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THE ACTIVE IMMUNISATION OF HORSES AGAINST TETANUS.

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THE clinical value of protective injections of tetanus antitoxin in horses and other animals is well known and has been definitely established as a result of prolonged usage.

It is also well known that the *passive* immunity which is conferred upon man or animals by such means is necessarily of a transitory nature. While the elimination of the antitoxin in man is, because it contains heterologous or "foreign" proteins, naturally more rapid than is the elimination of the homologous serum from horses, it is, nevertheless, certain that after the lapse of a few weeks the amount of antitoxin remaining in the system of the horse is probably never sufficiently high to protect the animal against a fatal intoxication.

It has long been known that more or less balanced mixtures of diphtheria toxin and antitoxin stimulate the body cells to produce their own antitoxin, and that the *active* immunity so produced persists for a very much longer time than does the *passive* immunity conferred by an injection of antitoxin alone. As long ago as 1907 Theobald Smith (*Journal Med. Research*, 1907, XVI, 359) suggested the possibility of protecting man against diphtheria by means of such mixtures, and subsequently showed that such an immunity could be produced in experimental animals. The mechanism of this reaction was ascribed by Behring (*Deutsch. Med. Wochenschr.*, 1913, XXXIX, 873) to the instability of the union of toxin and antitoxin, so that after the injection of such a neutral mixture into animals a certain amount of toxin becomes liberated and stimulates the body cells, which produce their own antitoxin. It is not finally decided whether this is so, or whether the action of antitoxin upon toxin is such as to render it incapable of producing its specific poisoning, while interfering to only a slight extent with the power of the toxin to cause the production of antitoxin in the animal; that is, converts it into a modified toxin which has lost its pathogenic but not its antigenic properties.

In the process of the active immunisation of many horses against tetanus toxin in the preparation of tetanus antitoxin during the war he found that the injection of such neutral mixtures of tetanus toxin and antitoxin in non-immune horses produced a valuable *active* immunity.

A short experiment was therefore carried out by Dr. R. A. O'Brien, Mr. Glenny and myself, and it was found that several horses which had been so treated with neutral mixtures of tetanus toxin and antitoxin withstood after an interval of a few weeks an intramuscular injection consisting of sterile garden soil, together with 2 cc. of an actively growing culture of the tetanus bacillus, representing many fatal doses.

The possibilities of this method of inducing an active and lasting immunity against tetanus will undoubtedly appeal to practitioners, more particularly to those who have experienced cases of so-called "delayed" tetanus.

Transpose To A. Page 1

The suggestion arises that mixtures of tetanus toxin and antitoxin would similarly cause the production of active, and therefore lasting, immunity against tetanus; my colleague, Mr. Glenny, has found that this expectation is justified by experiment.