ANTIGENIC STUDIES ON MICROCOCCI*

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ABSTRACT. Micrococci seem to be organized antigenically in a similar way to staphylococci. Agglutinogens shared with Staphylococcus aureus and S. epidermidis, and a number of specific agglutinogens have been demonstrated. Two serologically specific teichoic acids were revealed by agar-gel precipitation. The results indicate that M. varians has erythrocyte sensitizing antigens, but not M. luteus, M. roseus, or M. conglomeratus. The other serologic examinations revealed no correlation to these biochemical types.

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Twenty strains of micrococci classified as Micrococcus luteus (7), M. roseus (5), M. conglomeratus (4), and M. varians (4) were received from the Czechoslovak Collection of Microorganisms, Brno. Two strains produced acid from glucose anaerobically and were considered to be staphylococci. One M. varians strain produced acid from glucose aerobically and probably belonged elsewhere.

The micrococci, as well as control strains of Staphylococcus aureus and S. epidermidis, were examined serologically in rabbit immune sera against micrococci, S. aureus, and S. epidermidis. Techniques were on the whole as previously described (Oeding 1965).

Agglutination

The majority of the Micrococcus strains agglutinated strongly in preimmune rabbit sera 1/1 but were usually negative in 1/10. S. aureus and S. epidermidis gave similar

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results. Absorptions showed that these agglutinations were caused both by antibodies shared with staphylococci and by more specific antibodies. Titres $\geq 1/40$ in whole sera were estimated as significant for immune antibodies.

Cross-absorption confirmed that micrococci and staphylococci have shared antigens. When micrococcal immune sera were absorbed with one or two S. aureus strains, agglutination disappeared with all S. aureus strains and with the majority of Micrococcus strains, whereas the homologous strain and usually a few other Micrococcus strains were still positive. Therefore, in addition to the shared antibodies, micrococcal immune sera also have agglutinins specific to micrococci.

The presence of specific micrococcal agglutinogens, and the antigenic relationship between the micrococcal strains were evaluated by titration of the micrococcal immune sera and by absorptions. After successive absorption, often with three or four strains, the remaining specific antibody might agglutinate the homologous strain exclusively, or one or two additional strains. Micrococci, like S. aureus, seem to have patterns of more or less specific agglutinogens. No agglutinin characteristic of micrococci as a group, nor distinct serologic types were demonstrated. The agglutinations showed only a superficial correlation to the four biochemical groups.

Precipitation

Ring test precipitation showed cross-reactions between S. aureus, S. epidermidis and micrococci, although less common than agglutination. •

Agar gel precipitation was performed with suspensions of micrococci against micrococcal sera, using known systems as references. Usually a number of precipitation lines were produced by the micrococcal strains against homologous and heterologous micrococcal sera. Two lines were identified: four strains produced a line identical with the polysaccharide A line of S. aureus (β -glucosaminyl-ribitol teichoic acid). These strains possibly belong to a type of micrococci possessing a ribitol teichoic acid with glucosyl and glucosaminyl residues (Oeding *et al.* 1967), the latter being responsible for the cross-precipitation with polysaccharide A. Three strains gave an I3 line, which has been demonstrated in a Micrococcus strain containing glucosaminylglycerol teichoic acid (Oeding *et al.* 1967). There was no correlation between the type of teichoic acid and the biochemical types.

Haemagglutination

Normal and tanned sheep erythrocytes were sensitized with extracts of all Micrococcus strains and agglutinated in S. aureus Cowan I immune serum, which contains antibodies against S. aureus sensitizing antigens. All M. luteus, M. roseus, and M. conglomeratus strains gave negative or doubtful reactions. The three M. varians strains, the two strains which were shown to belong to S. epidermidis, and all the other S. epidermidis strains gave strong haemagglutination. M. varians may, therefore, constitute a particular group of micrococci, possibly more like staphylococci.

Reference

- Oeding, P. 1965. Antigenic properties of staphylococci. Ann. New York Acad. Sci. 128:183-190.
- _____, B. Myklestad and A. L. Davison. 1967. Serological investigations on teichoic acids from the walls of Staphylococcus epidermidis and Micrococcus. Acta path. et microbiol. Scandinav. (In press.)