

## Ultrasensitive detection of cancer cells based on anticancer-drug membrane interaction and selective silver deposition

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Simple, sensitive, and general cancer detection methods are required in the point-of-care diagnostics. Conventional clinical approaches to detect cancers are based on biopsy followed by histopathology, biomarkers detection through genomics and proteomics tools based on the protein or nucleic acid contents. In this presentation I will discuss two novel methods of cancer detection based on the selective signal amplification through silver ions deposition and the interaction between anticancer drug and the cell membrane component. These detection strategies are based on the development of biosensor where an antibody and/or aptamer was attached on nanoconducting material. In first section, the human epidermal growth factor receptor 2 (HER2) and HER2-overexpressing breast cancer cells were detected using an immunosensor combined with hydrazine and aptamer conjugated-gold nanoparticles (AuNPs). The hydrazine-AuNP-aptamer conjugate, where the hydrazine reductant was directly attached onto AuNPs to avoid the nonspecific deposition of silver on the sensor surface was designed and used to reduce silver ion for signal amplification, selectively. The fabricated biosensor was capable of differentiating between HER2-positive breast cancer cells and HER2-negative cells. This method exhibited an excellent diagnosis method for the ultrasensitive detection of SK-BR-3 breast cancer cells in serum samples with a detection limit of 26 cells/mL. In second part, the interaction between an anticancer drug, daunomycin (DAN) and cancer cell membrane components has been studied using an aptamer probe immobilized on a nanoconducting film through electrochemical and fluorescence method and applied for the quantitative detection of cancer cells. The developed method differentiates between cancerous and noncancerous cells effectively.

### Biography

Pranjal Chandra is M.S. in Microbiology, M.Tech. in Biotechnology, and earned his Ph.D. degree from the Institute of Bio-Physio Sensors Technology, Department of Chemistry, Pusan National University, Busan, South Korea on "Development of Electrochemical Biosensors for Cancer Diagnosis Based on Conducting Polymers and Nanomaterials". Currently he is Assistant Professor at Amity Institute of Biotechnology, Amity University, India. He has published more than 25 papers, book chapters, and is the editor and reviewer of various reputed journals. He is interested to combine microbiology, biotechnology, nanotechnology, electroanalytical chemistry, and molecular biology approaches to address the problems of biomedical significance and diagnostics.

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