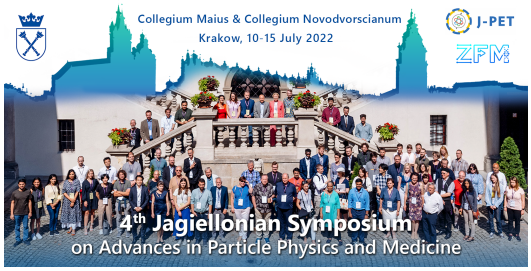

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Characterization of spheroid growth based on a new dynamical model

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Cell cultures are a recognized model that helps understand interaction of cells with certain external factors, such as radiation or drugs [1,2]. In particular, characterizing the growth of a given cell line for a different intensity of a therapeutic agent allows for non-invasive assessment of its effectiveness [1], and in some cases also for optimization of therapeutic conditions for cells of a given type [3,4]. Currently, there are two types of cell culture - 2D, where cells grow in a planar monolayer and 3D, an example of which are spheroids. 3D cultures are characterized by greater similarities to tumours in the conditions occurring in the body. The common features between spheroids and tumours allow for a more complete understanding evaluation of the effectiveness of therapy [3-6].
Currently, the growth of biological systems is mainly described by logistic models, most often with the Gompertz model [7,8]. However, this model does not always describe the experimental data perfectly, and it also fails to characterize the cell line based on parameters such as cell size, nutrient consumption, and separation zones of strongly dividing cells from zones with dead and non-dividing cells. A new, dynamic model of spheroid growth will be presented, allowing to characterize the above-mentioned parameters and additionally better reflecting the spheroid growth curve. Additionally, the simulations performed using dedicated software allowed for a detailed characterization of the WM266-4 skin cancer cell line, as well as for the theoretical visualization of the distribution of various zones inside the spheroid at different growth times.
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