**ANTIMICROBIAL ACTIVITY OF LYSOZYME TOWARDS LISTERIA MONOCYTOGENES AT VARIOUS MEDIUM CONDITIONS**

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**INTRODUCTION.** Though lysozyme (Lz) as an antimicrobial protein is studied about a century, its specific contribution to human defense against infection is far from clear. Lz is an enzyme which hydrolyzes glycoside bonds in the bacterial peptidoglycan thus destroying the cell wall. Gram-negative bacteria are usually resistant to Lz since their peptidoglycan is protected by the outer membrane. Moreover, it is generally accepted that under physiological conditions, most gram-positive bacteria also survive under Lz action as protoplasts, but at hypotonic conditions, they are lysed as a result of osmotic shock. On the other hand, some authors consider Lz as the main bactericidal factor of human plasma for gram-positive bacteria (without NaCl). However, the inhibitory effect of NaCl can be overcome by increasing the Lz concentration. In addition, Lz is more active in the veronal buffer than in the phosphate buffer.

**RESULTS AND DISCUSSION.** The *in vitro* antimicrobial action of human leukocyte lysozyme from on gram-positive bacterium *Listeria monocytogenes* under various medium conditions was studied. It was shown that in a low ionic strength buffer (without NaCl), lower doses of lysozyme are required to reveal the microbicidal effect than in the case of 0.075 or 0.15 M NaCl. The bacterial growth phase does not significantly affect the antimicrobial activity of lysozyme. The results obtained are consistent with the two-stage mechanism of the antimicrobial action of lysozyme, which includes enzymatic and non-enzymatic action.

**KEYWORDS:** lysozyme; antimicrobial activity; *Listeria monocytogenes.*
It seems that the antimicrobial action of Lz involves two stages: enzymatic lysis of the cell wall peptidoglycan and non-enzymatic disruption of the cytoplasmic membrane. The latter requires more than an order of magnitude higher Lz doses. Under hypotonic conditions, the second step probably is not essential since membrane lysis is achieved by osmotic force. In addition, lower doses of Lz would be effective in the second step in NaCl-free buffer because it is expected to be salt-sensitive as described for defensins. It is known that defensins are much more active towards bacteria in the exponential growth phase compared with the stationary phase. However, we did not observe a remarkable difference in the case of Lz as an antimicrobial agent. Presumably, it is easier for defensins to gain access to the cytoplasmic membrane of dividing bacterial cells, but it is not important for Lz, which provide access to the membrane by its own enzymatic action on peptidoglycan.

**Conclusion.** Our results imply that Lz alone can exhibit an antimicrobial effect on some gram-positive bacteria such as *L. monocytogenes* or equally sensitive in human saliva, tears or milk. On the other hand, in the blood plasma Lz level is insufficient to kill bacteria at physiological ionic strength. However, plasma Lz can convert bacterial cells to protoplasts making them susceptible to other bactericidal factors such as complement or antimicrobial peptides. This assumption is partially confirmed by literature data [6].

### References