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Exploring the Role of Calcium in Cardiac Cell Dynamics[1] CAROLYN BERGER, SALIM IDRISS, NED ROUZE, DAVID HALL, DANIEL GAUTHIER, Duke University — Bifurcations in the electrical response of cardiac tissue can destabilize spatio-temporal waves of electrochemical activity in the heart, leading to tachycardia or even fibrillation. Therefore, it is important to understand the mechanisms that cause instabilities in cardiac tissue.Traditionally, researchers have focused on understanding how the transmembrane voltage is altered in response to an increase in pacing rate, i.e. a shorter time interval between propagating electrochemical waves. However, the dynamics of the transmembrane voltage are coupled to the activity of several ions that traverse the membrane. Therefore, to fully understand the mechanisms that drive these bifurcations, we must include an investigation of the ionic behavior. We will present our recent investigation of the role of intracellular calcium in an experimental testbed of frog ventricle. Calcium and voltage are measured simultaneously, allowing for the previous research regarding voltage to guide our understanding of the calcium dynamics.

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