Hamilton Institute

Learning Cell Cycle Variability at the Level of each phase

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Thursday, September 27th, 2012

Abstract:
Inter-cellular variability in the duration of the cell cycle is a well documented phenomena which has been integrated into mathematical models of cell proliferation since the 70's. Here I present a minimalist stochastic cell cycle model that allows for inter-cellular variability at the level of each single phase, i.e. G1, S and G2M. Fitting this model to flow cytometry data from 5-bromo-2'-deoxyuridine (BrdU) pulse labeling experiments of two different cell lines shows that the mean field predictions mimic closely the measured average kinetics. However as indicated by bayesian inference, scenarios with deterministic or purely stochastic waiting times especially in the G1 phase seem to explain the data equally well. To resolve this uncertainty a novel experimental protocol is proposed able to provide sufficient information about cell kinetics to fully determine both the inter-cellular average and variance of the duration of each of the phases. Finally I present a case in which this model is extended in order to estimate cell cycle parameters in germinal centers. The latter play a central role in the generation of highly effective antibodies that protect our body against invading pathogens.

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

Time: 2.00pm - 3.00pm

Travel directions are available at www.hamilton.ie

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