

# Hypothyroidism

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## Concept

common disorder, esp. after the onset of middle age, women > men; increasing incidence with age.

**Iodine deficiency** remains the most common cause worldwide.

In areas of iodine sufficiency, **autoimmune disease** and **iatrogenic causes** are most common.

## Definitions/Classification:

- time of **onset** (congenital or acquired)
- the **level of endocrine dysfunction** (primary or secondary),
- **severity** (clinical /overt and subclinical / mild).

## Etiology

- **Congenital hypothyroidism**
  - about 1 in 3000 to 4000 newborns
  - **May be transient,**
  - **but permanent : majority**
  - **mutations are being increasingly recognized**
  - **but majority remains idiopathic**

## Congenital hypothyroidism

- **neonatal screening: TSH or T4 levels in heel-prick blood specimens**
- **T4 requirements are relatively great during the first year of life, and a high circulating T4 level is usually needed to normalize TSH**

## Autoimmune hypothyroidism

- most common cause of acquired hypothyroidism
- may be associated with a goiter (Hashimoto's, or goitrous thyroiditis)
- mean age: at dx is about 60 years; M: F = 1:7
- prevalence increases with age
- destructive lymphoid infiltration of the thyroid, ultimately leading to fibrosis and atrophy
- presence of circulating thyroid autoantibodies
- may be associated other autoimmune diseases, particularly vitiligo, pernicious anemia, Addison's disease, and type 1 diabetes mellitus etc.

## Iatrogenic hypothyroidism

- common cause
- can be detected by screening before symptoms develop
- in the first 3 to 4 months after radioiodine treatment, transient hypothyroidism: due to reversible radiation damage rather than to cellular destruction
- TSH levels are suppressed by hyperthyroidism, free T4 levels are a better than TSH for monitoring in the months following radioiodine treatment



## Iodine deficiency

- responsible for endemic goiter and cretinism
- uncommon cause of adult: unless the iodine intake is very low
- public health measures to improve iodine intake
- iodized salt or bread or the use of a single bolus of oral or intramuscular iodized oil

## Iodine excess

- occurs in 13% of patients treated with amiodarone
- lithium



## Secondary hypothyroidism

- usually occurs together with other anterior pituitary hormone deficiencies
- isolated TSH deficiency: very rare
- TSH levels may be low, normal, or even slightly increased (secretion of immunoreactive but bioinactive forms of TSH)
- most common causes are pituitary adenomas and the surgery of and/or radiotherapy



## Symptoms

- Tiredness, weakness
- Dry skin
- Feeling cold
- Hair loss
- Difficulty concentrating and poor memory
- Constipation
- Weight gain with poor appetite
- Dyspnea
- Hoarse voice
- Menorrhagia (later oligomenorrhea or amenorrhea)
- Paresthesias
- Impaired hearing



## Clinical manifestation

- gradual onset
- many medical and lifestyles causes similar symptoms,
- symptoms that are new or arise in combination are most likely to indicate hypothyroidism



## Signs

- Dry coarse skin; cool peripheral extremities
- Puffy face, hands and feet (myxedema)
- Diffuse alopecia
- Bradycardia
- Peripheral edema
- Delayed tendon reflex relaxation
- Carpal tunnel syndrome
- Serous cavity effusions



## Atypical clinical presentation

- Hypothermia; cool extremities
- congestive heart failure
- pericardial and pleural effusions
- ileus and intestinal pseudo-obstruction
- coagulopathy
- neurological manifestation: depression, psychosis, ataxia, seizures, and coma
- hypertension, particularly diastolic
- memory and concentration are impaired

## Atypical clinical presentation

- Children: atypical; a slow growth velocity, poor school performance and arrest of pubertal development
- Young women: hypothyroidism may not show obvious signs.
- Hypothyroidism should be excluded in all patients with oligomenorrhoea/amenorrhoea, menorrhagia, infertility or hyperprolactinaemia.



∴ **A**  
severely obtunded after surgery for fractured neck of femur. Marked myxoedema is evident. **B**: Several months later, after therapy including thyroid hormone replacement.

## Laboratory Evaluation

- Raised *primary hypothyroidism* irrespective of its cause and severity
- **a free T4** level and increased TSH: *clinical* ~
- only free T4: will not detect *subclinical* ~
- **secondary hypothyroidism**: low free T4 level regardless of TSH, investigation : pituitary imaging, a thyroid releasing hormone stimulation test to assess TSH responsiveness and other pituitary function testing should be performed
- **TPO** : 90 to 95% of patients with autoimmune hypothyroidism.
- goiter associated with hypothyroidism: **FNAC**

## Other laboratory abnormalities

- **Anaemia**: usually **normochromic** and normocytic in type but may be **macrocytic** (sometimes this is due to associated pernicious anaemia) or **microcytic** (in women, due to menorrhagia)
- increased serum **AST** levels, from muscle and/or liver
- increased serum **CK** levels, with associated myopathy
- **hypercholesterolaemia**
- **hyponatraemia** due to an increase in ADH and impaired free water clearance.

## Treatment

- ~ treated with
- start slowly 50 µg/d for 3 weeks, then 100 µg/d further 3 weeks and finally to 150 µg/d
- Thyroxine should always be taken as a single daily dose as it has a plasma half-life of approximately 7 days.
- The dose is adjusted on the basis of TSH levels, with the goal of treatment being a normal TSH, ideally in the lower half of the reference range.

- TSH responses are gradual; measured 4-6 weeks after instituting treatment or after any subsequent change in levothyroxine dosage.
- Patients may not experience full relief from symptoms until 3 to 6 months after normal TSH levels are restored.
- Adjustment of thyroxine dosage is made in 12.5- or 25-ug increments
- TSH levels are stable, follow-up measurement of TSH is at annual intervals and may be extended to every 2 to 3 years

## Special Treatment Considerations

### Pregnancy:

- most pregnant women require an increase in the dose of thyroxine of 50 µg daily
- return to previous levels after delivery
- serum TSH and free T4 should be measured during each trimester and the dose of thyroxine adjusted to maintain a normal TSH

### CAD:

- Around 5% of patients: angina at presentation or develop it during treatment with thyroxine.
- Approximately 40% of patients with angina cannot tolerate full replacement therapy despite the use of β-blockers and vasodilators.
- In the elderly, especially patients with known CAD, the starting dose of thyroxine is 12.5-25 µg/d with similar increments every 2 to 3 months until TSH is normalized.

## Myxedema coma

- mortality rate is 50% and survival depends upon early recognition and treatment of hypothyroidism and other contributing factors
- clinical manifestation:
  - reduced level of consciousness
  - sometimes associated with seizures
  - other features of hypothyroidism
  - hypothermia can reach 23°C (74°F)

## Myxedema coma

- almost always occurs in the elderly
- usually precipitated by factors that impair respiration, such as
  - antidepressants)
  - pneumonia
  - congestive heart failure
  - myocardial infarction
  - gastrointestinal bleeding
  - CVA
- hypoventilation, leading to hypoxia and hypercapnia, plays a major role in pathogenesis

## Myxoedema coma

- It is a medical emergency and treatment must begin before biochemical confirmation of the diagnosis
- **thyroxine** can initially be administered as a single intravenous bolus of **500 µg**, which serves as a loading dose, and is usually continued at a dose of 50-100 µg/d
- Supportive therapy to correct any metabolic disturbances
- External warming is indicated only if the temperature is <30°C, as it can result in cardiovascular collapse

### Additional measures:

- **oxygen** (by ventilation if necessary)
- monitoring of **cardiac output and pressures** via a Swan-Ganz catheter
- gradual **rewarming**
- **hydrocortisone** 100 mg i.v. 8-hourly
- **glucose** infusion to prevent hypoglycaemia
- cautious use of intravenous fluids
- broad-spectrum **antibiotics**

