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Determination of pharmaceuticals based on indole alkaloids with amperometric DNA-sensors and enzyme immunoassay test-system

Babkina S., Ulakhovich N.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Bioaffine methods were developed for determining indole-containing alkaloids ajmaline and vincristine. These methods are based on the proposed amperometric DNA-sensors and on immunoenzyme test-system with a spectrophotometric indication of the analytical signal. The complexing between ajmaline and immobilized native DNA (n-IDNA) allows effective preliminary concentration from test solutions on the biosensor. The time of analysis is 25-30 min, limit of detection (LOD) for ajmaline is 1.0×10-10 M. The test-system utilized the immunological reaction of ajmaline with its antibodies and the enzyme marker, horseradish peroxidase, LOD is 1.5×10-9 M. Anti-cancer vincristine interaction with immobilized renatured DNA (r-IDNA) was studied and determination was carried out using an amperometric DNA-sensor. Bioaffine membrane drug concentration and reactivation of the sensor was performed. The affinity binding constant Kbind for vincristine-r-IDNA complex calculated by Scatchard's method was found to be high enough [(5.0±0.4)×105 ll mol] confirming high specificity of the complexing with r-IDNA. The duration of the assay is 40 min. The developed method is characterized with an LOD of 1.1×10-9 M, with the lack of the need for long sample processing. The pharmaceuticals were determined by those methods in model solutions of blood serum and in tablets and solutions for injections. © Taylor & Francis Group, LLC.

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Keywords

Ajmaline, Amperometric DNA-sensor, Drug analysis, Immunoenzyme test system, Vincristine