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Mathematical Modeling of HIV-1 Infection and Drug Therapy

Abstract:

Mathematical models have made significant contributions to our understanding of HIV-1 dynamics. Many important features of the interaction between virus particles and cells have been determined by fitting mathematical models to experimental data. In this chapter, we begin with a brief review of some basic models used to study viral infection and estimate parameters that govern viral production and viral clearance. We then discuss recent developments in the modeling of HIV-1 dynamics and antiretroviral response. We focus on the impact of various classes of antiretroviral drugs that target different stages of the viral replication cycle. We also discuss how drug treatment affects the emergence of drug resistance during treatment, and how a low level of virus and latently infected cells can persist in infected individuals for a prolonged period of time despite an apparently effective antiretroviral therapy.