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MSL ACADEMIC ENDEAVORS

A 3D Cancer Cell Migration Assay on a 384-Pillar Plate with Sidewalls

Washkewicz College of Engineering

Student Researchers: Nicholas Lesh, Alexander Roth, Stephen Hong, [1]Oju Jeon, and Eben Alsberg[1]

Faculty Advisor: Moo-Yeal Lee

Abstract

Hepatocellular carcinoma (HCC) is an aggressive liver cancer where prognosis is heavily tied to metastasis progression. Researchers look to determine the triggers for metastasis to control its spread. The goal of this project is to determine these triggers by quantifying Hep3B cell migration on a high-throughput platform. We infected Hep3B cells with lentiviruses containing mCherry to produce stable fluorescent cells. Next, we determined the stability of growth factors in oxidized, methacrylated alginate (OMA) hydrogel by binding growth factors with methacrylated heparin sulfate (MHS) before encapsulating in OMA, printing onto the 384-pillar plate with sidewalls, and quantifying growth factor release via ELISA. Finally, we printed layer-by-layer migration assays, in which bottom layers of fluorescent cells would migrate in response to top layers of growth factors and quantified migration and proliferation using previously developed macros. Initially, there was a strong release of growth factor, but the release rate was retarded by binding to MHS, meaning growth factors were stable. Cells proliferated in response to growth factors that encourage proliferation, while migration occurred towards growth factors that upregulate angiogenesis. These results show that we have successfully developed a 3D-cancer cell migration assay which has implications in the characterization of other cancers.

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