STUDYING OF INFLUENCE OF SOME ANTIBIOTICS OF A CEPHALOSPORIN SERIES ON THE PROCESS OF ENZYME HYDROLYSIS OF CHITOZAN IN THE SOLUTION OF ACETIC ACID

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Nowadays one of the perspective directions of the use of chitosan (ChT) is the creation of the film materials on its basis including drugs for the treatment of surgical, burnt and sore wounds. In the conditions of medical application of chitosan materials their biodestruction is carried out under the influence of nonspecific enzymes of a human body (for example, hyaluronidase) and defines covering service life on a wound surface. In the works of previous years we defined some kinetic characteristics of the activity of enzyme hyaluronidase for the reaction of enzyme hydrolysis of ChT in the solution of 1 % acetic acid, and also in the presence of antibiotics of an aminoglycoside series - amikacin and gentamycin. This work is undertaken with the purpose of the expansion of some medical substances (MS) immobilized in a polymeric matrix.

The following objects were used in our research: they were ChT ("Bioprogress", Russia) with a molecular mass of $M_{s\eta} = 113000$, antibiotics of cephalosporin series − sodium salt of cefazolin (CFZ) and cefatoksim (CFT) ("Sintez", Russia), an enzyme preparation hyaluronidase (a trade name of the preparation is "Liraz") ("Mikrogen", Russia). Concentration of enzyme preparation was 0.1 g/l. 1 % acetic acid was used as some solvent for ChT. Concentration of ChT in the solution for carrying out the process of enzyme hydrolysis varied from 0.1 to 5 g/dl. Molar ratios of ChT:MS was equal to 1:0.01 and 1:0.1.

The conducted researches showed that the observed dependences of an initial rate of enzyme hydrolysis of ChT in the presence of CFZ and CFT from concentration of a substratum (ChT) can be described within the scheme of Mikhaelisa-Menten, as well as in case of enzyme hydrolysis of ChT with the lack of drugs. The results of Mikhaelis constant, the maximum rate determined by a graphic method of Laynuivera-Burke are presented in table.

Table. The value of kinetic parameters of the process of enzyme hydrolysis in Mikhaelisa-Menten equation for the system of chitosan-drug in 1 % acetic acid

Used MS	Molar ratio of components ChT: MS	K_m, g/dl	$V_{max} \cdot 10^6$, g/(dl·min)	$V_{max}/K_m \cdot 10^6$, min^{-1}
CFZ	1:0.01	3.82	0.47	0.12
	1:0.10	3.91	0.40	0.10
CFT	1:0.01	3.79	0.48	0.13
	1:0.10	3.95	0.41	0.10

The received values of K_m for the systems of ChT:CFZ and ChT:CFT testify that the affinity of ChT to enzyme in the presence of antibiotics worsens. Besides the reduction values of V_{max}/K_m in the systems of ChT-MS in comparison with an individual ChT says that drugs systems are more steady to biodegradation processes.

Thus, according to the influence of CFZ and CFT on the process of enzyme hydrolysis of ChT, antibiotics of a cephalosporin series, practically don't differ from the antibiotics of an aminoglycosideseries which had been researched earlier. It is obviously connected with the fact that all of them represent low-molecular electrolytes.