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ELECTROCHEMICAL BIOSENSORS FOR PHARMACEUTICAL INDUSTRY

Background. Biosensors have enormous potential in the pharmaceutical industry, becoming indispensable highly sensitive tools for accelerating drug development, ensuring quality control, safety and efficacy of drugs, as well as in optimizing their development and manufacturing processes. These devices combine biological recognition elements with physicochemical transducers to provide rapid, real-time and often cost-effective detection of analytes. This presentation will discuss the potential use of biosensors in the pharmaceutical industry and some results of such application will be presented. **Methods.** For development of biosensors, a different detection schemes include amperometric, potentiometric and conductometric transduction modes were used. As bioselective membranes we used various enzymes such as penicillinase, glucose oxidase, urease, arginase, arginine deiminase, cholinesterase, etc. **Results.** A number of electrochemical enzyme biosensors for quantitative detection of different substances (penicillin, glucose, lactose, urea, arginine, sucrose, some surfactants etc.) have been designed and developed; their experimental prototypes were fabricated and thoroughly tested for possible pharmaceutical applications. For example, conductometric biosensor based on the inhibition of cholinesterases by surfactants has been developed. Under optimal operating conditions of the biosensor, the dependence of the inhibition rate of the bioselective element on the concentration of benzalkonium chloride and sodium dodecyl sulfate has been investigated. A potentiometric biosensor based on the inhibition of cholinesterases by indole alkaloids has been developed, which have physiological activity associated with the effect on the central and peripheral nervous systems and are used in modern medicine and pharmacology for hypertension, arrhythmias and in the treatment of vascular diseases. Five types of electrochemical biosensors based on enzymes and other chemicals for the determination of L-arginine concentration in pharmaceutical samples are described and characterized. The analytical characteristics of the developed sensors are determined and compared. It is shown that each type of biosensor has its own advantages and limitations in terms of sensitivity, linear range and detection limit. **Conclusions.** It is worth noting that all developed electrochemical enzyme biosensors are adapted to large-scale production technologies. Regarding the further widespread application of the developed biosensors, the obtained results demonstrate the possibility of modulating their basic characteristics to meet the specific requirements of pharmaceutical applications.

Keywords: electrochemical biosensors, enzymes, pharmaceutical industry, express analysis.

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