RESULTS

Isolated Population Dynamics

In our preliminary analysis, the dynamics of each population $N(t)$, $L(t)$, and $T(t)$ were modeled separately. The differential equations were solved independently, assuming the other populations remained constant. This approach revealed the behavior of each variable without accounting for their interactions. The individual solutions provided insight into how each population evolved when isolated from the others but does not reflect the actual dynamics in a real-world setting, where interactions are inevitable.

Coupled Population Dynamics

To capture the interactions between populations, the system of equations was solved simultaneously. This integration accounted for the coupling between the populations, where each influenced and was influenced by the others in the system. The resulting curves showed more complex dynamics, as changes in $N(t)$, $L(t)$, and $T(t)$ were interdependent, reflecting a more accurate representation of the system as a whole.

Biological Interpretation of Immunotherapy Effects on Tumor Growth

The model examined how immune cells influenced tumor growth through immune activation. Immunotherapy enhanced immune response, slowing tumor proliferation by reducing tumor cell growth as a result of immune activity. The model captured this dynamic, showing how tumor growth is limited by immune cells, while considering the challenges of immune effectiveness in the presence of tumor cells.