STUDY OF GLUCOSE-6-PHOSPHATE DEHYDROGENASE IN THE HUMAN PLACENTA

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SUMMARY

The activity of glucose-6-phosphate dehydrogenase was investigated in eight normal human placentas at term of pregnancy. The authors demonstrate that the activity of this enzyme is greater in the syncytial layer of the placental villi of the central portion, and they advance ward the hypothesis that the site of metabolic activity of the carbohydrates, at least in the placenta at term, may be the syncytium.

The human placenta is a very complex organ whose many functions include synthesis, secretion and transportation.

It is the source of production of chorionic gonadotrophins, progesterone and oestrogens and it is also the site of synthesis of carbohydrates, proteins and fatty acids. It is now certain that the trophoblast is the site of all these biosynthesis functions.

Furthermore it is known ([1]) that the many enzymes present in the normal human placenta undergo modifications that are according to the stage of pregnancy. Thus, 3-beta-ol and 17-beta-ol-hydroxysteroid dehydrogenase, for example, participating in the biosynthesis of the steroid hormones, as well as isocitric-glucose-phosphate and lactic-dehydrogenase, show an increasing intensity from the 6th to the 12th week of pregnancy and a diminution of activity before its term, coincidentally with the diminished concentration of progesterone.

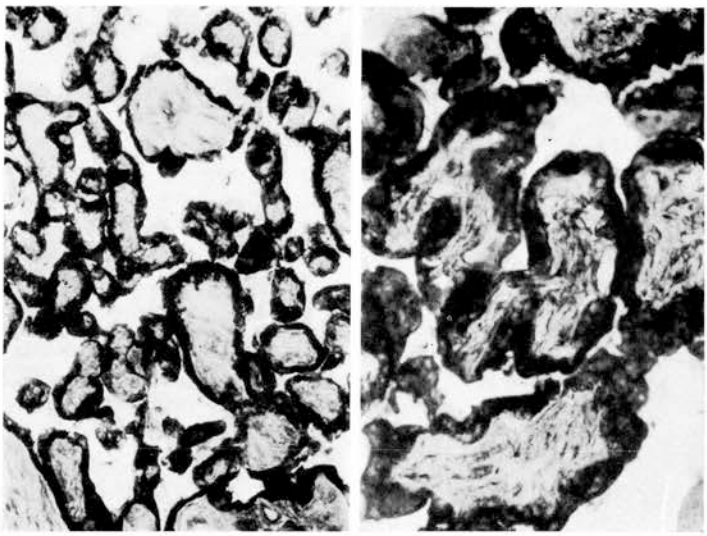
Then there are some enzymes, in the toxaemias of pregnancy, whose activity persists up to term, such as the phosphatases and leucine aminopeptidases, indicating that these substances participate in the processes of regression of the placenta ([1]).

It is thus clear that the histochemical evaluation of enzymatic variations is of ever-growing importance. Such abnormal variations, may disclose alterations in the maternal-foetal-placental metabolism.

In the present study, we have taken into consideration an enzyme, the glucose-6-phosphate dehydrogenase, that plays a part carbohydrate metabolism in the human placenta at pregnancy nearing term.

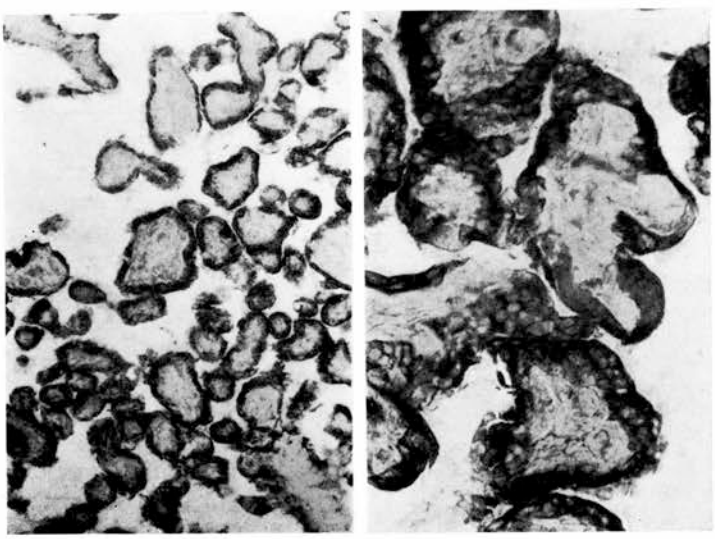
We shall attempt to assess istochemically its site of greatest concentration, aloug with the possible differences in relationship to various sites.

Few histochemical data have in fact been reported on this enzyme in the world literature.



a) *b*)

Fig. 1. — Central portion of a placenta of a pregnancy nearing term. Site of the Glucose-6-phosphate dehydrogenase in the trophoblast. Rudolph-Klein method (1964); *a*) analarged 200 ×; *b*) analarged 400 ×.



a) *b*)

Fig. 2. — Peripheral portion of a placenta of a pregnancy nearing term. Site of the Glucose-6-phosphate dehydrogenase in the trophoblast. Rudolph-Klein method (1964); *a*) analarged 200 ×; *b*) analarged 400 ×.

Eight normal human placentas at term were removed immediately after birth, and were separated from the umbilical cord and the foetal membranes. Small pieces of these placentas were taken, from the central portion and from the peripheral part of the organ. The material excised was partly fixed in formalin, included in Tissuemat, and stained after section using ordinary stains (haematoxylin-eosin; Mallory-azan). They were partly sectioned in the cryostat, and Rudolph and Klein's method (1964) ([2]) was used for glucose-6-phosphate dehydrogenase.

In all the sections examined, intense activity of glucose-6-phosphate dehydrogenase was found, affecting the syncytial layer of the placental villi. This activity was less intense in the sections of fragments of placenta obtained from the periphery of the organ (fig. 1, fig. 2).

On the basis of these findings, it is presumed that the site of metabolic activity of the carbohydrates, at least in the placenta at term, is the syncytium.

We now intend to extend this investigation, using placentas at different stages of pregnancy, and from women affected by toxaemia of pregnancy.

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