A Mathematical Model to Determine T-cell Behavior with Cancer Chimeric Antigen Receptor (CAR) Therapies

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Chimeric antigen receptor therapy, or CAR T therapy, utilizes the body's immune system to fight cancer by genetically modifying T-cells to recognize cancerous cells. We investigate three different types of CAR T therapy (CAR T therapy alone, CAR T therapy with added CXCR1 chemokine receptors, and CAR T therapy with added CXCR2 chemokine receptors) by modeling the flow of T-cells in the tumor, blood, and spleen of a cancerous body with a set of ordinary differential equations that utilize laws of mass balance. Each type of CAR T therapy has a different effect on antigen recognition, so we focus on the parameter which alters the flow of T-cells between the blood and tumor. Our goal is to fit our model to aggregate and sparse data collected from mice at the Moffitt Cancer Center using iterative least squares inverse problems and to inform future data collection using optimal design.

References

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⋆Mini-Symposium: Paramter Estimation in Population Models