

The hippocampus, which includes the dentate gyrus and CA3 subregions, is responsible for many functions, including memory, pattern recognition, and learning processes. Fos proteins are a protein family that resides within the hippocampus and works alongside Jun family proteins to facilitate transcriptional regulation. C-Fos is a member of the Fos family that is used as biomarker for neuronal and behavioral activity that can be detected using immunohistochemistry. The expression of c-Fos can be increased via multiple mechanisms, including neuronal activity and the sex hormone estradiol. C-Fos is expressed throughout the brain in mammals, including the hippocampus in mice. Although previous studies demonstrated estradiol and c-Fos are correlated within ovariectomized rats, whether c-Fos is increased in the hippocampus of female mice during the natural estrus cycle is unknown. Here, we propose to quantify c-Fos expressing cells in male mice, female mice in proestrus with high estradiol levels, and female mice that are not in proestrus and have much lower estradiol levels. We are quantifying c-Fos in the dentate gyrus and CA3 subregions of the hippocampus in females at different estrous cycle stages to investigate whether differences in estradiol or neuronal activity increase c-Fos expression in females. We will also investigate behavioral differences in hippocampal function in males and females at different estrous cycle stages. In doing so, we hope to build a comprehensive understanding of the mechanisms of hippocampal function in males and females at different estrous cycle stages.