Electronic Supplementary Material (ESI) for Lab on a Chip

Supplementary Information

Electrical Fingerprinting, 3D Profiling and Detection of Tumor Cells with Solid-state Micropores

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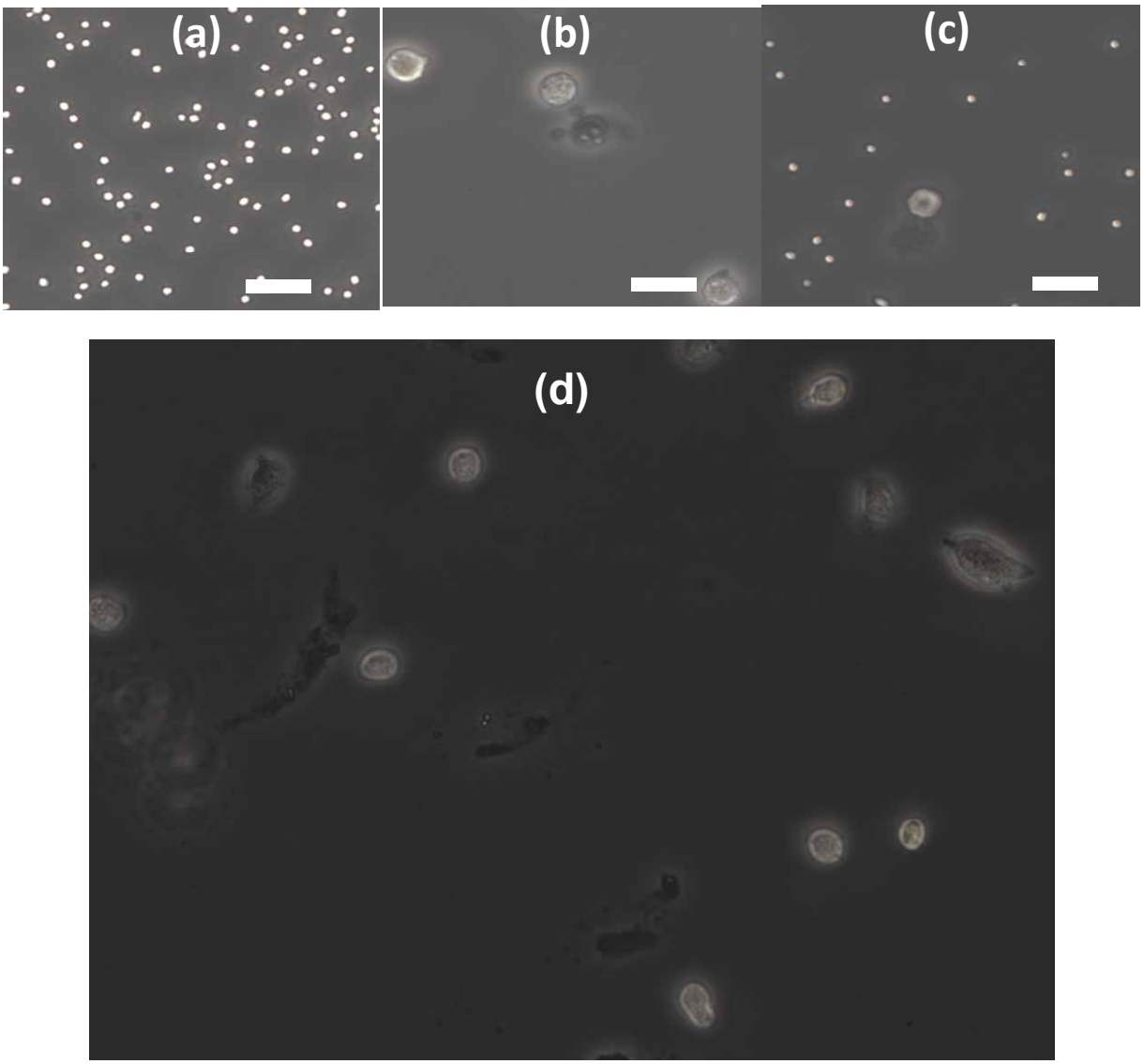
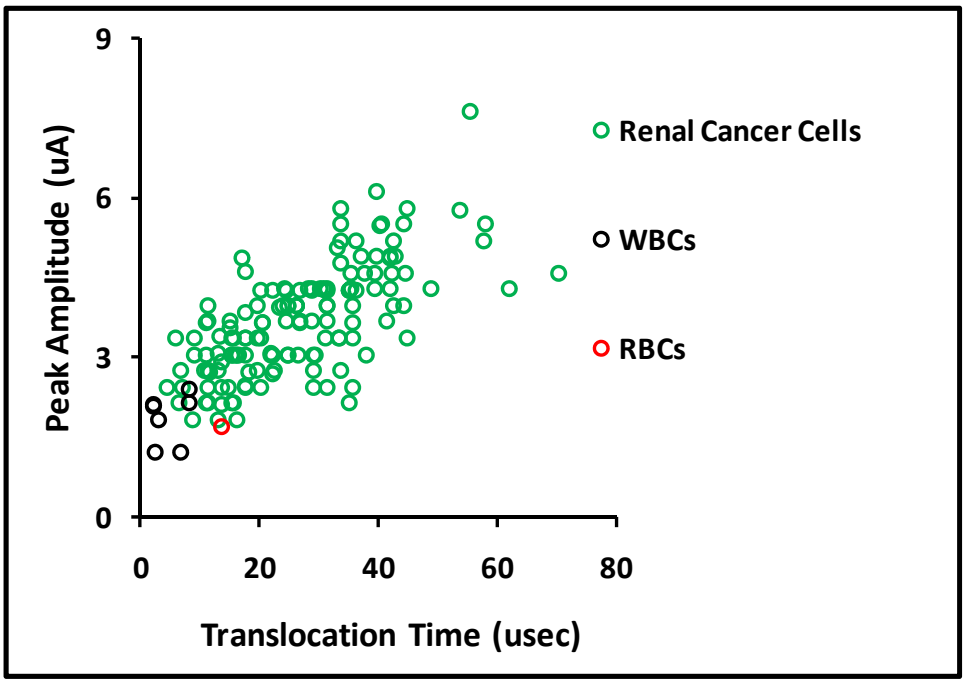
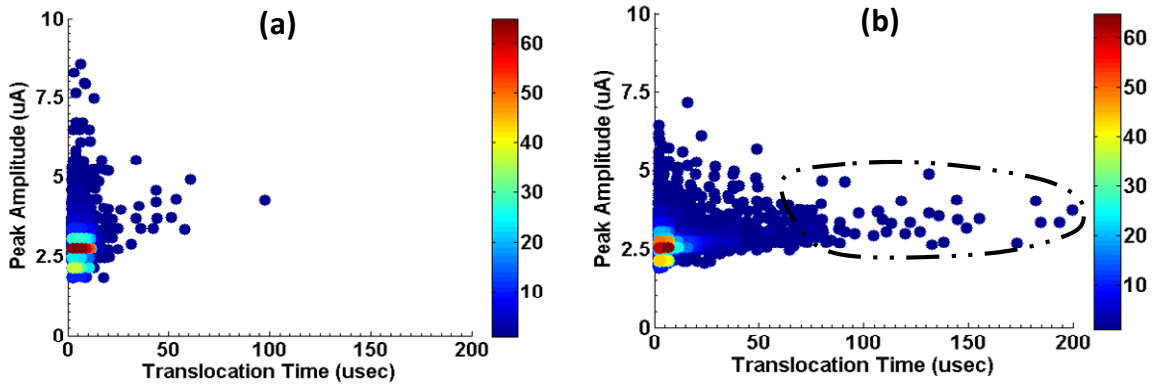


Supplementary Figure 1. The optical micrographs of the cell suspensions on glass slide. (a) Whole blood diluted with PBS. (b) Renal cancers cells suspended in PBS. (c) Renal cancer cells mixed with whole blood and suspended in PBS solution. Renal cancer cells are larger and show distinctive pulses while passing through the micropore. All the images were taken with same lens and magnification. Scale bar is 50 µm. (d) Renal cancer cells after passing through the micropores. The micrograph shows that the cancer cells retain their shape and morphology after passing through the micropore.



Supplementary Figure 2. The distribution of the cell translocation data through 20 µm pore at flow rate of 25 µl/min. This data points out the distinct distribution of cancer cells from the other cell types. The average translocation times and current blockade amplitudes for renal cancer cells were significantly higher than other cells types. Only few WBCs and RBCs were detected at higher flow rate of 25 µl/min.



Supplementary Figure 3. The density plots for mixed cell suspension. (a) Shows the density plot of whole blood diluted ten times in PBS processed with 20 µm micropore. The flow rate was 25 µl/min. The color-map at right shows the density distribution of cells according to their translocation time and pulse amplitude. According to this color-map, more of the cells are in red region than blue region. (b) Shows the density plot when mixture of whole blood with renal cancer cells was processed through 20 µm micropore. The cancer cells showed distinctive current pulses as highlighted by dashed oval. At flow rate of 25 µl/min, detection efficiency was reduced to 40%, and pulse characterization based on pulse shape became more challenging.