A free boundary model for tumour-immune interactions

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Tumour structure and geometry is highly intricate. It is therefore imperative to extend existing tumour-immune models to account for a more realistic tumour geometry. In this article we pick up on the growing literature of spatio-temporal mathematical models to investigate cancer dormancy.

A free boundary model for tumour-immune interactions is developed. Stability analysis and numerical simulations of the temporal model replicate experimental observations of immune-induced tumour dormancy. Travelling wave solutions are determined using the hyperbolic tangent method and minimum wave speeds of invasion are calculated. Travelling wave analysis depicts that cell invasion dynamics are mainly driven by their motion and growth rates. Turing instability analysis shows a possibility of dynamical stabilization of the tumour-free steady state. Simulation results reveal that the tumour swells to a dormant level.