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## Mathematical modelling of oncolytic virotherapy as a cancer treatment

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Title: Mathematical modelling of oncolytic virotherapy as a cancer treatment

Abstract: Virotherapy is a cancer treatment where oncolytic viruses are injected into the cancerous tumor cells. The oncolytic viruses are genetically modified to infect and kill cancer cells without destroying healthy cells. As the infected cancer cells are destroyed by oncolysis, new virions are released to kill the remaining tumor cells. In this project, we present a mathematical model of this cancer treatment by using a system of five nonlinear differential equations, where we investigate the interactions between uninfected cancer cells, infected cancer cells, oncolytic viruses, immune cells, and dead cancer cells. We establish positivity and boundedness of the system, compute the equilibria, and derive conditions for their stability. We use analytical methods to derive expressions that compute the radii of cancerous tumor cells and use these analytical computations to provide the basis for numerical simulations that establish effectivity of virotherapy as a treatment. Finally, we perform local sensitivity analysis by deriving differential equations that determine the behavior of the rate of change of a variable with respect to perturbations in a parameter.

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