



# “An In-Depth Analysis Of Thyroid Disease Including Hypothyroidism, Hyperthyroidism, Goitres, Thyroid Nodule, Thyroid Pregnancy Andthyroid Cancer

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1. Abstract: Thyroid problems are very common and can affect how the body uses energy, grows, and stays healthy. The thyroid gland makes two main hormones, T3 and T4, which control many body functions. Thyroid diseases can be of two types:

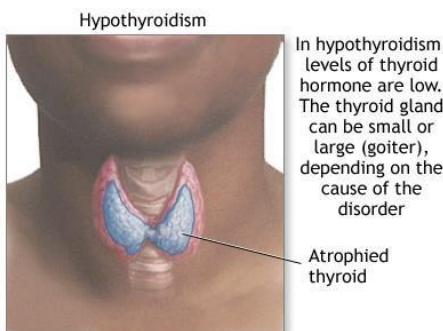
- **Functional problems** like hypothyroidism (low hormone levels) and hyperthyroidism (high hormone levels).
- **Structural problems** like goitres (swelling), nodules (lumps), or thyroid cancer

Introduction Thyroid disease is common. In some places, 15–30% of adults have goitre. Anaesthetists, even if they do not do thyroid surgery, often see patients with thyroid problems. [1,2]

- The main conditions important for anaesthesia are:

1. **Hypothyroidism**
2. **Hyperthyroidism**

## 1. Hypothyroidism:



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Figure no.1 hypothyroidism

## CAUSES OF HYPOTHYROIDISM[1]

## Central Hypothyroidism

## Primary Hypothyroidism

↑ TSH, ↓ free T4

Autoimmune thyroiditis  
(Hashimoto's)

↓ or normal TSH, ↓ free T4

Hypothalamic/pituitary disease

Tumors  
Infiltrative diseases  
Radiation therapy  
Postpartum pituitary necrosis  
Lymphocytic hypophysitis  
Head trauma

Both **primary and central hypothyroidism** can cause the same symptoms. These include:

- feeling very tired or weak
- being sensitive to cold
- constipation
- weight gain[3]

## 2. Hyperthyroidism:

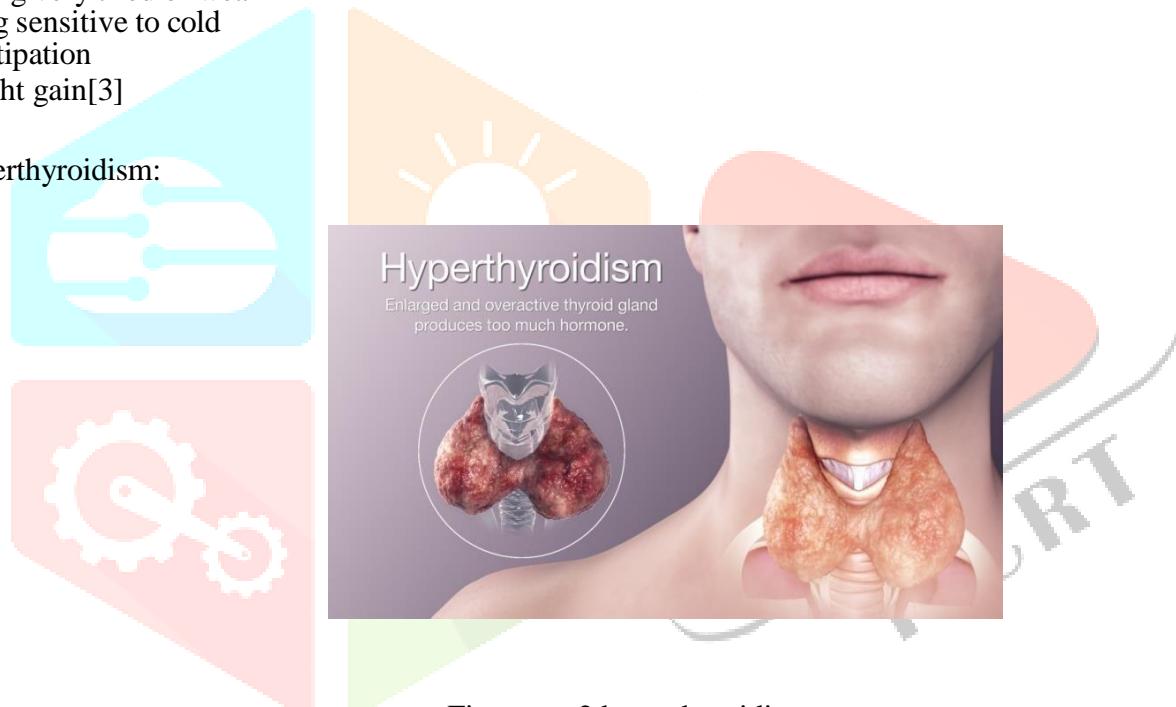


Figure no.2 hyperthyroidism

Typical symptoms of hyperthyroidism are:

- feeling hot easily (heat intolerance)
- sweating a lot
- fast heartbeat or palpitations
- shortness of breath on exertion
- increased appetite
- frequent bowel movements
- weight loss
- hand tremors

## CAUSES OF HYPERTHYROIDISM

**Primary Hyperthyroidism**

- ↓ TSH, ↑ free T4, ↑ T3
- High radionuclide uptake
- Graves' disease
- Toxic multinodular goiter \*
- Toxic nodule \*
- hCG-induced hyperthyroidism
- Low radionuclide uptake
- Thyroiditis (transient)
- Subacute thyroiditis
- Silent thyroiditis
- Postpartum thyroiditis

**Central Hyperthyroidism**

- ↑ or normal TSH, ↑ free T4, ↑ T3
- High radionuclide uptake
- TSH-secreting pituitary adenoma
- Thyroid hormone resistance



## 3. Thyroid nodule:

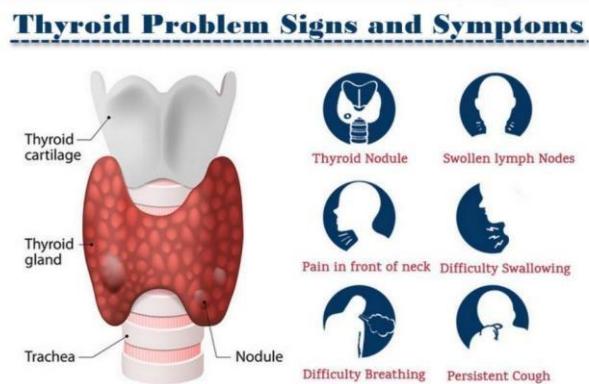


Figure no.3 thyroid nodule

- More common in women.
- Frequency ↑ with age.
- Detection varies by method:
  - Palpation: 5–6%
  - Autopsy (no thyroid disease): 50–60%
  - Ultrasound: 30–70%

90–95% benign, but main concern = thyroid

cancer[4] Radionuclide Imaging & Thyroid

#### Nodules:

- A test that uses radioactive material (like iodine or technetium) to study how the thyroid gland works.
- The patient swallows or gets an injection of a small radioactive trace
- Types of scans:
  - Iodine scan → shows iodine trapping + organification (better test).
  - Technetium scan → shows only iodine trapping (cheaper, commonly used).

Rarely, cancers may trap but not organify iodine → mismatch between iodine and technetium scans (very rare).[4]

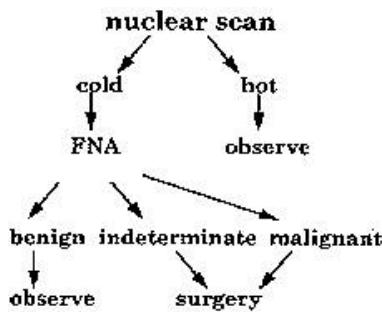


Figure no.4 nuclear scan

## 4. Thyroid Disease in Pregnancy:

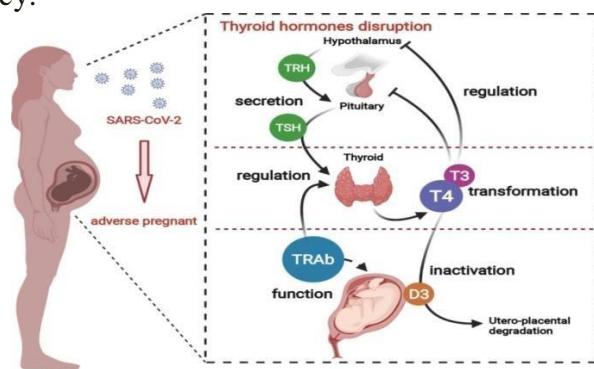


Figure no.5 thyroid in pregnancy

- During pregnancy, the body goes through special changes in thyroid hormone metabolism.
- Because kidney filtration increases, the body clears iodine faster → this lowers blood iodine levels.
- In countries with enough iodine (like the US and Japan):
  - This iodine loss does not cause problems.
  - Goiter is not more common in pregnancy.
  - Ultrasound may show a small thyroid enlargement (about 13%), but it is not noticeable on exam.
- In countries with iodine deficiency (parts of Europe, Asia, Africa):
  - Pregnancy may worsen iodine shortage.
  - This can lead to maternal hypothyroidism and goiter[5]

CHANGES IN MATERNAL THYROID HORMONE PHYSIOLOGY DURING PREGNANCY

- ↑ Renal clearance of iodide, secondary to ↑ glomerular filtration rate
- ↑ Thyroid-binding globulin
- ↑ Total T4 and T3 levels
- ↑ Free T4/↓ TSH\* (first trimester only), secondary to ↑ hCG[5]

Important Difference:

- Babies with congenital hypothyroidism (thyroid defect from birth) improve with early L-thyroxine treatment.
- Babies with endemic cretinism (due to iodine deficiency in pregnancy) do **not** improve much with treatment.

This shows that maternal thyroid hormones passed through the placenta early in pregnancy are essential to protect the baby's brain[5]

## 5. Thyroid Goiter:

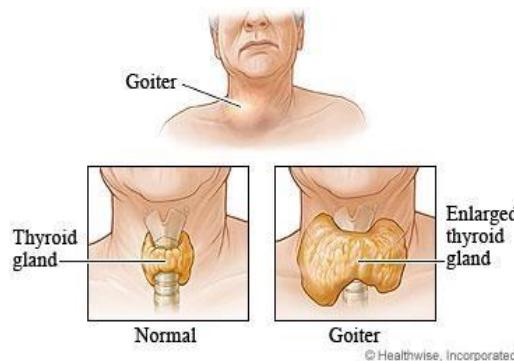


Figure no.7 thyroid goiter

goiter is when the thyroid gland in the neck becomes bigger than normal. It can happen whether thyroid hormone levels are low, normal, or high.[6]

## Causes

- Not enough iodine in the diet (most common worldwide)
- Autoimmune diseases:
  - Hashimoto's thyroiditis → can cause low thyroid hormone
  - Graves' disease → can cause high thyroid hormone[6]

## Symptoms

- Swelling in the neck
- Trouble swallowing or breathing if very large
- Hoarse voice
  - Sometimes feeling very tired (hypothyroidism) or very

active/nervous (hyperthyroidism)[2,6] Treatment

- Iodine supplements if lacking
- Medicine for low or high thyroid
- Surgery if goiter is large or there is cancer risk
- Radioactive iodine for overactive thyroid[4,6]

6. Thyroid cancer:

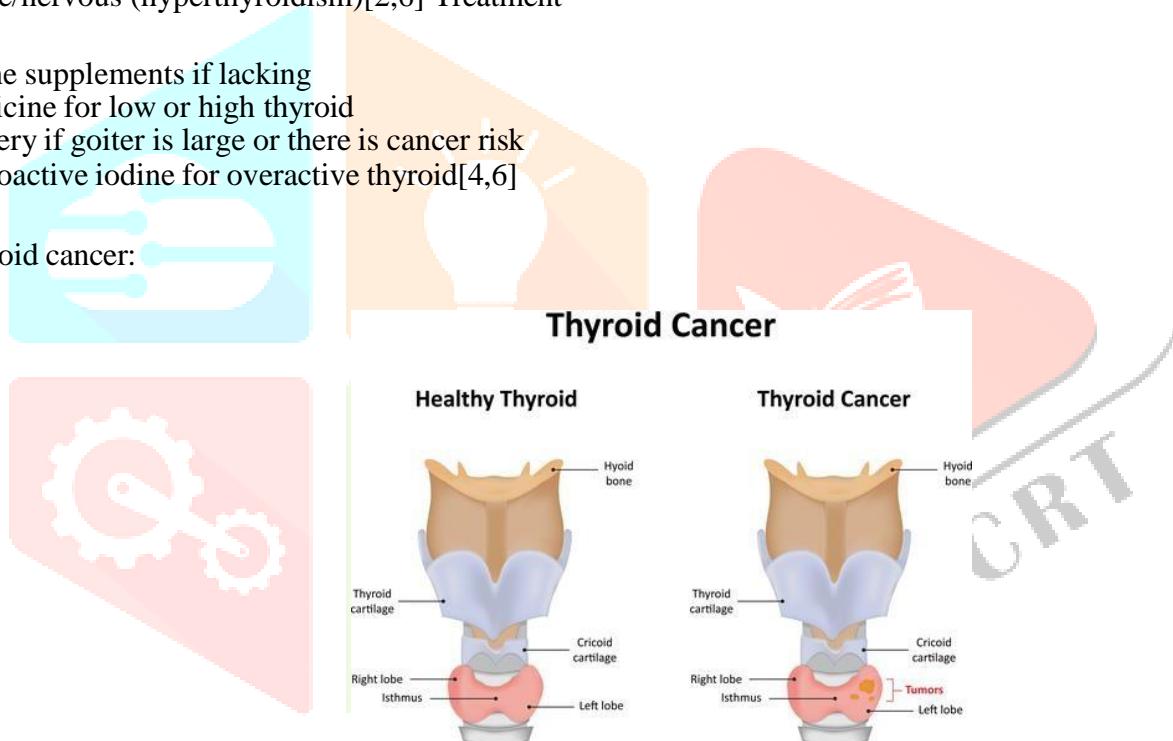


Figure no.8 thyroid cancer

Thyroid cancer is a disease in which malignant (cancer) cells form in the tissues of the thyroid gland. Thyroid cancer is not common in children and teenagers, but about 10% of all thyroid cancers happen in this age group.[7]

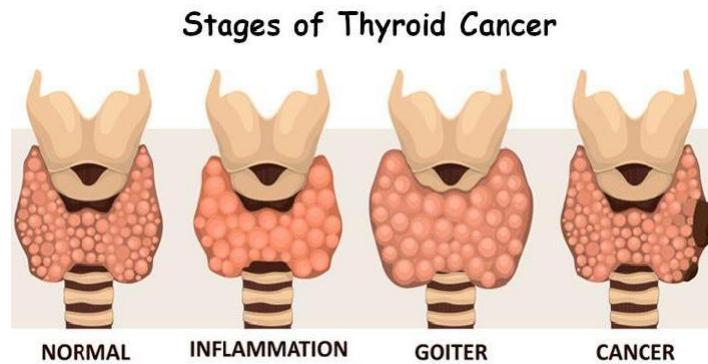


Figure no.9 stages of thyroid cancer

common symptoms of thyroid cancer

1. A lump or swelling in the neck – often the first sign; it may grow slowly.
2. Pain in the front of the neck – sometimes it spreads to the ears or jaw.
3. Hoarse voice or voice changes – the voice may sound rough or weak.
4. Difficulty swallowing – food may feel stuck in the throat.

Diagnosis

Surgery is usually the main treatment for thyroid cancer. To choose the best treatment plan, doctors try to confirm the diagnosis before surgery. However, in some patients, thyroid cancer is discovered after the surgery

3. Conclusion:

Thyroid diseases can affect many body functions, but with early diagnosis and proper treatment they can be easily managed. Regular check- ups, awareness of symptoms, and correct medication help prevent complications. Understanding thyroid problems is important for maintaining good health and improving quality of life

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Thyroid tumors section

