# Global Analysis of HIV Virus Models with Cell-to-Cell

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**Abstract :** Recent experimental studies have shown that HIV can be transmitted directly from cell to cell when structures called virological synapses form during interactions between T cells. In this article, we describe a new within-host model of HIV infection that incorporates two mechanisms: infection by free virions and the direct cell-to-cell transmission. We conduct the local and global stability analysis of the model. We show that if the basic reproduction number $R_0$ 1, the virus is cleared and the disease dies out; if $R_0 > 1$, the virus persists in the host. We also prove that the unique positive equilibrium attracts all positive solutions under additional assumptions on the parameters.
**Keywords :** HIV virus model, cell-to-cell transmission, global stability, Lyapunov function, second compound matrices
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