice, which are genetically modified to possess an increased risk for breast cancer. Specifically, not much is known about how these microglial responses differ across various brain regions. This study aimed to characterize microglia in our genetically modified mice and analyze differences in microglia profiles across two brain regions of interest, the dentate gyrus of the hippocampus and the motor cortex. A combination of immunohistochemistry and microscopy techniques was used to analyze the microglia cells. Thinly sliced brain tissues were incubated with an antibody specific for Iba-1, a protein unique to the surface of microglia. A secondary antibody with a fluorescent tag was then bound to the primary antibody, which allowed for visualization using fluorescent microscopy and confocal microscopy. The microscope images were analyzed in the following ways: microglia cell counts in the regions of interest, proportional area of Iba-1 staining, and cell body area and microglia process length. The results show significant differences in the cell body area and cell counts in the primary motor cortex when comparing results between LPS treated and control subjects. The cell counts and cell body area for the dentate gyrus were slightly higher for those in the LPS condition, but these findings were not significant, but trending in the right direction as the means were increased in the LPS samples compared to the control samples. These results suggest that the primary motor cortex has increased microglial activation in response to a peripheral immune challenge. Future research might focus on other brain regions and other immune challenges.