

Title: Nanotechnology-Enabled Liquid Biopsy for Cancer and Prenatal Diagnostics

Abstract:

The current gold standard for cancer diagnosis is based on pathologists' inspection of tumor tissues, acquired via invasive procedures, e.g., surgical excision or needle biopsy. As an alternative to solid tumor biopsy, many have proposed the use of a "liquid biopsy" based on blood components like circulating tumor cells (CTCs) and tumor-derived extracellular vesicles (EVs). Since the molecular contents in CTCs and tumor-derived EVs mirror those in the parental tumor tissues, performing molecular analysis of CTCs and tumor-derived EVs will allow us to understand the underlying biology of cancer, guide therapeutic interventions, and monitor the progression of disease. Over the past decade, our research team at the UCLA Liquid Biopsy Laboratory pioneered a collection of platform technologies, e.g., "NanoVelcro Chips" and "Click Chips", in which immuno-affinity agent-coated nanostructured substrates were utilized to purify and characterize CTCs and tumor-derived EVs. Much like cancer diagnosis, prenatal diagnosis also relies heavily upon invasive sampling of placenta tissues and can potentially benefit from our liquid biopsy technologies. In this presentation, I will summarize the development of our latest technologies, as well as their clinical validation for cancer and prenatal diagnoses.

Bio:

Professor Hsian-Rong (HR) Tseng obtained his PhD Degree in Chemistry from National Taiwan University in 1998. He was a postdoctoral fellow in UCLA Chemistry under the supervision of Professor Sir Fraser Stoddart, 2016 Nobel Laureate in Chemistry. Prof. Tseng joined the faculty of David Geffen School of Medicine at UCLA in 2003. He is currently a Professor of Molecular & Medical Pharmacology, who also holds joint memberships in the California NanoSystems Institute, Crump Institute for Molecular Imaging, and Jonsson Comprehensive Cancer Center on the UCLA campus. Prof. Tseng co-directs the UCLA Liquid Biopsy Laboratory, where his research team has been working to develop in vitro diagnostics (IVD) technologies for applications in the field of oncology and perinatology. To facilitate the commercial transition of NanoVelcro Chips, Prof. Tseng founded CytoLumina Technologies Corp., a biotechnology company that has licensed the core intellectual properties from UCLA. The company's CTC enumeration assay is currently undergoing an FDA 510(k) medical device clearance for prognostic utility in prostate cancer. In October 2019, NanoVelcro Chips was recognized as one of the [Success Stories](#) by the National Cancer Institute (NCI) Innovative Molecular Analysis Technologies (IMAT) program.