

## عنوان مقاله:

Optimal finite duration cancer treatment by using mixed vaccine therapy and chemotherapy

## محل انتشار:

بیست و دومین کنفرانس سالانه بین‌المللی مهندسی مکانیک (سال: 1393)

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## نویسندگان:

Ali Ghaffari - Professor of Mechanical Engineering, Center of Excellence in Robotics and Control at KNTU

Farhad Arab - MSc Student of Mechanical Engineering, Center of Excellence in Robotics and Control at KNTU

Mostafa Nazari - PhD Candidate of Mechanical Engineering, Center of Excellence in Robotics and Control at KNTU

## خلاصه مقاله:

The aim of this paper is to propose an optimal finite duration treatment method for cancer. For this purpose, we extend and analyze a mathematical model, in the form of a system of ODEs, governing interaction between healthy and cancer cells in the human body with combined vaccine therapy and chemotherapy treatments. We derive the equilibrium points and discuss about their local stability. We show that changing the dynamics of the cancer is essential for having finite duration treatment. So, we use vaccine therapy for changing the parameters of the system and chemotherapy for pushing the system to the domain of attraction of the healthy state of the system which is not considered yet. For optimal chemotherapy administration we use SDRE based optimal control to the nonlinear model. One of the most interesting advantages of the SDRE is that it is possible to consider the specific conditions of patients by defining appropriate weights in the cost function and by limiting the administered drug. Another advantage of this approach is that there are infinite ways to form the state dependent matrices. After finite duration chemotherapy the system goes to its healthy state even after elimination the treatment. Simulation results show that the development of optimal combination vaccine–chemotherapy protocols for removing certain forms of cancer is an appropriate strategy in cancer treatment. Also, the present study states that a proper treatment method should not only reduce the .population of cancer cells but also change the dynamics of the cancer

## کلمات کلیدی:

Mathematical model, SDRE optimal control, Chemotherapy, Vaccine therapy

## لینک ثابت مقاله در پایگاه سیویلیکا:

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