On the Computational Roles of Astrocytes

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Presentation Abstract Summary Evidence accumulated over the last few decades suggests that glial cells, in particular astrocytes, sense and orchestrate neuronal activity. Astrocytes encode neuronal activity with changes in their calcium concentrations, which in turn determine the ionic current injected into the neurons. This bidirectional signaling gives rise to many interesting computational phenomena. To study the computational aspects of the neuron-astrocyte interactions, we developed two biologically constrained models of astrocytic-neural networks: one exhibiting slow oscillations in the neural layer as a consequence of the slow, global calcium waves propagating in the astrocyte layer, and another exhibiting sequence memory as a consequence of fast, local neuron-astrocyte interactions. This aligns with our overarching goal to steer and expand our notions of information processing in non-neuronal elements

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