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Computational study of vascular tumour growth in response to combined therapies

The microvascular network plays crucial role in development of the solid tumours. It constitutes a source of the nutrient for the tumour and enables its continuous growth. However, due to fast metabolism of the tumour cells hypoxic regions may occur. Such regions are then cause of the angiogenesis. This study is intended to analyse computationally interplay between the tumour cells and vascular network, and additionally to find optimal scheduling for the combined chemotherapy and anti-angiogenic therapy [1].

The deterministic model is represented by a system of non-linear partial differential equations and enables to simulate growth of the solid tumour in its vascular phase as well as a process of the angiogenesis. In contrast to other models (*e.g.* [2]) the microvascular network is modelled *explicite*, not as a density of blood vessels. It enables to capture the heterogeneity of the tumour tissue, not only its averaged picture. In order to find optimal parameters for the combined chemotherapy and anti-angiogenic therapy a few heuristic algorithms are employed, including simulated annealing [3] and evolutionary algorithm.

References

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