69. *A Study on Blood Group. Substances in Pneumococci.*

By Tomoo AKAI, M. D.

The Institute of Legal Medicine, Medical Faculty, University of Tokyo.

(Director Prof. T. FURUHATA.)

(Comm. by T. FURUHATA, M. J. A., Nov. 12, 1949.)

It has been clarified by the studies of many scholars that the human blood group substances are distributed not only among animals and plants, but also among micro-organisms. It is recognized that among micro-organisms *B. paratyphi* B, Shiga dysentery bacillus, pneumococcus, *B. lepi-septicum*, etc. contain the FORSSMAN's antigen, Shiga dysentery bacillus besides contains the EISLER-KAGAYA's antigen, B and C antigens, and *B. proteus* OX 19 contains B and C antigens.

By analysing the FORSSMAN's antigen which pneumococcus contains, I give the following report on the result thereof.

Experiments: (1) Sheep hemolysin in the anti-A human red cell O' rabbit serum and anti-guinea pig kidney A' rabbit serum can be absorbed by type I, II, III pneumococci and their polysaccharide. Anti-A agglutinin in the human serum of type B and anti-A human red cell O' rabbit serum, anti-OIII and anti-BIII agglutinin can not each be absorbed by pneumococci of all types. The polysaccharide of pneumococci of all types can absorb the anti-A agglutinin in the B human serum. But protein and lipid of this organisms can not absorb these antibodies.

(2) The immunization of type O' rabbit respectively with the type I, II and III pneumococci produces the sheep hemolysin and anti-A agglutinin. When absorption tests are tried with these immune sera by means of various FORSSMAN's antigens and A antigens already known, it is perceived that the above mentioned sheep hemolysin is an antibody to sheep part (FA) and FORSSMAN's antigen in a narrow sense (F), and the anti-A agglutinin is an antibody to FA.

Then, the immunization of type A' rabbit with the type I, II and III pneumococci produces sheep hemolysin, but not anti-A agglutinin. When absorption tests are tried with these immune sera in the same way as above, it is perceived that the sheep hemolysin is an antibody to F.

(3) As the result of the tests in which immune sera are absorbed with protein, polysaccharide and lipid extracted from pneumococci, the polysaccharide alone absorbs the antibodies.

(4) The immunization of fowl with the type I, II and III pneumococci does not produce any agglutinin which acts on human erythrocytes of any type.

Conclusion: (1) The types I, II, and III pneumococci I used contain the sheep part and the FORSSMAN's antigen in a narrow sense, but not A antigen more complex than that of the sheep part.

(2) And these two antigens are contained in the polysaccharide fraction of pneumococci.

(3) The existence of B blood group substance and O substance was unable to be proved.

References

- 1) Forssman, J.: Biochem. Zeitschr., 37: 78-115, 1911.
- 2) Avery, O. T. and M. Heiderberger: J. of exp. Med., 38: 81-85, 1923.
- 3) Schiff, F. und L. Adelsberger: Z. f. Imm., 40 (4/5): 335-367, 1924; Zbl. Bakter. I Orig., 93 (1/4): 172-183, 1924.
- 4) Takahashi, Y.: Nippon Biseibutsugakkai Zasshi, 19 (2): 278-358, 1925 (in Japanese).
- 5) Bailey, G. H. and M. S. Shorb: Amer. J. of Hyg., 13: 831-856, 1931.
- 6) Eisler, M. and A. Howard: Z. f. Imm., 76: 461-468, 1932.
- 7) Bailey, G. H. and M. S. Shorb: Amer. J. of Hyg., 17: 329-357, 1933.
- 8) Avery, O. T. and W. F. Goebel: J. of exp. Med., 58: 731-755, 1933.
- 9) Witebsky, E., Neter, E. and H. Sobotka: Amer. J. of exp. Med., 61: 703-715, 1935.
- 10) Sobotka, H., Witebsky, E., Neter, E. and E. S. Schwarz: J. of inf. Dis., 60: 257-259, 1937.
- 11) Powell, H. M. and W. A. Jamieson: Proc. Soc. Exp. Biol. and Med., 39: 248-249, 1938.
- 12) Iseki, S. and M. Terashima: Hanzaigaku Zasshi, 14 (6): 803-808, 1940 (in Japanese).
- 13) Finland, M. and E. C. Curnen: J. of Immunol., 38: 457-478, 1940.