Development of Electrochemical Aptamer Biosensor for Tumor Marker MUC1 Determination

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With global-scale conformational & analyte-binding caused variation with respect to electrode-bound anti-MUC1 DNA aptamers as the basis, mucin 1 (MUC1) as a glycoprotein expressed on a majority of epithelial cell surfaces was quantitatively determined via an aptamer-based electrochemical biosensor proposed in this work. On the basis of the specific recognition of the MUC1 tumor marker through the thiolated aptamers that went through immobilization onto the glassy carbon electrode (GCE) modified by Au nanoparticle (Au NP), we designed electrochemical aptasensors to detect the MUC1 tumor marker. The differential pulse voltammetry (DPV), together with the electrochemical impedance spectroscopy (EIS) was utilized for quantitatively detecting MUC1 protein. This system excels the enzyme-linked immunosorbent assay (ELISA) kits on the market in its dynamic response range as high as 1.0 μ M & detection limit as low as 30 nM.

Keywords: Mucin 1; Aptasensor; Gold nanoparticle; Cyclic voltammetry; Differential pulse voltammetry

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