Rapid Pertussis Agglutination Tests of the Blood of One Hundred Normal Adult Persons

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Introduction. During the past year we have been concerned with blood typing and luetic flocculation tests of many thousands of bloods from persons acting as plasma donors. Following completion of these two tests, a sample tube containing blood clot, left-over serum, and more or less loose red blood cells about the clot is ordinarily discarded. It appeared of interest to conduct rapid pertussis agglutination tests with a series of samples of these serum plus red blood cell mixtures (adjusted roughly to simulate whole blood in appearance) in order to determine the incidence of pertussis agglutinins by this technique in normal healthy adults. This report gives the results of these tests of one hundred persons, blood samples of which were selected at random.

Materials Used. The antigen used was a blue colored pertussis suspension described by Powell and Jamieson (1) and adapted to the performance of rapid agglutination tests in which a single drop of antigen is mixed with a single drop of blood or blood serum on a slide or piece of impermeable cardboard. Results of preliminary tests with this antigen have already been reported (2, 3). Most of these tests have been conducted with the blood or blood serum of experimentally vaccinated laboratory animals. Daughtry-Denmark (4) and Lapin, (5) however, have published favorable preliminary results of the use of this rapid test in connection with examination of blood and blood serum from children vaccinated against pertussis. More recently Dr. John J. Miller, Jr., (6) has informed us of similar results which he has obtained.

The blood samples used in the tests reported in this paper were those referred to in the introduction. These were obtained from healthy adult persons who acted as donors of plasma for military use. These persons comprised both sexes between the ages of 21 and 60 years and at the time of bleeding showed hemoglobin of 80 per cent or more, temperature not to exceed 99.5° F., and presented satisfactory clinical evidence of freedom from malaria, tuberculosis and heart trouble, and general freedom from illness during the preceding month. (7) Their pertussis history was undetermined.

The rapid pertussis agglutination tests herein reported were conducted as already described. (1) This procedure comprises placing a droplet of blue pertussis antigen in this case on a piece of glazed cardboard of the size of a microscope slide or smaller, and adding to this a similar droplet of blood from the various blood samples utilized. The combined drop is stirred a few seconds to form a circle of one-half to three-quarters inch in diameter, and following this the cardboard slide is tilted back and forth for a period of one minute in order to insure

thorough mixing of antigen and blood. At the end of this time, the test drops are set aside to dry and, on drying, readings of the degree of agglutination are assigned them, after which they may form a permanent record.

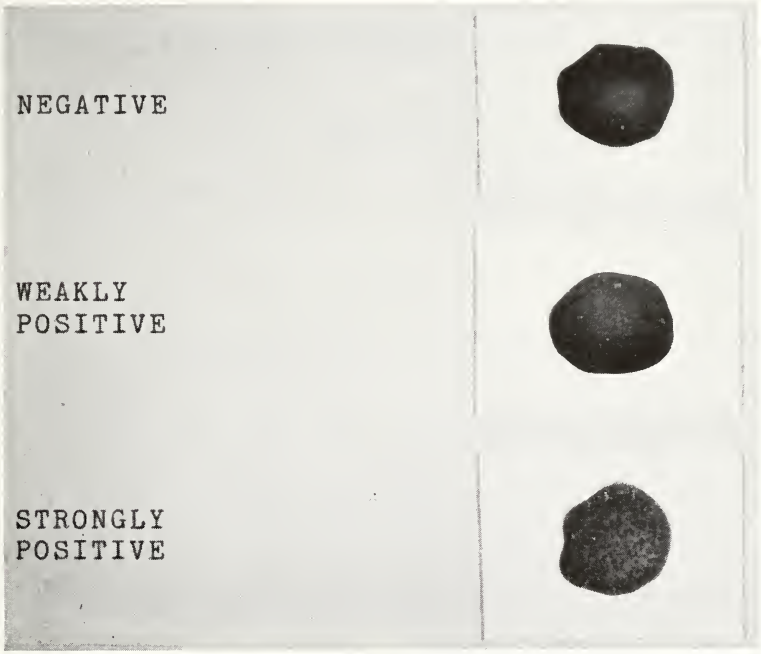

Fig. 1.

Results. Figure 1 shows the appearance of a negative reaction, a weakly positive reaction, and a strongly positive reaction, elicited by control bloods on hand in the laboratory. These control bloods had been bled at various times following the use of pertussis vaccine. The present group of 100 bloods was found to give almost uniformly the negative type of reaction as seen in figure 2. Only two of these gave what might be considered weakly positive reactions. This result may be the expectation in such a group of persons between the ages of 21 and 60, since most of these individuals would likely have had whooping cough 15 to 50 years previously, before widespread use of Phase I vaccine, and antibody incited at that time would have waned at the time of these tests.

Discussion. It is common knowledge that various serologic reactions, such as the Widal reaction, decline in strength in the years succeeding infection or use of vaccine. It appears that pertussis is no exception to this general rule, and although agglutinins and other antibodies may decrease in potency over a period of time even to the point of extinction

of any measurable reaction or titer, considerable specific resistance is known to occur. In all probability an incipient infection, long after antibodies have been produced and subsequently lost, can be dealt with adequately by means of an acquired adaptation to produce potent antibody in a very short period of time. In support of this idea in connection with

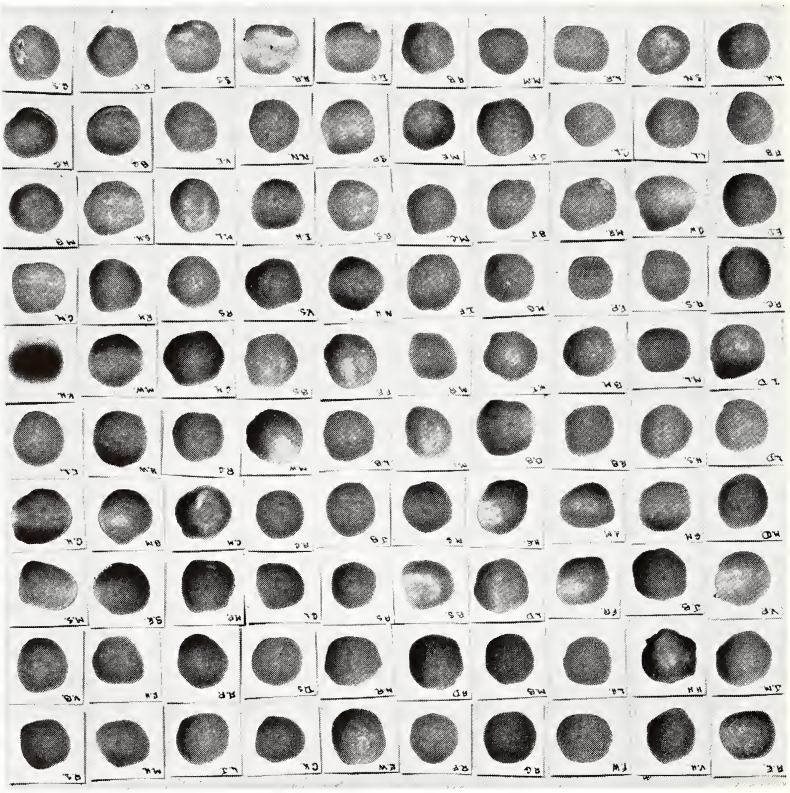

Fig. 2.

pertussis, we have observed that, within five years following pertussis vaccination, some 50 per cent of patients show no demonstrable antibody. However, these negative reactors produce strong agglutinin in a short period of two weeks following revaccination with a single small dose of antigen. (2) This accelerated rate of reappearance of substantial antibody appears sufficiently regular to comprise a rough serological indicator of previous specific vaccination in the absence of circulating antibody.

Conclusions. 1. Bloods from 100 healthy adult persons of both sexes covering a wide age group have been tested for presence of pertussis agglutinins by the rapid test.

2. With the exception of two weakly positive reactions, all of these gave essentially negative reactions.

3. There is no evidence from this group of tests that pertussis antigen is agglutinated non-specifically by normal human blood serum.

4. The above results verify a previous unreported series of tests we made eleven months ago on a sampling of 50 human sera from the same source as the bloods herewith reported. These former serum tests elicited practically all negative reactions, only one of these showing as weakly positive.

5. Absence of agglutinins for *H. pertussis* is not to be construed as evidence of susceptibility to pertussis, any more than absence of a demonstrable Widal reaction is to be construed as susceptibility to typhoid. It is obvious that previous host experience with the particular microorganisms should be taken into consideration.

References

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