



CANCER PREVENTION & RESEARCH  
INSTITUTE OF TEXAS

Award ID:  
RP140840

Project Title:  
New Technology for Ultra High Throughput Enumeration of Circulating  
Tumor Cells

Award Mechanism:  
High Impact/High Risk

Principal Investigator:  
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Entity:  
Texas Tech University

Lay Summary:

Circulating tumor cells (CTCs) in blood flow have been recognized to be the primary drivers of metastasis in cancer. Recently sensitive devices have been developed that allow detection of these tumor cells in the blood of cancer patients. This so called liquid biopsy approach has game-changing potential for cancer diagnosis, prognosis and personalized chemotherapy treatments. Despite the enormous potential of this liquid-biopsy approach, progress in CTC-related basic and clinical research has been hindered because of their extremely low counts (1-10 CTCs in 1 billion blood cells), highly heterogeneous morphologies and molecular expression profiles that depend on the type of cancer. In this proposal, we seek to develop microfluidic digital holography microscopy (DHM) – a new technology that is applicable to virtually all metastatic cancers and resolves current throughput challenges in enumeration of CTCs. Our microfluidic DHM has the potential to detect CTCs in 10 mL of whole blood in under 10 minutes. Such throughput surpasses all existing CTC enumeration technologies by orders of magnitude. Such a novel technology is of great significance for cancer diagnostics, prognosis and personalized chemotherapy regimens.