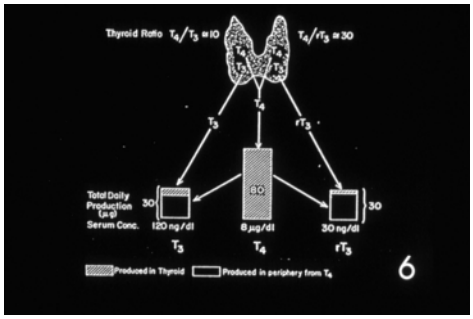
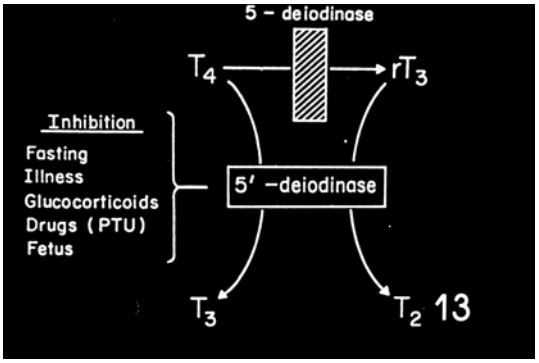
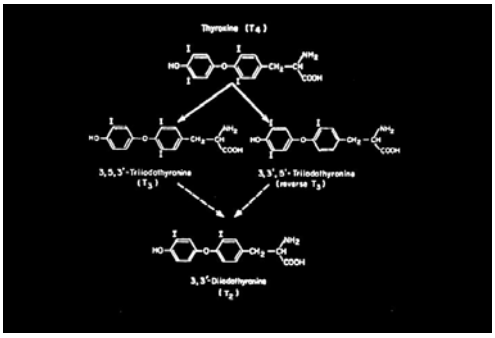
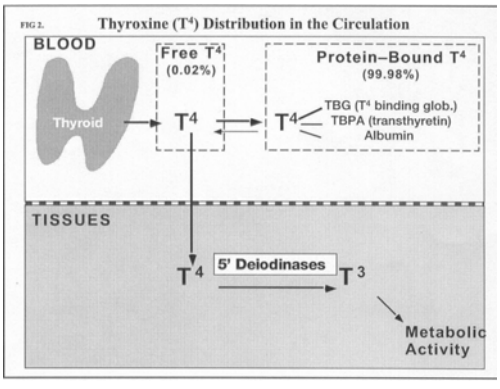


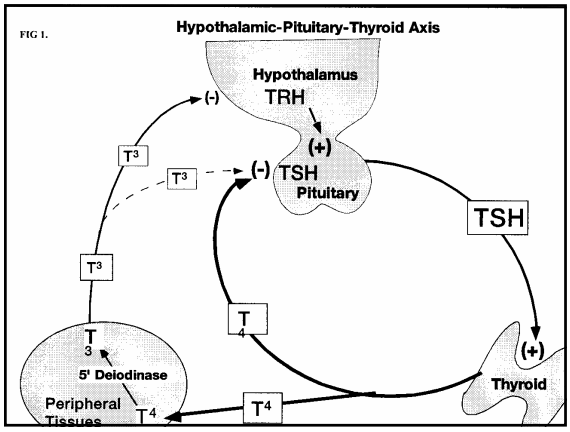




## Thyroid Function

- chemistry & pathophysiology
- causes of hyper-& hypothyroidism
- thyroiditis
- tests of thyroid function
- test strategies
- case studies



## Chemistry & Pathophysiology

- T4 - 80 ug/d produced by the thyroid gland
- T3 - 30 ug/d; 80% by peripheral action of 5' deiodinase
- T4 - 99.97% bound & T3 99.0% bound to TBG, albumin & pre-albumin
- FT4 & FT3 exert negative feedback on TSH
- Hypothalamic TRH modulates feedback setpoint

## Thyroid Binding Proteins

| INCREASES | DECREASES |
|---|---|
| • estrogen/pregnancy | • glucocorticoids |
| • methadone & heroin | • androgens |
| • acute & chronic active hepatitis | • L-asparaginase |
| • hereditary | • nephrosis |
| | • hereditary |

## Causes of Hyperthyroidism

- Graves Disease
- Functioning Thyroid Nodule (Plummer's)
- Toxic Multinodular Goiter
- Thyroiditis
- Factitious Hyperthyroidism
- Drug Induced: iodine, amiodarone, lithium
- Pituitary-Hypothalamic origin

## Causes of Hypothyroidism

- Chronic Thyroiditis (Hashimoto's)
- After radioiodine,surgery or antithyroid drug therapy
- Drugs: amiodarone, lithium,
- Congenital - 1in 4000 births:

## Thyroiditis

- Acute suppurative
- Subacute: granulomatous
- Subacute: lymphocytic
  - 10% postpartum (silent)
  - hamburger toxicosis
- Chronic Thyroiditis (Hashimoto's)

## Subacute Thyroiditis

| **Granulomatous** | **Lymphocytic** |
|---|---|
| • **post viral** | • **painless** |
| • **painful thyroid** | • **simulates Graves** |
| • **systemic symptoms** | • **normal or slightly elevated sed rates** |
| • **high sed rates** | |

## Thyroid Function tests

- TSH-2sd generation
- FT4

- TSH-3rd generation
- Total T3
- RAI uptake
- antithyroid antibodies

- Total T4
- T3 Resin Uptake
- Free T4 Index
- TRH Stimulation Test
- Thyroglobulin

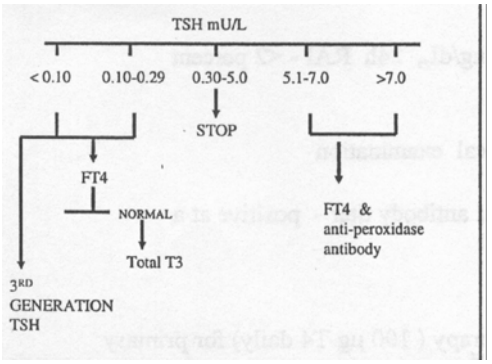
## TSH

- Immunometric Assays
  - Analytical Sensitivity (CV </= 20%)
    - 1st generation: 1.0 uU/mL
    - 2sd generation: 0.1 uU/mL
    - 3rd generation: 0.01uU/mL

## TSH

- INCREASES
- hypothyroidism
- inadequate T4 Rx
- lithium, iodine, antithyroid drugs
- nonthyroidal illness

- DECREASES
- hyperthyroidism
- L-dopa, dopamine, steroids
- excessive T4 Rx
- 2sdry hypothyroidism
- nonthyroidal illness




**Variation in thyroid function within reference range and adverse outcomes**

| | |
|---|---|
| TSH >2·0 mU/L* | Increased 20-year risk of hypothyroidism[6] |
| TSH >2·0 mU/L* | Increased frequency of thyroid autoantibodies[8–10] |
| TSH >4·0 mU/L* | Increased risk of heart disease[10] |
| TSH 2·0–4·0 mU/L* | Cholesterol values respond to thyroxine replacement[9] |
| TSH 0·2–5·5* | Decreased psychological well-being in patients on thyroid hormone compared with controls[12] |
| TSH in normal range* | Improved psychological well-being if T3 is added to T4 therapy[13] |
| Free T4 <10·4 pmol/L† | Impaired psychomotor development of infant if occurs in first trimester[11] |

TSH=thyroid-stimulating hormone, T4=thyroxine, T3=tri-iodothyronine.
*Typical reference ranges: TSH 0·2–5·5 mU/L, †free T4 9·8–25·0 pmol/L.

## Thyroid Function: References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