IDENTIFICATION OF ATENOLOL BASED AGENTS IN REAL OBJECTS USING THE PRINCIPAL COMPONENT METHOD

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One of the most common diseases to date, are diseases of the cardiovascular system. Such as arterial hypertension, tachycardia, arrhythmia, etc. Atenolol is a medicinal product that helps fight these diseases. Chemically, atenolol is designated as 4-(2-hydroxy-3-isopropylaminopropoxy) phenylacetamide, is a cardioselective b-adrenergic blocker. Biological activity depends on one of the enantiomers. In particular, for atenolol, the S-enantiomer is 50–500 times more effective than the R-enantiomer. Various methods are used for the recognition and determination of enantiomers in drugs: gas chromatography in combination with mass spectrometry, spectrophotometry and analysis of injection of a stream, etc. But the above methods are expensive in equipment, long-term preparation of samples that require highly qualified specialists, etc. These problems are solved by electrochemical methods of analysis, in particular voltammetry.

In work, contaminated voltammetric sensors based on glass-carbon electrodes modified with composites of polyelectrolyte complexes of chitosan and chitosan succinamide with cyclodextrins for recognition of atenol enantiomers. Based on the analytical signals obtained, it is impossible to uniquely identify the test samples, due to the low selectivity of the method. The solution to this problem is the chemometric processing of data.

Five tablets of atenolol were ground into a powder. A portion, equivalent concentration of the solution of about 0.01 M, was weighed and transferred to a volumetric flask and filled up to the mark with redistilled water. The resulting solution was sonicated for 15 minutes and then centrifuged. A suitable amount of this solution was diluted in a borate buffer solution.

A sample of the centrifuged urine of a healthy male was diluted 10-fold in a borate buffer solution, and tests were performed using a DPV method by dumping a known amount of the drug. The results of three replicates and a satisfactory recovery of 99.7–103.0 % are shown in Table.

Table. Determination of ATN enantiomers in human urine samples on the GCE modified by CS-SCS composite of β-CD in borate buffer solution of pH 9.18 using DPV method at a scan rate of 20 mVs^{-1}

Sample	Spiked, μM		Found, μM		RSD, %		Recovery, %	
	R-ATN	S-ATN	R-ATN	S-ATN	R-ATN	S-ATN	R-ATN	S-ATN
Urine 1	10.0	10.0	9.9 ± 2.0	10.7 ± 2.3	2.0	3.3	98.6	106.9
Urine 2	15.0	15.0	14.7 ± 1.5	15.9 ± 1.1	2.5	1.2	97.7	105.9
Urine 3	20.0	20.0	21.0 ± 1.2	21.1 ± 1.6	1.3	2.9	104.7	105.6

From the data obtained, it can be seen that the proposed sensors and sensor system based on a GCEs modified by composites of the polyelectrolyte complex of CS and SCS with α-, β- and γ-CD can be successfully used to recognize and determine the enantiomers of atenolol in human urine as real samples.