Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Modeling cell – extracellular matrix mechanical interactions during in vitro network formation DAPHNE MANOUSSAKI, Vanderbilt University — During the formation of vascular networks in vitro, endothelial cells exert traction forces onto the extracellular matrix (ECM), changing both the density and the orientation distribution of ECM fibers. ECM strain, in turn, affects cell migration. We study the effect of mechanical cell-ECM interactions on cell migration and cell distribution assuming a continuum description for the cells and the ECM. The theory assumes that the ECM is a viscoelastic material which deforms under cellular traction, and that resulting ECM strain influences cell movement. Numerical simulations predict that under certain mechanical conditions, cell traction can reorganize the cells and associated ECM into a network that compares well with the vascular networks that arise in vitro. I discuss the potential role of cell mechanical forces and ECM mechanical behavior on cell migration, and compare results with in vitro studies.

Daphne Manoussaki
Vanderbilt University

Date submitted: 05 Dec 2005 Electronic form version 1.4