

- Most of T4 is transported in plasma by **TBG and less as transthyretin**
- Peripheral tissues de-iodinate T4 by **deiodinase enzyme to T3**.
- In respiratory chain, some protons reenter the mitochondrial matrix thru uncoupling proteins (UCPs) without ATP synthesis and this is regulated by thyroid hormone.
- UCP1 in brown adipose tissue
- UCP3 in muscle, other tissues

مهم هذه تجي كيس سيناريو:

1-Elevated TSH, within or low normal T4= Confirmed hypothyroidism

2-Elevated TSH, within reference T4= Developing hypthyroidism

3-Within reference TSH, low T4=Non-thyroid illness.

4-Low TSH, Low T4= secondary or central hypothyroidism

Clinical evidence:

1-Untreated congenital hypothyroidism: Permeant brain damage

2-Hypothyroid children have:

Short stature – delayed puberty

3-Hypothyroid patients have high serum cholesterol due to:

1-Down regulation of LDL receptors on liver cells.

2-Failure of sterol excretion via the gut.

مهم هذه تجي كيس سيناريو:

❖ Undetectable TSH, increase T4 or within normal within normal limits, increase T3 = Thyrotoxicosis

❖ Detectable TSH, Increase T4= Repeat analysis, Immunoassay interference

Regulation of thyroid hormones secretion:

- The hypothalamic-pituitary-thyroid axis regulates thyroid secretion by TRH and TSH.
- TSH stimulates the thyroid to produce T3/T4.
- T3/T4 exert negative feed back control on the hypothalamus and pituitary.
 - ↑Thyroid hormone levels suppress TRH, TSH.
 - ↓Thyroid hormone levels stimulate TRH, TSH to produce more hormone.

- Thyroid hormone plays essential roles in thermogenesis.
- **Types of Thermogenesis:**
 - **Obligatory:** Heat production due to **basal metabolic rate**.
 - **Facultative:** On-demand extra heat production from **metabolic activity in brown adipose tissue, skeletal muscle, etc.**