

Horizontal Spread of Low Frequency (<1Hz) Activity induced in *in vitro* Slice Preparations of Entorhinal and Perirhinal Cortices

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Abstract

During slow wave sleep the membrane potential spontaneously fluctuates between two states (<1Hz): up state is the active phase, when the plasma membrane is depolarized and action potential can be elicited; down state is the inactive phase, when the plasma membrane is hyperpolarized. Our goal was to define which area triggers the low frequency oscillation and how the activity spreads to connected cortical regions.

We studied this slow oscillation *in vitro*, using slice preparations of limbic cortical regions. Up states that we registered *in vitro* have similar appearance as those registered *in vivo*. Multi- and single unit activity was extracted from our field recordings, to find correlation between field events and single cell firing.

We studied the relationship between the field activity of entorhinal and perirhinal cortices, and we found that spontaneous up states have the same frequency in both areas. Furthermore, in most cases up states registered from the perirhinal cortex followed those generated in the entorhinal cortex with specific latency. In addition, single unit activity was in strict correlation with cell firing.

Our results indicate that these *in vitro* up states coincident with action potential spikes. Concerning the spread of this activity, we suggest that the entorhinal cortex controls the activity of limbic structures, and in horizontal plane the spread of this activity proceeds from the entorhinal cortex to the direction of the perirhinal cortex.