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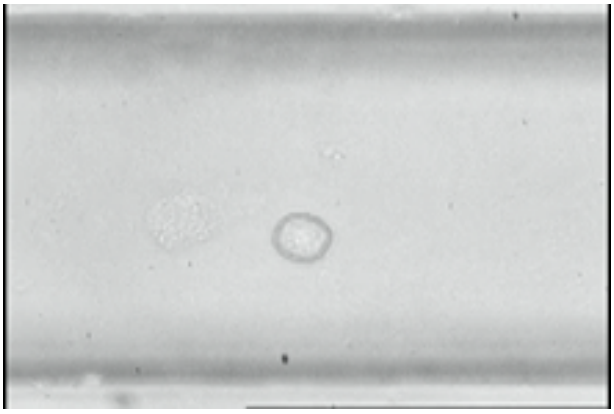
Biography

Udara Dharmasiri received his Bachelor of Science degree with honors from University of Peradeniya, Sri Lanka. He also obtained Master of Science degree in Analytical Chemistry from Post Graduate Institute of Science in University of Peradeniya, Sri Lanka. He joined Soper's research group in January, 2007.

Research Summery

Microfluidic devices offer multiple advantages, such as high throughput, multiplexing capabilities, high levels of system integration and significantly lower cost of operation due to reduced amount of sample consumption. My research is focused on developing tools for the molecular profiling of low abundant circulating tumor cells. Microfluidic devices have been designed and constructed by Adams et al. that selectively isolate and confine rare circulating tumor cells (CTCs) from whole blood samples with no post-rinse device contamination from white blood cells. The CTCs (MCF-7) currently under investigation are typically present in the peripheral blood of micrometastatic cancer patients at levels of 1-10 CTCs per milliliter of blood with the level of normal cells (red blood cells and white

blood cells) being substantially higher (>10^7/mL). Shown below is an isolated cancer cell captured through the formation of a cascade of antigen-antibody complexes.



Subsequent to capture, a CTC releasing agent has been developed in which the antibody-antigen complexes can be proteolytically cleaved leaving monodisperse in-tact cells for on-chip enumeration via conductometric detection. Antibodies/antigens often require stringent conditions to maintain their native conformations resulting shorter shelf life's for immobilized moieties. As a result, we are investigating developing aptamers, short oligos with K_d values in the 10^{-9} M^{-1} range, specific for CTC antigens. My future work will involve the development and incorporation of CTC protein biomarker recognizing aptamers that can be immobilized onto microdevices in place of antibodies. The extension of these technologies to a wide variety of cancers while penetrating point-of-care diagnostics building on the work completed by Adams et al.