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FROM INFLAMMATION TO INNOVATION: MECHANOBIOLOGICAL BIOPHYSICAL COMPUTATIONAL MODELING FOR THE DEVELOPMENT OF NEXT-GENERATION THERAPIES

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ABSTRACT

Inflammation plays a pivotal role in the progression of diseases such as cancer and neurodegenerative disorders[1]. However, its complexity in the progression mechanisms, especially in response to external stimuli as well as mechanical, chemical and physical modulation (like stresses, drugs or ionizing radiations, etc.), poses challenges in new therapeutic design. In this context, mechanobiology combined with *in silico* models is now incorporating the study of these cues and their biological responses, offering new perspectives. By modeling how tissues react to various stimuli throughout disease progression researchers provided evidence to support the development of innovative therapies[2]. In our vision, cellular behavior, inflammatory dynamics, metabolism and cellular damage progression are the key ingredients to realize reliable and predictive computational models. Thus, the simulation of the tissue response to different types of treatments, from conventional (e.g., approved drugs administration) to frontier therapies (investigational drug cocktails, hadrontherapy, etc.) is now allowing for the optimization of therapies and personalized healthcare. This symposium will focus on advances in numerical modeling applied to tissue engineering and nuclear medicine. Renowned scientists will present recent works ranging from inflammation progression to anti-cancer therapies, with a particular emphasis on cutting-edge treatments like immunotherapy, radiotherapy (like flash therapy) and their combination.

REFERENCES

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