

Towards Predictive Drug Screening with 3D Cell Culture

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With the goal of screening cells in an environment that mimics that of native tissue, we designed a hydrogel for 3D cell culture. With 3D cell culture, we gain understanding into both cell invasion and cell viability, thereby providing insight that is inherently unavailable with traditional 2D cell culture. To achieve a suitable environment, we synthesize hyaluronan-based hydrogels because hyaluronan is often over-expressed in invasive tumours including those in the breast and lung. To facilitate cell invasion and remodelling of the matrix, the hydrogels are crosslinked with peptides that can be degraded by matrix metalloproteinases (MMPs) secreted by the cells. To enhance cell adhesion, the hydrogels are modified with proteins and/or peptides; to facilitate cell invasion, the hydrogels are modified with growth factor concentration gradients. Using these well-defined hyaluronan-based hydrogels, we investigate both breast cancer and lung cancer cell invasion and their response to different therapeutic treatments. With the goal of more predictive drug screening, we test a library of drug candidates in a moderately high throughput assay in a 384-well plate.

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