Mission:

Our research group is focused on translating bioengineering innovations into health diagnosis for improving life quality. Drawing on the approach of microfluidics/Lab-on-Chip, nanotechnology, and molecular biology, our long-standing interests include developing novel, fast and mobile device based platform for defining sensitive elements in disease and personalized health condition. Education emphasis: training engineers to be creative thinker and collaborative researcher.

We would like to acknowledge the funding supports from K-State Johnson Cancer Research Center Innovative Research grant, and National Institutes of Health (NIH NIGMS P20 GM103418) Institutional Development Award (IDeA).

Research Highlights

3D Point-of-Care Biomedical Devices and Wireless Healthcare

The 3D engineered POC diagnostic platform will combine with transformative smartphone technology for distant monitoring of individual health condition and food nutrition. Yielding a disruptive wireless medical system, the long-term goal will be centered in improving the diagnostic efficacy and healthcare quality, revolutionizing the practice model of patient care.

Microfluidic Study of Circulating Tumor Exosomes for Cancer Biomarker Discovery and Early Detection

Probing tumor-derived circulating exosomes has been an emerging paradigm for non-invasive cancer diagnosis and monitoring of treatment response. Our long-term goal is to combine microfluidic isolation approach for molecular defining tumor derived circulating exosomes, identifying cancer specific, and cancer-type specific exosomal markers, improving the sensitivity and specificity of early detection of cancer.

Nano-scale Integration of Functional Biomaterials for Personalized Medicine

Biomaterials, including particles, organic synthesized polymer and living system delivered products, are important ingredients for engineering functional device and platform. Nano-scale integration of functional biomaterials is in long-standing interest for developing personalized cancer medicine. This project will integrate nanoparticles and biocompatible gel materials in microfluidic platform for mimicking biological environment (e.g., cellular features) and monitoring drug treatment response. Long-term goal of this research is to facilitate the accurate assessment of personalized therapy for customized management of cancer.

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