

ASTROCYTES, A KEY MEDIATOR OR AN INDIRECT EFFECTOR, FOR BRAIN-STATE DEPENDENT NEUROVASCULAR COUPLING

GUEST LECTURE by



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<u>Abstract</u>: We have used simultaneous fMRI and cell-type specific calcium recordings to specify a unique linkage of astrocyte calcium activity with neuronal firing patterns, as well as the whole brain BOLD signal changes. This multi-modal fMRI platform possibly revealed a potential regulatory role of astrocytes to mediate brain state changes.

Key words: GCaMP, Optogenetics, Brain state, Astrocytes

Key publications:

- He et al. (2018) Ultra-slow single vessel BOLD and CBV-based fMRI spatiotemporal dynamics and their correlation with neuronal intracellular calcium signals. Neuron 97:1-15
- Wang et al. (2018) Brain-state dependent astrocytic Ca2+ signals are coupled to both positive and negative BOLD-fMRI signals. Proc Natl Acad Sci U S A, 115(7):E1647-E56
- Yu et al. (2016) Sensory and optogenetically driven single vessel fMRI. Nature Methods, 13, 337-40
- Yu et al. (2014) Deciphering laminar-specific neural inputs with line-scanning fMRI. Nature Methods 11, 55-8
- Yu et al. (2012) Thalamocortical inputs show post-critical-period plasticity. Neuron 74,731-42



Temporal features of sensory and optogenetically driven BOLD and CBV fMRI signals from individual arterioles and venules. Yu *et al.* (2016) Nature Methods, 13, 337-40



Ultra-slow single vessel BOLD and CBVbased fMRI spatiotemporal dynamics and their correlation with neuronal intracellular calcium signals. He *et al.* (2018) Neuron 97:1-15



Intrinsic astrocytic Ca²⁺ spikes negatively correlate with neuronal and BOLD signals. Wang *et al.* (2018) PNAS, 115(7):E1647-E56