



Colleen E. Clancy, Ph.D.

Research/Academic Interests

For his full details on Colleen Clancy's leadership role and activities, please visit her executive leadership bio page.

Research:

Colleen Clancy's research interests include computational approaches to reveal mechanisms of excitability in the heart and brain.

Research Synopsis: The Clancy Lab aims to develop and implement computational approaches to understand mechanisms of excitable disease in the heart and brain. Electrically based syndromes such as arrhythmia and epilepsy are integrative disorders that result in disruption of normal electrical behavior. In arrhythmia cardiac electrical synchrony is abolished, while epileptic seizures result from pathological synchronization in neuronal networks. However, understanding the precise cause of these syndromes has been extremely difficult. This may be due, in part, to inadequate approaches to understand system level electrical disorders that focus on one specific part of the system and fail to reveal the most valuable information — how protein and cell anomalies affect complex interactions to disrupt the tissue and cause the disease state.

To achieve an integrative understanding of such a complex system, our lab uses mathematics and high-performance computing to construct quantitative representations of the heart and hippocampus brain region. The general approach used in the laboratory is to design detailed models of ion channel activity that can be used to study perturbations, such as those caused by effects of drugs, mutations or phosphorylation. Ion channel models are then incorporated into virtual excitable cells and connected to form functional models of tissues, which allows us to follow perturbations across multiple scales, from the modified proteins to altered cellular states to the propagation of the perturbation in cell networks.

We are also attempting to build predictive models of pharmacological intervention during arrhythmia. Prediction of the origin and pathway of pathological triggers, and strategies for intervention may ultimately lead to improved diagnosis and treatment.

Graduate Group Affiliations:

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Lab Page:

[Clancy Lab](#)

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Specialty Pharmacology

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