Apr 15th, 10:00 AM - 11:00 AM

The Effects of Theta Reset in the 4 Hz Range on Enhancing the Encoding of Incoming Information

Alexander Dimov
Illinois Wesleyan University

Joseph Williams, Faculty Advisor
Illinois Wesleyan University

Poster Presentation 11

THE EFFECTS OF THETA RESET IN THE 4 HZ RANGE ON ENHANCING THE ENCODING OF INCOMING INFORMATION

Alexander Dimov and Joseph Williams*
Department of Psychology, Illinois Wesleyan University

The theta rhythm is a characteristic, 4-12 Hz EEG pattern that is found in numerous brain areas, including the hippocampus (HPC), the entorhinal cortex (EC) and the anterior cingulate (AC). The theta rhythm is important for working memory, as disruptions of the theta rhythm have been correlated with impairments in working memory. However, the precise mechanism by which the theta rhythm is involved in mnemonic processing is still unclear. One proposed mechanism is through a resetting of the theta rhythm in which ongoing theta becomes phase-locked to incoming sensory stimuli. Theta reset may allow the HPC to be in a maximum state of depolarization when sensory input arrives from the EC, ultimately enhancing the encoding of incoming information. The current study examined resetting by utilizing a spatial working memory task comprised of two components: a sample (encoding) and a choice (retrieval) phase. Rats were tested in an operant chamber with three levers on the front panel with a light located above each lever. In the sample phase, a light appeared over either the left or right lever. After a delay period, the center light was illuminated indicating the start of the choice phase in which the rat was required to press the lever opposite the sample light. The results obtained on the reset of lower frequency theta (about 4Hz) in the HPC, EC and AC were congruent with previous conclusions about theta reset in the 7Hz range. Resetting to the sample light, choice light and/or motor responses was found in all areas, with the reset being highly predicative of correct task performance.