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Microfluidics modeling of interstitial flow through a tumor BENJAMIN TAY, MARCOS MARCOS[1], Nanyang Technological University, DAVID GONZALEZ-RODRIGUEZ, Universit de Lorraine — 90% of cancer-related mortalities are due to metastasis. Interstitial pressure and flow within tumor microenvironment have been identified to influence biological and biochemical aspects of metastasis. However, little is known on the biophysical effect. This study focuses on the effect of interstitial pressure and flow on the detachment of tumor cells from primary tumor. Interstitial flow through a tumor generates tensile force in the direction of flow which might contribute to detachment of tumor cells from primary tumor. Here, flow is introduced into a microfluidic device to measure pressure difference across MCF-7 aggregates with different adhesions. Aggregates with different adhesions mimic in-vivo heterogenous tumor. Initially, fluid seeps through the porous aggregate. As pressure builds up at the afferent end, pressure-driven flow through the aggregate increases. At critical pressure difference, fracture occurs and hydraulic permeability increases. Cell masses dislodge from aggregate. Fractures occur at different critical pressure for aggregates with different adhesions. This mimic the detachment of tumor cells from primary tumor. These findings will provide better understanding about the biophysical effects of interstitial pressure and flow.

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