Theoretical and numerical study of Kirschner-Panetta equations in immunotherapy of cancer

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The Kirschner Panetta (KP) model, which illustrates through mathematical modeling the dynamics between tumor cells, immune effector cells and Interleukin-2 is a well accepted one. In this project, we have considered a delayed KP model, where, deriving certain properties of complex values of Lambert W function, we aim to obtain a large class of initial history corresponding to tumor decrease with bounded effector cells level. In this project, we re-look at the delayed KP model in the light of data presented by Rosenberg on patients with metastatic Malenoma or Renal cell cancer and focus on IL-2 therapy alone.

The objectives of the project are:

- Given our background in mathematics, there is an occasional temptation of proving theorems. This project will provide exciting opportunities for doing real mathematics in the context of real biological questions.
- The research question which we will be answering here is whether Interleukin-2 therapy alone can provide ample success for the treatment of tumor/cancer through mathematical modeling.
- The project aims to initiate a combined theoretical and experimental approach to the dynamics of tumorimmune interactions that would yield a deeper understanding of some of the forces determining tumorimmune dynamics in the immunological research and to propose some measures to control tumor progression and to shed some light on immmunotherapy with Interleukin-2 alone.