CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP160834

Project Title:
Integrated-cavity-enhanced pre-screening for lung cancer

Award Mechanism:
High Impact/High Risk

Principal Investigator:
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Entity:
Texas A&M University

Lay Summary:

Lung cancer is the leading cause of cancer mortality in the United States. Early diagnosis is documented to lead to significantly higher rates of patients' survival. Only 15% of lung cancer cases are diagnosed this way. Currently, most medical practices use plain film PA and lateral chest x-ray as a screening method. However, the sensitivity and specificity of these plain films are poor, especially for early stage disease. Data suggests Computed Tomography (CT) is cost effective over time as a screening modality but acceptance has been slow due to initial higher cost and concerns over increased dosage of ionizing radiation. Widespread use of CT scanning has been shown to result in an increase in late secondary malignancies due to higher radiation exposure. There is thus a documented and pressing need to diagnose lung cancer at earlier stages using other methods. The ideal device should be inexpensive, sensitive, specific, non-invasive, real time, and avoid the use of ionizing radiation. A most promising technology for attaining this long-reaching goal is a breath analyzer for chemical composition of exhaled air that enables early diagnosis of lung cancer in patients. Unfortunately, no technology exists that can offer real-time (i.e. during the patient's visit) inexpensive assessment of chemical breath profiles. Literature strongly suggests breath analysis satisfies these goals but the techniques applied are too cumbersome to use in a real world clinical setting. We propose a novel approach based on submillimeter spectroscopy with an integrated cavity for signal enhancement to achieve an unprecedented 1 part in 10+15 level of detection sensitivity of cancer biomarkers, discriminating them from other molecular species also in human breath. If successful, a prototype instrument will be constructed (Phase II) and extensive clinical evaluation performed in collaboration with an academic oncology center to validate the proposed technology for cancer screening (Phase III).