Mathematical Modeling of the CAR T-cell Therapy

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Chimeric antigen receptor (CAR) T-cell therapy is a novel and very effective immunotherapy that involves infusing the patient with genetically modified CAR T-cells to help fight the tumor. CAR T-cell therapy has been very successful with cancers of the blood, with limited effectiveness agains solid tumors. Our differential equations-based mathematical model aims to replicate the CAR T-cell therapy for a solid tumor that also incorporates the cancer stem cell population. The stem cell hypothesis states that cancerous stem cells are the reason tumors persist and grow, and proposes targeting treatments towards the cancerous stem cells instead of tumor cells. Therefore, in addition to the more traditional CAR T-cell therapy targeting the tumor, we model the cancer stem cell-targeting CAR T-cell therapy and compare the effectiveness of both therapies.