HISTOCHEMISTRY OF PLACENTAL CARBOHYDRATES IN PREGNANT ALBINO RATS WITH HYPERINSULINEMIA

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The object of this investigation was to study the carbohydrate content of the placenta after experimental procedures directed toward the pancreas.

EXPERIMENTAL METHOD AND RESULTS

The experimental material consisted of the hemochorial placenta of the rat, very similar in its structure to the human placenta. The pregnant animals were given daily subcutaneous injection of insulin in a dose of 0.04 ml for from 17 to 64 days in order to produce general hypoglycemia. To indicate the effect of the insulin, the blood sugar of the experimental rats was investigated by a photocolorimetric method. In none of the animals did the blood sugar exceed 50-55 mg %.

The placentas were fixed in 10% acid formalin and embedded in paraffin wax. Sections were cut to a thickness of 5-6 μ and stained with hematoxylin–eosin and by Mallory's method. Histochemical methods also were used: Hale's method, staining with toluidine blue at different pH values, the PAS reaction. All the histochemical methods were accompanied by the appropriate enzymic and chemical controls.(sulfatation, methylation, blocking the 1, 2-glycol and aldehyde groups, treatment with amylase).

The investigations yielded the following results. After staining with toluidine blue weak γ-metachromasia was observed at pH values higher than 4.0. In the parts of the syncytium lying next to the large blood vessesls vacuoles and metachromatic granules were visible. Little Hale-positive material was present in either the fetal or the maternal part of the placenta. Compared with the normal placenta, no differences were seen in the content of substances staining by Hale's method. The investigations showed that these substances are compounds of the glycogen or glycoprotein type (Fig. 1).

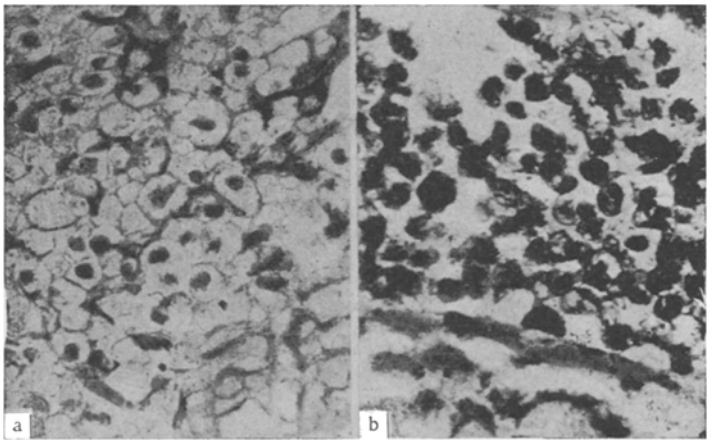

Fig. 1. Maternal part of the placenta of an albino rat on the 19th-20th day of pregnancy. a) control with amylase; b) without amylase. Photomicrographs. PAS. Objective 20×, ocular 10×.

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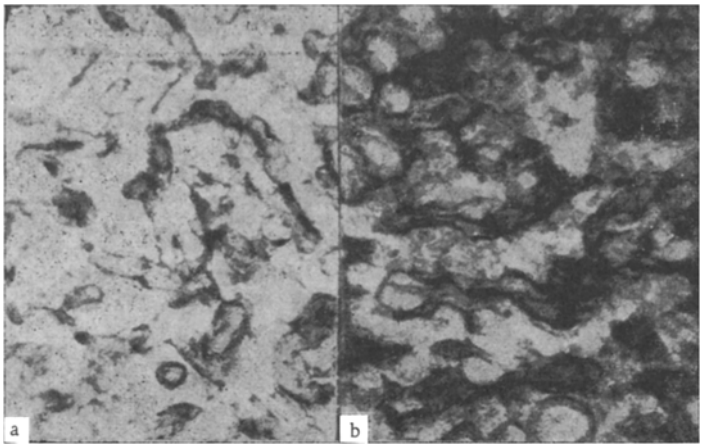

Fig. 2. Fetal part of the placenta of an albino rat on the 19th-20th day of pregnancy. a) normal; b) placenta of an experimental rat. Photomicrographs. PAS. Objective 20, ocular 10×.

After administration of insulin the glycogen content of the placenta was increased. Glycogen was expecially abundant in the syncytium next to the large fetal blood vessels. The glycogen here formed large conglomerates on the side bathed with maternal blood (Fig. 2). In the experimental rats accumulation of glycogen was also observed in the bands of the trophoblast on the 10th-11th day of pregnancy, whereas normally no glycogen is present at this stage. According to some reports [1, 2], glycogen appears in the trophoblast only on the 14th-15th day of pregnancy.

In the placentas of the experimental animals on the 10th-11th day of pregnancy glycogen was present in the syncytium next to the maternal part of the placenta and to the fetal blood vessels in the form of tiny granules, and it had disappeared from the syncytium close to the large fetal vessels.

In pregnant rats with hyperinsulinemia the content of glycogen in the bands of the trophoblast is thus higher, and it appears sooner, than in normal conditions.

LITERATURE CITED

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