# Mathematical analysis of a tumour-immune interaction model: A moving boundary problem

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Studies indicate that some people have lived with a non-cancerous tumour for their entire life. This is attributed to the interactions between the host immune system with tumour cells. Nonetheless, the specific biochemical and cellular mechanisms by which immune cells manage to keep tumour cells dormant are still not clearly understood. In this paper we develop and analyse a spatio-temporal mathematical model, in the form of a moving boundary problem, in a bid to explain cancer dormancy. Analysis of the model is carried out for both temporal and spatio-temporal cases. Stability analysis and numerical simulations of the temporal model replicates experimental observations of immune-induced tumour dormancy. Travelling wave solutions of the spatio-temporal model are determined using the hyperbolic tangent method. A stability analysis of the spatio-temporal model showed a possibility of dynamical stabilization of the tumour- free steady state. Simulation results reveal that the tumour radius first increases but after sometime reduces to a dormant level. Our approach may lead to a deeper understanding of cancer dormancy and this may be helpful in the future development of better and effective therapeutic methods.