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Hybrid Cellular Continuum Simulations of Heterogeneity in Tumor Growth H.G.E. HENTSCHEL, FEREYDOON FAMILY, Dept of Physics, Emory University, ERWIN VAN MEIR, Winship Cancer Institute, Emory University, HANS GROSSNIKLAUS, Dept of Opthalmology, Emory University — We will discuss simulations of pre-angiogenic tumor growth using a class of hybrid cellular-continuum models. A lattice site can be occupied either by a cell of a specific tumor cell population or consist of extracellular matrix. The local concentrations of oxygen is described by continuum reaction-diffusion equations. Dynamic linked lists of cells are evolved in time and contain information on cell type, position, age, concentration of oxygen at cell site. When cells proliferate via mitosis or differentiate, new cells are added to the list, if mutation occurs the cell types are altered, and if the cell dies via apoptosis the cells are removed from the linked list. The motion of individual cells consist of random walks subject to caging and chemotaxis away from regions of low oxygen concentration. We will describe the heterogenous spatial segregation of different cell types in the tumor, the development of necrotic cores as well as micronecrotic regions, and the effects of externally applied drugs on cell populations and overall tumor shape.

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