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Optimal Control Treatment Analysis for the Predator-Prey Chemotherapy Model.

In this talk, we investigate a non-autonomous model of chemotherapy cancer treatment with time-dependent infusion concentration of the chemotherapy agent. A predator prey type model is adopted to describe the interactions between the chemotherapy agent and cells, in which the chemotherapy agent is modeled as the prey being consumed by both cancer and normal cells, thereby affecting the population of both. We derive an optimal control for this model and provide necessary conditions for continuous application of chemotherapy treatment. Finally, we provide selected numerical results and find out that with the same amount of chemotherapy drug infused at the beginning of the treatment, normal cell population continually increase over time, while the tumor cell population is quickly driven to zero. An interesting aspect of this work indicates that for large volume of tumor, our numerical result shows that continuous treatment needs to be carried out in order to combat the tumor. (Received September 16, 2019)