Abstract Submitted
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Biomechanical Discrimination of Diseased Cells for Cancer Diagnosis[1] AZHAR ILYAS, MUHAMMAD AHSAN, YOUNG-TAE KIM, SAMIR IQBAL, University of Texas at Arlington (UTA), Texas, USA, NANOBIO LAB TEAM, NEUROENGINEERING LAB COLLABORATION — Biomechanical properties (size, shape, stiffness, viscosity, deformability) of cells change significantly in unhealthy cells and can be used to indicate the physiological state of the cells. Here, we report a simple and interesting strategy to identify cancer cells from biopsy samples. The detection scheme utilized single solid-state micropore as the biological transducer which translated the cell's viscoelastic behavior into electrical signals. As a model, bladder cancer cells and normal urothelial cells were investigated. The approach didn't require any staining, functionalization or availability of any biomarkers but relied on merely cellular mechanical properties. Temporal measurements of the ionic current were recorded across the micropore. Cancer cells gave distinctive pulse signals while passing through the micropore. The analysis of the pulses showed clear data clusters for cancer cells in contrast to their normal counterparts. On average, the bladder cancer cells showed one order of magnitude faster translocation time as compared to normal urothelial cells due to their softer nature. The cancer cells were easily identified from a mixture with a detection efficiency of more than 75%. The statistical analysis of each single cell present in the probed sample demonstrated its capability to identify cancerous cells when they were very few in number.

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