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## Lactate determination in Ante- and intrapartum surveillance

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### AKADEMISK AVHANDLING

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## ABSTRACT

Lactate concentration is reported to be high in amniotic fluid (AF). Prelabour rupture of membranes (PROM) occur in about 20% of all pregnancies. The condition is associated with fetal and maternal complications, and might be a marker of imminent delivery. Therefore among women with suspected prelabour rupture of the membranes (PROM); it is of great importance to accurately confirm the diagnosis.

In our studies we wanted to assess whether lactate determination in vaginal/amniotic fluid could be used as a diagnostic test for prelabour rupture of membranes, and could predict onset of labour in women with suspected PROM.

In our PROM studies we selected women with a history of suspect PROM after 34 weeks gestation for determination of lactate concentrations in vaginal fluid.

A lactate concentration  $\geq 4.5$  mmol/l was found to be the best cut-off value for a positive 'Lac-test' and showed a sensitivity of 86% and specificity 92%. The median time interval between examination and spontaneous onset of labour among the women with "high" lactate ( $\geq 4.5$  mmol/l) were 8.4 hours and for those with low" lactate concentration ( $< 4.5$  mmol/l) 54 hours. Among women with "high" lactate concentration 88% started in labour within 24 hours, as compared with 21% for those with "low" lactate concentration.

Labour dystocia is clinically defined as slow or arrest of progress during labour and is a common obstetrical problem worldwide. In our study we looked for an association between high lactate concentration in amniotic fluid and labour dystocia. We selected women in active labour attending labour ward, and performed at least two consecutive measurements of lactate concentration in amniotic fluid during labour. Among women with spontaneous vaginal deliveries (n=23) the mean lactate concentration in AF during labour was 8.9 mmol/l and among women with labour dystocia (n=31) the corresponding value was 10.9 mmol/l ( $p < 0.001$ ). Of 29 women with a high lactate concentration ( $\geq 10.1$  mmol/l) in at least two consecutive measures, 86% were delivered instrumentally/operatively due to dystocia. Using this definition of a positive test gives a sensitivity of 81% a specificity of 82%, a positive predictive value of 86%, and a negative predictive value of 76%.

Fetal surveillance during labor is often based on fetal heart rate monitoring using the cardiotocograph (CTG). A normal CTG is reassuring for a well oxygenated fetus. However, a non-reassuring trace occurs in up to 50% of all recordings, but only a small proportion of these fetuses are at risk of hypoxia. In a multicentre trial we wanted to compare pH vs. lactate analysis, regarding prevention of acidemia at birth. 2992 women in labour were randomised to pH (n=1,496) or lactate analysis (n=1,496). Protocol violations were significantly less frequent in women randomised to lactate compared with women randomised to pH analysis, 11.0% vs. 1.5%. There were no significant differences between the groups in the rate of metabolic acidemia (RR 0.96) or pH  $< 7.00$  (RR 0.88) in cord artery blood at birth.

We have with this thesis shown the usefulness of determination of lactate in AF and fetal blood sampling. Lactate in AF can be used in the diagnosis of suspected PROM, in the prediction of spontaneous onset of labour for women with suspected PROM, and also in the diagnosis of labour dystocia. We have shown lactate analysis of fetal scalp blood to be at least as good as pH analysis in the management of intrapartum fetal distress

**Key words:** lactate, amniotic fluid, PROM, prediction of onset of labour, diagnosis of dystocia, fetal distress, hypoxia.

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