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# Looking beyond the wavelength: exploring the impacts of electrophysiological variability on rotor-driven re-entries using emulation

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Variability in electrophysiological properties, between different cells in a given heart and between the hearts of different members in a population, has a profound impact on deciding both the susceptibility to dangerous arrhythmias and the success or failure of anti-arrhythmic treatments. This variability also complicates the interpretation of both experimental and clinical data, and the predictions of *in silico* models. A key biomarker in the understanding of arrhythmias is the wavelength of excitation fronts, a measure of how much tissue remains refractory in the wake of an excitation impulse. However, this tissue-level biomarker is found to be unable to predict the susceptibility to wavebreaks that trigger fibrillation. It is therefore important to consider variability in underlying cell-level properties more directly. Using a novel combination of supervised learning and emulation, we are able to greatly reduce the computational costs involved with exploring variability in large numbers of parameters, hence identifying how differences in these properties impact on some key aspects of rotor-driven re-entries, including risk factors for the devolution into fibrillation.

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