NONLINEAR TUMOR GROWTH: TISSUE INHOMOGENEITY.

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Here we focus on a continuum-scale description of solid tumor growth and pose the problem in terms of conservation laws for the nutrient and tumor-cell concentrations. We account for necrosis and we model tissue and vascular inhomogeneities. We study solid tumor (carcinoma) growth in the nonlinear regime using level-set/ghost-fluid methods. While necrosis may lead to the growth smaller tumors, necrosis may also leads to enhanced instability, tumor fragmentation and metastasis. The effects of tissue and vascular inhomogeneity are studied through the construction of morphology diagrams that characterize tumor morphologies as a function of the parameters. It is found that vascular inhomogeneities lead to heterogeneous tumor-cell proliferation and increased tendency of tumors to fragment. Tissue inhomogeneity is found to strongly affect the invasive tumor morphologies.

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Keywords: tumor growth, inhomogeneity, nonlinear simulation.