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Amperometric DNA-peroxidase sensor for the detection of pharmaceutical preparations

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Abstract

Novel DNA-sensor with enzymatic amplification of the signal has been developed on the base of glassy carbon electrode modified with ds-DNA and horseradish peroxidase (HRP). Phenothiazine dyes Methylene Blue and Methylene Green were used as electrochemical markers for the detection of sulfonamide and anthracycline preparations able to interact with DNA. The biosensor signal related to HRP oxidation of the markers depends on the relation between their bonded and readily oxidized forms which depends on the nature and concentration of pharmaceuticals. Sulfonamides diminish surface concentration of MB accessible for HRP reaction whereas anthracyclines release intercalated marker and increase the signal. The DNA-HRP sensor developed makes it possible to detect down to 0.002 nmol L-1 of sulfamethoxazole, 0.1 nmol L-1 of sulfadiazine, 0.01 nmol L-1 of sulfamethazine, 0.1 nmol L -1 of sulfaguanine, 0.05 µmol L-1 of rubomycin and 0.08 µmol L-1 of doxorubicin.

Keywords

Affinity biosensor, Anthracycline determination, DNA sensor, Horseradish peroxidase, Sulfonamide determination