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**Title:**

From Mice to Men: Modeling Electrical Activity in Human Beta-Cells

**Abstract:**

Electrical activity in pancreatic beta-cells plays a pivotal role in glucose-stimulated insulin secretion by coupling metabolism to calcium-triggered exocytosis. Mathematical models based on rodent data have helped in understanding the mechanisms underlying the electrophysiological patterns observed in laboratory animals. However, human beta-cells differ in several aspects, and in particular in their electrophysiological characteristics, from rodent beta-cells. Hence, from a clinical perspective and to obtain insight into the defects in insulin secretion relevant for diabetes mellitus, it is important to study human beta-cells. We use a recently developed mathematical model of electrical activity based entirely on detailed ion channel characteristics of human beta-cells, to investigate various patterns of electrical activity, and interpret atypical and non-intuitive responses to ion channel blockers in human beta-cells. I will also present a mathematical analysis of how rapid bursting occurs in the model using the theory of mixed-mode oscillations, singular Hopf bifurcations and canards.