Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The mechanics of cellular compartmentalization as a model for tumor spreading[1] ANATOL FRITSCH, STEVE PAWLIZAK, MAREIKE ZINK, JOSEF A. KAES, University of Leipzig, Division of Soft Matter Physics — Based on a recently developed surgical method of Michael Höckel, which makes use of cellular confinement to compartments in the human body, we study the mechanics of the process of cell segregation. Compartmentalization is a fundamental process of cellular organization and occurs during embryonic development. A simple model system can demonstrate the process of compartmentalization: When two populations of suspended cells are mixed, this mixture will eventually segregate into two phases, whereas mixtures of the same cell type will not. In the 1960s, Malcolm S. Steinberg formulated the so-called differential adhesion hypothesis which explains the segregation in the model system and the process of compartmentalization by differences in surface tension and adhesiveness of the interacting cells. We are interested in to which extend the same physical principles affect tumor growth and spreading between compartments. For our studies, we use healthy and cancerous breast cell lines of different malignancy as well as primary cells from human cervix carcinoma. We apply a set of techniques to study their mechanical properties and interactions. The Optical Stretcher is used for whole cell rheology, while Cell-cell-adhesion forces are directly measured with a modified AFM. In combination with 3D segregation experiments in droplet cultures we try to clarify the role of surface tension in tumor spreading.

[1]Funding from ESF and Graduate School BuildMoNa

Josef A. Kaes
University of Leipzig, Division of Soft Matter Physics

Date submitted: 29 Nov 2011 Electronic form version 1.4