Cardiac electrophysiology modelling for drug safety testing

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Abstract:

The first cardiac electrophysiology model was published in 1960, based on the Nobel-prize winning work of Hodgkin & Huxley. Over the past 50 years, ODE-based models of cellular electrophysiology have been created to describe the effects of different ion currents, and these have been associated with different proteins in the cell membrane.

Recently, safety pharmacologists have identified that pharmaceutical drugs can cause potentially fatal changes to cardiac rhythm, due to binding to particular ion channel proteins and blocking the currents that flow through them. In this talk I'll discuss how mathematical modelling is starting to help pharmaceutical safety testing, and how it could be used to improve upon the human clinical trials that are in use at present. I'll also highlight some of the shortcomings in the model development process, and discuss progress and challenges in parameterisation and selection of the ODE systems that make up cardiac models.