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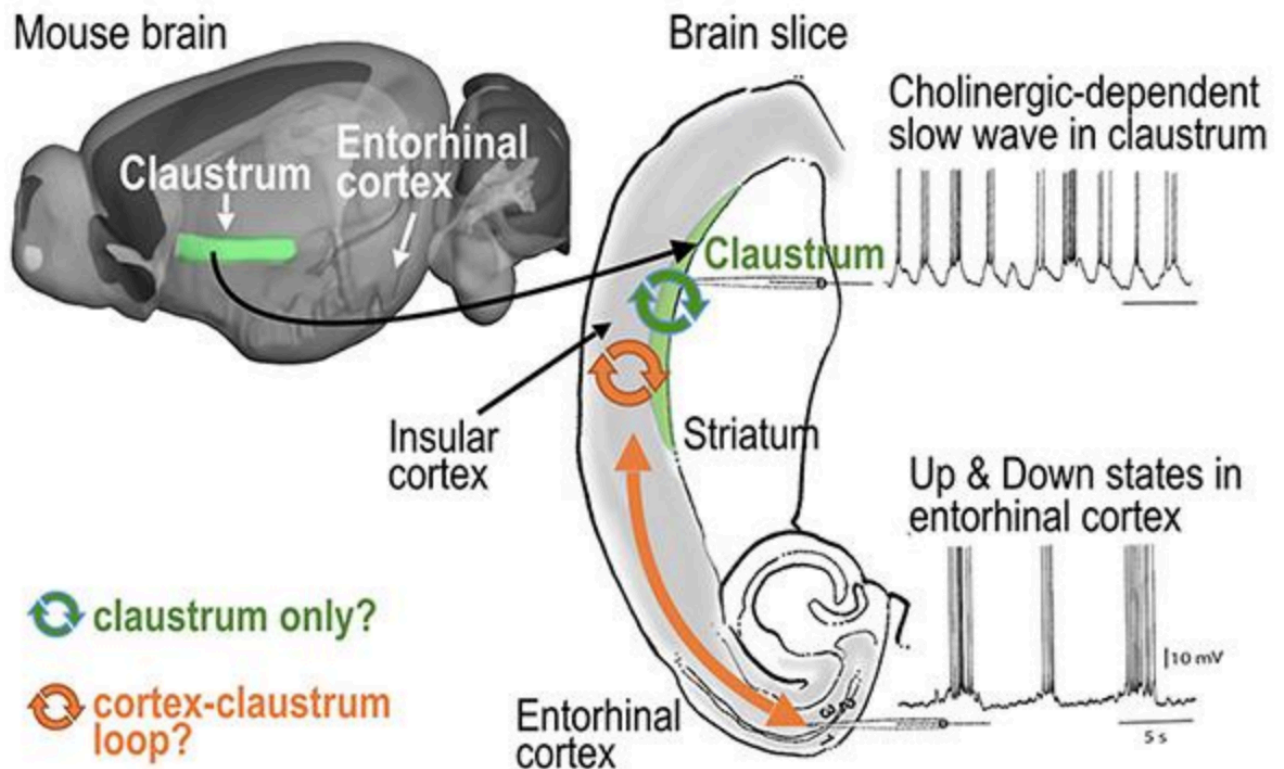
Thème: 4. Integrative neurosciences, sensory physiology

Titre: Cholinergic-dependent slow-wave activity in the claustrum *in vitro*

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Texte: The claustrum (and the endopiriform nucleus) form a complex containing a small proportion of interneurons and a majority of far-projecting excitatory neurons that lay deep below the insular cortex. It is the most reciprocally connected structure in the brain and receives cholinergic and a variety of neuromodulatory inputs from subcortical structures (Goll et al., 2015). Its functional role remains largely unknown. It has been proposed to be a “seat of consciousness” (Crick & Koch, 2005), a hub for attention (Atlan et al., 2018), for multi-sensory binding, or for the synchronization of neocortical slow-wave activity (Narikiyo et al., bioRxiv 2018). Little is known on the claustrum circuit properties or on its cell-types: the membrane and synaptic properties, the sensitivity to neuromodulation, and spontaneous states of activities. We use techniques to preserve recurrent slow oscillations (resembling the *in vivo* up & down states) in cortical circuits in mouse brain slices. In a slice that contains parts of the claustrum and neocortex, we found that the claustrum generates two different types of activities. 1) A spontaneous and moderate spiking discharge in individual neurons generated by background synaptic activity appears randomly, can last seconds to minutes, and returns to quiescent periods reminiscent of the down states of cortical circuits. 2) Application of the cholinergic agonist carbachol induces a robust 0,5-1 Hz rhythmic recurrent network activity in about 50% of the slices. We are exploring the mechanisms of this claustrum slow-wave activity: Does it result solely from the interactions of neurons within the claustrum, and/or is it due to synaptic loops between the claustrum and neocortex, such as the adjacent insular cortex, or the entorhinal cortex that spontaneously generates Up & down states in the same slice?



[Recurrent rhythmic activity in the claustrum *in vitro*]