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Effects of Chemotherapy-Induced Alterations in Cell Mechanical Properties on Cancer Metastasis SRUTI PRATHIVADHI , ANDREW EKPENYONG , MICHAEL NICHOLS , CAROLYN TAYLOR , JIANHAO NING, Creighton University — Biological cells can modulate their mechanical properties to suit their functions and in response to changes in their environment. Thus, mechanical phenotyping of cells has been employed for tracking stem cell differentiation, bacterial infection, cell death, etc. Malignant transformation of cells also involves changes in mechanical properties. However, the extent to which mechanical properties of cancer cells contribute to metastasis is not well understood. Yet, more than 90% of all cancer deaths are directly related to metastasis. Transit of cells through the microcirculation is one of the key features of metastasis. We hypothesize that cancer treatment regimens do inadvertently alter cell mechanical properties in ways that might promote cancer metastasis. We use a microfluidic microcirculation mimetic (MMM) platform which mimics the capillary constrictions of the pulmonary and peripheral microcirculation to determine if *in-vivo*-like mechanical stimuli can evoke different responses from cells subjected to various cancer drugs. In particular, we show that cancer cells treated with chemotherapeutic drugs such as daunorubicin, become more deformable at short timescales (0.1 s) and transit faster through the device. Our results are first steps in evaluating the pro- or anti-metastatic effects of chemotherapeutic drugs based on their induced alterations in cell mechanical properties.

Sruti Prathivadhi
Creighton University

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