

Controlled Chemotherapy Strategy Applied to HIV Model

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Abstract : Optimal control can be helpful to test and compare different vaccination strategies of a certain disease. The mathematical model of HIV we consider here is a set of ordinary differential equations (ODEs) describing the interactions of CD4+T cells of the immune system with the human immunodeficiency virus (HIV). As an early treatment setting, we investigate an optimal chemotherapy strategy where control represents the percentage of effect the chemotherapy has on the system. The aim is to obtain a new optimal chemotherapeutic strategy where an isoperimetric constraint on the chemotherapy supply plays a crucial role. We outline the steps in formulating an optimal control problem, derive optimality conditions and demonstrate numerical results of an optimal control for the model. Numerical results illustrate how such a constraint alters the optimal vaccination schedule and its effect on cell-virus interactions.

Keywords : chemotherapy of HIV, optimal control involving ODEs, optimality conditions, Pontryagin's maximum principle

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