

Chemoimmunotherapy treatment strategies on a mathematical model of cancer evolution

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Abstract: In this work, we study the global dynamics of a mathematical model of six first-order Ordinary Differential Equations formulated by de Pillis et al. in 2009. In this system, both the immune response against cancer and the stimulation and harmful effect of a combined chemoimmunotherapy treatment on tumor evolution and the immune system are considered. By means of the Localization of Compact Invariant Sets and Lyapunov's Direct Methods, it is possible to demonstrate the asymptotic stability of the tumor-free equilibrium point, that is, sufficient conditions are obtained to ensure the elimination of the tumor cell population by means of the combined application of both therapies. Further, several in silico experiments are presented in order to illustrate and discuss our mathematical results obtained.

Keywords: Asymptotic stability, Cancer, Chemoimmunotherapy, In silico, Treatment strategies.