

MAR14-2014-020831

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Are biomechanical changes necessary for tumor progression?

JOSEF A. KAS, Faculty of Physics and Earth Sciences, University of Leipzig, Linnéstrasse 5, 04103 Leipzig, Germany

Already the Roman Celsus recognized rigid tissue as characteristic for solid tumors. Conversely, changes towards a weaker cytoskeleton have been described as a feature of cancer cells since the early days of tumor biology. It remains unclear if a carcinoma's rigid signature stems from more inflexible cells or is caused by the stroma. Despite that the importance of cell biomechanics for tumor progression becomes more and more evident the chicken-and-egg problem to what extent cancer cells already change their mechanical properties within the solid tumor in order to transgress its boundary or mechanical changes are induced by the microenvironment when the cell has left the tumor has been discussed highly controversial. Comprehensive clinical biomechanical measurements only exist from tumor tissue without the possibility to identify individual cells or from individual cancer cells from pleural effusions. Since the biomechanical properties of cells in carcinomas remain unknown measurements on individual cells that directly stem out of primary tumor samples are required, which we have conducted. We found in cervix and mammary carcinomas a distinctive increase of softer cells as well as contractile cells. A soft and contractile cell is like a strong elastic rope. The cell can generate a strong tensile tension to pull its self along and is soft against compression to avoid jamming.