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Response to Type 1 Pneumococcal Vaccine of Persons Belonging to Different Blood-Groups.*

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Antibody-production following oral administration of pneumococcal vaccine, types 1, 2, and 3, to human beings was reported.[1] Witebsky, Neter, and Sobotka[2] have described an immunological relationship between the specific polysaccharide of type 1 pneumococcus and the blood-group A specific substance.† They observed that isoagglutination of group A human red cells by group O serum, as well as lysis of sheep's red cells by anti-A rabbit serum, was inhibited by acetyl-SSS-1 derived from pneumococci grown in broth which contained peptone. In subsequent experiments[3] in which veal broth free of A-substance was used for propagating the pneumococci they found a less pronounced, though definitely demonstrable, interference. They left open the question whether the phenomenon was due to contamination of SSS with A-antigen from the medium or to similar chemical groupings in the two substances. If due to the latter it might be expected, though it need not necessarily follow, that persons belonging to blood-group A would not form antibody to type 1 pneumococcus so well as members of groups O and B. Similarly it might also be expected that fewer positive skin-reactions would occur among A than among O persons after intracutaneous injection of acetyl-SSS-1, but Rogers and Wagner[6] did not find this to be so.

The present study was made because of the general interest in

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1 Ross, Victor, *J. Immunol.*, 1934, **27**, 307.

2 Witebsky, Ernst, Neter, Erwin, and Sobotka, Harry, *J. Exp. Med.*, 1935, **61**, 703.

† An analogous relationship between type 14 pneumococcal polysaccharide and the human blood-group specific substances has been described.[4, 5]

3 Sobotka, Harry, Witebsky, Ernst, Neter, Erwin, and Schwarz, Eleanor S., *J. Inf. Dis.*, 1937, **60**, 257.

4 Finland, Maxwell, and Curnen, Edward C., *Science*, 1938, **87**, n.s., 417.

5 Hoagland, Charles L., Beeson, Paul B., and Goebel, Walther F., *Science*, 1938, **88**, n.s., 261; *J. Biol. Chem.*, 1939, **129**, 455; Beeson, Paul B., and Goebel, Walther F., *J. Exp. Med.*, 1939, **70**, 239.

6 Rogers, Edw. S., and Wagner, Harold C., PROC. SOC. EXP. BIOL. AND MED., 1935-6, **33**, 249.

any relationship that may exist between blood-group and the capacity to form antibody for bacterial antigens, as well as to learn whether the anticipated consequence of the acetyl-SSS-1 and A-substance relationship would be observed. Although there is evidence that the distribution of blood-groups among persons suffering from various infectious diseases is the same as among the healthy population and there is information concerning the susceptibility to diphtherial and scarlatinal toxins and blood-group there is a lack of data on the response of persons of different blood-groups to the stimulus of an antigen.

The survival of a single mouse infected with one fatal dose of pneumococci was considered evidence of the presence of antibody. Of the 63 persons who were the subjects of the experiments referred to above, blood-group data were obtained for 50. In addition, the groups of 8 of 13 persons to whom only type 1 vaccine had been previously administered were determined.[7] Five of the 50 and 1 of the 8 were not included in calculating the percentage of individuals that formed antibody for type 1 pneumococcus, either because the concentration of native antibody for this organism was so high that a response even if it had been maximal, could not have been detected (4 cases), or because type 1 vaccine was not given‡ (1 case) or due to insufficient serum to make the protection-test (1 case). Of the remaining 52 persons 19 belonged to group O, 24 to group A, 7 to B and 2 to AB. Fourteen individuals in group O, 16 in group A, 6 in group B and both AB individuals formed antibody following ingestion of type 1 vaccine. There appears to be no significant difference between persons belonging to the 2 blood-groups (O and A) comprising the large majority of this series of subjects so far as capacity to react to the vaccine is concerned. The total number of B and AB subjects is too small to justify emphasizing the better response. If there are common chemical groupings in SSS-1 and the specific antigen of human A-cells their presence is, apparently, insufficient to interfere with the production of antibody for type 1 pneumococcus.

The data also give some information regarding the frequency of native type 1 pneumococcal antibody among persons belonging to the several blood-groups. Of the total of 58 typed individuals there were 22 O's, 25 A's, 7 B's, and 4 AB's. Eight persons belonging to group O, 4 to A, 4 to B, and 2 to AB possessed such antibody. A

[7] Ross, Victor, PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 822.

‡ This subject is recorded because his blood-group is included in the calculation of the percentage of individuals possessing native pneumococcal antibody.

much larger number of persons will have to be examined before the difference between groups O and A can be accepted as other than fortuitous.

Summary. Persons belonging to blood-group A and those belonging to blood-group O formed protective antibody equally well following ingestion of type 1 pneumococcal vaccine. A somewhat greater percentage of persons in group B responded than in groups O and A but the number of individuals was too small to justify relating the fact to membership in the group.

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Effect of Desoxycorticosterone Acetate upon Plasma Volume in Patients During Ether Anesthesia and Surgical Operation.

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In recent years, several workers have found that hemoconcentration develops in the course of ether anesthesia. McAllister[1] showed that in dogs there is a drop in plasma volume and a rise in hematocrit. Searles[2] employing an increase in hematocrit, red cell count, and hemoglobin as his criterion for hemoconcentration in dogs came to a similar conclusion. Bollman, *et al.*,[3] also working with dogs, were able to demonstrate a fall in plasma volume and rise in hematocrit in response to ether anesthesia. Gibson and Branch[4] showed that ether anesthesia in man was accompanied by a slight but definite decrease in plasma volume. Stewart and Rourke[5] showed in man

1 McAllister, F., *Am. J. Physiol.*, 1938, **124**, 391.

2 Searles, P. W., *Am. J. Surg.*, 1938, **41**, 399.

3 Bollman, J. L., Svirbely, J. L., and Mann, F. C., *Surgery*, 1938, **4**, 881.

4 Gibson, J. G., 2nd, and Branch, C. D., *Surg. Gyn. and Obst.*, 1937, **65**, 741.

5 Stewart, J. D., and Rourke, G. M., *J. Clin. Invest.*, 1938, **17**, 413.