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The Role of the Lateral Septum in the Modulation of Hippocampal Theta and Learning and Memory Processes

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Poster Presentation 32

**THE ROLE OF THE LATERAL SEPTUM IN THE MODULATION OF
HIPPOCAMPAL THETA AND LEARNING AND MEMORY PROCESSES**

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The theta EEG rhythm, a regular 4-12 Hz oscillation present in the hippocampus, plays an important role in learning and memory. It has been proposed that the hippocampus (HPC), lateral septal area (LS), and the medial septal area (MS) are connected in a tri-synaptic feedback loop, which modulates the theta rhythm. Numerous studies have examined the relationship between the HPC and MS in regards to theta modulation. However, comparatively little is known about the role of the LS in hippocampal theta and in learning and memory processes. Research has shown that fibers descend from the HPC to the LS and from there to the MS. The MS in turn projects back to the HPC. The present experiment utilized a spatial working memory task to assess whether disruption of LS processing would affect HPC theta and/or working memory performance. Saline and two doses of kynurenate (2.5 and 5 g), a glutamatergic antagonist, were injected into the LS of all rats on separate testing days, to determine if reversible lesions of the LS produced deficits in task performance. Infusions of kynurenate into the LS significantly impaired working memory performance and lowered theta power. A significant positive correlation was found between theta power and task performance. Overall, the data showed that inhibition of the LS lowered theta power and caused a deficit in performance on a working memory task, indicating that the LS plays a significant role in the modulation of HPC theta.