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The William G. Lowrie Department of Chemical and Biomolecular Engineering Graduate Program

Cordially invites you to attend a seminar on

Membrane Proximal Signaling in Lymphocytes: An interplay between co-operative processes and stochastic fluctuations

Thursday, October 15th, 11:30 a.m.

Room 207 Koffolt Labs, 140 W. 19th Avenue
Reception before the Seminar in Room 336 Koffolt Labs, at 11:00 a.m.

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Abstract

Lymphocytes are the main orchestrators of our immune system. T cells and Natural Killer (NK) cells are the two important lymphocytes of our adaptive and innate immune system respectively. T and NK cells can be activated by a minute number of molecular signatures of the pathogen, and this, in turn, can ultimately lead to the clearance of an infection. In spite of enormous advances in experimental technology and the availability of data at an unprecedented level of accuracy, the principles that govern the emergence of an immune response have proven elusive. This is principally because the pertinent processes involve highly co-operative dynamic events that are further modulated by stochastic fluctuations. A synergistic combination of theoretical, computational and experimental approaches can glean mechanistic insights into such complex phenomena. In this talk, I will describe how such synergies can work by focusing on two issues pertinent to lymphocyte signaling and activation. The first concerns membrane proximal signaling events on the T cell surface involving Ras activation. In this context, I will describe how positive feedback loops result in thresholding, robust and sensitive T cell activation in peripheral organs, and how this relates to thymic selection (a key process that shapes our self tolerant T cell repertoire). The second issue deals with how NK cell activation or tolerance is modulated by the half-life of the receptor ligand interaction strength and ligand concentrations in a non-monotonic manner.