# A Multi-Scale Cell-Based Model of Tumor-Induced Angiogenesis

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Tumor-induced angiogenesis, which is the formation of new blood vessels from existing vasculature in response to chemical signals from a tumor, is a crucial step in cancer invasion and metastasis. Although the sequential steps involved in tumor-induced angiogenesis are well known, the interplay between the biochemical and biomechanical mechanisms (e.g., cell-cell and cell-matrix interactions, and intracellular signaling pathways) that affect angiogenesis is largely unresolved. In this talk, I will introduce a novel multi-scale cell-based model of tumor-induced angiogenesis and present results from numerical simulations that elucidate some mechanisms controlling vascular formation in the context of pro- and anti-angiogenesis treatment strategies. In particular, I will discuss how the topology of the extracellular matrix influences cell migration and vascular structure, and the relationship between external stimuli, cell phenotype, and vascular morphology. This model ! is the first to simulate branching, anastomosis, and the brush border effect without prescribing any rules for the formation of such complex structures. These results translate and synthesize a large body of compartmentalized research on angiogenesis and are meant to inform and advance efforts to develop new approaches for treating cancer and other angiogenesis-dependent diseases.