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Heterophile Antigenicity of Hamster Tissues and Its Relation to Wassermann Reaction Induced in Normal Rabbits.

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The finding of Hu and his coworkers[1] that normal rabbits receiving injections of hamster tissue developed strongly positive Wassermann reactions suggested the following 2 lines of study, namely, (1) the heterophile antigenicity of various hamster tissues, and (2) the relation of its antibody to the Wassermann reaction induced in rabbits. The presence of heterophile antigens in various tissues of experimental animals such as horses, guinea pigs, mice, etc.,[2, 3] as well as those of plants (corn)[4] has been demonstrated and the induction of the Wassermann reaction in rabbits by injections of extracts of guinea pig tissue and of lipoidal substances from rabbit testis has been observed.[5, 6, 7] In this study observations were made on the presence of heterophile antigens and Wassermann stimulating substances in the hamster tissues, and on the relationship between the two.

Methods. Ten rabbits were selected for the experiments. Tests were made on the blood serum of these animals for the presence of "natural" heterophile antibody. Wassermann tests were also performed on the same blood specimens. The results of these tests were all negative. Various hamster tissues, emulsified in sterile normal saline, were injected into 8 rabbits, either intratesticularly or subcutaneously; 2 remaining rabbits received intratesticular injections of an emulsion of guinea pig testis. Following these injections, a determination of heterophile antibody and a Wassermann test were made simultaneously at weekly intervals on the blood of these animals for a total period of 5 weeks.

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1 Hu, C. K., Wong, Dorothy Huie, and Pearce, Louise, PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 989.

2 Bull, C. G., Newer Knowledge of Bacteriology and Immunology, University of Chicago Press, Chicago, 1928, p. 933.

3 Iijima, T., *Scien. Rep. Gov. Inst. Inf. Dis.*, 1921, **1**, 97.

4 Hyde, R. R., Chapman, J., and Kiesling, C., *Am. J. Hyg.*, 1934, **20**, 465.

5 Taniguchi, T., *Scien. Rep. Gov. Inst. Inf. Dis.*, 1921, **1**, 87.

6 Eagles, H., *J. Exp. Med.*, 1932, **55**, 677.

7 Klauder, J. V., *Arch. Derm. Syph.*, 1931, **23**, 884.

For the determination of heterophile antibody, the usual technique was followed. Various dilutions (from 1:80 to 1:1280) of inactivated sera in 1 cc. amounts were mixed with 0.5 cc. of guinea pig complement (2 units) and 0.5 cc. of 2% sheep cells, making a total volume of 2 cc. Controls without complement were set up with the highest concentration of serum (1:80) at the same time. Readings were taken at the end of 2 hours' incubation in a water bath at 37°C. For the Wassermann test, the Kolmer method[8] was employed. The results are presented in Chart 1.

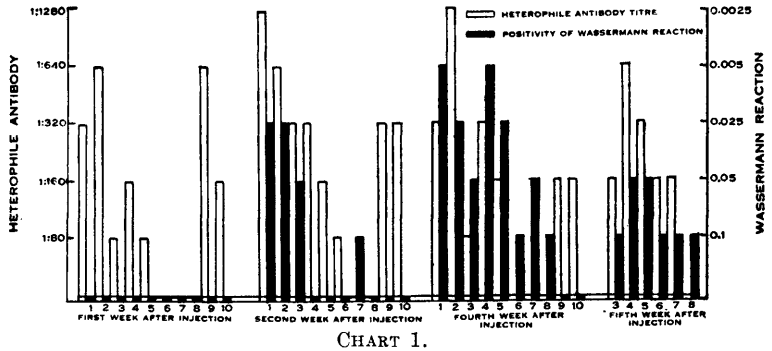

CHART 1.

The Wassermann reaction and heterophile antibody response in rabbits to intratesticular and subcutaneous injections of various hamster and guinea pig tissues.

Rabbit 1 and 2 received one cc. of an emulsion of hamster testis injected intratesticularly.

Rabbit 3 and 4 received one cc. of an emulsion of hamster testis injected subcutaneously.

Rabbit 5 and 6 received one cc. of an emulsion of hamster kidney injected subcutaneously.

Rabbit 7 received one cc. of an emulsion of hamster spleen subcutaneously.

Rabbit 8 received two-tenths cc. of hamster whole blood injected subcutaneously.

Rabbit 9 and 10 received one cc. of an emulsion of guinea pig testis injected intratesticularly.

The height of the columns represents the highest dilution of serum in which the tests were positive.

In order to go further in establishing the absence of any relation between these 2 bodies, absorption tests were carried out as follows: Ground hamster, guinea pig and rabbit tissues were separately mixed with 2 rabbit sera showing high heterophile antibody titres and giving strongly positive Wassermann reactions. The mixtures were placed in a water bath at 37°C. for 2 hours and then centrifugalized. The supernatant sera were retested. The results are presented in Table I.

Results. From Chart 1, it is clear that the injection of emulsions of hamster testis, either intratesticularly or subcutaneously, and of

[8] Kolmer, J. A., Infection, Immunity and Biologic Therapy, W. B. Saunders, Philadelphia, 1925, p. 478.

TABLE I.

Titre of heterophile antibody and degree of Wassermann reaction in rabbit serum before and after absorption with various tissues.

	Heterophile antibody determination serum dilution						Wassermann reaction quantity of serum					
	1:80	1:160	1:320	1:640	1:1280	Control 1:80	.1	.05	.025	.005	.0025	Control .1
Rabbit I												
Unabsorbed serum	++	++++	++++	++++	+++	0	++++	++++	++	0	0	0
Absorbed with rabbit kidney	+++	++++	+++	+++	+++	0	+++	++	0	0	0	0
Absorbed with hamster testis	±	±				0	++++	++++	0	0	0	0
Rabbit II												
Unabsorbed serum	+++	+++	+++	++	+	0	++++	++++	++++	+++	0	0
Absorbed with rabbit kidney	+++	+++	++	+	+	0	++++	++++	+	0	0	0
Absorbed with guinea pig kidney	0	0				0	++++	++++	+	0	0	0
Absorbed with hamster testis	0	0				0	++++	++++	++++	0	0	0

hamster kidney or spleen subcutaneously, induced in the appearance of both heterophile antibodies and Wassermann reactive bodies in the rabbit's blood. That these 2 bodies are not identical is indicated by the fact that one week after injection the heterophile antibodies were present in large quantity, while the Wassermann reactive bodies were absent. The heterophile antigenic power seemed to be greater with testicular tissue than with that of the kidney or spleen, and the intratesticular route of injection was somewhat more effective than the subcutaneous one. The same differences obtained in the production of Wassermann reactive bodies. It is to be noted, however, that the intratesticular injection of guinea pig testicular emulsion into 2 rabbits produced a fairly high titre of heterophile antibody, but that the Wassermann test was negative with 0.1 cc. of these sera during the observation period of 5 weeks.

Table I shows that the heterophile antibodies may be completely absorbed by either hamster testicle or guinea pig kidney. After absorption, the quantity of Wassermann reactive bodies was not materially reduced in comparison with that of the sera absorbed with rabbit's tissue which contains no heterophile antigen.

In another group of 8 rabbits which received intratesticular injections of syphilitic rabbit testis, the Wassermann reactions became strongly positive, but heterophile antibody was not detectable.

Summary and Conclusion. The presence of heterophile antigen in hamster tissues was demonstrated by direct examination for the antibodies in rabbits injected with various hamster tissues. This was confirmed by the absorption test with guinea pig kidney. That there is no relationship between heterophile antibody and a positive Wassermann reaction, induced in normal rabbits by injections of the hamster tissues, was demonstrated by the following facts. In the first place, contrary to Taniguchi's statement,[9] it was found that although guinea pig tissue has a high heterophile antigenic power, it does not induce a positive Wassermann reaction in the normal rabbit. Secondly, after complete absorption of heterophile antibody from rabbit serum, the positivity of the Wassermann reaction is not materially reduced. Thirdly, tests made on 8 syphilitic rabbits, infected intratesticularly by injecting syphilitic rabbit testicular emulsion, showed that the sera developed strongly positive Wassermann reactions, but were negative for heterophile antibody.

[9] Taniguchi, T., *J. Path. Bact.*, 1921, **24**, 222.