Centre de Recherche
en Neurosciences de Lyon

Cycle de Conférences

Sleep and Plasticity: New insights from in vivo calcium imaging

Lundi 4 octobre 2021
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Neils NEITHARD est sénior post-doc chez Jan Born à Tuebingen (Allemagne).
Sa thématique de recherche, sur la plasticité synaptique, le sommeil et l'apprentissage devrait intéresser de nombreuses équipes au CRNL d'autant qu'il travaille à la fois chez l'animal et l'être humain

Abstract :
Sleep concurrently contributes to homeostatic down-regulation and mnemonic synaptic up-regulation in cortical networks. We used two-photon imaging of calcium activity to examine how these seemingly opposing functions are established. We found that neuronal excitability on average decreases across sleep, whereas subsets of neurons increase firing rates across sleep. Studies of the excitation/inhibition balance in cortical circuits suggest that both processes are connected to a specific inhibitory regulation of cortical principal neurons, characterized by an enhanced perisomatic inhibition via parvalbumin positive (PV+) cells, together with a release from dendritic inhibition by somatostatin positive (SOM+) cells. Such shift towards increased perisomatic inhibition of principal cells appears to be a general motif which underlies the plastic synaptic changes observed during sleep, regardless of whether towards up or downregulation.

S**es dernières publications:**

- **Niethard N**, S Brodt, J Born. Cell-type specific dynamics of calcium activity in cortical circuits over the course of slow wave sleep and rapid eye movement sleep. **JNeuroscience. 2021**
- Oyanedel CN, Durán E, **Niethard N**, Inostroza M, Born J. Temporal associations between sleep slow oscillations, spindles and ripples. **Eur J Neurosci. 2020**

- Sawangjit A, Oyanedel CN, **Niethard N**, Born J, Inostroza M. Deepened sleep makes hippocampal spatial memory more persistent. **Neurobiol Learn Mem. 2020**
- **Niethard N**, Born J. A Backup of Hippocampal Spatial Code outside the Hippocampus? New Light on Systems Memory Consolidation. **Neuron. 2020**
- Klinzing JG, **Niethard N**, Born J. Mechanisms of systems memory consolidation during sleep. **Nat Neurosci. 2019**
- Puentes-Mestril C, Roach J, **Niethard N**, Zochowski M, Aton SJ. How rhythms of the sleeping brain tune memory and synaptic plasticity. **Sleep. 2019**
- **Niethard N**, Born J. Back to baseline: sleep recalibrates synapses. **Nat Neurosci. 2019**
- Sawangjit A, Oyanedel CN, **Niethard N**, Salazar C, Born J, Inostroza M. The hippocampus is crucial for forming non-hippocampal long-term memory during sleep. **Nature. 2018**
- **Niethard N**, Ngo HV, Ehrlich I, Born J. Cortical circuit activity underlying sleep slow oscillations and spindles. **Proc Natl Acad Sci U S A. 2018**
- Durán E, Oyanedel CN, **Niethard N**, Inostroza M, Born J. Sleep stage dynamics in neocortex and hippocampus. **Sleep. 2018**
- **Niethard N**, Burgalossi A, Born J. Plasticity during Sleep is linked to specific regulation of cortical circuit activity. **Front Neural Circuits. 2017**
- **Niethard N**, Hasegawa M, Itokazu T, Oyanedel CN, Born J, Sato TR. Sleep- stage-specific regulation of cortical excitation and inhibition. **Curr Biol. 2016**