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www.elsevier.com/locate/yjtbi

PII: S0022-5193(16)30118-7
DOI: http://dx.doi.org/10.1016/j.jtbi.2016.05.027
Reference: YJTBI8677

To appear in: *Journal of Theoretical Biology*

Received date: 22 June 2015
Revised date: 15 May 2016
Accepted date: 19 May 2016

Cite this article as: Andrzej Świerniak, Michał Krześlak, Sebastian Student and Joanna Rzeszowska-Wolny, Development of a population of cancer cells Observation and modelling by a Mixed Spatial Evolutionary Games approach *Journal of Theoretical Biology,* http://dx.doi.org/10.1016/j.jtbi.2016.05.027

Development of a population of cancer cells: observation and modelling by a Mixed Spatial Evolutionary Games approach

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Abstract

Living cells, like whole living organisms during evolution, communicate with their neighbors, interact with the environment, divide, change their phenotypes, and eventually die. The development of specific ways of communication (through signaling molecules and receptors) allows some cellular subpopulations to survive better, to coordinate their physiological status, and during embryonal development to create tissues and organs or in some conditions to become tumors. Populations of cells cultured in vitro interact similarly, also competing for space and nutrients and stimulating each other to better survive or to die. The results of these intercellular interactions of different types seem to be good examples of biological evolutionary games, and have been the subjects of simulations by the methods of evolutionary game theory where individual cells are treated as players. Here we present examples of intercellular contacts in a population of living human cancer HeLa cells