Newcastle Neonatal Service Guidelines

GUIDELINE FOR THYROID FUNCTION TESTING IN NEONATES

This guideline is aimed at the management of infants born to mothers with thyroid problems cared for on Ward 35 or the postnatal ward.

1. **Management of Congenital Hypothyroidism with abnormal Guthrie**
2. **Management of babies at risk Neonatal Thyrotoxicosis (born to mothers with hyperthyroidism)**
3. **Management of babies born to mothers with hypothyroidism.**

Abnormal TSH result on blood spot screening
Congenital hypothyroidism has an incidence of 1:3-4000 live births. Prompt treatment with thyroxine markedly reduces the severity of developmental delay. TSH concentrations are measured on a blood spot sample taken from newborn infants at 5-7 days of age as part of the neonatal screening programme. Infants born less than 36 gestation have second test at 36 weeks corrected. A positive test should be discussed with the blue consultant and endocrine team.

Assessment

- History: Feeding, sleeping pattern, maternal details – diet, drugs, autoimmune disease
- Examination: umbilical hernia, wide posterior fontanelle, goitre, sleepiness, poor feeding, peripheral cyanosis, jaundice These tend to be late signs.
- Bloods to include thyroid function tests (TSH, FreeT4, Free T3).
- If there is a maternal history of autoimmune thyroid disease then check Mothers thyroid binding inhibitory immunoglobulins (TBII), antithyroglobulin and antimicrosomal antibodies.

Please inform the biochemistry department (ideally Steve Turner or Anne Burnett or the duty biochemist) and ask for the tests to be conducted the same day.

Management

- Early treatment with thyroxine (before 10 - 21 days of age) is crucial if neurological disability is to be avoided. Tablets and suspension are available.
- **All babies with a TSH>10mU/l should be commenced on thyroxine at a dose of 10-15micrograms/kg/day. Arrange to inform the family of the results on the same day and make arrangements to start thyroxine if necessary.**
- Treatment should be started as soon as diagnosis is confirmed (preferably the same day) following discussion with the endocrine team. Do not delay treatment if a member of the endocrine team cannot be contacted.
- If the laboratory TSH is between 4 and 10, please discuss with endocrine team.
- Thyroxine tablets can be crushed and mixed with a little water or milk.
- WARNING: Thyroxine suspension – There are now a number of suspensions available. We have opted to use 100micrograms per 5ml formulation to avoid confusion but do check this with pharmacy and the family.

For further information please refer to "Guidelines on the initial management of Congenital Hypothyroidism"on the Intranet.

Neonatal Thyrotoxicosis – screening and management

***Neonatal thyrotoxicosis will not be detected by newborn screening programme, as low TSH levels are not reported*.**
Cause: Maternal Graves' disease (hyperthyroidism) is the commonest cause. In 1-12.5% of such pregnancies IgG thyroid stimulating antibodies (thyroid receptor antibodies- TRAb or Thyroid binding inhibitor Immunoglobulin- TBII) cross from mother to fetus towards the end of pregnancy. Other rare causes include maternal Hashimoto's thyroiditis activating mutations of the TSH receptor (family history of hyperthyroidism in previous infant) and maternal intake of antithyroid drugs

Clinical features:

These are usually present by 10 days of age but can occur as late as 4-7 weeks.
Head and Neck: goitre, periorbital oedema, exophthalmos
CNS: irritability, jitteriness, poor sleeping, microcephaly
CVS: tachycardia, arrhythmias, flushing, sweating, hypertension
GI: diarrhoea, vomiting, excess weight loss, hepatosplenomegaly
Others: bruising, petechiae due to thrombocytopenia, jaundice

Baby is at high risk if

- Mother has high levels of thyroid antibodies (TRAb/TBII) – refer to maternal notes
- Maternal Thyroid antibody status unknown
- Mother is clinically hyperthyroid in 3rd trimester
- Mother is on propylthiouracil or carbimazole in 3rd trimester
- Evidence of fetal hyperthyroidism

It is insufficient to judge risk based on current maternal thyroid function as those mothers who are on anti-thyroid medication or who have received thyroid ablative therapy (surgery or radioactive iodine) may be euthyroid or hypothyroid yet still have high TRAb titres.

Management

- Examine all babies at high risk after delivery. Inform the Blue team Registrar and Consultant and discuss if baby unwell. Look in the maternal notes to see if antibody titres have been recorded. Details about fetal thyroid and heart rate can be obtained from notes too.
- Check if Cord blood sent for thyroid function tests (TFTs).
- **Observe baby for 48 hours, and take bloods for FT4 and TSH at 48 hours**
- Discharge if well. Parents must be advised about signs of hyperthyroidism and contact number for the neonatal unit should be provided in case there are any concerns for the first 2 weeks of life. Chase results and discuss with consultant.
- Arrange review at 10-14 days to repeat TFTs and clinical assesment. Send at least 1-2 ml of Lithium Heparin blood.
- If a baby is clinically hypothyroid or hyperthyroid, discuss with Blue team consultant.
- If **biochemically hypothyroid**, discuss with Paediatric Endocrine team urgently. If Endocrine team not available, contact Consultant on call for Paediatric Diabetes.
- If baby is clinically hyperthyroid and sick, discuss urgently with Paediatric Endocrine team as baby may need treatment with Propranolol and Carbimazole.

A neonate born to a mother with Graves' disease may have primary hypothyroidism on biochemical testing because of the transfer of antithyroid drug or 'blocking' TRAb to the fetus. The half-life of TRAbs is about 6 weeks. Treatment with Carbimazole/propranolol as advised by the endocrine team may be required for 8-12 weeks.

Maternal Hypothyroidism

Effects of maternal hypothyroidism on fetal development

Physiology: Fetal and neonatal development of thyroid function involves the embryogenesis, differentiation and maturation of the thyroid gland, the hypothalamic-pituitary-thyroid axis and the systems controlling thyroid hormone metabolism. Throughout gestation, thyroxine (T4) transferred from the mother, present in embryonic fluids by 4 weeks, protects the fetal brain. Free T4 in fetal fluids increases rapidly, approaching adult levels by midgestation, in concentrations that are determined by the maternal serum T4. After onset of fetal thyroid secretion at midgestation, maternal transfer of T4 continues to contribute importantly to fetal serum T4, protecting neurodevelopment until birth.
The prompt treatment of maternal hypothyroidism should mitigate negative effects on neurodevelopment.

Cause: The commonest cause is Hashimoto's thyroiditis (autoimmune). Incidence is about 2.5% of all women.

Risks associated with maternal hypothyroidism are preterm delivery, intrauterine growth restriction and post partum bleeding. Untreated severe hypothyroidism in the mother can lead to impaired brain development in the baby.

Management:

- Babies born to mothers with hypothyroidism treated with thyroxine do not need their thyroid function tests done routinely.

- If maternal hypothyroidism has been poorly controlled during pregnancy due to poor compliance with Thyroxine or late diagnosis, there is still no need for testing thyroid functions at birth. The Guthrie test must be done as routine. If TSH is abnormally raised, do TFTs and inform the Paediatric Endocrine team.

- Mothers who have received thyroid ablative therapy (surgery or radioactive iodine) may be euthyroid or hypothyroid but may still have high TRAb titres. In those cases, treat as high risk for hyperthyroidism.

Breastfeeding: This should be encouraged in all babies even if their mother is currently taking carbimazole, propylthiouracil or thyroxine. The only contraindication would be radioactive iodine treatment.

References:
1. British Thyroid Association. UK Guidelines for the use of thyroid function tests, July 2006; extensive guidelines for use by patients, GPs and hospital doctors
2. Best Pract Res Clin Endocrinol Metab. 2004 Jun;18(2):225-48. Maternal thyroid hormones early in pregnancy and fetal brain development, de Escobar GM, Obregón MJ, del Rey FE
3. Endocr Dev. 2007;10:86-98, Ontogenesis of thyroid function and interactions with maternal function. Obregon MJ, Calvo RM, Del Rey FE, de Escobar GM