INTRODUCTION
Astrocytes are highly heterogeneous neuroglial cells in the brain that are fundamental elements in local synaptic plasticity and critical determinants of cognition.1 While previous research has established that astrocytes play a supportive role in the hippocampus, a brain region critical for spatial working memory (SWM)2, their role in the medial prefrontal cortex (mPFC), another region important for learning and memory, is not as well characterized. Astrocytes communicate through Ca$^{2+}$ waves, thereby making Ca$^{2+}$ signaling an important measure for astrocytic activity.3 Using a miniature microscope in freely behaving rats and a delayed spontaneous alternation task, we aim to achieve broader understanding about the dynamics of astrocytic activity and how it affects SWM in the mPFC. Additionally, previous research has suggested during periods of high activity, like working memory, glucose preferentially enters the brain through astrocytes4 and can enhance working memory.5

METHODOLOGY

Virus Injection and Lens Implantation

Animals were anesthetized using isoflurane and placed in a stereotaxic frame. AAV5 pZac2.1 GfaABC$_2$D-cytoGCaMP6f (Addgene) was injected at one site (AP: +2.8, ML: +/-0.7, DV: -4.0) in the mPFC (0.5µL, rate: 0.25µl/min). The needle remained in place for 1 min after the injection was complete. After vector delivery, a gradient refractive index (GRIN) lens probe (0.5 mm diameter x 6.1 mm length) was implanted (AP: +2.5, ML: +/-0.5, DV: -3.7).

RESULTS

Troubleshooting and Issues

DISCUSSION & FUTURE DIRECTIONS

- Problems in the image acquisition phase prevented us to move on to behavioral testing
- By examining the lens placement and virus expression in the histology photos, we were able to isolate the virus expression to be the main issue
- New virus would be used and tested, and behavioral data can be obtained

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