Fetal Blood Sampling and Cord Blood Lactate Test Using Nova Statstrip^{tm} Lactate Meter

Type: Policy	HDSS Certification Standard:
Issued by: Maternity PPG Group	**Version:** 2.1
Applicable to: Hutt Valley DHB	**Contact person:** Midwife Educator
Lead DHB: Hutt Valley DHB	**Level:**

Hutt Maternity Policies provide guidance for the midwives and medical staff working in Hutt Maternity Services. Please discuss policies relevant to your care with your Lead Maternity Carer.

Purpose:

To provide guidance for fetal scalp blood and cord blood lactate testing as a tool to support fetal heart rate monitoring in labour, and ensure appropriate use of the Nova StatstripTM Lactate Meter.

Scope:

Includes: Midwives, theatre nurses, theatre technicians and obstetric staff.

Excludes: Other parts of the DHB

For the purposes of this document, staff will refer to:

All staff within Hutt Valley DHB. This includes staff not working in direct contact with patients/consumers. Staff are taken to include anyone engaged in working to the Hutt Valley DHB. This may include but is not limited to:

- Employees irrespective of their length of service
- Agency workers
- Self-employed workers
- Volunteers
- Consultants
- Third party service providers, and any other individual or suppliers working in Hutt Maternity, including Lead Maternity Carers, personnel affiliated with third parties, contractors, temporary workers and volunteers
- Students

Definitions:

Abbreviations used in this document

- **BPM** Beats per minute
- **CTG** Cardiotocograph
- **CEFM** Continuous electronic fetal monitoring
- **EFM** Electronic fetal monitoring
- **FBS** Fetal blood sampling
- **FGR** Fetal growth restriction
- **FHR** Fetal heart rate
- **FSE** Fetal scalp electrode

- **LSCS** Lower segment caesarean section birth

The increased intervention rate associated with EFM can be reduced with the use of fetal blood sampling.

Units employing electronic fetal monitoring are strongly encourage to have access to fetal blood sampling facilities to assist in the management of labours where the fetus is demonstrating heart rate abnormalities. Either scalp lactate or pH measurement is reasonable, but lactate is used at Hutt Valley DHB, as it provides an easier and more affordable adjunct to EFM. It gives a more direct measure of metabolic acidosis than pH, as it measures a metabolite of anaerobic metabolism.

Fetal Blood Sampling Policy content:

Indications and contraindications to the use of FBS

As an adjunct to CTG monitoring in the active phase of labour FBS for scalp lactate should be considered in all circumstances where the CTG is abnormal.

Indications	Contraindications
• Abnormal trace + clinical picture. Normal variability will generally provide reassurance, but FBS may still be warranted to assess deterioration over time • Persistent variable decelerations • Unexplained reduced variability in the absence of other normal features. • Unexplained tachycardia • Prior to trial of assisted delivery where the CTG is abnormal (see comments below regarding fetal blood sampling at full dilatation)	• Clear evidence on CTG of serious fetal compromise (e.g. prolonged fetal bradycardia where urgent birth is required, chronic hypoxic late decelerations, sinusoidal trace) • Significant fetal compromise in second stage of labour where assisted vaginal birth is appropriate • Known maternal infection, e.g. HIV, Hepatitis B&C viruses, active Herpes simplex virus or evidence of intrauterine sepsis. Group B Streptococcus carrier status does not preclude FBS • Prematurity < 34 weeks • Face, brow or uncertain presentation • Bleeding disorder such as suspected fetal thrombocytopenia, haemophilia or known maternal autoimmune thrombocytopenia

The threshold for FBS should be reduced in the presence of other risk factors such as meconium, known FGR or oligohydramnios.

The following are not absolute contraindications, but situations where FBS should be used with caution:

- Evidence of labour obstruction

- Evidence of maternal sepsis, including maternal pyrexia
- Between 34+0 and 36+6 weeks of pregnancy discuss the possible use of FBS if the benefits are likely to outweigh potential risks.
- Full dilatation – second stage is naturally accumulative of lactic acids in both the birthing person and fetus, and not necessarily associated with hypoxia.

In the presence of infection, fetal condition can change rapidly. Fetal blood sampling may be of less value in the presence of pyrexia, as it assesses hypoxia / acidaemia and not sepsis. Therefore, the results of fetal blood sampling, if reassuring, should be interpreted with caution.

In general, it is reasonable to perform fetal blood sampling in the passive phase of second stage. In the active phase of the second stage maternal lactate rises by 2mmol/l for every 30 minutes of active pushing. Fetal lactate rises correspondingly and may be difficult to interpret. FBS may be appropriate before a 'trial' of instrumental delivery, but if delivery is assured at a low station with OA presentation, then proceeding direct to assisted delivery without FBS may be expedient.

FBS procedure

- When it is decided that FBS is appropriate, the following procedure should be used:
- Explain clinical rationale and procedure for fetal blood monitoring to the pregnant person, and gain verbal consent for procedure, and any additional people in the room
- Gain verbal consent for procedure
- Apply universal precautions
- A trained and credentialled clinician collects two samples from the fetal scalp. The first sample should be tested; if a result is achieved, discard other sample(s).
- A midwife carries out the test sample following instructions for use of Nova Statstrip™ Lactate Meter in Appendix 1.

Interpretation and Response

The following are recommended actions according to lactate level:

Lactate	Classification	Action
Lactate ≤ 4.0	Normal	• Repeat FBS in 1 hour if the FHR abnormality persists • Repeat sooner if new abnormalities arise
Lactate 4.1 - 4.7	Borderline	• Repeat FBS within 30 minutes if the FHR abnormality persists • Repeat sooner if new abnormalities arise • Consider expediting birth if rapid rise from previous sample.
Lactate 4.8 - 5.7	Indicative of fetal acidaemia	• Administer tocolytic • Proceed to caesarean birth

Lactate ≥ 5.8	Abnormal	• Administer tocolytic • Proceed to category 1 caesarean birth with Emergency Move to Theatre process

Scalp lactate results should be interpreted taking into account any prior lactate measurement, the rate of progress in labour and any other risk factors.

If the CTG remains unchanged and the FBS result is unchanged at the second test, a further sample may be deferred unless additional abnormalities develop on the trace.

Where FBS sampling is considered necessary for a third separate occasion, an obstetric SMO opinion should be sought prior.

Worsening lactates with ongoing CTG abnormality and inadequate progress warrant expedited birth.

Following any labour where FBS has been performed, arterial and venous cord samples should be taken at birth to confirm acid-base status of the baby. Results must be signed off on concerto.

Education and Training

Obstetric RMOs must be appropriately trained and credentialled for the FBS procedure, and an SMO opinion must be sought if a third FBS be thought warranted during labour.

Midwifery staff must complete the Ko Awatea eLearning Module, "HVDHB - Stat Strip: Lactate Meter" and a face-to-face session with an ACMM prior to testing fetal blood samples.

References:

Auckland District Health Board (2020) Intrapartum Fetal Surveillance Policy.

Capital and Coast District Health Board (2012) Fetal Heart Rate Monitoring (intermittent auscultation and electronic) and fetal blood sampling – Intrapartum.

Canterbury District Health Board (2020) Fetal Heart Monitoring.

Nordstrom L, Achanna S, Naka K, Arulkumaran S. Fetal and maternal lactate increase during active second stage of labour. Br J Obstet Gynaecol 2001; 108: 262-26.

Preterm labour and birth, NICE Guideline [NG25], November 2015
https://www.nice.org.uk/guidance/ng25

RANZCOG (2019) Intrapartum fetal surveillance: Clinical guideline - Fourth edition.

Related Documents:

MATY022 Fetal heart rate monitoring in the antenatal and intrapartum period

MATY071 Uterine Hyperstimulation Policy

RANZCOG (2019). Intrapartum Fetal Surveillance Clinical Guideline (4th ed.)

Keywords for searching:

1. Fetal Blood Sampling
2. Cord Blood Lactate
3. Lactate
4. MATY093

Informed Consent:

The right of a consumer to make an informed choice and give informed consent, including the right to refuse medical treatment, is enshrined in law and in the Code of Health and Disability Consumers' Rights in New Zealand. This means that a woman can choose to decline treatment, referral to another practitioner, or transfer of clinical responsibility. If this occurs follow the process map on page 18 of the Referral Guidelines (Ministry of Health, 2012).

Tangata Whenua Statement:

The Women's Health Service recognises the rights and responsibilities of Māori as tangata whenua and Treaty Partners. This allows and acknowledges the importance of cultural diversity in all aspects of our care and practice in Aotearoa New Zealand.

As stated in Te Pae Amorangi (Hutt Valley DHB Māori Health Strategy) 2018-2027, Hutt DHB as a Crown agency is committed to our role in maintaining active relationships with iwi, under Te Tiriti o Waitangi. This strategy recognises the established principles of Partnership, Participation and Protection and recognises steps towards the reviewed interpretation of Te Tiriti principles to date (from the Wai 2575 claim into health). These are tino rangatiratanga, equity, active protection, partnership and options.

Attention in particular is drawn to:

- **Article one – Kāwanatanga**: actively engaging and working alongside with local iwi through the Hutt Valley Māori Health Unit
- **Article two – Tino Rangatiratanga**: Self-autonomy, self-determination; the responsibility to enable Māori to exercise their authority over their own health, determinants and definition of health
- **Article three – Ōritetanga**: equal health outcomes of peoples; ensuring that policy, guidelines or programmes do not further perpetuate any inequity
- **Article four (the 'oral clause') – Wairuatanga**: spirituality; thriving as Māori and the importance of health providers understanding health in te ao Māori (the Māori world), acknowledging the interconnectedness and inter-relationship of all living and non-living things.

Appendix 1: Cord Blood Lactate Test Using Nova Statstrip™ Lactate Meter

Definitions

Certified staff

Staff who have attended training and been approved to operate the system.

Point of care testing (POCT)

Medical laboratory testing performed near or at the site of the patient with the result leading to possible change in the care of the patients. 1

Calibration

The process of testing and adjusting values obtained from an instrument or other measuring device to provide a known relationship between the response measurement and the value of the analyte measured by the procedure.

Quality control (QC)

To monitor the status of an analysis to maintain its performance within desired limits

External quality assessment (EQA) or Proficiency testing (PT)

To assess the performance of an analyser by an external challenge of a blind sample, results of which are assessed against a reference or peer review.

Equipment

Nova StatStrip Lactate™ Hospital Meter and docking station

A connectable lactate meter that interfaces to middleware NovaNet and Bioconnect. This middleware holds all the operator, device, reagent and results data. Fetal scalp results are available electronically in Concerto only.

Consumables

All consumables (except Fetal Scalp Kits) for the meters are held and issues by Laboratory. Contact Ext 8512

Item	Name	Supplied by
Strips	LAC – Test strips 2 pottles of 25 strips REF 47486	 NZMS NZ Medical and Scientific 2a Fisher Crescent Mt Wellington Auckland 1060 P.O. 132400 Sylvia Park Auckland 1644
Control Solutions	Stat_Strip LAC control level 1 REF 47553 Stat_Strip LAC control level 2 REF 4755	
Battery for Lactate Meter (Spare found at back of docking station)	Battery for Lactate Meter Ref NB46827-1	

Fetal Scalp Kits held and ordered by Delivery Suite

Rocket Fetal Scalp Kits	R57018 Compatible with Radiometer ABL90	USL Medical Order from Stores

Test principle

The test strip is an electrochemical sensor, using the enzyme lactate oxidase to convert lactate to a current. The amount of current that is produced depends on how much lactate is in the blood. [1] The strips are calibrated to be equivalent to laboratory plasma lactate.

The strip has a multi well system. One well measures electrochemical interferences e.g. ascorbic acid, uric acid, paracetamol, oxygen saturation, and bilirubin. One well measures Haematocrit.

Lactate well subtracts electrochemical interferences and corrects for Haematocrit providing a true interference free result.

The strips have a Gold backing. Gold is stable to ensure:

No variance lot by lot
No calibration required
No check strip required
Strip is stable environmentally and on handling

No result if strip short samples or if there are air bubbles present.

Limitations

Sample:

Fresh whole blood venous or arterial specimens.
It is not for use with capillary specimens. The performance characteristics have not been determined for capillary samples.
Not used to test newborns in the USA
It has not been verified for fetal scalp samples. [2]

Samples should be analysed as soon as possible post collection. Lactate concentrations increase in whole blood samples post collection due to continued metabolism of glucose and production of lactic acid.

Interferences

No interference from common substances, see above.

Lactate measurement range 0.3-20 mmol/L

Meter will display LO if result is <0.3 mmol/L

Meter will display HI if result is >20.0 mmol/L

[1] NOVA biomedical REF47486 package insert LPN-485005D 2012-06
[2] Personal communication Trish Snegirev NZMS 26 April 2013.

Temperature range the meter reads at is 15°C to 40°C

Strips should be stored at Room Temperature 15°C to 30°C

Roles and responsibilities

The overall responsibility for testing and result management of the Nova Lactate Stat Strip is with the trained operators with a valid certificate. The laboratory acts as resource to help maintain the quality of lactate results.

It is the Operator's responsibility to:

- Maintain the analyser
- Ensure meter is fully charged
- Ensure staff who use the meter are trained. Clinical Nurse Educators or other certified trainers
- Maintaining supply of in date strips and controls
- Running weekly QC
- The quality of the testing they perform
- Use their operator ID and patient NHI in Nova StatStrip™ when performing a test.

Point of Care Co-ordinator (or other trained Laboratory Scientist) and vendor is responsible for:

- Training the certified trainers.
- Approving QA practice
- Auditing POCT QA compliance
- Reviewing Ko Awatea eLearning and loading new operators and recertifying operators.
- Replacing the QC every 3 months

Staff training

All staff using the Nova Statstrip™ Lactate Meter must receive training in the use of the equipment including the quality and maintenance programmes. Competence is maintained and accessed annually through annual recertification

Training

Hands on training

E-Learning Quiz

Recertification

Hands on training if returning after >1 year lapse in certification

E-Learning Quiz

Quality Assurance

QC

LAC control 1 (low) and LAC control 2 (Normal) are run once per week by the ACMMs.

EQA

A whole blood comparison at three levels is run weekly by the Laboratory

Calibration

Not required

Stock control

Test strips and controls must be within date and have been opened no longer than 90 days

Lot number and expiry date can be found on outer box and pottle of strips and on box and bottle of QC material

Test strips and controls should be stored at room temperature but below 30°C

Test strips and controls are viable for 90 days after opening.

Maintenance and troubleshooting

Docking/Charging Station

When the meter is not in use, place it into the Docking/Charging Station. This enables the meter to remain fully charged and connects the meter to the computer network.

The right light is green when the battery is fully charged or amber when charging.

Testing Errors

Analysis error:	The test strip was removed or lost electrical contact with the meter before completing the test. Insert a new test strip and repeat the test
Flow error:	Insufficient sample. Sample was applied incorrectly to the test strip.
Battery Low:	Replace the battery or, place the meter into the Docking Station.

Battery Replacement

If there is a spare fully charged battery, it can be changed to allow for continuous operation.

1. Press the Power Button to place the meter into Sleep Mode. This allows the operator approximately 20 seconds to change the battery without losing the Date/Time settings.
2. Push down on the two cover latches to release the cover. Take the battery cover off the back of the meter**.** (Fig. 1)
3. Push up on the battery latch. Remove the drained battery. (Fig 2)
4. Replace with a fully charged battery. (Fig 3)

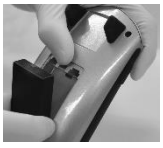


Fig 1

5. Replace the battery cover.
6. Place the drained battery into the Charging Station.
7. Dock the meter.

Fig 2

Fig 3

Infection Control

All PoCT Lactate Stat Strip testing complies with Infection Control standards and Hutt Valley DHB Infection Control policy.

Clean the meter using hospital microfibre wipes and dry after every patient test.

Do NOT immerse the meter or hold the meter under running water

Do NOT spray the meter with a disinfectant solution

Sample Collection

Trained and credentialled clinicians collect two samples from the fetal scalp.

The cord should be double clamped and arterial and venous cord blood samples taken as soon as possible after birth and within 10 minutes. Use a blood gas syringe to collect at least 2 mls of blood (this ensures you can send to the laboratory for further analyser if required) Take further samples if the venous and arterial sample have a lactate <0.6 difference.

Procedures

Patient samples

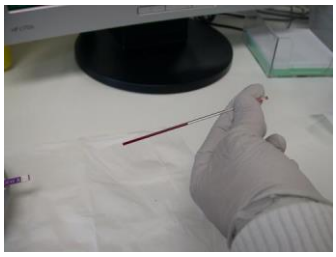
Refer to the "Performing a Patient Lactate Test" quick guide

QC Samples

Refer to the "Performing a QC Test "quick guide.

Fetal Scalp Sample Application to strip

Remove capillary tube from fetal scalp kit holder



Move blood down to clean end of capillary tube

Position the capillary tube vertically so a drop forms at the end of the tube.