

## **Title: Cell-ECM Interactions in Cancer Invasion**

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### **Abstract:**

The extracellular matrix (ECM), a fibrous material that forms a network in tissues, significantly affects many aspects of cellular behavior, including cell movement and proliferation. Transgenic mouse tumor studies indicate that excess collagen, a major component of ECM, enhances tumor formation and invasiveness. Clinically, tumor associated collagen signatures are strong markers for breast cancer survivability. However, the underlying mechanisms are unclear since the properties of ECM are complex, with diverse structural and mechanical properties depending on various biophysical parameters. We have developed a three-dimensional elastic fiber network model, studied the structure of 3D networks, and calibrated the mechanical properties using in vitro collagen data. Using this model, we study ECM remodeling as a result of local deformation and cell migration through the ECM as a network percolation problem. We are in the process of developing a 3D multiscale model of cell migration and interaction with ECM. Preliminary results reproduced quantitative single cell migration experiments. This model is a first step toward a fully biomechanical cell-matrix interaction model, which may shed light on tumor associated collagen signatures in breast cancer development and in cancer invasion in general.