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The role of interventions in the cancer evolution – an evolutionary games approach

We propose to endow evolutionary game models with changes of the phenotypes adjustment during the transient generations performed by the parameters in the payoff matrix which determine the fitness resulting from different interactions between players. These changes represent an alteration of access to external resources which, in turn, may reflect anticancer treatment. In the case of spatial games, these functions are represented by an additional lattice where another and parallel game based on cellular automata is performed. The main assumption of the spatial games is that each cell on the lattice is represented by a player following only one strategy. We propose to consider cells on the spatial lattice as heterogeneous (instead of homogeneous), so that each particular player may contain mixed phenotypes. Spatial games of the type, proposed by us, are called multidimensional spatial evolutionary games (MSEG). It may happen that within the population, all of the players have diverse phenotypes (which probably better describes biological phenomena). The additional lattice representing the evolution of resources increases only the dimension of the lattice in the MSEG. The paper has been accepted for publication in Mathematical Bioscience and Engineering in 2018.