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Co-existence of Multiple Stable Periodic Solutions in in-host Viral Models with Delayed Immune Response

Stable periodic oscillations have been shown to exist in mathematical models for the CTL response to HTLV-I infection *in vivo*. These periodic oscillations can be the result of mitosis of infected target CD4⁺ cells, of a general form of response function, or of time delays in the CTL response. In this study, we show that time delays in the CTL response process to HTLV-I infection can lead to the coexistence of multiple stable periodic solutions, which differ in amplitude and period, with their own basins of attraction. Our results imply that the dynamic interactions between the CTL immune response and HTLV-I infection are very complex. Different routes or initial dosages of the viral infection may lead to quantitatively and qualitatively different outcomes.

This is joint work with Hongying Shu of Harbin Institute of Technology.