NCAI Funded Project Description

**Project Title:** High Resolution Intravascular Ultrasound

**Principal Investigator:** Aaron Fleischman, Ph.D., Cleveland Clinic, Cleveland, OH

**Clinical Indication:** Coronary and Peripheral Vascular Imaging

**Product Type:** Diagnostic

**Project Description:** Intravascular Ultrasound (IVUS) is a catheter based diagnostic system for tomographic imaging from within coronary and peripheral vasculature. It is used to plan interventions, characterize plaque morphology, evaluate stent placement, and monitor progression and regression of plaques. Despite recent growth in the market, Intravascular imaging, encompassing both IVUS and optical coherence tomography (OCT), is underutilized with a penetration of about 10% of percutaneous coronary interventions (PCI) and peripheral artery disease (PAD) procedures. The reason for this low penetration is that IVUS has insufficient resolution to permit detection of thin fibrous caps associated with vulnerable plaques, fissures and stent edges. While OCT has greater resolution, it has limited depth of penetration which inhibits usefulness in these applications. Therefore, no currently available intravascular imaging modality can achieve the full range of imaging required for clinically meaningful diagnosis.

Dr. Fleischman and his engineering team at The Cleveland Clinic have developed a low cost High Frequency Broad Bandwidth (HFBB) transducer for IVUS that has sufficient lateral and axial resolution necessary to image stents, neointimal formation, and critical lesion morphology at the lumen while maintaining the ability to determine plaque composition and depth of penetration associated with current state-of-the-art IVUS. This project will demonstrate proof-of-concept for their HFBB transducer in clinically relevant models.

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