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Title: Variability in HIV Infection In-host: A Monte Carlo Markov Chain Model.

HIV/AIDS is a serious threat to public health around the globe. It is estimated to have killed more that 25 million people since it was first recognized. HIV damages the immune system by targeting CD4 T-cells, the main driver of immune response. Through infection it kills these cells which make a patient susceptible to opportunistic infections. CD4 T-cell count and viral load measurements are used to assess patient health, and assess the efficacy of drug therapy. Natural fluctuations in these measurements however, can obscure clinically significant changes. We have developed a Markov Chain Monte Carlo (MCMC) stochastic simulation to measure the expected variability in viral load and T-cell count for a simple model of HIV virus dynamics. The model considers the acute and latent stages of infection and determines variability in the time to peak viral load, the magnitude of this peak, the basic reproductive ratio, the initial growth rate, and the infected equlibrium. The simulation is also used to measure the probability of extinction of an initial viral load.