

A NEW MODEL FOR Ca^{2+} WAVES IN ASTROCYTES:
GLUTAMATE INDUCED GLUTAMATE RELEASE

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Bi-directional communication between neurons and astrocytes may be induced by Ca^{+2} waves and mediated by glutamate. We have developed a computational model simulating glutamate-induced calcium oscillations that trigger vesicular glutamate release from astrocytes. All four variables $[\text{Ca}^{+2}]_{\text{cyt}}$, $[\text{Ca}^{+2}]_{\text{ER}}$, $[\text{IP}_3]$, and $[\text{glutamate}]_{\text{ext}}$ in the glutamate-induced glutamate-release (GIGR) model were found to oscillate above a given threshold of neuronal activity. The glutamate feedback loop was found to drive the underlying calcium oscillator into bursting behavior. Interestingly, the bursting pattern increase in complexity and frequency with synaptic stimulation, suggesting that the astrocyte is encoding the synaptic signal.

PREFERENCE: POSTER PRESENTATION