Oncolytic virus dynamics model with time delay

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In this talk, we introduce delay differential equation model including time between enter the tumor cell through the plasma membrane and get out of tumor cell. We firstly consider condition of the existence of therapy failure equilibrium and partial success equilibrium. Sufficient criteria for local asymptotic stability for two equilibrium point and existence of Hopf bifurcation by using delay as a bifurcation parameter are given. We show that the time delay can unstabilize the partial success equilibrium, leading to Hopf bifurcations and stable periodic oscillations. We will focus on the Hopf bifurcation point that is calculated depending on viral cytotoxicity and infection rate. Secondly, the optimal control problem is suggested to investigate the impact of delay for oncolytic immunotherapy, by reformulating the model with two control: cancer-viral therapy and immunotherapy. Numerical simulations are presented to support the analytical results.

REFERENCES

