Theses for the Master's Course

BIOLOGICAL CHARACTERISTICS OF STAPHYLOCOCCI ISOLATED FROM COW'S MILK

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Biological characteristics of 405 strains of staphylococci from milk samples of dairy cows in the vicinity of Sapporo were examined, especially on the correlations to coagulase production and hemolysis which were generally accepted as the characteristics which most commonly run parallel with the pathogenicity of this organism. Critical observation was also made on the grouping method of staphylococci which has been put forward by OCHI et al. (1958, 1960).

Moreover, pathogenicity for mice was examined with a small number of coagulase-positive and δ-hemolytic coagulase-negative strains.

The data obtained may be summarized as follows:

1. Forty-one strains (10.1%) out of 405 were confirmed to be coagulase producers. Two strains among them feebly clotted rabbit blood plasma alone and showed some differences in other biological characters including hemolysis, compared with the other coagulase producers.

2. Thirty-eight strains (92.7%) out of 41 coagulase-positive ones produced either α- or β-hemolysin or both. These hemolysins were never demonstrated in coagulase-negative strains (364). The majority of coagulase-negative strains (300 strains out of 364) were non-hemolytic, however, 64 strains produced clear δ-lysin. Accordingly α- and β-hemolysin production seemed to show the highest correlation with coagulase production. Pigment production, gelatin liquefaction and mannitol fermentation do not always run parallel with the ability of producing coagulase or hemolysin. Fibrinolysin production or egg-yolk reaction was also proved not to have very significant relations with coagulase production as has been hitherto reported in the organism of human origin.

3. The grouping method by OCHI et al. which is based chiefly on the production of coagulase and hemolysin seems to be a useful method from the viewpoint of clinical bacteriology.

4. Coagulase-positive strains which clotted human and rabbit plasma showed

higher pathogenicity for mice (death or severe abscess formation) than δ-hemolytic coagulase-negative ones. On the contrary to this, the organism which feebly clotted rabbit plasma alone showed only less virulent to mice, in comparison with the organism above noted. δ-Hemolytic coagulase-negative strains also caused death or abscess formation, however, the organism of this group generally showed very weak pathogenicity as evidenced by a delay of the time of death or degree of abscess formation; they showed a tendency to be rapidly cleaned up from the animal body.

5. From the data above summarized, the ability of producing coagulase or hemolysin may be emphasized as the most important criterion for judging the pathogenicity of staphylococci isolated from cow's milk.