

# THYROID DISEASES

- **Thyroid disease** is a medical condition that affects the function of the thyroid gland.
- The thyroid gland is located at the front of the neck and produces thyroid hormones that travel through the blood to help regulate many other organs, meaning that it is an endocrine organ.
- These hormones normally act in the body to regulate energy use, infant development, and childhood development.
- There are five general types of thyroid disease, each with their own symptoms. A person may have one or several different types at the same time.

- **The five groups are:**
- 1) **Hypothyroidism** (low function) caused by not having enough thyroid hormones
- 2) **Hyperthyroidism** (high function) caused by having too much thyroid hormones
- 3) Structural abnormalities, most commonly a **goiter** (enlargement of the thyroid gland)
- 4) **Tumors** which can be benign (not cancerous) or cancerous
- 5) Abnormal thyroid function tests without any clinical symptoms (subclinical hypothyroidism or subclinical hyperthyroidism).

## **Symptoms of hypothyroidism:**

- Tiredness
- Unexplained weight gain
- Slow movement
- Muscle cramps
- Slow heart rate (bradycardia)
- Sensitivity to cold temperatures
- Constipation
- Depressed mood
- Memory difficulty

## Symptoms of hyperthyroidism:

- Difficulty sleeping (insomnia)
- Unexplained weight loss
- Tremors
- Fast heart rate (tachycardia) or palpitations
- Sensitivity to hot temperatures, excess sweating
- Diarrhea
- Anxiety, irritability
- **Note:** certain symptoms and physical changes can be seen in both hypothyroidism and hyperthyroidism —fatigue, fine/ thinning hair, menstrual cycle irregularities, muscle weakness/ aches (myalgia), and different forms of myxedema.

## **PATHOPHYSIOLOGY of HYPOTHYROIDISM**

- Thyroid hormone is required for the normal functioning of numerous tissues in the body.
- In healthy individuals, the thyroid gland predominantly secretes thyroxine ( $T_4$ ), which is converted into triiodothyronine ( $T_3$ ) in other organs by the selenium-dependent enzyme iodothyronine deiodinase.
- The thyroid gland is the only source of thyroid hormone in the body; the process requires iodine and the amino acid tyrosine.

- Iodine in the bloodstream is taken up by the gland and incorporated into thyroglobulin molecules.
- The process is controlled by the thyroid-stimulating hormone (TSH, thyrotropin), which is secreted by the pituitary.
- Not enough iodine, or not enough TSH, can result in decreased production of thyroid hormones.

## **PATHOPHYSIOLOGY of HYPERTHYROIDISM**

- Autoimmune thyroid disease is a general category of disease that occurs due to the immune system targeting its own body. It is not fully understood why this occurs.
- In one of the most common types, Grave's Disease, the body produces antibodies against the TSH receptor on thyroid cells.
- This causes the receptor to activate even without TSH being present and causes the thyroid to produce and release excess thyroid hormone (hyperthyroidism).



- Another common form of autoimmune thyroid disease is Hashimoto thyroiditis where the body produces antibodies against different normal components of the thyroid gland, most commonly thyroglobulin, thyroid peroxidase, and the TSH receptor.
- These antibodies cause the immune system to attack the thyroid cells and cause inflammation (lymphocytic infiltration) and destruction (fibrosis) of the gland.

## **PATHOPHYSIOLOGY of GOITER**

- Goiter is the general enlargement of the thyroid that can be associated with many thyroid diseases.
- The main reason this happens is because of increased signaling to the thyroid by way of TSH receptors to try to make it produce more thyroid hormone.
- This causes increased vascularity and increase in size (hypertrophy) of the gland.

- In hypothyroid states or iodine deficiency, the body recognizes that it is not producing enough thyroid hormone and starts to produce more TSH to help stimulate the thyroid to produce more thyroid hormone.
- This stimulation causes the gland to increase in size to increase production of thyroid hormone.

# DIGANOSIS

- Blood Test:
  - Thyroid function test (Triiodothyronin-T3 & thyroxin-T4)
  - Antithyroid antibodies.
  - Thyroglobulin (TG) level
- Ultrasound
- Radioiodine scanning (Thyroid scintigraphy)
- Biopsy

# Treatment

- Medication: Levothyroxin (sterioisomer of T4), propylthiouracil, carbimazole, methimazole.
- Lugol's solution
- Radioiodine therapy
- Surgery