



## CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:  
RP100934

Project Title:  
Antibody-free microfluidic isolation and molecular analysis of circulating cancer cells

Award Mechanism:  
Individual Investigator

Principal Investigator:  
Gascoyne, Peter R

Entity:  
The University of Texas M.D. Anderson Cancer Center

### Lay Summary:

Cancer cells that leave a primary tumor and enter the blood stream (called circulating tumor cells, or CTCs) occasionally lodge in other tissues and develop into new tumors called metastases that are often more dangerous and more difficult to treat than the original cancer. Recent research shows that the concentration of CTCs at the time of treatment can be used to predict the probability of subsequent metastatic disease and it is believed that analysis of the molecular properties of CTCs will lead to improved understanding of metastasis and treatments to reduce the likelihood of relapse. Current isolation methods for CTCs (which occur at tiny concentrations in the blood) are antibody-based and fail to recognize CTCs from all cancers. Furthermore, these methods kill the CTCs, which cannot, therefore, be grown for study or subjected to complete molecular analysis. We aim to develop a new method for CTC isolation that is independent of specific proteins, is applicable to all types of cancers, delivers live CTCs for growth, and is interfaced directly to detailed molecular analysis. The new technology is based on advances in microfluidics and an electrical phenomenon called dielectrophoresis that can discriminate the rare CTCs from blood cells according to differences in their metabolic activities and sizes. The isolated CTCs will be passed to a molecular analysis system that works with small numbers of cells; some will be placed into growth culture. We will test our methods using very small numbers of cultured human cells mixed into donated blood (to simulate rare CTCs), then detect CTCs in tumor-bearing mice, and, finally, isolate blood specimens from breast cancer patients. Recovered CTCs will be studied to identify molecular profiles associated with metastasis with the aim of improving diagnosis, prognosis and therapy. CTC recovery will be compared with existing, antibody-based methods.