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A MATHEMATICAL APPROACH WITH DELAY KERNEL FOR THE ROLE OF
THE IMMUNE RESPONSE TIME DELAY IN PERIODIC THERAPY OF THE
TUMORS

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We consider the model of interaction between the immune system and tumor cells including a memory function that reflect the influence of the past states, to simulate the time needed by the latter to develop a chemical and cell mediated response to the presence of the tumor. The memory function is called delay kernel. The results are compared with those from other papers, concluding that the memory function introduces new instabilities in the system leading to an uncontrollable growth of the tumor. If the coefficient of the memory function is used as a bifurcation parameter, it is found that Hopf bifurcation occurs for kernel. The direction and stability of the bifurcating periodic solutions are determined. Some numerical simulations for justifying the theoretical analysis are also given. We find the existence of metastable states induced by the treatment, and also of potentially adverse effects of the dosage frequency on the stabilization of the tumor.

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