An automated high-content assay for tumor cell migration through 3-dimensional matrices

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Overview

High-content tumor cell migration assays in 3-dimensional extracellular matrix are a powerful tool for modeling and understanding the biology of this critical step in the process of metastasis. Currently available methods are not amenable to increased throughput required by studies of comparative pharmacology or small scale screening. We present here an automated approach to high-content tumor cell migration assays. A standard screening-sized plate with an array of embedded microchannels was designed and constructed from common thermoplastics. After filling the channels with 3D matrix, cells were placed at one end of the channel and migration into the channel was monitored via an imaging system. All liquid handling steps were performed by standard liquid handling robotics. Tumor cell migration in the channel was truly 3-dimensional. The information-rich data from these assays was used to rank the potency of migration inhibitors through 3D collagen, as well as gain additional insights into the compounds’ activities related to cell proliferation and health. This approach is compatible with a variety of multiparametric, morphological and/or kinetic readouts.

Alternative and auxiliary modes of analysis

Migration is collagen dependent and 3-dimensional

An array of microchannels used to monitor tumor cell migration through 3D extracellular matrix

Invasion can be monitored kinetically

Effect of inhibitors on migration

Profiling inhibitors

Migration through laminin-rich matrix results in altered morphology

Conclusions

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References

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