Neonatal Thyrotoxicosis
Management of babies born to mothers with a history of hyperthyroidism (Grave’s Disease)

This document is applicable to all medical, nursing and midwifery staff caring for the newborn in hospital or community. The guideline should be used with reference to the appropriate pharmacy monographs and obstetric guidelines for the management of pregnant women with thyroid disease.

Introduction
Neonatal Thyrotoxicosis is usually the result of thyroid stimulating antibodies crossing from the mother to fetus towards the end of pregnancy. Thyroid Receptor Antibodies (TRAbs) occur in women with Graves’ disease and are usually the cause of this condition. The prevalence of Graves’ disease in pregnancy is around 0.2% and the incidence of overt thyrotoxicosis in their offspring has been estimated to be between 1% and 12.5%.

Much more rarely hyperthyroidism may occur in infants born to mothers with Hashimoto’s thyroiditis or where there are activating mutations of the Thyroid Stimulating Hormone (TSH) receptor. These causes are too uncommon to warrant routine screening of infants unless there is a family history of hyperthyroidism in a previous infant.

It is important to remember that neonatal thyrotoxicosis will not be detected by the Newborn Bloodspot Screening Programme. The UK programme screens only for high TSH to identify congenital hypothyroidism. It does not measure T4 and low levels of TSH are not reported.

Identifying Babies at risk of hyperthyroidism
Any infant whose mother has a current or past history of hyperthyroidism is potentially at risk of neonatal thyrotoxicosis. ‘At risk’ infants should be identified by maternal history and the measurement of TRAbs in the mother during pregnancy. Current maternal thyroid function may be misleading as the mother may still have circulating thyroid receptor antibodies, despite being euthyroid or hypothyroid, if she is currently receiving treatment with anti-thyroid medication or following thyroid ablative therapy (surgery or radioactive iodine).

NB. mothers with thyroid disease frequently have Thyroid Peroxidase (TPO) antibodies reported – these are not a risk factor for hyperthyroidism in the neonate and do not require any neonatal investigations

High risk mothers
- Current thyrotoxicosis on antithyroid medication (Carbimazole or Propylthiouracil)
- Previous thyrotoxicosis treated with radioactive iodine or thyroid surgery

Low risk mothers
- Previous thyrotoxicosis treated only with antithyroid medication.
  Mother now euthyroid and off anti-thyroid treatment.

Negligible risk
- Maternal hypothyroidism (unless due to surgery or radioactive iodine - see above)

All mothers with a current or past history of thyrotoxicosis (high and low risk groups) should have their antibody titres measured at booking. If positive these may be repeated later in pregnancy (antibody titres often fall toward the end of pregnancy). See obstetric guideline

Page 1 of 5  WoS_Thyrotoxicosis_Neonates 21/11/2013
If thyroid antibodies are detected (TRAb >15 U/L) then this should be indicated in the ‘paediatric alert’ section of the maternal notes. Paediatric staff should be informed as soon as the baby has delivered. *N.B. Where there is a history of thyrotoxicosis in the mother but no TRAb titres are available the baby should be managed as ‘High Risk’*

No further action is required for the negligible risk group or for the low risk group if thyroid antibodies are not detected at booking.

**Management of babies at risk of hyperthyroidism**

**NB. Only babies whose mothers have TRAbs > 15 U/l require investigation (or those for whom no TRAb measurement is available from the current pregnancy)**

Infants with Neonatal Thyrotoxicosis may present at birth and the remainder usually become symptomatic over the first 10 days of life. These infants may be critically unwell therefore clinical assessment for signs of thyrotoxicosis and initial investigations should be performed very shortly after birth.

- Confirm maternal TRAb titres >15 U/L during current pregnancy.
- Ask if there is a family history of neonatal thyroid disease.
- Examine for features of neonatal thyrotoxicosis. *See below.*
- Send following investigations (can be from cord blood)
  - freeT4, TSH (requires a minimum of 1ml in lithium heparin).
- If maternal TRAb results are not available it may be useful to request TRAb antibody titres on the neonatal sample. However, analysis will take too long to inform treatment of the infant

*N.B. in the first few days of life it is common to find that TSH and free T4 are both raised. This is a normal acute phase response and is not hyperthyroidim. TSH is *suppressed* in thyrotoxicosis (TSH <0.2milliunits/L).*

Normal reference ranges: TRAb <15 U/L, fT4: 6-30picomol/L, TSH: 0.2-15 milliunits/L

**Subsequent management is based on the results of these initial investigations**

**Normal Thyroid Function and absent/low (baby’s) TRAb levels.**

*NB. TRAb levels will usually not be available in the first few weeks of birth as the analysis is performed infrequently. In this situation follow up as below (infants with Normal TFTs and raised TRAb)*

- Follow up as outpatient at 10-14 days. No further investigation unless symptomatic.
- Prior to discharge, parents should be advised of the features of neonatal hyperthyroidism *see below* and advised to contact the unit if symptomatic.

**Normal Thyroid Function but (baby’s)TRAb > 15 U/L or unknown**

- Repeat fT4 and TSH on day 2-3 and again at day 10 to detect later onset hyperthyroidism.
- Prior to discharge, parents should be advised of the features of neonatal hyperthyroidism *see below* and advised to contact the unit if symptomatic.

**Abnormal Thyroid Function**

- If fT4 >30 and TSH < 0.2, or there are symptoms or signs of hyperthyroidism then the baby is potentially hyperthyroid and should be discussed urgently with the duty Neonatal Consultant as pharmacological treatment may be required. Liaison with a consultant paediatric endocrinologist should be considered for babies with thyrotoxicosis.
Treatment of neonatal thyrotoxicosis

Drug therapy

- **Carbimazole** - 250 micrograms/kg/dose 3 times daily until euthyroid. Higher doses, up to 1mg/kg/day, may be required if the infant is in thyrotoxic crisis. Carbimazole reduces the uptake of iodine by the thyroid and blocks thyroid hormone synthesis by preventing the organification and coupling of iodothydroine residues. It does not inhibit the release of pre-formed thyroid hormones and may take a number of weeks to render the infant euthyroid. Monotherapy with Carbimazole may be sufficient in an asymptomatic infant with biochemical evidence of hyperthyroidism. In a symptomatic infant concurrent therapy with iodine and propranolol may be required. Agranulocytosis may occur during treatment with Carbimazole.

- **Lugol's Iodine solution (Aqueous Iodine Oral Solution)** - 0.05 ml, 3 times a day for 1 week. Lugol's Iodine helps rapidly block thyroid hormone synthesis, blocks thyroid hormone release and promptly reduces free thyroid hormone concentrations. The effects are temporary and co-administration of carbimazole is essential.

- **Propranolol** - 250–500 micrograms/kg/dose every 6–8 hours initially adjusted according to response. Propranolol helps control symptoms caused by adrenergic stimulation. In addition, it inhibits deiodination of T4 to T3

Monitoring

The aim of treatment is to abolish hyperthyroidism without causing hypothyroidism. Treatment must be titrated against the clinical response. Propranolol may be stopped once clinically euthyroid.

**TFTs**

These should be measured at regular intervals aiming to achieve T4 measurements in the normal range. fT4 – 6 - 30 pmol/L and a TSH level between 0.05 - 5mU/L

_N.B. TSH may remain suppressed for 2-3 weeks even with adequate therapy_

**FBC**

Carbimazole may cause agranulocytosis in 0.03% of patients. The FBC should be measured after 1 week of treatment. This should be repeated at any stage if there are suggestive symptoms (fever, mouth ulcers, rash).

Prognosis

The half life of TRABs is about 6 weeks. Treatment may therefore be required for 8-12 weeks. Following successful cessation of carbimazole there is usually no need for further follow-up.
Features of Neonatal Hyperthyroidism / Thyrotoxicosis

**Head and Neck**
- Goitre
- Periorbital Oedema
- Exophthalmos

**CNS**
- Irritable
- Jittery
- Poor sleeping
- Microcephaly – head <5th centile

**CVS**
- Tachycardia
- Arrhythmias
- Flushing
- Sweating
- Hypertension

**GI**
- Increased appetite
- Diarrhoea / vomiting
- Excess weight loss
- Hepatosplenomegaly

**Other**
- Bruising + petechia due to thrombocytopenia
- Jaundice
Other Documents

References

2. Do we need to assess the thyroid function in the infants of mothers with Hashimoto’s thyroiditis? A M Habeb, M Zubier, P Pairaudeau, V Mathew. Archives of Disease in Childhood. 2003; 88: F258

Author
Dr A Powls – Neonatal Consultant PRM.

Other specialists consulted
Obstetrics – Dr F MacKenzie
Endocrinology (adult) - Dr R Lindsay (GRI)
Endocrinology (paediatric) – Dr M Donaldson (RHSC)
Pharmacy – Maria Tracey

Reviewed (Oct 2013)
Angela Lucas-Herald – Paediatric Trainee

Document Name
WoS_Thyrotoxicosis_Neonates

Start / Review Dates
Replaces GGC_Thyrotoxicosis_Neonates
Start Date 01/03/07  Latest Review Date 18/11/13  Next review 08/11/16