The role of neurogliaform cells in interhemispheric inhibition

Anthony Holtmaat, PhD, Prof.
Département des Neurosciences fondamentales,
CMU, Geneva, Switzerland

Foivos Markopoulos, Ronan Chereau, Federico Brandalise, Vaibhav Chippalkatti, Stéphane Pagès, Alexandre Dayer, Anthony Holtmaat

Interhemispheric inhibition is thought to be essential for proper sensory perception and producing coordinated actions. It has been postulated to operate in part via neurogliaform cells (NGCs) which have been identified as a source of slow, γ-aminobutyric acid type B receptor (GABABR)-mediated, inhibition to pyramidal neurons (PNs) (Palmer et al., 2012; Tamás et al., 2003). In sensory cortices, NGCs may relay a slow inhibitory signal from callosal inputs, thereby mediating the integration of interhemispheric signals for sensory processing. We explore this hypothesis in the primary somatosensory cortex (S1), building on our recent work that rendered cortical NGCs tractable (Niquille et al., 2018). We characterized whisker-related activity as well as the synaptic inputs and outputs of NGCs, using calcium imaging in awake mice and using ex vivo whole-cell recordings combined with optogenetics. Ongoing experiments aim at characterizing the interplay between interhemispheric activity and NGCs during sensory perception.

References
1. Palmer, L. M. et al. The cellular basis of GABAB-mediated interhemispheric inhibition. Science. 2012 Feb 24;335(6071):989-93. doi: 10.1126/science.1217276.
2. Tamás, G., Lörincz, A., Simon, A. & Szabadics, J. Identified sources and targets of slow inhibition in the neocortex. Science. 2003 Mar 21;299(5614):1902-5. doi: 10.1126/science.1082053.
3. Niquille, M. et al. Neurogliaform cortical interneurons derive from cells in the preoptic area. Elife. 2018 Mar 20;7. pii: e32017. doi: 10.7554/eLife.32017.