

A mathematical model for cancer dynamics with treatment and saboteur bacteria

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We consider a mathematical model of cancer dynamics with chemotherapeutic treatment, in the presence of bacteria that are capable of metabolizing the chemotherapeutic drug, hence sabotaging the treatment. We investigate the possibility of complementing the cancer treatment with antibiotic drugs, thus eradicating the bacteria or at least mitigating their negative impact on the prospects of the therapy. Our model is a system of four differential equations, for which we perform a complete analysis, explicitly characterizing the four possible outcomes, depending on whether the cancer cells or the bacteria are eliminated or persist. Global stability results are proven by the iterative application of a comparison principle. We apply our model to an experiment: the growth of colon cancer in mice in the presence of saboteur bacteria.

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