_.png _.bb _.png height

Contribution ID: **138** Type: **Oral Presentation**

Dynamical conditions for the containment of HIV infection by CD8+ T Cells – a variable structure control approach

Wednesday, 11 July 2018 11:30 (30 minutes)

In the study of the Human Immunodeficiency Virus (HIV) infection dynamics, the reproductive ratio is a well known tool which provides a steady-state condition to determine the outcome of the infection. This paper assesses the control of HIV by the immune response. Dynamical conditions for the containment of HIV infection by the HIV-specific CD8+ T cell response are evaluated using a model of HIV dynamics in vivo in which HIV-infected cells are killed before they start producing new virion. The reachability paradigm from Variable Structure Control (VSC) theory is used to formulate a dynamical condition for immunity. Simulation results show that this reachability condition effectively monitors the immunological requirements to contain HIV. This work also suggests that the cytolytic killing mechanism of CD8+ T cells operates as a boundary layer control to contain HIV infection. Together, the findings indicate that in contrast to the reproductive ratio, the proposed VSC approach delivers a framework to assess the effects of nonlinear dynamics and uncertainty as well as providing a means to investigate immunotherapy strategies.

Primary authors: Dr ANELONE, Anet Jorim Norbert (Theoretical biology, Utrecht University); SPURGEON, Sarah (University College London)

Presenter: Dr ANELONE, Anet Jorim Norbert (Theoretical biology, Utrecht University)

Session Classification: Modelling immune interactions with disease

Track Classification: Minisymposium: Modelling immune interactions with disease