Mechanisms of Additive Effects of Salt on Bactericidal Action of Ethanol.

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Summary

We investigated the mechanism of the phenomenon that both antiseptic effect and bactericidal effect became stronger by using ethanol in combination with salt. We have made an experiment about the relation between the condition of salt-added ethanol solution and bactericidal action with DSC and NMR.

This time, as the experimental result of bactericidal action of salt-added ethanol solution with different concentration on coliform bacillus, it was made clear that the combined effect of salt was small in low concentration of ethanol, but remarkable combined effect was shown with the higher concentration of both ethanol and salt. This reason was supposed as follows. If the number of water molecules became fewer, compared with that of alcohol molecules, the influence of selective hydration of salt appeared much strongly, making the concentration of alcohol higher.

When salt was added, on the way, to ethanol with low concentration which showed no bactericidal action, the bactericidal action of ethanol was revealed.

According to the photo micrographs by TEM, ethanol treatment caused remarkable plasmolysis. However, in the case of saline-added ethanol treatment, any change was not found even in surface layer structure and cell picture was similar to that with non-treated one.

We will investigate the influence of salt-added ethanol solution on the surface layer structure of bacillus, especially on the physical property of cell membrane and membrane-bound enzyme activity in the future.