

## CELLULAR AUTOMATON CANCER TUMOR MODELING

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The cell automaton method is a mechanism that allows to observe the inner behavior of complex biological and physical systems. The matter of modelling the development and the action on the subcell level of cancer cells in tissues of organisms and other adjacent processes such as vascularization, tissue necrosis, aberration of specialized state of cells, are related to this type. In the frame of a scientific group at the faculty of CMC MSU a software framework was created that lets work on the creation and examination of such model types.

By now within the framework the realization of the following aspects has been performed:

- diffusion modelling,
- modelling of behaviour of various cell types (healthy cells, cancer cells, vasculars) within the cell environment,
- modelling of vascularization processes.

The framework will allow to create different configurations of the initial state of cell environment, to model its development, to visualize the results for analysis. Now the control and study of such important processes as necrosis, for example, are available.

The program was created in view of simplicity of modification of its diverse parts for the further development of the model: algorithms of the diffusion used, cells behaviour, the amount of substances transmitted by cells (oxygen, medicinal products).

The difficulty in this work is regarded in a huge amount of required calculating resources. At the moment the framework is undergoing customisation and testing on supercomputers.

The following step of the work is to attract biologists and doctors able to estimate the scheduled course, to give useful comments from the medicinal and gystological points of view, draw a practical plan of applying the results.

### References.

1. *Zapolski C.*, Diploma work, CMC MSU, Moscow, 2010.
2. *P. Gerlee, A.R.A. Anderson.* Stability Analysis of a Hybrid Cellular Automaton Model of Cell Colony Growth. — University of Dundee, Scotland, 2007.