Common Thyroid Disorders in Children

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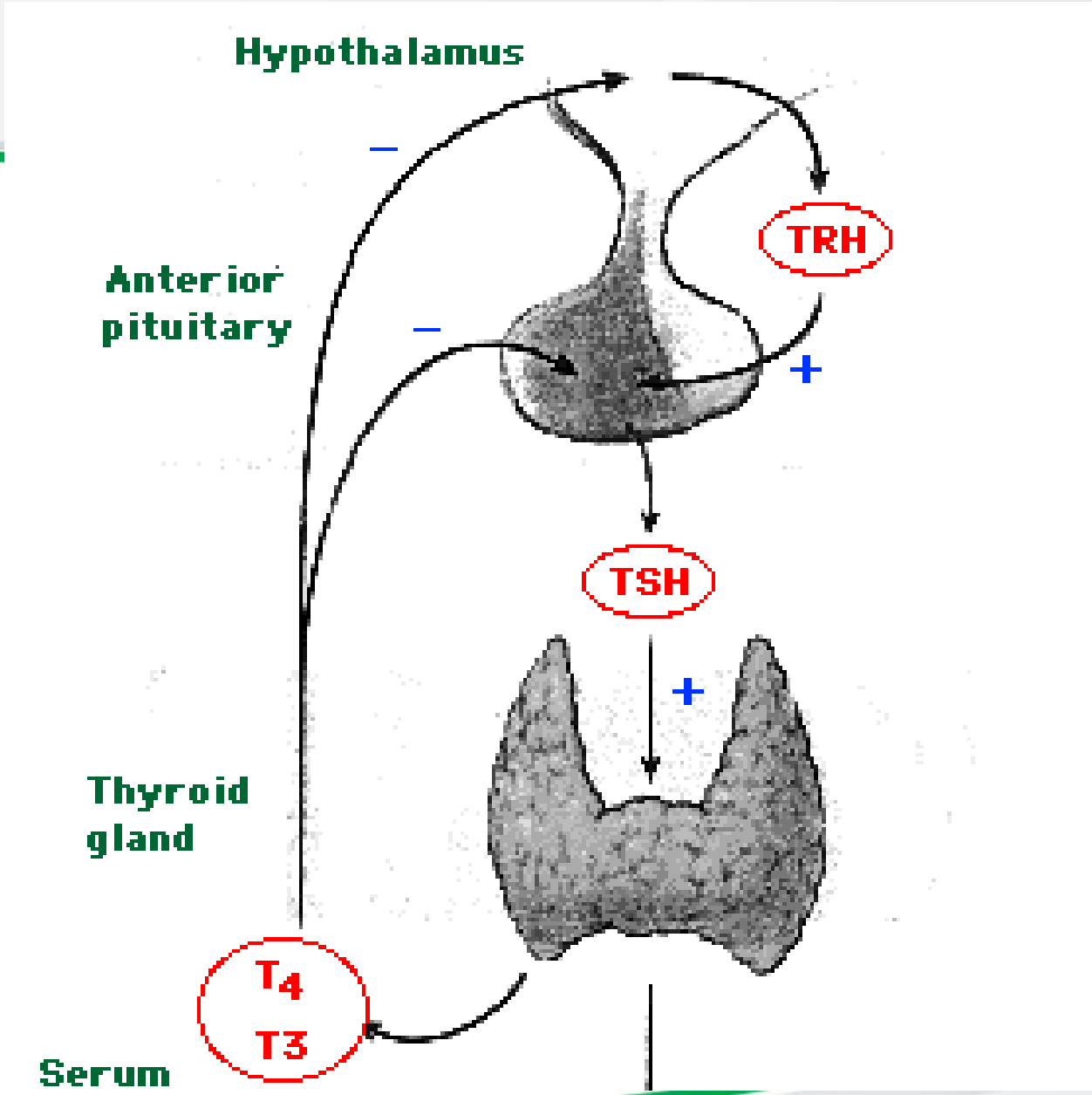
Agenda

- Thyroid Function Test
- Congenital Hypothyroidism
- Newborn screening for congenital hypothyroidism
- Acquired hypothyroidism
- Hyperthyroidism
- Causes of goiter


Hypothalamus
–
TRH
Anterior pituitary
–
+
TSH
+
Thyroid gland
T4
T3
Serum

Thyroid Function: blood tests

TSH mU/L	0.4 –5.0
Free T4 (thyroxine) pM	9.1 – 23.8
Free T3 (triiodothyronine)	2.23-5.3 pM

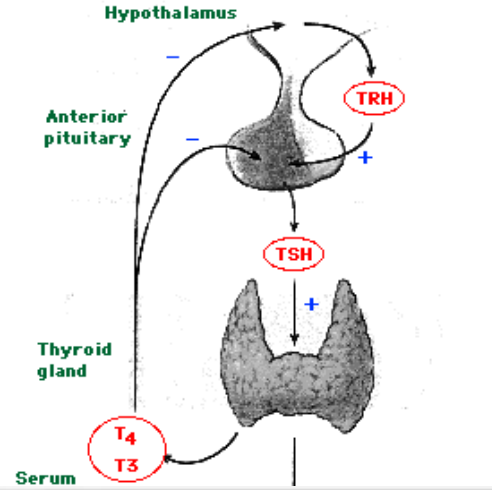
Dysfunction Thyroid Gland

1. Too little thyroxin – hypothyroidism
    a. short stature (aquiered), developmental delay (congenital)

2. Too much thyroxin – hyperthyroidism
    a. Agitation, irritability, & weight loss

Hypothyroidism

- Decreased thyroid hormone levels
  - Low T4
  - Possibly Low T3 too.
  - Raised TSH (unless pituitary problem!)



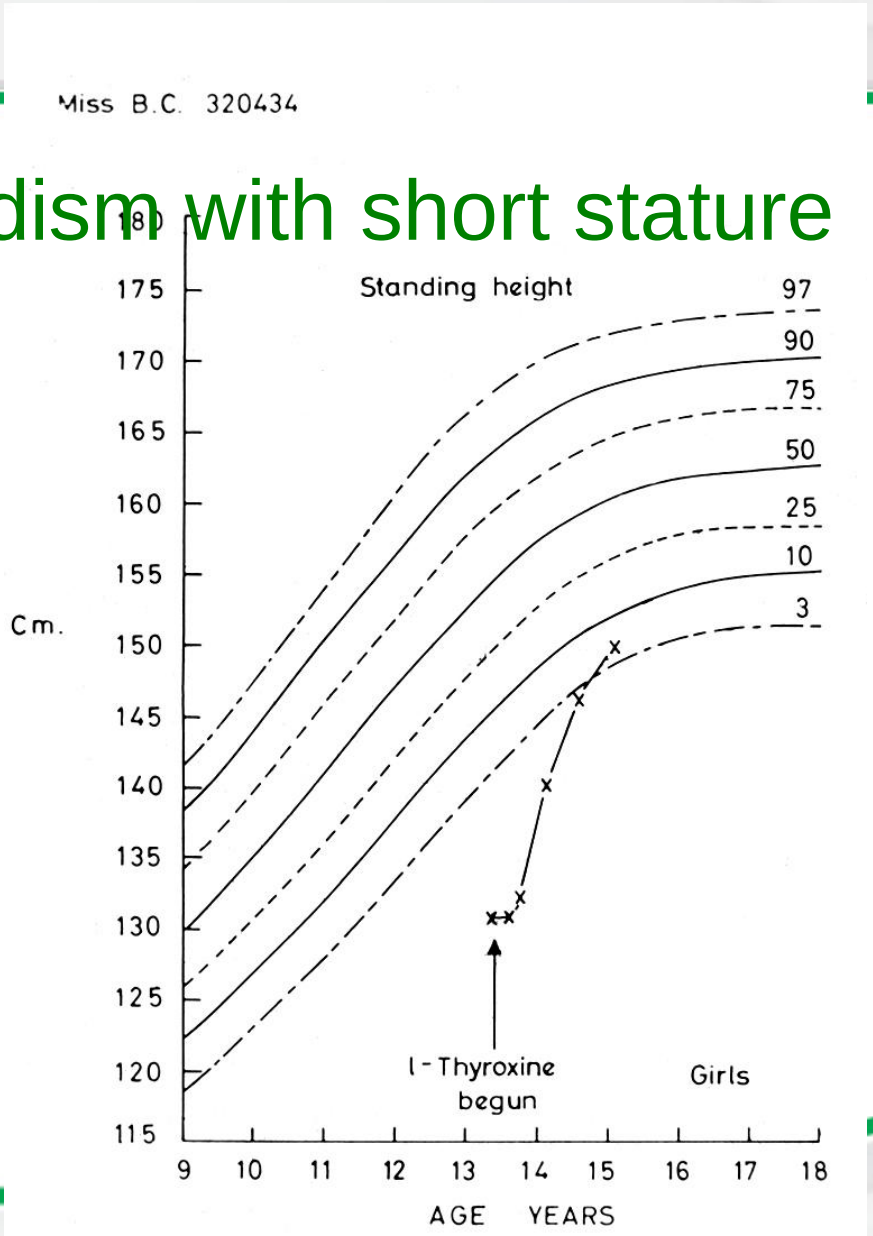
Causes of hypothyroidism

- Congenital
- Autoimmune (Hashimoto)
- Iodine deficiency
- Subacute thyroiditis
- Drugs (amiodarone)
- Irradiation
- Thyroid surgery
- Central hypothyroidism (radiotherapy, surgery, tumor)

Clinical features of Acquired hypothyroidism

- Weight gain
- Goitre
- Short sature
- Fatigue
- Constipation
- Dry skin
- Cold Intolerance
- Hoarseness
- Sinus Bradycardia

Hypothyroidism with short stature



Diagnosis

- High TSH, low T4
- Thyroid antibodies

Hashimoto's Disease

- Most common cause of hypothyroidism
- Autoimmune lymphocytic thyroiditis
- Antithyroid antibodies:
  - Thyroglobulin Ab
  - Microsomal Ab
  - TSH-R Ab (block)
- Females > Males
- Runs in Families!

Subacute (de Quervain's) Thyroiditis

- Preceding viral infection
- Infiltration of the gland with granulomas
- Painful goitre
- Hyperthyroid phase → Hypothyroid phase

Treatment of Hypothyroidism

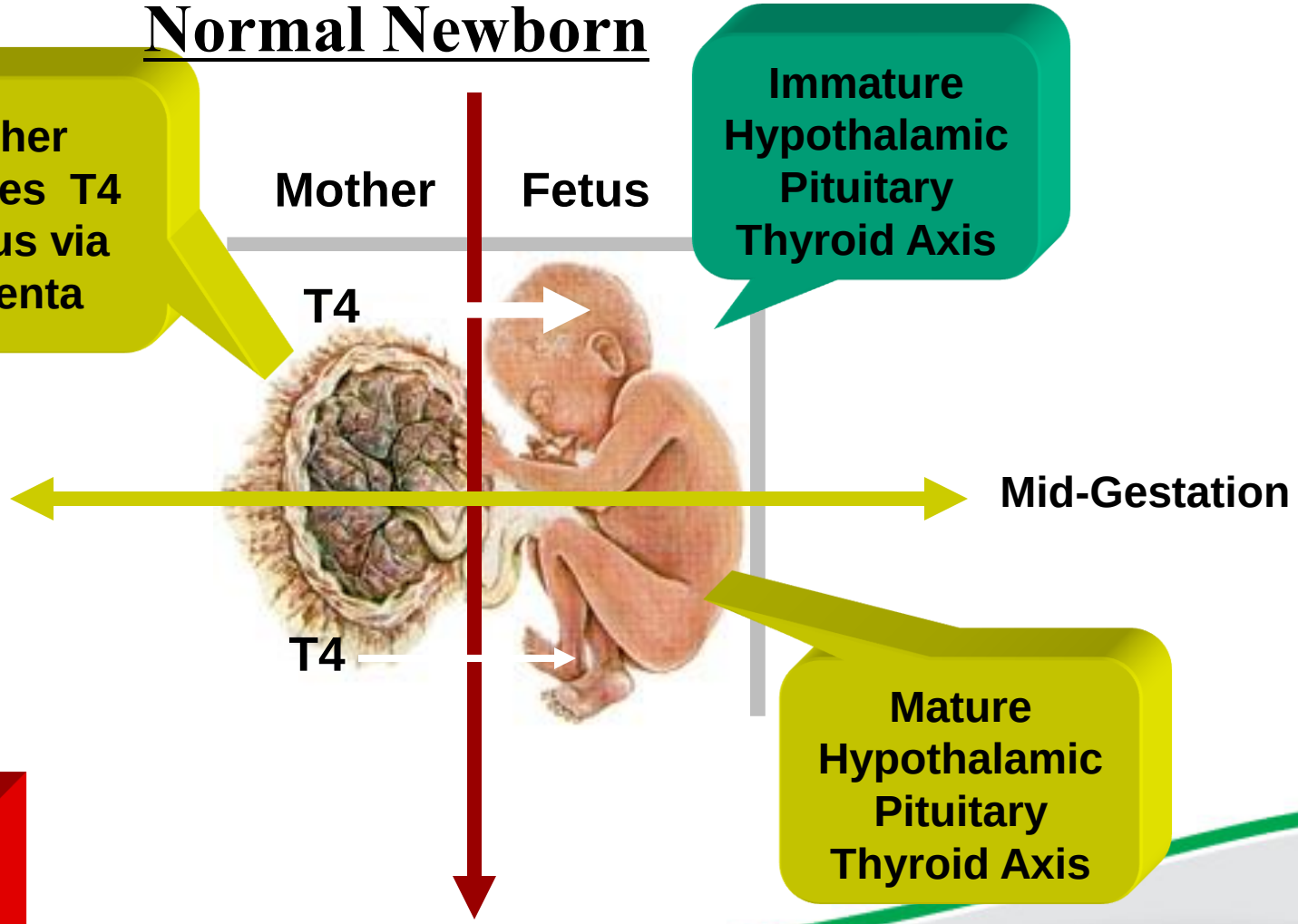
- Replacement thyroid hormone medication: Thyroxine

Congenital Hypothyroid

- **Incidence 1:3000 – 4000 (more than PKU)**
- **Female : Male is 2 : 1**
- **Almost all affected NB have no S/S at birth**

Facts

Normal Newborn



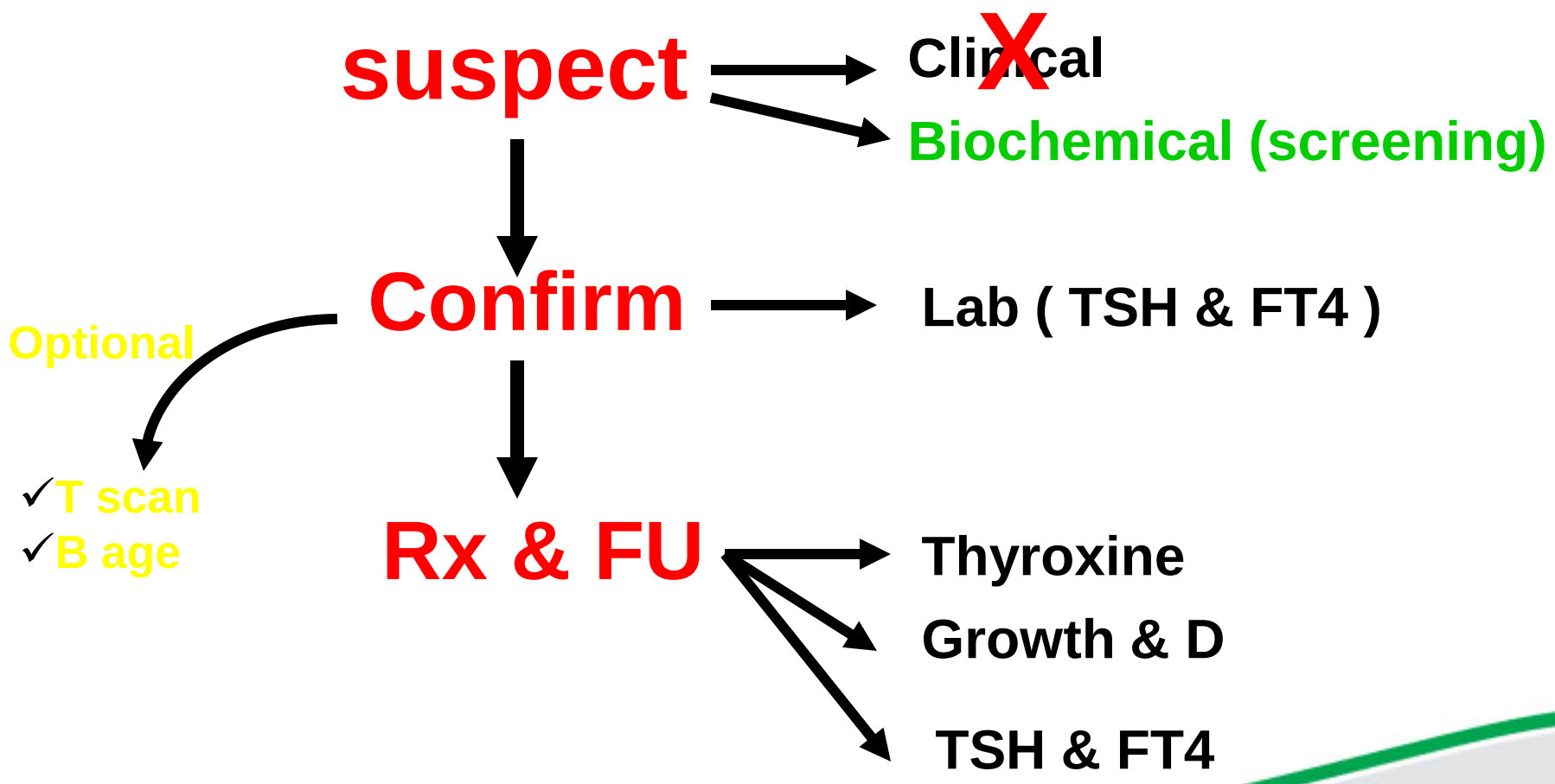
Congenital Hypothyroidism: Causes

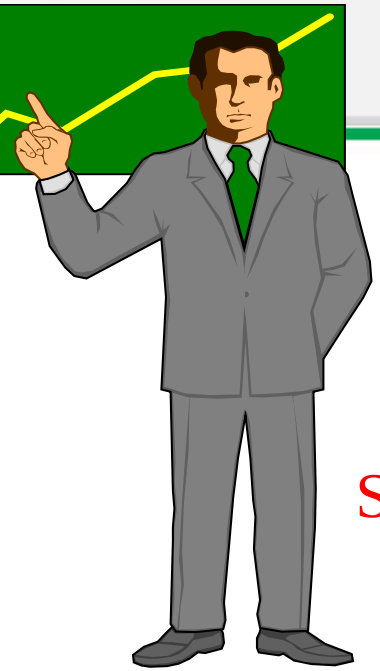
- Agenesis or dysgenesis of thyroid gland
- Dyshormonogenesis
- Ectopic gland
- Maternal hypothyroidism

Clinical Features of Congenital Hypothyroidism

Finding	%
Lethargy	**96%**
Constipation	**92%**
Feeding problems	**83%**
Respiratory problems	76%
Dry skin	76%
Thick tongue	67%
Hoarse cry	67%
Umbilical hernia	67%
Prolonged jaundice	12%
Goiter	8%

Congenital Hypothyroidism





Definitions

Screening: search for a disease in a large unselected populatio

PKU

Congenital hypothyroidism

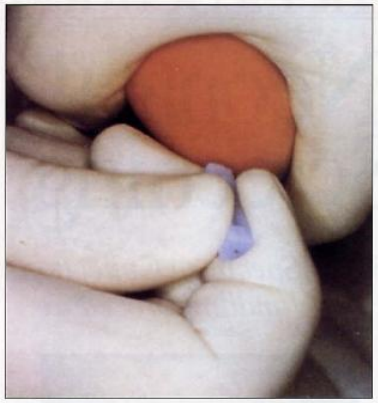
Principal of newborn screening

- Aim is to identify affected infants before development of clinical signs
- **Objective :** ***Eradication of MR secondary to CH***
- **The earlier dx the better IQ**

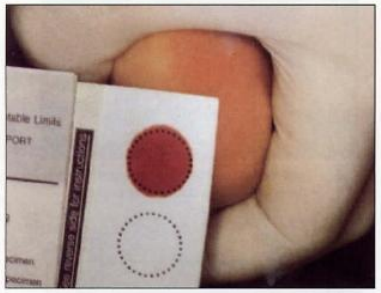
Screening Technique

- cord blood TSH
- blood spot in a filter paper obtained by heel brick for TSH /T4

Newborn Screening



6 Puncture heel. Wipe away first blood drop with sterile gauze pad. Allow another LARGE blood drop to form.



7 Lightly touch filter paper to LARGE blood drop. Allow blood to soak through and completely fill circle with SINGLE application to LARGE blood drop. (To enhance blood flow, VERY GENTLE intermittent pressure may be applied to area surrounding puncture site). Apply blood to one side of filter paper only.

8 Fill remaining circles in the same manner as step 7, with successive blood drops. If blood flow is diminished, repeat steps 5 through 7. Care of skin puncture site should be consistent with your institution's procedures.

9 Dry blood spots on a dry, clean, flat non-absorbent surface for a minimum of four hours.

10 Mail completed form to testing laboratory within 24 hours of collection.

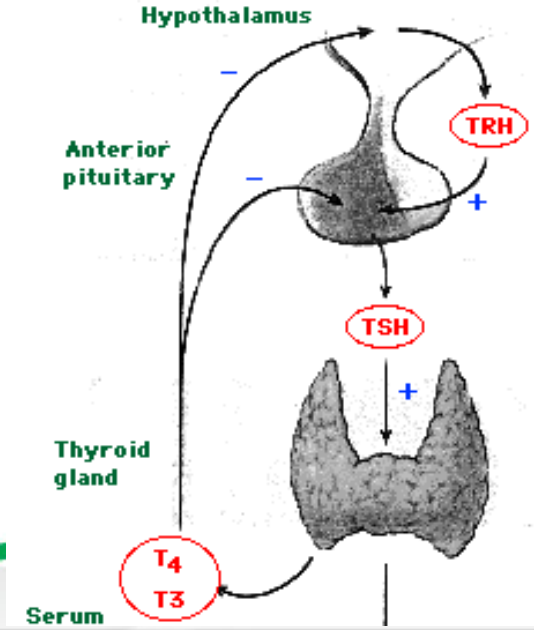
Clinical Outcome

- **Pre-screening data:**
  - Mean IQ = 76
- **Post-screening data:**
  - Children screened & treated by age 25 days
    - Mean IQ = 104

Age of Diagnosis	% with IQ > 85
3 months	78%
6 months	19%
> 7 months	0%

Hyperthyroidism

- Increased thyroid hormone levels
  - High T4 +/- High T3
  - Low (suppressed) TSH



Causes of hyperthyroidism

- Graves Disease
- Overtreatment with thyroxine
- Thyroid adenoma (rare)
- Transient neonatal thyrotoxicosis

Graves' Disease

- Most common cause of hyperthyroidism
- TSH-R antibody (stimulating)
- Goitre, proptosis

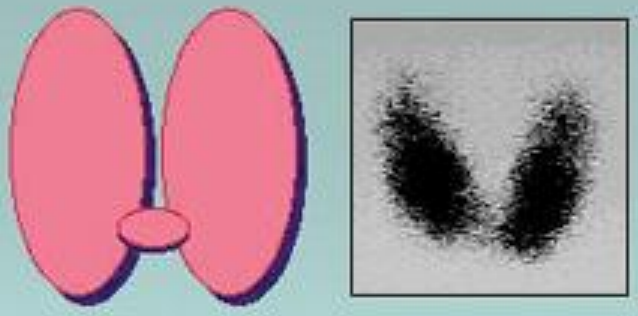
Hyperthyroidism S&S

- Heat intolerance
- Hyperactivity, irritability
- Weight loss (normal to increased appetite)
- diarrhea
- Tremor, Palpitations
- Diaphoresis (sweating)
- Lid retraction & Lid Lag (thyroid stare)
- proptosis
- menstrual irregularity
- Goitre
- Tachcardia

Investigations

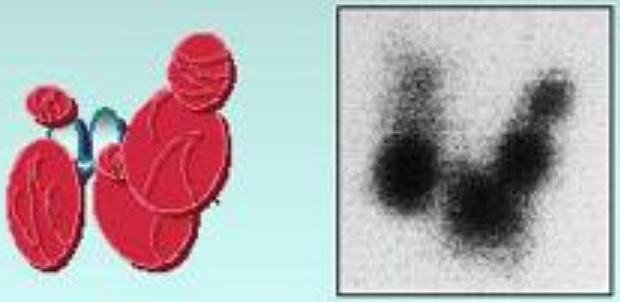
- TSH, free T3&T4
- Thyroid antibodies (TSH receptors antibodies)
- Radionucleotide thyroid scan (incease uptake)

Thyroid Scan in Thyrotoxicosis

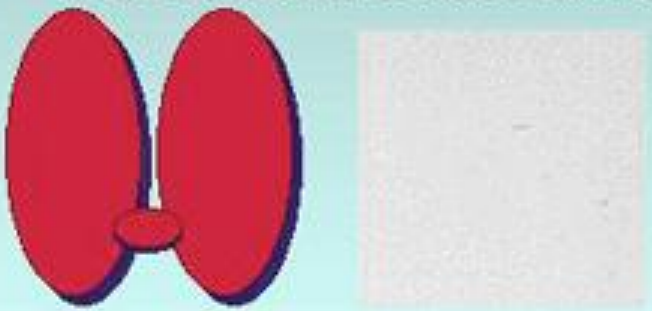


Graves' Disease

Follicular Adenoma



Multinodular Goiter



Subacute Thyroiditis

Hyperthyroidism

- Treatment
  - *Beta*-blockers
  - Carbimazole
  - PTU (propylthiouracil)
  - Radioactive iodine (in adults)
  - Surgery

- 40-70% relapse after 2 years of treatment

Causes of goiter

- Physiological (puberty)
- Iodine deficiency
- Hashimoto thyroiditis
- Graves disease
- Tumor
- Congenital (maternal antithyroid drugs, maternal hyperthyroidism, dyshormonogenesis)