In this presentation I will start by reviewing the basics of the Hodgkin-Huxley model equations for the neuron, including the two main types of neurons they represent and the inactivation of the sodium channels responsible for the so-called refractory period. Then I will introduce a Hodgkin-Huxley based compartmental axonal model, and discuss the passive membrane potential decay and the signal propagation speed along the axon. Next I will show the effects of axonal action potentials traveling in opposite directions. While there has been some debate about the capability of two action potentials for surviving a collision and crossing each other, our simulations indicate that colliding action potentials do not cross, they annihilate each other. Additionally, I will show results of two experimental settings using real biological neurons that confirm the prediction of our model. Concluding, I will discuss the relevance and potential implications of our findings.

Neuronal Action Potential Propagation Dynamics

Monday, April 18, 2016
4:15 PM – 5:15 PM
129 Hayes-Healy Center
Colloquium Tea  3:45 PM to 4:15 PM  154 Hurley Hall