Rena Orman et al., J Neurol Disord 2016, 4:6(Suppl)
http://dx.doi.org/10.4172/2329-6895.C1.012

Regional origins and spread of very fast oscillations in rat hippocampus

Rena Orman and **Stewart M**
SUNY Downstate Medical Center, USA

Field potential oscillations reflect synchronized rhythmic synaptic potentials and/or firing by populations of neurons. Such oscillations are characteristics of and perhaps a cause of a variety of physiological and pathophysiological states such as cognition, sleep and seizures. While it is known that very fast oscillations (100-500 Hz) can be observed in hippocampus under pathological conditions, a detailed spatio-temporal analysis of such a phenomenon does not exist. Rat ventral hippocampal brain slices were cut and maintained in a recording chamber with 64 simultaneous extracellular recordings. We found that single stimulus pulses in the presence of bicuculline and/or kainic acid in artificial CSF triggered epileptiform events that contained episodes of very fast oscillations lasting 50-150 msec. For both drugs, the oscillations of largest valley-to-peak amplitude were located in the CA3 region. These findings indicate that CA3 is involved in the generation of very fast oscillations in hippocampus, which may contribute to the epileptogenic properties of that area of hippocampus. Furthermore, the difference in duration of the events under disinhibition and excitation suggests an intrinsic oscillatory circuit that is modulated more by inhibition than by limitation of excitation.

Biography

Rena Orman, PhD is a Research Assistant Professor in the Department of Physiology & Pharmacology at the State University of New York Downstate Medical Center in Brooklyn. Her research is focused on neurophysiological and neuroanatomical evidence for regional and long-range circuit properties. Specific attention has been paid to evidence for laterality of circuit activity in subcortical structures such as amygdala and the properties of hippocampal formation circuits for the generation and spread of seizure activity.

rena.orman@downstate.edu

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