Cell Migration in Microfluidic Devices

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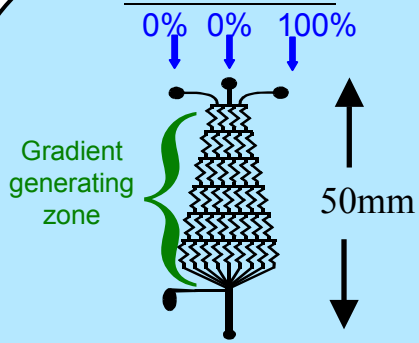
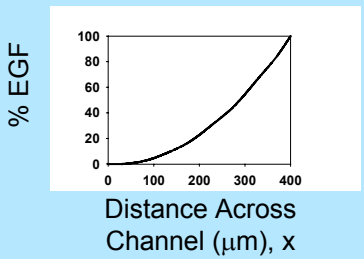
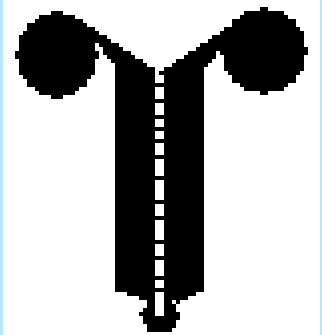
3 Inlet Device



Gradient



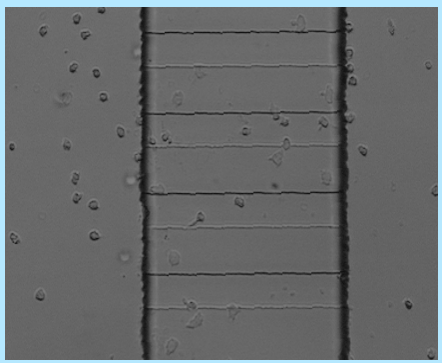
H-channel Device



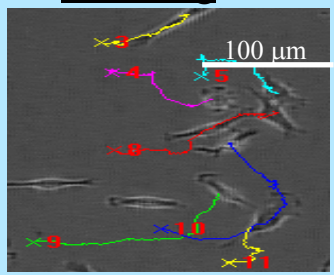
ABSTRACT

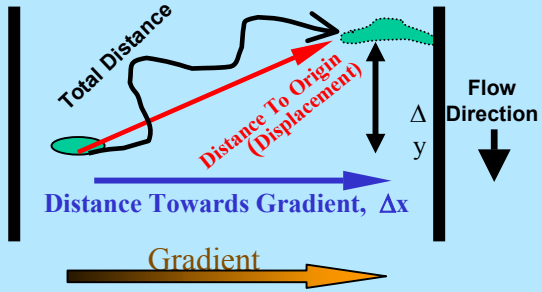
The field of microfluidics provides a means to study and have real-time monitoring of cell migration in a controlled environment. Two types of microfluidic devices were used to produce controlled gradients, christmas tree and H-channel design. The christmas tree design enables higher ordered profile shaped gradients, such as 2nd order polynomial, while the H-channel design only allows for linear gradients. Although the H-channel is limited in the types of profile gradients it can produce, its advantages are that it is more practical to setup and allows for the isolation of cells that underwent chemotaxis. With a pure population of cells that migrated, more specific tests can be conducted on their inherent properties, such as which receptors were more utilized. Three types of cells were studied, human neural stem cells (hNSC), metastatic rat breast cancer cells (MTLn3) and neutraphils. The hNSC were studied with the christmas tree design that produced gradients of SDF1-α at 100 ng/ml and 250 ng/ml. Conditions for the MTLn3 cells and neutraphils were optimized in both the christmas tree design and the H-channel design, however experimental data has not yet been fully analyzed.

Time-lapse Imaging

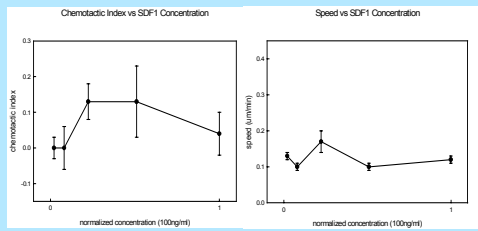


Tracking





hNSC Data



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CI: 0 ± 0.03

Steep Region:
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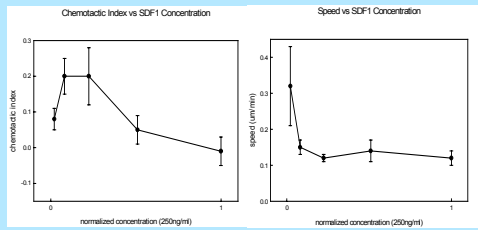
CI: 0.075 ± 0.045



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CI: 0.08 ± 0.03

Steep Region:
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CI: 0.11 ± 0.0525

Jeon et al.,Nature Biotechnol. (2002) 20 826–30. www.calit2.net