Abstract Submitted
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Silicon Micropore based Electromechanical Transducer to Differentiate Tumor Cells[1] WAQAS ALI, MUHAMMAD U. RAZA, RAJA R. KHANZADA, YOUNG-TAE KIM, University of Texas at Arlington, SAMIR M. IQBAL, Nano-Bio Lab, Electrical Engineering, Bioengineering, University of Texas at Arlington — Solid-state micropores have been used before to differentiate cancer cells from normal cells using size-based filtering. Tumor cells differ from normal ones not only in size but also in physical properties like elasticity, shape, motility etc. Tumor cells show different physical attributes depending on the stage and type of cancer. We report a micropore based electromechanical transducer that differentiated cancer cells based on their mechanophysical properties. The device was interfaced with a high-speed patch-clamp measurement system that biased the ionic solution across the silicon-based membrane. The bias resulted in the flow of ionic current. Electrical pulses were generated when cells passed through. Different cells depicted characteristic pulses. Translocation profiles of cells that were either small or were more elastic and flexible caused electrical pulses shorter in widths and amplitudes whereas cells with larger size or lesser elasticity/flexibility showed deeper and wider pulses. Three non-small cell lung cancer (NSCLC) cell lines NCI-H1155, A549 and NCI-H460 were successfully differentiated. NCI-H1155, due to their comparatively smaller size, were found quickest in translocating through. The solid-sate micropore based electromechanical transducer could process the whole blood sample of cancer patient without any pre-processing requirements and is ideal for point-of-care applications.

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