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Quantification of the Motion of Non-Adherent Cells in a Microfluidic Device[1] ERIC KIM, KEVIN SEALE, JOHN WIKSWO, Vanderbilt University
— Cellular motion involves a large number of intracellular processes impacted by environmental factors or toxins. Non-adherent cells such as Jurkats constantly move non-translationally when trapped in microfluidic devices. The degree to which they move may be indicative of many environmental influences and intracellular conditions. We have devised a technique wherein we assay intracellular conditions by utilizing the quantification of overall cellular motion irrespective of center of mass. Differential image stacks are formed from bright field image stacks by subtracting from spatial pixels their next temporal counterparts. Image pixels in each frame are summed to develop a quantitative plot of overall cellular kinetics over time in the field of view. To demonstrate intracellular correlation, we used paraformaldehyde to fix cells and halt cell movement. Our results indicate an average percent drop of 6.6% in processed pixel intensity with fixation relative to baseline (n=6 and p <0.05). Within each plot we find $p<0.05$ between baseline and fixation points. This simple, image-processing assay shows promise for characterization of intracellular conditions in response to environmental influences in microfluidics.

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