Award ID:
RP150421

Project Title:
High-throughput Screening and Detection of Circulating Tumor Cells

Award Mechanism:
Individual Investigator Research Awards for Prevention and Early Detection

Principal Investigator:
Ugaz, Victor

Entity:
Texas A&M Engineering Experiment Station

Lay Summary:

The technologies proposed here offer potential to deliver a transformative advance in cancer diagnostics and treatment by enabling rapid (~ 40 min) analysis and characterization of the entire cell population in a 1 mL blood sample. Unlike current methods based on antibody capture and fluorescent labeling, our approach eliminates the need for staining and permits all cells to be simultaneously probed, delivering at least a 10-fold reduction in analysis time, while simultaneously providing a wealth of currently unavailable morphological information across the entire cell population that can be mined to gain new diagnostically relevant insights.

The goal of this proposal is to overcome remaining knowledge gaps associated with adapting our approach toward high-throughput analysis, and to quantify achievable performance and throughput. Once these barriers are overcome, it is envisioned that this technology can progress toward implementation as a diagnostic tool on a rapid 2-4 year timeframe. Development of new technologies to enable direct analysis of CTCs would provide a revolutionary step forward in cancer diagnostics (i.e., to provide early detection of metastasis) and treatment (i.e., removal of CTCs could greatly reduce spreading of the malignancy). We propose to develop an entirely new class of instrumentation that uniquely addresses these needs, with the aim of making CTC-based analysis a routine diagnostic tool. In addition to isolation and enrichment, our design will enable viable CTCs to be easily recovered for subsequent analysis to aid in cancer biology research. Finally, by providing a convenient platform to routinely monitor CTC levels, we ultimately envision that this research will lay a foundation for new and powerful methods to assess the efficacy of cancer treatments so that personalized “on the fly” adjustments can be made during the course of therapy. These capabilities are not available in technology available today.