

HETEROPHILE ANTIGENS OF ORGANISMS CAUSING  
PARTICULARLY DANGEROUS INFECTIONS AND THEIR  
ACTION ON HUMAN INTESTINAL TISSUES

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To detect heterophile antigens similar to those of human small intestinal tissue in organisms responsible for particularly dangerous infections, strains varying in their degree of virulence were used: Vibrio cholerae, Vibrio El Tor, vibrios of Heiberg's VI group, water-inhabiting and nonagglutinating vibrios, and virulent and avirulent strains of Pasteurella pestis. Heterophile antigens were detected in strains of V. cholerae, V. El Tor, nonagglutinating vibrios with the ability to cause cholera, and in the virulent strain P. pestis 232. No reaction was obtained with all the other strains tested.

KEY WORDS: particularly dangerous infections; similar antigens in microorganisms and man.

The results of a study of heterophile antigens of the organisms of plague and cholera similar to tissue antigens of man and animals were described previously [4]. The agent of plague was found to have common antigens with human red blood cells and with guinea pig liver and spleen, whereas Vibrio cholerae had common antigens with the epithelium of the mucous membrane of the human small intestine.

Antigenic similarity between Pasteurella pestis and human red blood cells was first discovered by Zhukov-Verezhnikov and Guseva in 1944 [5]. On this basis these workers put forward the hypothesis that the virulence of microorganisms containing heterophile antigens is increased [3].

At the present time heterophile antigens have been found in the agents of many infectious diseases [1, 2, 6, 7]. However, no comparative investigation of heterophile antigens in virulent and avirulent microorganisms has yet been undertaken.

Accordingly in the investigation described below the presence of heterophile antigens similar to tissue antigens of the human intestine was studied in strains of V. cholerae and P. pestis with different degrees of virulence.

EXPERIMENTAL METHOD

Two strains of V. cholerae, four strains of V. El Tor, two strains of vibrios of Heiberg's VI group, two strains of water-inhabiting and four strains of nonagglutinating vibrios, and also two strains of P. pestis were tested.

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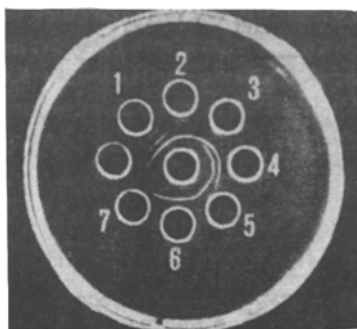


Fig. 1

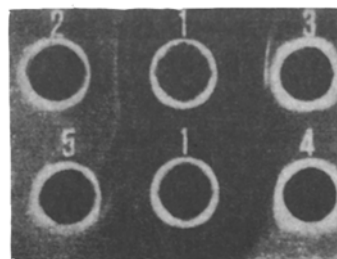


Fig. 2

Fig. 1. Relations between somatic and heterophile antigens of V. cholerae. Central well contains culture of V. cholerae strain 569(B). Peripheral wells contain: 1) cholera agglutinating O-serum, 2-7) antiserum against tissue of human small intestine, whole and in dilutions of between  $\frac{1}{2}$  and  $\frac{1}{32}$ .

Fig. 2. Heterophile antigens of V. cholerae and P. pestis similar to tissue antigens of human small intestine: 1) antiserum against tissue of human small intestine, 2) nonagglutinating cholera vibrio (cholero-genic strain), 3) V. cholerae, 4) P. pestis EV, 5) P. pestis 231.

To detect antigens similar to tissue antigens of the human intestine in the microorganisms the precipitation test in agar gel was carried out.

Antitissue rabbit antisera were used for the test. Tissue of the small intestine of a stillborn infant was used as the antigen for immunization. After its sterility had been verified by seeding, saline extracts were prepared from this tissue and rabbits were immunized with them [4].

Suspensions of living bacterial cells in physiological saline ( $80 \cdot 10^9$  cells/ml) were used as antigens in the precipitation test.

#### EXPERIMENTAL RESULTS

The results of the precipitation test in agar gel with highly cholero-genic strains of V. cholerae 155 and 569(B) showed that two distinct lines were formed with antiserum against human small intestine.

The relations between the heterophile and somatic antigens of V. cholerae are illustrated in Fig. 1. Clearly the precipitation lines of the heterophile antigen of V. cholerae strain 569(B) were identical with one of the precipitation lines of the somatic antigen.

Two strains of nonagglutinating vibrios, possessing cholero-genicity in experiments on rabbits, each gave one diffuse line with antiserum against human small intestine. There was no reaction with non-cholero-genic nonagglutinating vibrios.

Of the four strains of V. El Tor two (308 and 344) each gave one sharp line with this antiserum, whereas there was no reaction with the remaining strains (CW6 and T-16), which were old museum strains.

No reaction was obtained with any of the strains of water-inhabiting vibrios or vibrios of Heiberg's group VI tested.

It can be concluded from these results that the presence of heterophile antigens similar to tissue antigens of the human intestine in the agents of cholera depends on the degree of their virulence: the more virulent the strain, the stronger the precipitation test with antiserum against human small intestine. Conversely, a negative reaction was observed with the avirulent strains.

Similar results also were obtained with the agents of plague (Fig. 2). Antiserum against human small intestine reacted only with the virulent strain P. pestis 231. There was no reaction with the avirulent vaccine strain P. pestis EV. As already stated, common antigens were found previously between P. pestis, human red blood cells, and guinea pig liver and spleen [4, 5].

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