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Effect of Viscosity on Specific Agglutination.

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In a previous note¹ reference was made to the enhancing effect of increased viscosity on the agglutinative property of specific immune serum. Plasma of abnormally increased viscosity caused agglutination of bacteria to take place in higher dilutions of specific immune serum than normal plasma. Recently, opportunity was afforded to repeat the experiments using the plasma obtained from a patient with hyperinosis. The patient's plasma contained 10.12% protein, of which 5.48% were fibrinogen, 2.27% euglobulin, 1.47% pseudoglobulin I and II and 0.90% albumin (Dr. Grace Medes). The viscosity of this plasma tested with the Hess viscosimeter was over 7, as compared with normal plasma which, according to the technic employed, varied between 1.6 and 1.8.

Tests were made by arranging parallel series of tubes, one row containing plasma with a viscosity of 7, the other with normal plasma with a viscosity of 1.7, from a normal individual. To each row was added type II antipneumococcus serum (New York State Department of Health) so that dilutions ascended from 1-10 to 1-160 as shown in Table I. A suitable amount of type B Friedländer bacilli (kindly supplied by Dr. L. A. Julianelle) which agglutinate specifically in type II antipneumococcus serum was added to each tube. The tubes were incubated for 10 minutes at 37°C., during which time they were inverted gently at frequent intervals to insure thorough mixing. At the end of this time, smears were made from each tube and stained.

Results. There was no agglutination demonstrable in the normal plasma in any tube. Marked clumping was present in most of the tubes containing plasma of high viscosity. Clumping diminished as

TABLE I.

Dilution of type II serum	1-10	1-20	1-40	1-80	1-160	No serum
Normal plasma	—	—	—	—	—	—
High viscosity plasma	+++	+++	++	++	+	—

Effect of high viscosity plasma, contrasted with normal plasma on specific agglutination of type B Friedländer bacilli in type II antipneumococcus serum dilutions. Microscopic agglutination after 10 minutes at 37°C.

¹ Reimann, H. A., *Science*, 1931, 74, 513.

the dilution of specific immune serum increased as shown in Table I. Clumping did not occur in the tube containing no immune serum.

A similar phenomenon can be demonstrated by increasing the viscosity of normal plasma with gum acacia. The following experiment illustrates the effect of various dilutions of acacia, while the concentration of specific immune serum in plasma remains constant.

TABLE II.

Dilution of acacia gum	10%	5	2½	1¼	Control
Normal plasma containing type II antipneumococcus serum 1-10	++++ (Disc)	+++	+	±	—

Effect of acacia in enhancing the specific agglutinative effect of type II antipneumococcus serum on type B Friedländer bacilli. Macroscopic agglutination after 2 hours at 37°C.

Clumping is markedly increased in the stronger concentrations of acacia. Agar, gelatin, glycerin, egg white, and starch paste are less effective than acacia in favoring agglutination.

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Streptococcic Agglutination in Glomerulonephritis.

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The streptococcic agglutinating titers of the serums of 20 patients with glomerulonephritis were determined for a strain of streptococci recovered from the blood of a patient having acute rheumatic fever. This strain had been kept on media for 9 years. It produced a green discoloration faintly on sheep blood agar when incubated at 37°C. for 24 hours. It cross agglutinated in high dilution (1:50,000 and more) with many other strains isolated from patients with acute rheumatic fever and with several strains recovered from the blood of patients having chronic arthritis.

In determining the titers the various dilutions of the serums and the suspensions of the streptococcus were incubated in Wassermann tubes in a water bath at 40°C. for 2 hours and then placed in the icebox until the next morning when the agglutinating titers were read.

All serums agglutinated in dilutions as high as 1:800. Five