Outline

• Thyroid physiology
• Adaptations in pregnancy & Iodine
• Thyroid dysfunction
  • Pregnancy
    • Hyperthyroidism
    • Hypothyroidism
• Post-partum
Background

• Marked changes to thyroid physiology in pregnancy

• Thyroid disease affects women of child bearing age

• Common
  • Up to 3% have abnormal thyroid function
  • Thyroid auto-antibodies are found in 5-15% of women

• Implications for mother and baby

• Treatable
Iodine is released from the thyroid gland by TSH (Thyroid-Stimulating Hormone). TSH stimulates the thyroid gland to produce T4 (Thyroxine) and T3 (Triiodothyronine), which are then released into the bloodstream.
Pituitary

TSH

Thyroid

T4 → T3
TSH

pituitary

T4 → T3

TSH
Thyroid function & Iodine metabolism in pregnancy
TSH

pituitary

T4      T3

Iodine

T4      T3

Placenta

T4 → T3
• Increased demand
  • Increased plasma volume
  • TBG – pool increased
  • Renal clearance
  • Feto-placental unit uptake
  • Placental deiodination
i. Normal thyroid hormone synthesis increases by 30-50% in pregnancy

ii. Iodine requirements are increased in pregnancy
   • RDI in pregnancy 250µg/day
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Derived from 200 million year old salt solutions found more than 7,000 feet below the Earth's surface, the next level of Survival Shield™ is now here – and much stronger than our original formula with a powerful 650 micrograms per single drop.”
Reference ranges & normal function in pregnancy
Pregnancy

- HCG
- TSH
- T4
- T3
- Pituitary
Pregnancy

HCG -> TSH -> pituitary

T4 → T3
Pregnancy

HCG

pituitary

TSH

↑

T4 → T3
Pregnancy

**HCG**

- **TSH**
- **pituitary**
- **T4** → **T3**
Key points:

i. Predictable changes to thyroid function in pregnancy

ii. Trimester specific reference ranges

iii. Use of non-pregnant ranges may:
   i. Under call hypofunction
   ii. Over call hyperfunction
Hypothyroidism
Hypothyroidism

TSH

pituitary

T4 → T3
Hypothyroidism

- Intolerance of cold
- Headache
- Constipation
- Weight gain
- Lethargy
- Dry skin
Hypothyroidism - spectrum

- Overt
  - Low fT4, high TSH

- Subclinical
  - Normal fT4, high TSH
Fetal Brain Development

• Children of women with untreated hypothyroidism during pregnancy:
  – Averaged 7 points lower on IQ testing*
  – Had a significant percentage (19%) of IQ ≤85

*Full-scale Wechsler Intelligence Scale for Children.
Women with thyroid autoimmunity and who are euthyroid in the early stages of pregnancy are at risk of developing hypothyroidism later; therefore, their serum TSH levels should be monitored.

If overt hypothyroidism is diagnosed during pregnancy, thyroid function tests should be normalized as rapidly as possible.

Known hypothyroidism need dose increase 30-50%, earlier increase in assisted reproduction (due to oestrogen effect on TBG)
Hyperthyroidism
Hyperthyroidism

pituitary

TSH

T4 ➔ T3
Hyperthyroidism

- Palpitations
- Sweats
- Flushing
- Anxiety
- Intolerance of hot
- Headache
- Tremor
- Diarrhoea
- Weight loss
- Lethargy
Pregnancy induced hyperthyroidism

• Transient ‘gestational thyrotoxicosis’
  • hCG mediated
  • 2-4% of pregnancies

• Hyperemesis Gravidarum (HG) associated with hyperthyroidism
Graves’ disease
Graves' disease

TSH

T4 → T3

TRAb

pituitary
Graves’ disease

TRAb

T4

T3

Pituitary

TSH

Placenta

T4
Graves’ disease in pregnancy

• Complicates 1 in 500 pregnancies

• Untreated hyperthyroidism causes
  • Miscarriage
  • premature labour
  • low birthweight
  • Pre-eclampsia
Graves’ disease in pregnancy

- Transplacental passage of TSH rec. Ab can cause fetal and neonatal thyrotoxicosis
  - US to detect fetal tachycardia and goitre

- Effect of PTU treatment in lactating mothers
  - Use as low doses as possible
  - Take dose immediately after breast feeding
  - Limited, if any effect on infants’ thyroid function
Post partum thyroiditis

- 5% of women (30-50% of the ~10% of women who have thyroid peroxidase antibodies)

- Rebound of immunocompetence after delivery

- Transient hyperthyroidism followed by hypothyroidism followed by recovery

- 25% develop permanent hypothyroidism

- Recurrent postpartum thyroiditis occurs in up to 80% of subsequent pregnancies
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   • RDI 250mcg
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vi. High index of suspicion for post-partum thyroiditis
Antenatal screening?
WHO TO SCREEN?

1. Women who already take thyroxine prior to conception.
2. Women with a history of hyperthyroid or hypothyroid disease, postpartum thyroiditis, or thyroid lobectomy.
3. Women with a family history of thyroid disease.
4. Women with a goiter.
5. Women with thyroid antibodies (when known).
6. Women with symptoms or clinical signs suggestive of thyroid underfunction.
7. Women with type I diabetes.
8. Women with other autoimmune disorders.
10. Women with infertility should have screening with TSH as part of their infertility work-up.