

MULTISCALE IN-SILICO MODELLING OF CANCER BIOPHYSICS AND THERAPY

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ABSTRACT

Despite the tremendous progress in understanding the genetic and biochemical mechanisms underlying cancer, it remains a major health problem worldwide. To date, most insight in Tumour pathophysiology, drug testing and cancer therapy is accomplished via sophisticated in-vitro and in-vivo systems. However, it is nowadays becoming evident that reliable and successful treatment of the disease – on a personalized setting – necessitates an integrative, multiscale, cancer-biology system approach. To this end, mathematical and computational (in-silico) models have proved a very powerful tool for studying and understanding the complexity arising in cancer development, its microenvironment heterogeneity, the transport of anti-cancer drugs and the effects of radiotherapy.

The purpose of this Minisymposium is to act as a forum for presenting the state-of-the-art mathematical and computational (in-silico) modelling approaches and techniques in the field of tumour growth and cancer therapy. Thus, in this Minisymposium, we aim to foster the exchange of knowledge and ideas in cancer research between engineers, physicists, mathematicians, tissue engineers, biologists and clinicians. We expect to organize for this Minisymposium two sessions at minimum; therefore, we solicit contributions addressing challenges related to cancer research modelling with an emphasis on:

- Multiscale and hybrid modelling methods: from tissue to cell, to protein and molecular levels, and flow-related phenomena;
- In-silico simulations integrated with in-vitro & in-vivo laboratory experiments;
- Coupled imaging and numerical modelling techniques;
- In-silico surgery: pre-operative planning and intraoperative computer-aided surgery;
- Drug delivery, in-silico drug testing, and nanomedicine modelling procedures;
- Mathematical and computer models in personalized cancer chemo-radiotherapy.