CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP110360

Project Title:
Ultra-Sensitive Multiplex Detection of Lung Cancer Biomarkers Using Immuno-Magnetic Particles

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
University of Houston

Lay Summary:

This proposal aims to develop and evaluate “urchin” nanoparticles, as new tools for the detection of non-small cell lung cancer (NSCLC) biomarkers. The proposed project constitutes an innovative research strategy integrating aspects from engineering, molecular pathology and translational medicine into a new, broadly-applicable detection system. Urchins are a family of engineered, small magnetic particles that can be customized to bind to specific protein or nucleic acid (DNA/RNA) biomarkers. Each urchin particle also carries a unique, sensitively-detectable DNA reporter molecule that provides feedback on the presence of cancer biomarkers in the patient sample through fluorescence. In a new approach, non-specific background fluorescence will be reduced through the use of magnetic force, removing randomly bound urchins from the reaction compartment prior to measuring the fluorescent signal. While our preliminary data clearly demonstrate the general feasibility of the urchin technology, there is a need to determine and optimize the analytical performance characteristics of the platform in detecting biomarkers in real-life clinical samples, for example sputum or small biopsy samples. The underlying hypothesis for this work is that the use of urchins will allow the detection of different types of cancer biomarkers in parallel, in a single reaction, while dramatically improving the sensitivity of protein marker detection when compared to current assays. Our immediate goal will be to demonstrate the urchin platform’s ability to distinguish tumor-negative from tumor samples, which eventually will allow the physician to initiate treatment at a very early stage of the disease. Our long term goal is to engineer a novel, highly sensitive and parallel detection system for various kinds of biomarkers and/or infectious agents with better sensitivity and specificity than current techniques.