

# **HYPOTHYROIDISM**

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# Hypothyroidism

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- Deficiency in production and secretion of T4 and T3
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# Prevalence of Hypothyroidism

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- ❑ Prevalence is 14/1000 females and 1/1000 males.
  - ❑ Other autoimmune diseases.
  - ❑ Family history of autoimmune diseases
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# KILPATRIK GRADING OF GOITRE

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- Grade 0: Not visible neck extended & Not palpable
  - Grade 1: Not visible, but palpable
  - Grade 2: Visible only when neck is extended & on swallowing,
  - Grade 3: Visible in all positions
  - Grade 4: Large goiter
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# Causes Primary hypothyroidism-

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- Autoimmune thyroiditis (Hashimoto's)
  - Radioactive iodine
  - Post thyroidectomy
  - Anti-thyroid drugs (CMZ PTU)
  - Lithium Amioderone
  - Iodine deficiency
  - Subacute thyroiditis
  - Infiltrative disease
  - Agenesis
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# Secondary hypothyroidism-causes

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- Hypothalamic disease
  - Pituitary disease
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# Clinical features

## General and CVS

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- Tiredness
  - Weight gain
  - Cold intolerance
  - Goitre
  - Constipation
  - Bradycardia
  - Angina
  - Cardiac Failure
  - Pericardial effusion
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# Clinical Features

## Neurological and Haematological

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- Aches and Pains
  - Carpal Tunnel
  - Deafness
  - Hoarseness
  - Ataxia
  - Depression
  - Psychosis
  - Iron deficiency A
  - Pernicious Anemia
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# Clinical Features    Skin and Reproduction

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- Dry skin
  - Erythema
  - Vitiligo
  - Infertility
  - Menorrhagia
  - Galactorrhoea
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# GOITROGENS

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## □ DRUGS

- Anti-thyroid
  - Cough medicines
  - Sulfonamides
  - Lithium
  - Phenylbutazone
  - PAS
  - Oral hypoglycemic agents
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# GOITROGENS

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## FOOD

- ✓ Soybeans
  - ✓ Millet
  - ✓ Cassava
  - ✓ Cabbage
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# Laboratory Diagnosis

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- T4/FT4 reduced
  - T3/FT3
  - TSH elevated
  - Thyroid Antibodies may indicate aetiology.
  - If TSH is reduced or normal in the presence of a low T4, pituitary function necessary.
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# THYROID FUNCTION TESTS (2)

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## 2. Thyroid gland economy:

- Radio iodine uptake
  - Perchlorate discharge test (+ve in Pendred syndrome & autoimmune thyroiditis)
  - TSH level
  - TRH stimulation tests
  - Thyroid scan
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# THYROID FUNCTION TESTS (3)

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## 3. Tests for thyroid hormone:

- Total & free T4 & T3
  - Reverse T3 level
  - T3 Resin Uptake
  - $T3RU \times \text{total } T4 = \text{Thyroid Hormone Binding Index (formerly Free Thyroxin Index)}$
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# **THYROID FUNCTION TESTS (4)**

## **□ Special Tests:**

- Thyroglobulin level**
  - Thyroid Stimulating Immunoglobulin**
  - Thyroid antibodies**
  - Thyroid radio-isotope scan**
  - Thyroid ultrasound**
  - CT & MRI**
  - Thyroid biopsy**
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# Additional abnormal tests.

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- ❑ Fasting cholesterol and triglycerides may be raised
  - ❑ Ck AST and LDH (SMAC 20) may be raised
  - ❑ FBC Anemia
  - ❑ ECG Slow rate. Small complexes.
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# Treatment

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- ❑ Thyroxine. Usual maintenance dose is 150ug.
  - ❑ Compliance and adequacy of dose checked by TSH measurements.
  - ❑ Try to maintain TSH in normal range.
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# Hashimoto's Thyroiditis

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- ❑ Chronic lymphocytic thyroiditis
  - ❑ Chronic autoimmune thyroiditis
  - ❑ Caused by:
    - Antithyroid peroxidase antibodies
    - Antithyroglobulin antibodies
  - ❑ Antibodies cause thyroid injury
  - ❑ Overt hypothyroidism, rare initial hyperthyroidism
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# Postpartum Thyroiditis

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- Usually presents as overt hypothyroidism
  - May have associated goiter
  - Occurs within first 6 postpartum months
  - Non-tender gland
  - Self-limiting
  - No treatment required usually
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# Subacute Thyroiditis

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- May be associated with a viral infection
  - Gland usually tender
  - Fever, sore throat, malaise may be present
  - Elevated ESR
  - Self-limiting
  - Lasts 1-3 months
  - NSAIDs for pain, fever prn
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# Riedel's Thyroiditis

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- ❑ Rare
  - ❑ Middle-aged or elderly women
  - ❑ Enlarged, asymmetric, stony hard gland adherent to neck structures
  - ❑ Local pain, dysphagia, dyspnea, hoarseness
  - ❑ Treated with Tamoxifen [generic]
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# Myxedema Coma

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- ❑ Medical emergency
  - ❑ High mortality rate
  - ❑ Rare
  - ❑ Occurs in older women as a consequence of poorly controlled or untreated hypothyroidism
  - ❑ Hospitalization, sepsis, exposure to cold, trauma
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# Myxedema Coma

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- Altered consciousness, coma
  - Hypothermia
  - Bradycardia
  - Hypotension
  - Reduced ventilatory rate
  - Hypoglycemia, hyponatremia, elevated TSH
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# Myxedema Coma

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## □ Treatment:

- Intubation and mechanical ventilation
  - Control hypothermia
  - Volume expansion
  - Large dose of Levothyroxine (synthetic T4) [generic], then daily therapy
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# Hypothyroid Face

**Notice the apathetic facies, bilateral ptosis, and absent eyebrows**



# Iodine Deficiency

# Need for Iodine

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- Iodine is an essential component of thyroid hormones
- Daily needs calculated from balance studies, hormone replacement; represent safe average
- Major effects of iodine deficiency come from hypothyroidism

# Consequences of Iodine Deficiency

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- Decreased child survival
- Defective child
- Reproductive complications
- Hypothyroidism
- Goiter
- Economic deprivation





# Recommended Daily Iodine Intake (FNB,2001)

- Adults 150 mcg
- Pregnant 220
- Lactating 290
- Infants 0-6 mos 110
- Infants 7-12 mos 130
- Children 1-8 y 90
- Children 9-13 y 120

# Iodine excess

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- Tolerable upper limit 1100 mcg (adults)
- Often no effects from much higher doses
- Increase in autoimmune thyroid diseases
- Occasional iodine-induced hyperthyroidism
- Occasional hypothyroidism
- Possible increase in papillary cancer

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*GOAL:* To get the RIGHT amount  
of iodine



# Classifying Iodine Nutrition by UI

| <i>mcg/L</i> | <i>Condition</i>    |
|--------------|---------------------|
| • <19        | Severe deficiency   |
| • 20-49      | Moderate deficiency |
| • 50-99      | Mild deficiency     |
| • 100 –199   | Optimal intake      |
| • 200-299    | More than adequate  |
| • >300       | Excessive           |

# Sources of US Iodine

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- Dairy products
- Medicines
- Vitamin/mineral preparations
- Antiseptics
- Seafood, meat
- Bread
- Iodized salt

# Other iodine sources: examples

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- Medicines (eg amiodarone)
- Radiocontrast dyes
- Antiseptics
- Water purification
- Vitamin/mineral mixes

# Iodized salt in USA

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- Fortified at 100 ppm (=77 mcg I/g)
- About 70% of household salt is iodized
- Only about 15% of daily salt intake comes from household salt
- Salt for processed foods not usually iodized
- Choice of household iodized salt adds about 50 mcg iodine daily

## B. Nodules

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- Can be multiple or single, hot or cold
- Overall 5-10%% are malignant
- 95% of solitary nodules are cold and 85% of those are benign
- 5% of patients who had neck radiation as child (esp. w/>100 rads) get malignant nodules (papillary carcinoma)

# 1. Solitary Thyroid Nodule

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- Defined as discrete swelling within otherwise palpably normal thyroid
- Most are simply in an early stage of MNG
- Other causes of solitary nodules are:
  - Thyroid adenomas
  - Thyroid cysts
  - Thyroiditis
  - Thyroid carcinomas (5%)

# Diagnosis

- Do FNA & biopsy as initial test of all nodules
- This includes ALL palpable solitary nodules, ALL palpable dominant nodules in MNG, and any palpable nodule in thyrotoxic patient
- Ultrasound guided FNA is indicated for NON-palpable nodules if  $>1.5\text{cm}$  or if it has suspicious findings on U/S (i.e. encapsulated or distinctly different from the other nodules)

## 2. Benign Nodular Disease

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- Tx of benign cold solitary nodules is indicated if :
  - a) compression of the trachea
  - b) recurrence of cyst after aspiration
  - c) neck discomfort
- Recurrent cystic nodules can be treated with a sclerosing agent (tetracycline, ethanol) injected into nodule
- If indicated, surgery is UNILATERAL lobectomy



# 3. Thyroid Adenoma

- Benign area of hyperfunctioning autonomous thyroid tissue
- Most are follicular type; occur as single nodule
- Starts off small, grows slowly, and becomes large enough that thyroxine produced suppresses TSH production.
- Adenomas may get a hemorrhagic necrosis with associated pain and subsequent loss of function—with surrounding tissue resuming function

# Treatment of Thyroid Adenomas

- Ablative therapy with high-dose I131 or surgery
- Ablative treatment is indicated for local compressive or cosmetic effects.
- Ablative treatment is indicated in patients with adenomas >3cm or are already hyperthyroid
- For euthyroid, do NOT do suppressive therapy with thyroxine

## 4. Thyroid carcinoma

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- Either Parafollicular or Follicular
- Parafollicular CA is called medullary thyroid cancer (MTC)
- Affects parafollicular C-cells---serum calcitonin is increased
- Sporadic, but about 15% are seen in MEN 2A or MEN 2B
- Present with mass, cervical LAD

# Thyroid carcinoma

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- Follicular cancer has three histologic types:
  - Papillary
  - Follicular
  - Anaplastic carcinoma

# Papillary

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- Most common, indolent
- Spreads via lymphatics
- Patients present with thyroid mass and cervical lymphadenopathy

# Follicular

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- Less rare
- Mimics normal thyroid tissue
- Has early hematogenous spread especially to bone and lungs
- Patients present with a thyroid mass and distinct metastasis

# Anaplastic cancer

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- Rare and highly malignant
- Present with a rapidly growing mass

# Treatment

- Near-total thyroidectomy (parathyroid spared)
- In patient with a hx of previous thyroid cancer treated with thyroidectomy and radiation, there should be a low thyroglobulin level
- After initial treatment, follow up q6months for several years. Repeat scans done at 1 and 3 years