Do Hippocampal Place Cells Respond Differently to Visual Cues that Vary in Size and Perspective?

Torres, Isabel

The purpose of this study is to examine the neurophysiology of place cells by studying the place cell firing patterns created when only visual cues are utilized in an environment. Based on published research, the hypothesis was that when restricted to only visual inputs, landmark cues will cause the place fields to rotate meaning that they are being used in orientation and object cues will cause the place fields to remap, meaning that they are being used to understand the context of the environment. In this study, one rat with a microdrive device implanted in the brain was used along with a floor projection maze. Testing was broken up into 3 different sections: Behavioral testing, place cell sorting and analysis of place cell response. During the behavioral testing, the response to the visual cue was tested by placing the rat in the maze for three 10 minutes sessions. Then, cell data was grouped, sorted, and analyzed during the other two sections using PlexUtil, Offline Sorter, and Matlab. The findings supported the hypothesis that when restricted to only visual cues, place fields will rotate with the landmark cues and will remap with the object cues. This project is important because the results suggest that visual cues are an integral part in place cell response for orientation and contextual representation of an environment. Because of this, the researcher believes that neuronal pathways delivering visual information to the hippocampus are good targets for further studies involving disorders such as Alzheimer’s and schizophrenia where spatial memory and navigation deficits are observed.

Awards Won: