An age and telomere length structured PDE model of cancer cell populations

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Abstract

In this talk I will briefly introduce two hypothesized mechanisms involved in cancer cell proliferation: the cancer stem cell model and the clonal evolution model. I will focus on the clonal evolution hypothesis, and I am going to introduce and analyse an age and telomere length structured partial differential equation model. The key feature of the model is that it allows telomere restoration of cancer cells, and therefore features a so-called distributed recruitment process (birth). These type of models are notoriously difficult to analyse using the spectral theory of positive operators, because for a general (non-separable) kernel one usually cannot obtain an explicit characteristic equation to characterise the point spectrum of the generator of the semigroup. However, I will present some analytic results for separable kernel functions, and extensive numerical simulations.

References

[1] J. Z. Farkas and G. F. Webb, Mathematical analysis of a clonal evolution model of tumour cell proliferation, *Journal of Evolution Equations*, 17 (2017), 275-308.

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