# Maternity - Indications for Placental Histological Examination

**Summary** This guideline provides direction to all staff in NSW Public Health Organisations on the indications for placental histological examination.

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**Distributed to** Public Health System, Divisions of General Practice, NSW Ambulance Service, Ministry of Health, Private Hospitals and Day Procedure Centres

**Audience** All maternity clinicians;obstetricians;GPs;midwives;Visiting Medical Officers

NSW GOVERNMENT Health

GUIDELINE SUMMARY

# MATERNITY - INDICATIONS FOR PLACENTAL HISTOLOGICAL EXAMINATION

## PURPOSE

This guideline describes indications for placental histological examination for births occurring in NSW Public Health Organisations as well as recommendations for storage, transport and submission of placentas for pathological review.

This document is intended to support clinical practice. The information provided in this document has been guided by the *Clinical Practice Guideline for Perinatal Mortality* produced by the Perinatal Society of Australia and New Zealand (PSANZ).

## KEY PRINCIPLES

Within NSW, all placentas should be grossly examined at the time of birth. Specialist medical practitioners and midwives present at the time of delivery who have knowledge of placental anatomy and pathology as well as an understanding of the abnormalities and variations that affect the placenta may carry out the examination.

As the vast majority of pregnancies, newborns and placentas are normal, formal pathological examination of all placentas is neither required nor feasible for many institutions. Therefore, only a subset of placentas requires submission for histological examination. Formal histological examination of the placenta may provide valuable explanation for pregnancies affected by medical complications, pregnancy loss or neonatal death, as well as information relevant to the management of the infant and/or subsequent pregnancies.

## USE OF THE GUIDELINE

This guideline should be brought to the attention of staff involved in the delivery of maternity and neonatal care including maternity services units, neonatal intensive care units and general and specialist pathology departments.

The decision regarding the indications for referral of placenta for histological examination should be agreed at a local level by obstetricians, neonatologists, midwives and other relevant maternity services staff. Further advice can be found in Appendix 1 of the Guideline – A Guide to Indications for Placental Histological Examination. Submission of placentas following other pregnancy complications or adverse outcomes that are not listed in the Guide at Appendix 1, may depend on local resources and availability of pathology services.

## REVISION HISTORY

| Version | Approved by | Amendment notes |
|---|---|---|
| May 2014 (GL2014_006) | Deputy Director-General Population Health | New Guideline |

## ATTACHMENTS

1. Maternity - Indications for Placental Histological Examination: Guideline

NSW KIDS + FAMILIES

# MATERNITY INDICATIONS FOR PLACENTAL HISTOLOGICAL EXAMINATION

NSW Health Guideline

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# 1 INTRODUCTION

## 1.1 Background

The placenta is a unique gestational organ that connects mother to fetus. It provides a record of pregnancy in which the cumulative effects of pregnancy-related events and changes to the intrauterine environment may be examined.[1] Formal histological examination of the placenta may provide valuable explanation for pregnancies affected by medical complications, pregnancy loss or neonatal death as well as information relevant to the management of the infant and/or subsequent pregnancies. In recent years, placental examination has become an important component of medicolegal litigation by providing evidence for obstetric malpractice cases.[2]

## 1.2 About this document

This guideline describes indications for placental histological examination for births occurring in NSW Public Health Organisations as well as recommendations for storage, transport and submission of placentas for pathological review.

This document is intended to support clinical practice. The information provided in this document has been guided by the *Clinical Practice Guideline for Perinatal Mortality* produced by the Perinatal Society of Australia and New Zealand (PSANZ).[3]

This guideline should be brought to the attention of staff involved in the delivery of maternity and neonatal care including maternity services units, neonatal intensive care units and general and specialist pathology departments.

## 1.3 Key definitions

**Placenta**
The placenta is a gestational organ in which the developing fetus derives nutritional sustenance and obtains immunological and metabolic requirements. Examination of the placenta is effectively a whole organ biopsy that provides a record of pregnancy-related events and changes to the intrauterine environment.[4]

**Maternal conditions**

**Significant / Active Autoimmune Disease**
A pathologic condition caused by an acquired or adaptive autoimmune response.

**Pre-eclampsia**
As per the NSW Health Policy Directive PD2011_064 *Maternity-Management of Hypertensive Disorders of Pregnancy*[5], pre-eclampsia is defined as hypertension that arises after 20 weeks gestation and is accompanied by one or more of the following:

- Renal involvement
- Haematological involvement
- Liver involvement
- Neurological involvement
- Pulmonary oedema
- Fetal growth restriction
- Placental abruption

**Intrauterine growth restriction (IUGR)**
Infants with birth weight or birth length below the 10th percentile for gestational age.

**Intrapartum fever (above 38.5°C)**
A rise in the maternal body temperature above 38.5°C during labour. This may be due to an infectious or non-infectious etiology and can lead to a variety of maternal and neonatal sequelae. Numerous risk factors for intrapartum fever have been reported, and include nulliparity, prolonged labour, and premature rupture of membranes.

**Chorioamnionitis (intra-amniotic infection)**
An acute inflammation of the membranes and chorion of the placenta, typically due to ascending polymicrobial infection in the setting of membrane rupture.

**Placental abruption**
Decidual haemorrhage leading to the premature separation of the placenta prior to delivery of the fetus. Although there are no standard diagnostic criteria for placental abruption, the clinical hallmarks of the condition are vaginal bleeding and abdominal pain accompanied by uterine hypertonicity, tachysystole, and a nonreassuring fetal heart rate pattern.

**Amniotic Fluid Index (AFI)**
A clinical semiquantitative measurement of amniotic fluid. The amniotic fluid index (AFI) varies according to gestational age. Abnormalities include:

- Oligohydramnios (AFI < 5cm) - Low volume of amniotic fluid, often measured by ultrasound. This condition is often associated with developmental abnormalities, such as renal development, and a poor perinatal outcome.
- Polyhydramnios (AFI > 25 cm) - Excess volume of amniotic fluid (> 25cm), often measured by ultrasound.

**Fetal conditions**

**Preterm birth**
Birth that occurs before $37^{+0}$ weeks of pregnancy, regardless of birth weight.[6] Preterm birth can be either spontaneous or iatrogenic. Approximately 20% of all preterm deliveries are iatrogenic.

**Congenital anomaly**
A physical malformation, chromosomal disorder or metabolic abnormality that is present at birth.

**Discordant twin growth**
20% or greater difference in birth weights of twins and is calculated as: ((larger twin weight – [minus] smaller twin weight) / larger twin weight) x 100.

**Stillbirth or fetal death**
Death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400g or more birth weight where gestation is not known. The death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.

**Neonatal conditions**

**Hydrops fetalis**
The presence of two or more of the following abnormal fetal fluid collections: ascites, pleural effusion, pericardial effusion, skin oedema and polyhydramnios. Nonimmune hydrops fetalis (NIHF) comprises the subgroup of cases not caused by red cell alloimmunisation.

**Neonatal infection or sepsis**
Clinical syndrome present in an infant from birth to 28 days of life, manifested by systemic signs of infection and/or isolation of a bacterial pathogen from the blood stream.

**Neonatal seizures**
A paroxysmal behaviour caused by hypersynchronous discharge of a group of neurons. Neonatal seizures are the most common overt manifestation of neurological dysfunction in the newborn.

# 2 BENEFITS OF PLACENTAL HISTOLOGICAL EXAMINATION

The clinical value of placental examination is well accepted and includes the following:
1. Identification of aetiologies and pathological processes contributing to or causing an adverse pregnancy outcome;
2. Identification of pathological conditions that require timely clinical intervention;
3. Identification of conditions known to have a risk of recurrence or which may be treatable or preventable, and therefore, improved management of subsequent pregnancies;
4. Understanding of antenatal and intrapartum events that contribute to long-term neurodevelopmental sequelae. The early identification of these events enables the provision of early intervention and consequently improved long-term outcomes;
5. Provision of an audit of antenatal management;
6. Assessment of factors contributing to poor pregnancy outcomes in the context of resolving medicolegal issues.

The benefits of placental histological examination may be measured as improvements in rates of prematurity; in the incidence of neurodevelopmental disorders from antepartum and intrapartum events; and in the perinatal death rate. Additional benefits may relate to reduced medicolegal costs resulting from adverse obstetric outcomes.[1,4]

# 3 PLACENTAL HISTOLOGICAL EXAMINATION

## 3.1 Indications for examination

Within NSW, all placentas should be grossly examined at the time of birth. Specialist medical practitioners and midwives present at the time of delivery who have knowledge of placental anatomy and pathology as well as an understanding of the abnormalities and variations that affect the placenta may carry out the examination.

As the vast majority of pregnancies, newborns and placentas are normal, formal pathological examination of all placentas is neither required nor feasible for many institutions. Therefore, only a subset of placentas requires submission for histological examination.

The decision regarding the indications for referral of placenta for histological examination should be agreed at a local level by obstetricians, neonatologists, midwives and other relevant maternity services staff. Further advice can be found at Appendix 1 - A Guide to Indications for Placental Histological Examination. Submission of placentas following other pregnancy complications or adverse outcomes that are not listed in the Guide at Appendix 1 may depend on local resources and availability of pathology services.

### 3.1.1 Maternal indications

Maternal indications for placental histological examination include systemic disorders with clinical concerns for the mother or infant (significant / active autoimmune disease, uncontrolled diabetes or other significant maternal disease affecting the pregnancy); diagnosis of moderate or severe pre-eclampsia; intrapartum fever and/or infection, suspected chorioamnionitis; unexplained third-trimester bleeding or excessive bleeding more than 500mL; placental abruption; severe maternal trauma; and Amniotic Fluid Index (AFI) abnormalities.

### 3.1.2 Placental indications

Placental indications for examination include the presence of a physical abnormality on gross examination; small or large placental size or weight for gestational age; number of cord vessels (2 arteries, 1 vein); umbilical cord lesions (e.g., thrombosis, torsion); and abnormalities of cord length.

### 3.1.3 Fetal indications

Fetal indications for placental examination include premature delivery (less than or equal to 37 weeks); clinical concern for infection during pregnancy; intrauterine growth restriction; abnormal umbilical cord artery Doppler S/D ratio; major congenital anomalies, dysmorphic phenotype with unknown cause; multiple gestation with same-sex infants and unconfirmed chorionicity; discordant twin growth; and stillbirth or fetal death.

### 3.1.4 Neonatal indications

Neonatal indications for examination include admission or transfer to Neonatal Intensive Care Unit (NICU) or Special Care Nursery (SCN); hydrops fetalis; signs of compromise at birth; neonatal infection or sepsis; neonatal seizures; Newborn and Paediatric Emergency Transport Service (NETS) transfer; and neonatal death.

## 3.2 Specimen submission

Placentas submitted for histological examination should be accompanied by a birth summary and as much relevant clinical history/information as is available, to assist the perinatal pathologist to provide a high quality opinion. At a minimum, request forms should contain: the date of delivery, gestational age, plurality, cord length including any missing portions (e.g. part of the cord left with the baby for intravenous access), birth weight, relevant clinical history and relevant ultrasound results. The indication for histological examination (maternal, placental, fetal and/or neonatal) should be provided as well. The importance of providing detailed clinical information with specimen submission cannot be overemphasised, as the absence of relevant background information limits histological examination and the correlation of findings with clinical outcomes.

## 3.3 Transport and storage

Fresh placental tissue is required for bacterial and viral cultures, cytogenetic and metabolic studies. Fresh placentas should be submitted to pathology departments in a large sealed container. For infants transferred to another facility for care, placentas should be sent fresh with the NETS team to the tertiary centre. Placentas should not be fixed in formalin as this may limit tissue procurement for histological examination. Additionally, placentas should not be frozen as this may introduce artefacts that can interfere with pathological examination.[4] All placentas received in pathology laboratories should be considered as potentially infectious and should be handled in accordance with standard infection control procedures.

Local guidelines should include detailed procedures for the storage and transport of placentas.

# 4 REFERENCES

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6. Royal College of Obstetricians and Gynaecologists. (2011) *Tocolytic drugs for women in preterm labour - Clinical Guideline No 1(B).* RCOG, London. Available at: http://www.rcog.org.uk/files/rcog-corp/GTG1b26072011.pdf

# LIST OF ATTACHMENTS

Attachment 1: A Guide to Indications for Placental Histological Examination

# Attachment 1: A Guide to Indications for Placental Histological Examination

| Indications for Placental Histological Examination | | | |
|---|---|---|---|
| **Maternal** | **Placental** | **Fetal** | **Neonatal** |
| Systemic disorders with clinical concerns for mother or infant:<br>• Significant/active autoimmune disease<br>• Uncontrolled diabetes<br>• Other significant maternal disease affecting the pregnancy | Physical abnormality on gross examination (e.g. completeness of the disc and membranes, infarct, mass, vascular thrombosis, retroplacental haematoma, abnormal colour, opacification, malodour) | Preterm birth (less than $37^{+0}$ weeks) – spontaneous or iatrogenic | Admission or transfer to NICU or SCN at delivery (excluding gestational diabetes unless another indication present) |
| A diagnosis of pre-eclampsia with or without IUGR | Small or large placental size, or weight, for gestational age | Clinical concern for infection during this pregnancy (e.g., HIV, syphilis, CMV, primary HSV, toxoplasma, rubella) | NETS transfer |
| Intrapartum fever (above 38.5°C) and/or infection<br>Suspected chorioamnionitis | Umbilical cord lesions (e.g., thrombosis, torsion) | Clinical concern re possible IUGR/growth concern | Neonatal death |
| Unexplained antepartum or intrapartum haemorrhage | Vasa praevia/suspected vasa praevia or velamentous cord insertion | Abnormal umbilical artery Doppler S/D ratio | |
| Placental abruption | | Major congenital anomalies, dysmorphic phenotype with unknown cause | |
| Severe maternal trauma | | Multiple gestation with same-sex infants and unconfirmed chorionicity | |
| Amniotic Fluid Index (AFI) abnormalities<br>• Oligohydramnios (AFI less than 5cm)<br>• Polyhydramnios (AFI greater than 25cm) | | Discordant twin growth (greater than 20% variation in birth weight) | |
| | | Stillborn or fetal death | |

## Specimen Submission

- Please send birth summary and neonatal discharge summary or as much information as possible with the placenta – the perinatal pathologist will be able to give a much higher quality report if this information is provided.
- Please send the placenta fresh in a sealed container – not fixed in formalin or frozen – send to local pathology service or with NETS retrieval team to the tertiary centre
- As a minimum the request form should include the following information: date of birth, indications for histology – maternal, fetal placental, relevant clinical history, gestational age, cord length including any missing portion (e.g. part of cord left with the baby for intravenous access), relevant ultrasound results, plurality, birth weight.