1154-92-1973 **Colin T Barker*** and **Naveen K Vaidya**. *Modeling HIV-1 Infection in the Brain.*

While highly active antiretroviral therapy (HAART) is successful in controlling replication of Human Immunodeficiency Virus (HIV-1) in many patients, currently there is no cure for HIV-1 due to the presence of reservoirs of the virus. One of the least studied viral reservoir is the brain, which the virus enters by crossing the blood-brain barrier (BBB). The presence of HIV-1 in the brain often leads to HIV associated neurocognitive disorders (HAND), such as encephalitis and early-onset dementia. In this study we develop a novel mathematical model that describes HIV-1 infection in the brain and in the plasma coupled via the blood-brain barrier. The model predictions are consistent with data from macaques infected with a mixture of simian immunodeficiency virus (SIV) and simian-human immunodeficiency virus (SHIV). Using our model we estimate the rate of transport of the virus across the blood-brain barrier as well as viral replication inside the brain, and compute the basic reproduction number. Our model provides useful insight into viral dynamics within the brain and predicts that the brain can be an important reservoir causing long-term viral persistence. (Received September 16, 2019)