

Modeling HIV-1 Infection in the Brain

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Human Immunodeficiency Virus (HIV) infection in the brain causing several neurological disorders is one of the least understood mechanisms of HIV biology. In this study, we develop a novel mathematical model that can describe virus dynamics seen in the experimental data from the brain of macaques infected with Simian Immunodeficiency Virus (animal model of HIV). Using our model, we identify key parameters related to the brain infection, including virus-transfer across blood-brain barrier, and compare the viral infection dynamics in the brain with that in the plasma. Our model provides useful insight into viral dynamics within the brain and predicts that the brain can be an important reservoir causing longterm viral persistence. We further extend our model to evaluate effects of antiretroviral drugs, which may struggle to penetrate the blood-brain barrier.

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