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DEVELOPMENT AND CHARACTERIZATION OF A POTENTIOMETRIC BIOSENSOR FOR BUTYRYLCHOLINESTERASE ACTIVITY MEASUREMENT

Aim. Butyrylcholinesterase (BChE), commonly referred to as pseudocholinesterase, is a member of the serine hydrolase enzyme family and is widely regarded as a valuable biomarker for the assessment of liver failure, Alzheimer's disease, and organophosphate intoxication. Given the significant clinical and diagnostic relevance of this enzyme, the development of accurate, rapid, and reliable methods for its determination is of considerable importance. **Methods.** In this work, a potentiometric transducer based on pH-sensitive field-effect transistors was used. During the reaction on the substrate due to immobilized BChE, protons were generated and a signal appeared. After adding a certain aliquot of free BChE to the measuring cell, competition for the substrate occurred and the signal was recorded according to the rate of the enzymatic reaction. **Results.** As a result of this study, the optimal substrate concentration (0.32 mM butyrylcholine) was selected, the optimal incubation time between immobilized and free BChE was established, and some of the most important analytical characteristics of the biosensor were investigated – the minimum detection limit of 0.003 U/ml and a fairly wide range of enzymatic activity detection from 0.01 to 0.5 U/ml. In addition, the developed biosensor is characterized by a high signal reproducibility RSD = 2.7%. **Conclusions.** In this experimental study, a potentiometric biosensor based on immobilized BChE was developed and partially characterized. The low detection limit and a sufficiently wide linear range of detection of the free enzyme activity indicate the promising use of the developed test-system in medical diagnostics. **Grants.** The work was supported by the national budget program "Support for priority scientific research and scientific and technical (experimental) developments for the state", program number 6541230 and by the National Research Foundation of Ukraine grant № 0126U003794.

Keywords: biosensor, butyrylcholinesterase, enzyme, potentiometry, BChE activity.

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