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Alcohol Effects on Hippocampal Entorhinal, and Prefrontal Theta EEG Rhythms

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Poster Presentation 27

ALCOHOL EFFECTS ON HIPPOCAMPAL, ENTORHINAL, AND PREFRONTAL THETA EEG RHYTHMS

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Alcohol elicits an impairment of spatial working memory comparable to lesions of the hippocampus, suggesting that alcohol may impair working memory by either directly affecting the hippocampus or by targeting areas that project to the hippocampus. In the hippocampus, a distinct EEG rhythm, found occurring in the 4-12 Hz range, is believed to serve an active role in learning and memory. This 4-12 Hz oscillation is known as theta rhythm. Currently, it is believed that alcohol specifically targets the medial septal area (MSA), the pacemaker of hippocampal theta rhythm, by inducing GABAergic inhibition of the MSA, which causes an overall reduction of theta power in the hippocampus. This reduction of theta power results in mnemonic deficits during the encoding, retrieval, and response phases of a working memory task. However, it is currently unknown if alcohol reduces theta power in the entorhinal cortex, which could impair the encoding of sensory information, and/or theta power in the prefrontal cortex, namely the anterior cingulate, which could impair both the retrieval of information and motor responses in working memory tasks.

This project examines the effects of alcohol on theta power in the hippocampus, entorhinal cortex, and anterior cingulate in rats in a spatial working memory task following systemic injection of various concentrations of alcohol. From these results, it will be determined if alcohol acts solely upon the MSA and hippocampus or if its effects on theta are more widespread.