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Affinity biosensors based on disposable screen-printed electrodes modified with DNA

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Abstract

Simple and sensitive DNA sensors have been developed on a base on graphite screen-printed electrodes modified with DNA and enzymes. Cholinesterase and peroxidase immobilized by treatment with glutaraldehyde were used for the detection of human DNA antibodies of systemic lupus erythematosus and bronchial asthma patients. The amperometric signal was measured at +680mV versus Ag/AgCl for DNA-cholinesterase sensor and -150mV for DNA-peroxidase sensor 5min after the injection of acethylthiocholine and hydroquinone, respectively. The addition of serum samples results in the sharp decrease of the signal due to the formation of DNA-antibody adducts followed by the suppression of the access of substrate to the enzyme active site. Sulfonamide medicines suppress the DNA-antibody interaction due to the competitive binding along DNA minor grooves. DNA sensor labeled with peroxidase showed the linear calibration range of 5×10-9 to 7×10-5moll-1 of sulfamethoxazole and of 5×10-8 to 1×10-4moll-1 of sulfathiazole.

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Keywords

Affinity biosensor, DNA antibodies, DNA sensor, Sulfonamide determination