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Cellular mechanotypical property as a novel biomarker for cancer

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The hallmark of cancer is the invasive and metastatic nature of the disease. Cancer cell invasion and metastasis are partly regulated by altered cytoskeletal structures that result from the complex interplay of activation/inactivation of multiple signaling pathways regulating these cellular events, which can occur at either the genetic or epigenetic level. Thus, attempts to accurately assess these physiologically relevant mechanical properties of cancer cells using single, or even multiple marker profiles at the DNA, RNA, or protein level, may not be effective. Recently we showed that cancer cell mechanical properties, or mechanotypic biomarkers, including cell elasticity and deformability can be directly and accurately measured by state of the art, label-free technologies at the single cell level. These mechanical properties of cells can be a marker for cancer cell behavior including invasion, metastasis, and drug response. We developed an approach that uses mechanotypic profiling to complement morphological and molecular analyses, a process called "Nanocytology" which collectively enable robust and high throughput measurements and can potentially be implemented even in resources poor areas. The nanocytology approach combined with targeted delivery of nanoparticles with molecular-tailored anti-cancer agents may provide a more effective alternative for cancer detection and management.

Biography:

Dr. Rao is a tenured full professor of pathology and epidemiology at University of California at Los Angeles (UCLA). He is the chief of Cytopathology, the ex-director of gynecological pathology, the director of international telepathology, and the medical director of cytotechnology school. He is a fellow of College of American Pathologist (FCAP), Fellow of Academy of Translational Medicine (FacdTM), Member of Jonsson Comprehensive Cancer Center, a Member of California Nanosystem Institute, aGuangji Scholar and visiting professor at Zhejiang University, and elected-recipient of Thousand-Talent Program, China. He has over 150 peer-reviewed publicationsand been a speaker for over 150 meetings and occasions locally, nationally and internationally for variety topics including cancer biomarkers,screen and prevention, cytology, pathology, and nanotechnology. His notable accomplishments include established the first-ever international Telepathology program, investigated mechanisms of cytoskeletal actin remodeling in cancer development and progression, and studied cellular nano-mechanical profiling as a biomarker for cancer.

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