Research/Academic Interests
Theoretical and computational cardiology. Mathematical modeling of action potential and calcium
cycling. Nonlinear dynamics of cardiac phenomena including alternans, early and delayed
afterdepolarizations, Ca sparks, Ca waves.

Synopsis:
Sudden cardiac death is the leading cause of death in the United States. Our knowledge of sudden
cardiac death is still limited. CAST (Cardiac Arrhythmia Suppression Trial) and SWORD (Survival
With Oral d-Sotalol) clinical trials failed and tested drugs increased mortality. These single target
drugs often cause unpredicted phenomena in the heart, which is the highly complex system. The
complexities come from nonlinearities in the heart. The goal of my research is to understand how
molecular level properties are linked to organ level phenomena using mathematical analysis and
multiscale modeling of the heart.
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phenomena using mathematical analysis and multiscale modeling of the heart.

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