



Hamilton Institute

An evolutionary theory to bind together our
molecular, cellular and systems based
understanding of the immune response

Professor Phil Hodgkin

The Walter and Eliza Hall Institute of
Medical Research,
Victoria, Australia

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Abstract:

The immune response is known among biologists for being particularly complex. This perception is exacerbated by the empirical inventiveness with which immunologists manipulate the many different molecules, cell types, cell interactions and disparate tissue sites that underlie the response. It is fair to say that compelling empiricism has run far ahead of quantitative theory creating a gulf it is hard to know how to fill. In this lecture I will outline our attempts to build a 'cellular calculus' to describe signal integration for lymphocytes that aims to bridge the three levels - molecular, cellular and population responses. This framework can be used to predict and calculate the impact of molecular changes or drugs used in combination on the immune response. In this way the system biology goal of formulating working, computational models that operate at multiple levels of scale to make predictions can be satisfied. As a bonus, results from using this framework suggest that a simple core of behaviour patterns underlie the adaptive immune response, and that the renowned complexity arises from interleaved stochastic events that essentially make every cell different, but leave the population entirely predictable.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 2.00pm - 3.00pm

Travel directions are available at www.hamilton.ie