SMART BioSyM Seminar

Suspended-cell mechanics: Which chemoenvironmental cues matter? Why are distribution widths so important?

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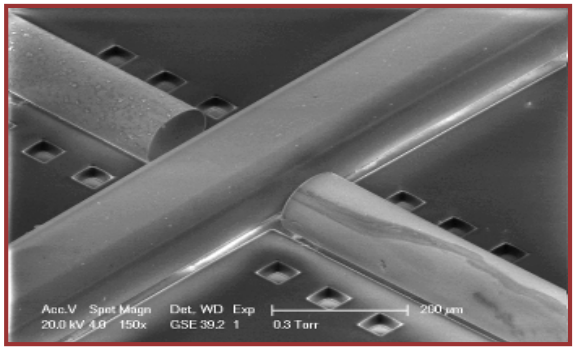
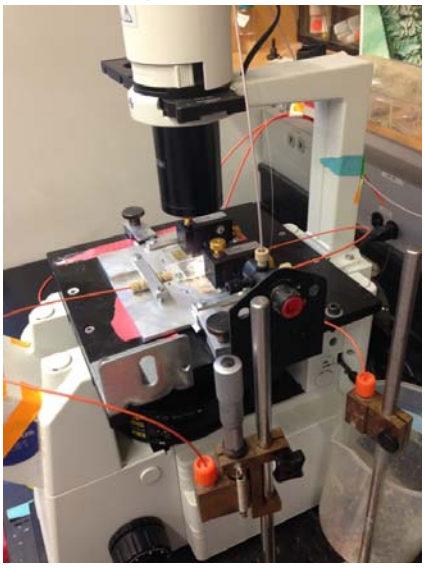
Thursday 29 January, 2015
4pm-5pm
SMART Enterprise Wing Level 5,
Perseverance Rooms 1 & 2

What kind of mechanical material is the cell? Rheologically, how is the cell altered by cytoskeleton-disassembling drugs and by changes in osmolarity, pH, and temperature? Because of the potential uses for label-free sorting of valuable cell subpopulations, we are interested in whole-cell mechanical parameters such as stiffness and fluidity (i.e., phase lag). To avoid conflation with size or stickiness, optical stretching, which deforms single cells in suspension by photonic pressure alone, was used to characterize thousands of cells from multiple lineages around a timescale of 1 s. I will summarize these results.

Single-cell sorting lives or dies according to the frequency of false positives and negatives, however, and the dispersion---or distribution width---of cell mechanical properties is frustratingly large. Single-cell probes invariably find large and right-skewed intrinsic variation even in terminally differentiated populations. I present our own findings of cell-to-cell mechanical heterogeneity, especially as it depends on the cell type, cell cycle, and cytoskeletal alteration. For useful leveraging of cell mechanics, at least as important as mean differences is the dispersion around means that could threaten the usefulness of this flavor of label-free sorting.





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