CONFERENCE PAPERS

157. Stochastic Modelling, Analysis and Simulation of HIV-HBV Co-infection Using SDEs and Euler-Maruyama numerical Scheme

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Abstract

Human Immunodeficiency Virus and Hepatitis B co-infections complicates population dynamics and brings forth a wide range of clinical outcomes which makes it a difficult situation for public health. In particular designing treatment plans for the co-infection. In this study, we develop a stochastic mathematical model derived from deterministic model to examine the dynamic behavior of co-infection between HIV and hepatitis B virus. SDEs are deduced from the stochastic flowchart incorporating random white noise transmission. The Euler-Maruyama numerical scheme is used to obtain the numerical results of the stochastic model. To represent the interaction between these two viruses, the model combines epidemiological insights with current developments in mathematical modelling approaches. Basic statistics of the sample paths showed that the variability of infection outcomes oscillates around the deterministic trajectory. These results provide new insights into the dynamics of co-infection through in-depth research and simulation, which helps to understand the inherent nature of deterministic model by incorporating the stochastic effects. These understanding will further help the policer makers in health sector to take care of the variability and uncertainty in designing treatment and management strategies.

Keywords: *Stochastic Differential Equations (SDEs), HIV-HBV co-infection, Euler-Maruyama numerical scheme, Ito formula, Weiner process*