1064-92-42 **Abbas Shirinifard*** (ashirini@indiana.edu), Simon Hall MSB1, 047, 212 S. Hawthorne Drive, Bloomington, IN 47405, and **James Alexander Glazier** (glazier@indiana.edu), Simon Hall MSB1, 047, 212 S. Hawthorne Drive, Bloomington, IN 47405. *3D Multi-Cell Simulation of Angiogeneis and Its Application in Tumor Growth and Choroidal Neovascularization.*

Angiogenesis is the adaptive formation of new blood vessels in both embryonic and adult tissues. It can both cure and cause diseases depending on the vessels' interaction with their micro-environment. The underlying mechanisms controlling growth and patterning of capillaries are multi-scale and stochastic and thus require appropriate stochastic mathematical description. We introduce a 3D simulation of angiogenesis using the Glazier-Graner-Hogeweg model (GGH), a multi-cell, lattice-based, stochastic model which describes biological cells and their interactions. We use our simulation to investigate the interaction of a growing micro-tumor with neighboring capillary vasculature and the morphological and kinetic differences between vascular and avascular tumors. We also use our 3D angiogenesis simulation to simulate choroidal neovascularization (CNV), the leading cause of adult blindness in industrialized societies. We identify failures in particular types of inter-component adhesion as the causes of specific types of CNV. In both cases, stochastic multi-cell studies of angiogenesis effectively capture the complex interactions between capillaries and their micro-environment and make meaningful, experimentally testable predictions. (Received September 06, 2010)