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Agglutinins and Protective Bodies in Pneumococcus Immunity and Application to the Control of Specific Therapy.

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Noble¹ has described an accurate method of determining agglutinins in the blood within 2 minutes after setting up the test. Since agglutinin response in pneumonia has been found to be fairly well correlated with the clinical course of the disease, in untreated cases by Blake² and in serum treated cases by Cole,³ we felt that a thorough trial of this new method of agglutinin determination was indicated.

In several patients with lobar pneumonia we have correlated the appearance of agglutinins with the dosage of serum and with the appearance of protective bodies in the patient's blood serum and we present these results pending the examination of a larger series. In 1 case of lobar pneumonia caused by pneumococcus Type IV, small doses of Felton's concentrated anti-pneumococcus serum (polyvalent against Types I, II and III) were given at varying intervals, and samples of blood serum taken at corresponding intervals were examined for agglutinins and protective bodies against the 3 fixed types of pneumococcus.

TABLE I.
Agglutinin titer and mouse protective substance.
Pneumococcus—Type I. Type II. Type III.

	Agglutinin titer	Mouse protect'n (MLD)	Agglutinin titer	Mouse protect'n (MLD)	Agglutinin titer	Mouse protect'n (MLD)
Before serum	00	00	00	00	00	00
30 min. after 1 cc.	00	10	00	1,000	00	10
30 min. after 5 cc.	00	100,000	00	100,000	00	1,000
30 min. after 5 cc.	1:20	100,000	00	100,000	00	1,000
30 min. after 5 cc.	1:20	100,000	00	1,000,000	1:20	1,000
30 min. after 5 cc.	1:100	10,000	00	1,000,000	1:40	(Tests incomplete)
90 min. after 5 cc.	1:40	10,000	1:10	1,000,000	1:40	1,000
3 hours after 15 cc.	1:80	10,000	1:20	1,000,000	1:100	1,000

From these figures we may conclude that following the administration of Felton's polyvalent serum, agglutinins appear after a certain amount of protection has been established.

A further comparison has been made of agglutinins and protective bodies in specimens obtained at a time when a fall in antibodies was taking place. A fall in agglutinin titer took place during the convalescence of a patient with Type I lobar pneumonia during the acute phase of which he received a considerable amount of Type I serum. No decrease in protective bodies occurred during the same interval. In another Type I case treated with Felton's serum, agglutinins, once present, disappeared entirely, but protective antibodies for pneumococcus Type I remained about the same in amount in the same samples of serum. In still another case of pneumococcus Type IV pneumonia treated with polyvalent serum, the disappearance of agglutinins, but persistence of protective antibodies against pneumococcus Type I was demonstrated.

To illustrate the application of this test in guiding specific therapy a case of Type II pneumonia may be cited in which a specimen of patient's blood before the administration of therapeutic serum showed no agglutination or protection. Specimens after the injection of 50 cc. of Felton's serum showed agglutination in 1:20 dilution. Protection tests done later showed the presence of considerable protection in the same blood serum sample. The maximum serum dosage was no longer necessary, thus saving annoyance to patient and saving serum. The case mentioned represents the majority of instances that are met, but more urgent circumstances may be shown by the following example. A moribund patient with a precipitin test in the urine for pneumococcus Type I showed no agglutinins in the first serum sample. Twenty cubic centimeters of serum were given. Two hours later a blood sample was taken and 30 cc. more of serum injected. This blood sample showed agglutinins in a dilution of 1:40. Another blood serum taken one-half hour after the second injection of therapeutic serum showed an agglutinin titer of 1:100. Mouse protection tests on the same samples of the patient's serum showed no protection before the administration of Felton's serum, but the presence and increase of protective bodies for pneumococcus Type I after the administration of Felton's serum. This reassurance was obtained quickly enough with this rapid agglutinin test to guide the further administration of serum.

¹ Noble, Arlyle, *J. of Bact.*, 1927, xiv, 287.

² Blake, F. G., *Arch. Int. Med.*, 1918, xxi, 779.

³ Cole, Rufus, *J. Exp. Med.*, 1917, xxvi, 453.