BIVALENT TYPHUS VACCINE OF HIGH IMMUNIZING VALUE

BASED on immunologic differences found between endemic and epidemic typhus strains, some authors recommend the production of "epidemic" vaccines as means of practical protection against the infection. Such vaccines have little if any value against "murine" and closely related strains which have been found to originate outbreaks of typhus fever of considerable extent and great severity. On the other hand, by increasing the antigenic content of our "murine" vaccine it is possible to immunize against both types of the infection as shown by Veintemillas,[1] who has found that complete protection can be obtained in men vaccinated against the experimental inoculation by both Mexican endemic virus and Bolivian epidemic typhus.

The results of practical vaccination with "murine" vaccine have not been carefully studied. A considerable number of persons has been vaccinated, but we may draw information from only 5,000. All these cases were potentially exposed to the infection and we know that at least seven developed typhus after being properly vaccinated. From a large group of physicians, nurses and medical students, two vaccinated persons developed mild typhus, while two non-vaccinated students died of the infection. The possibility that the indicated failures might have been due to insufficient cross-protection against some epidemic strains encouraged us to improve our monovalent "murine" vaccine by addition of "epidemic" antigen.

The cultivation of murine virus in the lungs of rats produces amounts of rickettsiae which are far superior to the yield of ordinary bacteria growing in artificial media if we compare lungs and media by weight, but, so far, we have not been able to obtain practical "lung" cultures of the "Breinl" strain, not even in mice. However, we have found that a Mexican epidemic strain is suitable for the production of considerable growth of rickettsiae in the lungs of mice. Pure suspensions of organisms thus obtained have a high protective value against both the "Breinl" and the homologous strains, although it is not satisfactory against endemic typhus. Suspensions which are water-like in appearance have a definite protective effect against the "Breinl" strain. The bivalent vaccine has a final concentration, when ready for human use, equivalent to a turbidity intermedial between Nos. 1 and 2 of the McFarland scale. This amount of antigen produces local and sometimes general reactions in vaccinated persons, but it is well tolerated. When tested in guinea-pigs, it shows a high degree of protection against both "murine" and "Breinl" strains. Since the organisms can be obtained in pure suspensions, the antigenic content of the vaccine can be modified at will. For instance, for field work we distribute a suspension containing 10 times more rickettsiae than that required for human vaccination. Therefore, 50 cc of such stock vaccine is sufficient to start the immunization of 1,000 people. Before use, the concentrated vaccine is diluted in the same syringe with 9 parts of steric isotonic NaCl solution administering a first dose of 0.5 cc and 2 subsequent doses of 1 cc each at weekly intervals. However, this treatment is insufficient for laboratory workers, who require at least 5 doses of vaccine to be fully protected.

The cost of production of the bivalent vaccine is relatively low since the mouse vaccine is only a minor part of the mixture.

In selecting the strain for the preparation of the murine vaccine we found the "L" strain most suitable for the production of large quantities of rickettsiae in the lungs of rats, and the epidemic strain called "42," which has properties equal to the "Breinl" strain, is readily adapted to grow in the lungs of mice. Further modifications in the antigenic composition of the vaccine depend on the results of its application to men.

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[1] F. Veintemillas, Suplementos del Instituto Nacional de Bacteriología, June and November, 1941, La Paz, Bolivia.

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