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Role of Interstitial Flow in Migration of Breast Cancer through Dual-gel Dual-porosity 3D ECM Mimics ALIMOHAMMAD ANBARI, CHUN-WEI CHI, SIHONG WANG, JING FAN, The City College of New York — Interstitial flow (IF) in the extracellular matrix (ECM) has been postulated to play a key role in regulating behaviors of breast cancer cells. Despite substantial advances made in understanding the effects of IF on cancer cell migration in vitro models, existing artificial environments deserve further improvement in controlling individual components and properties of the realistic tumor microenvironment. For example, the permeability of the ECM, together with IF velocity, governs flow-induced force on residential cells and thus regulate cell migration behaviors; however, the inevitable correlation between permeability and stiffness of traditional single-hydrogel-based 3D cell culture matrices prevents an independent control of these two important properties. To address this challenge, we developed a dual-gel dual-porosity metamaterial integrating with a microfluidic platform for studying the effects of IF on cellular behaviors. This novel in-vitro model allows for independently controlling stiffness, cell-binding sites, permeability, and IF, as well as live imaging of migrating dynamics. We will present our preliminary results showing the effectiveness of our platform by characterizing the migration of breast cancer cells under different flow conditions and ECM properties.

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