

David Terman
Ohio State University

Title:

Modeling the Neuroprotective Role of Stimulating Glial Mitochondria During Stroke

Abstract:

We present a mathematical model that integrates the dynamics of cell membrane potential, cell volume, mitochondrial and ER calcium handling and P2Y₁ receptor stimulation. Simulations of the model support recent experimental data showing the protective effect of stimulating astrocytic P2Y₁ receptors following ischemia. An important goal of the paper is to mathematically analyze the model in order to better understand mechanisms underlying the experimental results and model behavior. The mathematical analysis leads to explicit formulas that determine how changes in IP₃-mediated Ca²⁺ release and the pyruvate and external oxygen levels effect mitochondrial ATP production. This is joint work with Casey Diekman, Chris Fall and Jim Lechleiter.