Abstract Submitted
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A Two-Stage Microfluidic Device for the Isolation and Capture of Circulating Tumor Cells[1] ANDREW COOK, Fisk University, SAYALI BELSARE, Birla Institute of Technology and Science Pilani, TODD GIORGIO, Vanderbilt University, RICHARD MU, Fisk University — Analysis of circulating tumor cells (CTCs) can be critical for studying how tumors grow and metastasize, in addition to personalizing treatment for cancer patients. CTCs are rare events in blood, making it difficult to remove CTCs from the blood stream. Two microfluidic devices have been developed to separate CTCs from blood. The first is a double spiral device that focuses cells into streams, the positions of which are determined by cell diameter. The second device uses ligand-coated magnetic nanoparticles that selectively attach to CTCs. The nanoparticles then pull CTCs out of solution using a magnetic field. These two devices will be combined into a single 2-stage microfluidic device that will capture CTCs more efficiently than either device on its own. The first stage depletes the number of blood cells in the sample by size-based separation. The second stage will magnetically remove CTCs from solution for study and culturing. Thus far, size-based separation has been achieved. Research will also focus on understanding the equations that govern fluid dynamics and magnetic fields in order to determine how the manipulation of microfluidic parameters, such as dimensions and flow rate, will affect integration and optimization of the 2-stage device.

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