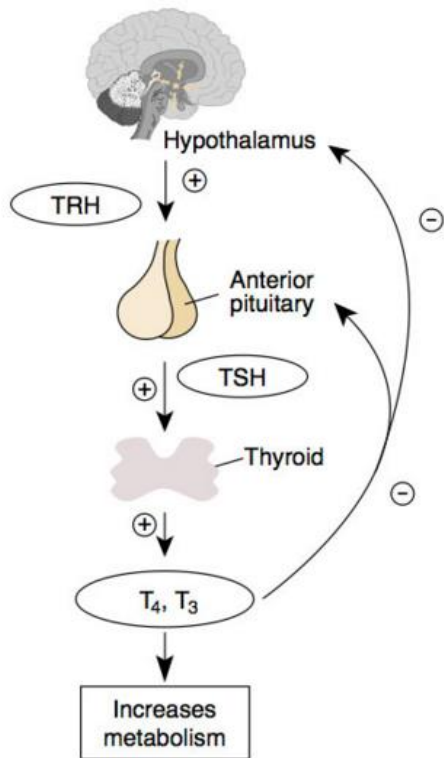


## CLINICAL SKILLS: INTERPRETING THYROID FUNCTION TESTING

Interpreting TFTs crops up in long OSCE cases, often with a symptomatic patient in front of you. This guide aims to recap the hypothalamus-pituitary-thyroid axis and give a structure for you to interpret TFTs, along with explaining a few caveats.

### Hypothalamic-pituitary-thyroid (HPA) Axis



- T4(90%) + T3(10%) are bound to thyroid-binding globulin and albumin.
- T3 is the active hormone
- Only 1% is active and not bound.
- T4 → T3 in peripheral tissues

- **Hyperthyroidism** - overproduction of thyroid hormones; secondary to Grave's disease (autoimmune), toxic goitre, DeQuervain's thyroiditis (painful), follicular carcinoma and medication
- **Hypothyroidism** - underactivity of the thyroid gland secondary to Hashimoto's (autoimmune), iodine deficiency and medication
- **Sick euthyroid syndrome** - ('non-thyroid illness') in states of critical illness or starvation, dysregulation of the thyroid feedback loop is affected. This results in abnormal TFT patterns.

Please note that detailed information on pathology is beyond the scope of this guide.

A "TFT screen" (approximate reference values - please check your local ones)

- T3 (0.9-2.5 nmol/L)
- T4 (10-20 pmol/L)
- TSH (0.2-4.0 mIU/L)

	TSH LOW	TSH HIGH
T3/T4 LOW	Central hypothyroidism: primarily a pituitary deficiency	1° hypothyroidism - Hashimoto's and iodine deficiency
T3/T4 HIGH	1° hyperthyroidism - Graves, goitre, malignancy	TSH secreting tumour (pituitary)

- Sick euthyroid syndrome presents with any abnormal TFT but often the TSH is normal, with changes in T3/4.
- Subclinical hypo/hyperthyroidism present with normal T3/T4 levels but raised or reduced TSH respectively.

#### Medications altering TFTs (Drug history is key):

- Amiodarone - can cause *both* hyperthyroid and hypothyroid states, very difficult to assess purely on TFTs.
- Beta blockers - alters conversion of T4 → T3, but doesn't result in hypothyroidism.
- Lithium - inhibits thyroid release, causing overt hypothyroidism.
- NSAIDs + aspirin - affects binding with proteins, *thus low T4 in presence of normal TBG levels.*

#### OSCE-Aid Tips

Thyroid binding globulin (TBG):

↑TBG in pregnancy = ↓free T3/4

↓TBG in cirrhosis and steroid use = ↑free T3/4

#### Anti-thyroid antibodies to remember:

- Anti-thyroglobulin - Hashimoto's
- Anti-thyroid peroxidase - Hashimoto's
- Anti-TSH receptor - blocking = Hashimoto's; stimulating = Grave's

#### References:

Image from: Hiller-Sturmhofel, S. & Bartke, A. The Endocrine System. Alcohol Heal. Res. World 22, 153-163 (1998).