

LACTATE DEHYDROGENASE ACTIVITY IN THE MYOMETRIUM, PLACENTA, AND BLOOD OF WOMEN WITH UTERINE INERTIA

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Lactate dehydrogenase (LDH) activity in the myometrium is considerably increased (by more than threefold) but reduced in the placenta and blood plasma of women with uterine inertia compared with women in normal labor. Changes in the LDH isoenzyme spectrum are also observed in uterine inertia. It is postulated that LDH activity in the blood of parturient women may provide an additional diagnostic test of uterine inertia.

In uterine inertia the fetus frequently is exposed to hypoxia of asphyxia, being in a state of increased acidosis, i.e., carbohydrate metabolism in the fetus takes place predominantly by the glycolytic route.

It was therefore decided to investigate lactate dehydrogenase (LDH) activity in the myometrium, placenta, and blood of women in labor with normal uterine activity and with uterine inertia.

The hypothetical changes in LDH activity in the myometrium and placenta in this form of obstetric pathology and the possible correlative changes in the maternal blood could provide the starting point for further investigations in the quest for more effective prophylactic and therapeutic measures.

EXPERIMENTAL METHOD

Biopsy material from the myometrium was taken from the body of the uterus of 21 women during caesarian section undertaken on obstetric grounds at the end of pregnancy, both on women with a normal course of labor and also on women with uterine inertia. The placenta was obtained from 15 women after spontaneous labor. Immediately after birth the placenta was perfused at 2-4°C with distilled water. It was ground in a mortar with Al_2O_3 and then extracted with 0.1 M phosphate buffer, pH 7.4 (1:9 for the myometrium) and 0.14 M NaCl (1:4 for the placenta). The supernatant fraction was centrifuged at 7000 g for 15 min at 2-4°C, then diluted with the same solution to give a final protein concentration, determined by Lowry's method [6], of 2-3 mg/ml. Total LDH activity in the myometrium and placenta and also in the blood plasma taken from 36 women was determined spectrophotometrically at 340 nm from the decrease in $NAD \cdot H_2$ during incubation for 1 min at 24°C [1, 7] and calculated per milligram extract of myometrium and placenta or per milliliter of citrated plasma. The composition of the LDH isoenzymes, adsorbed on DEAE-Sephadex A-50 (cardiac type) and unadsorbed (hepatic type) was determined in the blood serum of 31 women by the "Boehringer" (Mannheim, West Germany) method using their reagents.

EXPERIMENTAL RESULTS AND DISCUSSION

The results given in Fig. 1 show that LDH activity in the myometrium of women during labor was almost indistinguishable from the activity of this enzyme in the myometrium before the beginning of labor. Uterine inertia was characterized by a marked increase (more than threefold) in the LDH activity in the myometrium; this could lead to an increase in the lactic acid concentration and hence, weakening of the contractile function of the uterus. However, the mechanism of the increase in LDH in the myometrium in this form of obstetric pathology has not been explained.

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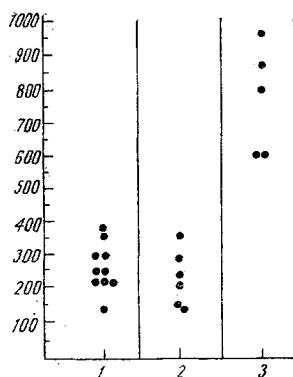


Fig. 1

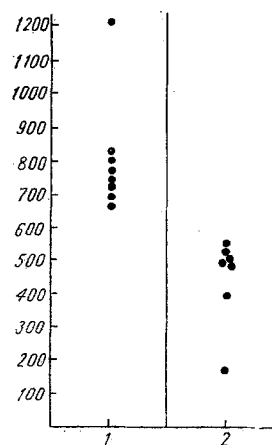


Fig. 2

Fig. 1. LDH activity (in nmoles $\text{NAD} \cdot \text{H}_2$ /min/mg) in myometrium of women at end of pregnancy and during labor: 1) end of pregnancy; 2) normal uterine activity; 3) uterine inertia.

Fig. 2. LDH activity (in nmoles $\text{NAD} \cdot \text{H}_2$ /min/mg) in human placenta during labor: 1) normal uterine activity; 2) uterine inertia.

LDH activity was next investigated in the blood plasma of women in labor with normal uterine activity and with uterine inertia. Dilatation of the cervix uteri in the last two groups at the moment of taking the blood was approximately the same (3-6 cm). The first period of normal labor was accompanied by frequent pains of satisfactory strength and duration. In primary uterine inertia the pains from the beginning of labor were weak, infrequent, and short.

The results of the investigations (Table 1) showed that during normal labor LDH activity in the blood of the women was more than twice the LDH activity at the end of pregnancy, in agreement with results obtained by Fedorova et al. [5]. In women with uterine inertia, the LDH activity in the blood was much lower than the activity of this enzyme in women during normal labor.

The changes in LDH activity in the myometrium and blood plasma in uterine inertia were thus dissimilar: in the myometrium there was a marked increase in LDH activity, but in the blood plasma, on the other hand, it was reduced; there is thus no direct correlation between these changes.

It was later shown that in uterine inertia there are changes in the relative distribution of LDH isoenzymes adsorbed and not adsorbed on DEAE-Sephadex A-50, in the blood serum, namely a mean decrease of 30% in the adsorbed fraction of LDH (Table 1).

TABLE 1. LDH Activity in Blood Plasma and Serum of Women During Normal Labor and With Uterine Inertia

Index	End of pregnancy	First stage of normal labor	Uterine inertia
LDH activity in blood plasma			
Relative activity (in %) of LDH isoenzymes in blood serum:			
adsorbed on DEAE-Sephadex A-50	65,4 \pm 2,1 (9)	55,7 \pm 1,0 (14)	40,6 \pm 1,5 (8)
unadsorbed	34,6 \pm 2,2 (9)	44,3 \pm 1,4 (14)	59,4 \pm 1,5 (8)

Note: LDH activity expressed in nmoles $\text{NAD} \cdot \text{H}_2$ oxidized by 1 ml plasma during incubation for 1 min at 24°C. Number of persons tested in parentheses.

LDH activity in the placenta of women with uterine inertia, just as in the blood stream, was reduced on the average by 40% (Fig. 2). It is interesting to note that the highest LDH activity in the placenta was found if labor was rapid, and the lowest was observed in women with primary uterine inertia (1250 and 170 nmoles $\text{NAD} \cdot \text{H}_2/\text{min}/\text{mg}$ respectively).

Determination of LDH activity in the plasma of parturient women can thus be used as an additional diagnostic test of one of the most serious and widespread forms of obstetric pathology – uterine inertia. This condition, as the experiments showed, is characterized by a decrease in LDH activity both in the placenta and in the blood stream. Since the content of ribonucleic acids (RNA, DNA) in the placenta in patients with uterine inertia is reduced, mainly at the expense of ribosomal RNA [2, 4], presumably the decrease in LDH activity in the placenta in this disease is the result of reduced biosynthesis of LDH molecules in the ribosomes.

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