

Stochastic Hepatitis C model - conditions for disease extinction

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Hepatitis C is an infectious liver disease caused by the Hepatitis C virus and transmitted exclusively by infected person's blood. There are many papers in the literature which consider spread of Hepatitis C. In some of them infected persons are divided in two classes: acute and chronic persons, but we construct our stochastic model on basis of the deterministic one which takes into account the isolation stage of infection, too. Hence, we obtain, five-state stochastic model by using system of stochastic differential equations of Ito type. This model better describes variability and uncertainty which may manifest through the contact between persons in population. Also stochastic model is constructed on such way, that inherits the disease free equilibrium point of deterministic model. In this presentation the conditions for coefficient of stochastic systems that provide stability in probability of disease free equilibrium state are shown. On the other words, it means, that under these conditions Hepatitis C will die out in population. Our theoretical results show that reduction of contact rate and isolation of those with disease symptoms are the best measures for suppression of spread of infection. These theoretical results are also confirmed by numerical simulation.