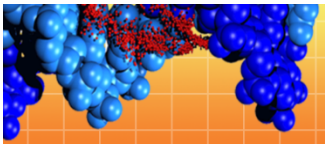

CENTER FOR BIOINFORMATICS & COMPUTATIONAL BIOLOGY

BIOINFORMATICS 2016 SPRING SEMINAR SERIES

Hosted by: Department of Computer and Information Sciences,
Department of Electrical and Computer Engineering &
Center for Bioinformatics and Computational Biology
http://bioinformatics.udel.edu/Seminars/Current

MONDAY, May 16, 2016
3:30pm
DBI Room 102

Excitable and other dynamic behaviors in migrating cells

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ABSTRACT: Chemotaxis, the directed motion of cells in response to chemical gradients, requires the coordinated action of three different and separable processes: motility, gradient sensing and polarization. Much effort has been expended understanding each of these processes, and numerous mathematical models have been proposed that explain each one. In this talk I will present a comprehensive model that explains all three aspects of chemotaxis. The central element is the presence of a biased excitable system. This model takes into account reports that the actin cytoskeleton and other signaling elements in motile cells have many of the hallmarks of an excitable medium, including the presence of propagating waves. This excitable behavior can account for the spontaneous migration of cells. We suggest that the chemoattractant-mediated signaling can bias excitability, thus providing a means by which cell motility can be directed. We also provide a mechanism for cell polarity that can be incorporated into the existing framework. Finally, we show that the model predicts a number of other possible dynamic behaviors, and demonstrate how these behaviors can be induced in live cells.