MODELLING OF CARCINOMA GROWTH WITH DIFFERENTIATION OF CELLS AT EPITHELIAL-MESENHYMAL TRANSITION

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As is known, the epithelial-mesenchymal transition (EMT) is the main factor causing cancer tumor. In this process, malignantly changed epithelial cells located on the invasive front lose adhesiveness, and the epithelial basement membrane breaks down, resulting in cells capable of invasive growth and migration of single cells into the neighboring healthy tissue, which causes intensive growth of the tumor [1].

We represent further development of the two-dimensional chemo-mechanical model of the carcinoma growth in the epithelial tissue suggested in [2,3]. The model is represented of elastic polygonal cells. The size and shape of the cells were calibrated in the model based on the experimental data. The model allows for the simulation of evolution of cells interacting via mechanical deformation or the exchange of a chemical signal. The model also takes into account the division and intercalation of cells. The latter is most important, since in modeling it is necessary to take into account collective migration and migration by single cells. To modelling the growth of invasive carcinoma requires the differentiation of cancer cells with respect to the edge of the tumor is required that means that the front cells should be most mobile. Taking all these conditions, we present results of simulations demonstrating different results of the behavior of an invasive cancer tumor. The comparison of the simulation results with the clinical studies presented in paper [1] is presented.

References:

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