Fundamental research and clinical trials with nucleic acids

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A full understanding of the molecular basis of diseases depends on the development of molecular probes able to recognize disease targets of interest. Until very recently, such tools have been absent from the clinical practice of medicine. The newest molecular probe, and one that holds most promise, is a new class of designer nucleic acids, termed aptamers, which are single-stranded DNA/RNA able to recognize specific targets, such as single proteins and even small molecules. Recently, we applied a simple, fast and reproducible cell-based aptamer selection strategy called Cell-SELEX which uses whole, intact cells as the target for aptamer selection. This selection process then generates multiple aptamers for the specific recognition of biological cells, but without the need for prior knowledge about the signature of target cell-surface molecules. The selected aptamers have dissociation constants in the nanomolar to picomolar range. Thus far, we have selected aptamer probes for many different diseases, and used them to carry out studies at the vanguard of biomedical science, including ultrasensitive detection of tumors, molecular imaging, targeted drug delivery, and, most critically, cancer biomarker discovery. Taken together, these molecular level tools form a solid scientific platform from which to pursue advanced studies in molecular medicine. We will report our most recent progress in this exciting research area, especially in molecular engineering, nanomedicine and molecular elucidation of cancer biomarkers and theranostics.

Short Biography

Professor Weihong Tan earned his Ph.D. in physical chemistry at the University of Michigan in 1993. Currently, he is the director of Hangzhou Institute of Medicine, Chinese Academy of Sciences, the dean of Zhejiang Cancer Hospital. He is also the director of the State Key Laboratory of Chemo/Biosensing and Chemometrics at Hunan University, and the director of the Institute of Molecular Medicine at Renji Hospital and Shanghai Jiao Tong University. He served as a University Distinguished Professor and a V.T. and Louis Jackson Professor at the University of Florida for more than 20 years.

Professor Tan's research is in the area of bioanalytical chemistry, molecular medicine and chemical biology. He specializes in aptamer research, DNA nanotechnology, and cancer theranostics. Professor Tan has also been recognized as an Academician of the Chinese Academy of Sciences in 2015, Academician of the World Academy of Sciences in Developing Countries in 2016.