The relationship between LFP and spike during the period of IEDs in penicillin epilepsy model

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Abstract: Between seizures, there are synchronous paroxysmal electrical activities on electroencephalogram, termed as interictal epileptiform discharges (IEDs). Interest in the neurophysiological mechanisms underlying IEDs has increased during the last decade. We used the rat model to mimic the acute seizures by application of penicillin. We simultaneously recorded local field potentials (LFPs) and single-unit action potentials during IEDs. We found that a phase-lock relationship between the LFPs and single neuron, all neurons fired near or during the peak of IEDs. These neurons showed a great synchrony during the IEDs, supporting the previous studies in animal models that IEDs reflect synchronous and excessive discharges from a large population of neurons.

Keywords: epilepsy; penicillin; IEDs; Local Field Potential; spike; phase-lock; synchrony