RESEARCH OF LYSIS OF LACTIC ACID BACTERIA CELLS UNDER THE ACTION OF PROTEOLYTIC ENZYMES

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The expediency of destroying of lactic acid bacteria cells has been substantiated in order to obtain powerful immunotropic compounds – low molecular weight peptides of the muamilpeptide series.

Characterization of substrate specificity of enzymes of animal, plant and bacterial origin is given. That is approximated for the hydrolysis of certain peptide bonds in the structure of peptidoglycans of bacteria cell walls.

The enzymatic lysis of Lactobacillus acidophilus cells with pancreatin, subtiline and papain has been investigated. Enzymatic hydrolysis was studied by varying the ratio of the enzyme to the substrate and its duration.

Enzymatic hydrolysis was controlled on the accumulation of aminoacids, soluble protein, low molecular weight peptides in the reaction medium. It was established that the maximum accumulation of target peptides in the lysate with pancreatin using is 4.5 mg/cm$^3$ at the ratio of the enzyme : substrate 1:100 and the duration of the process for 180 minutes, in the lysate with subtiline using – 4.5 mg/cm$^3$ at the ratio of the enzyme : substrate 1:100, during this same time, in the lysate with papain using – 4.5 mg/cm$^3$ at the ratio of the enzyme : substrate 1:250 and the duration of the process for 120 minutes.

This nature of enzymatic hydrolysis by different proteases can be explained by their substrate specificity. Thus, papain can hydrolyze the peptide bonds of peptidoglycan of the bacteria cell walls that are formed by lysine and glycine. Concerning pancreatin, which consists of proteases trypsin and chymotrypsin, and subtilin, their substrate specificity, is slightly higher than that of papain, and therefore the probability of hydrolysis of specific bonds in peptidoglycan is less, which is confirmed by the results of research.

It proved, that in the resulting target peptides with a molecular weight less than 1500 Da, there are glucopyranose rings, which, are known, form the residues of the N-acetylglucosamine and of the muramic acid of peptidoglycans This proves that the resulting low molecular weight peptides can be attributed to the compounds of the muramilpeptide composition.

Keywords: lysis, proteases, lactic acid bacteria, peptidoglycan, muramilpeptide.