Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Mechanical properties of healthy and tumor tissue ADRIANA DICKMAN, FLÁVIO RESENDE, MARIA EUGÊNIA NUNES, Pontifí cia Universidade Católica de Minas Gerais — Many biological processes depend on cellular organization and the mechanical properties of multicellular aggregates. In general, the cells forming a tissue are in contact with an extracellular matrix, which, along with adhesion between cells, helps them to bind into tissues. Experiments on embryonic tissue [M. S. Steinberg, et al., J. Cell. Physiol., 173, (1997)] reveal viscoelastic behavior. During embryonic development, infections and healing processes, cells move and reorganize themselves intensively. Analogously, tumors are characterized by a continuous spatial reorganization which minimizes intracellular stresses. In this work we study the mechanical properties of cellular aggregates using computer simulations. The cells are represented by semi-rigid bodies with position and shape exhibiting thermal fluctuations. The corresponding Langevin equations are solved numerically. The interaction between cells involves an adhesion force, simulated by a harmonic potential, and a random force. We adjust the parameters that control the random force intensity and the interaction potential, to reproduce real biological tissue behavior. Then we introduce a tumor cell in the center of the tissue and compare the adhesion properties in healthy and tumor tissue.

Adriana Dickman
Pontifí cia Universidade Católica de Minas Gerais

Date submitted: 25 Nov 2006 Electronic form version 1.4