HFOs at the time of seizure onset - evidence from animal models

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Low-voltage, fast (LVF) and hypersynchronous (HYP) onset seizures occurring in animal models of temporal lobe epilepsy appear to rely on distinct cellular mechanisms; specifically, LVF seizures are mainly associated with ripples suggesting the predominant involvement of interneuronal (inhibitory) networks while HYP seizures are mostly accompanied by fast ripples (250-500 Hz) thus highlighting the potential role of principal (glutamatergic) networks. By using optogenetic tools we have tested this hypothesis in the *in vitro* model of epileptiform synchronization induced by 4-aminopyridine. Field recordings from the entorhinal cortex revealed that spontaneous seizure-like events and those induced by optogenetic activation of interneurons displayed LVF onset patterns associated with a higher occurrence of ripples than of fast ripples; in contrast, seizures-like events induced by the optogenetic activation of principal cells had a HYP onset pattern with fast ripple rates that were higher than those of ripples. These findings firmly establish that under similar experimental conditions, LVF and of HYP onset seizures depend on the preponderant involvement of interneuron and principal cell networks, respectively.