**Prevention of perinatal asphyxia**

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**Bakground:**

The most recognized method for fetal monitoring during labor is cardiotocography (CTG). The method is characterized by a high intra- and inter-observer variation and a low positive predictive value for adverse outcome, resulting in a variable but inappropriately high operative delivery rate. To decide whether to manage the labor expectantly or intervene for better neonatal outcome, complimentary tools are needed. Fetal scalp blood sampling with bedside analysis of lactate as well as fetal scalp stimulation are suggested as second line tools.

The most well tested lactate meter (LactatePro™) has been discontinued and is no longer commercially available. StatStrip®Xpress is FDA and CE/ISO certified and marked as the only lactate meter developed specifically for hospital use. New cut-offs for StatStrip®Xpress are proposed but the results are contradicting and without alignment mainly due to underpowered studies. Scalp stimulation is a non-invasive test recommend by many of the obstetrical societies although the lack of evidence for the safety.

**Aims:**

I: To evaluate how often a low 5-min Apgar score at term is associated with asphyxia. A retrospective case control study.  
II: To propose cutoffs in fetal scalp blood for LactatePro™. A prospective cohort study.  
III: To evaluate the reliability StatStrip®Xpress. A prospective quality study.  
IV: To investigate whether fetal heart rate accelerations in response to scalp stimulation (FSS) is correlated to the degree of lactateacidemia. A prospective observational study.  

**Results:**

I: The majority of AS 5-min below four could be attributed to birth asphyxia. Signs of hypoxia usually appeared during labor, but was also present to a high degree at admission.
II: Proposed reference values for LactatePro™2: scalp lactate <6.3mmol/L=normal, 6.3–7.1mmol/L=preacidemia, >7.1mmol/L=acidemia. The coefficient of variation was calculated from five different cord blood samples with lactate levels ranging from 3.5-11.2 mmol/L and varied between 4.2-23.4%.

III: SSX-lactate values were constantly lower but correlated excellent to the reference method $R^2 = 0.95$. The reproducibility was good for cord and scalp blood. For lactate values >3mmol/L the mean CV was 3.8% in cord blood and 6.8% in scalp blood.

IV: Fetal scalp stimulation test showed a negative predictive value of 86% and is therefore not to be considered a safe secondary test to CTG in order to exclude fetal hypoxia during labor.

V: To be shown

Implications:

Apgar score is a relatively good proxy for asphyxia.
Reference values for LactatePro™2 were retrieved but the device showed unsatisfactory reproducibility.
StatStrip®Xpress is a reliable point-of-care device for measurement of fetal lactate with low coefficient of variation and excellent correlation to a standard blood gas analyzer.
Fetal scalp stimulation is not a safe method to exclude fetal hypoxia during labor.
The proposal of new cut-offs to exclude fetal hypoxia during labor with StatStrip®Xpress will add a safe second line tool for fetal monitoring into modern obstetrics.

Published papers:


IV: Association between fetal response to scalp stimulation, the lactate value in scalp blood and the perinatal outcome. Shakouri F, Edwards H, Iorizzo L, Kristensen K, Vinter C, Wiberg N. To be submitted spring 2019

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