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The Permeability of the Placenta of the White Rat to a Specific Hemolysin.

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In view of the controversy upon placental permeability, the following experiments were undertaken to keep the animal under observation for a longer period than has heretofore been done, and to test placental permeability by means of a definite indicator (in this case immune serum hemolysin against guinea pig corpuscles). The white rat was used as it has been shown (Nicholas, 1925,[1] 1926[2]) that this animal is capable of withstanding the shock incident to the necessary surgical procedure without subsequent abortion. Frequent injections could, therefore, be made into the foetus, and its condition followed through frequent observations.

Specific immune serum hemolysins were prepared by the following method: 3 cc. of a 50 per cent suspension of washed guinea pig corpuscles were injected intraperitoneally twice a week for 3 weeks; the animals were not injected during the succeeding 10 days. The second series of injections was begun at the end of this period, twice a week for 3 weeks, consisting of a 60 per cent corpuscle suspension. The percentage of the corpuscle suspension was increased 10 per cent each week. The serum of 12 rats so treated was then pooled, and the titer taken. While the rat is regarded as being a poor animal, from the standpoint of the strength of the reaction obtained, the low titer hemolysin (titer 500) secured had the advantage of being nontoxic to the rat foetuses.

The experiments with the above material are: 1. The injection of immune serum hemolysin into 14 to 19 day old foetuses; 2. The injection of 50 per cent suspension of washed guinea pig corpuscles into foetuses of the same age, and 3. tests to determine the passage through the placenta of materials from mother to foetus.

An injection of 2 cc. of titer 500 hemolysin into the foetuses gave no reaction when the blood of the mother was tested for this hemolysin. The same quantity of material injected into a nonpregnant individual gave positive reactions over a considerable period of time. The hemolysin could be recovered from the embryos, for forty-eight hours, after which the tests were negative. The experiments were controlled by testing the maternal blood before the injection.

When 50 per cent suspension of washed guinea pig corpuscles was injected into rat foetuses, there was a response, on the part of the foetus as shown by tests for hemolysins and agglutinins in the foetal blood. The maternal blood showed, however, no increase in hemolysin either in the general circulation, or in the uterine vein blood. Instead, a substance was found which retarded and prevented the hemolytic reaction. This substance measured 25 units in the uterine vein, and as high as 1 to 2 units in the general circulation. The unit of measurement consisted of the prevention of the hemolytic process of 0.01 cc. of hemolysin (titer 500) by 0.1 cc. of serum.

When females were injected to produce hemolysins before conception, the hemolysin was not passed to a subsequent litter in demonstrable quantity, although the titer of the maternal serum was as high as 300 or 400.

Natural hemolysins, when found in the maternal serum, could not be demonstrated in the young.

The placenta of the white rat acts as a barrier and not as a semipermeable membrane to hemolysins prepared in the rat against guinea pig corpuscles. In some way the characteristic reaction of the hemolytic body is changed or else an antibody or neutralizing substance is formed, probably by the placenta. There is, of course, a possibility of this substance being formed in both the mother and the foetus but if such is the case, it is probably in much smaller quantity than that which is formed by the placenta.

The placenta of the white rat, therefore, restricts the passage either from mother to foetus or foetus to mother of natural hemolysin and of both actively and passively acquired white rat-guinea pig hemolysin.

[1] Nicholas, J. S., *Anat. Rec.*, 1925, xxxi, 385-394.

[2] Nicholas, J. S., PROC. SOC. EXP. BIOL. AND MED., 1926, xxiii, 436-439.

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Hormone Content of the Placenta and Chorionic Membranes.

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Earlier investigators have studied the hormone content of the placenta by the reactions of the mammary glands[1] and uterus[2, 3, 4] to injected extracts. It has been difficult to use such test reactions