Abstract Submitted
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Microfluidic devices for label-free separation of cells through transient interaction with asymmetric receptor patterns[1] S. BOSE, R. SINGH, M.H. HOLLATZ[2], C.-H. LEE, MIT, J. KARP, Brigham & Women's Hospital, R. KARNIK, MIT — Cell sorting serves an important role in clinical diagnosis and biological research. Most of the existing microscale sorting techniques are either non-specific to antigen type or rely on capturing cells making sample recovery difficult. We demonstrate a simple; yet effective technique for isolating cells in an antigen specific manner by using transient interactions of the cell surface antigens with asymmetric receptor patterned surface. Using microfluidic devices incorporating P-selectin patterns we demonstrate separation of HL60 cells from K562 cells. We achieved a sorting purity above 90% and efficiency greater than 85% with this system. We also present a mathematical model incorporating flow mediated and adhesion mediated transport of cells in the microchannel that can be used to predict the performance of these devices. Lastly, we demonstrate the clinical significance of the method by demonstrating single step separation of neutrophils from whole blood. When whole blood is introduced in the device, the granulocyte population gets separated exclusively yielding neutrophils of high purity (<10% RBC contamination). To our knowledge, this is the first ever demonstration of continuous label free sorting of neutrophils from whole blood. We believe this technology will be useful in developing point-of-care diagnostic devices and also for a host of cell sorting applications.

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