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# Did You Know?

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## Hypothyroidism

### WHAT IS IT?

Endocrine disorder that results from a deficiency in thyroid hormones (Prohormone T4 and Active T3)

- T4 and T3 act on nearly all cell types to affect many important body functions including basal metabolic rate, body temperature, growth and development
  - Loss of thyroid function causes sequelae of metabolic disturbances and homeostasis imbalances

### SIGNS AND SYMPTOMS

Weight Gain | Slow Heart Rate | Constipation | Cold Intolerance | Cognitive Dysfunction
Puffy Face | Brittle Nails | Thinning Hair | Dysmenorrhea | Muscle Weakness | Dry Skin

### CAUSES

Primary hypothyroidism (most common etiology): inadequate thyroid hormone synthesis by the thyroid gland

***Causes: iodine deficiency, medical conditions, drug therapy, or injury to the thyroid gland***

- ***Iodine deficienc***
  - Iodine is an essential building block for thyroid hormones
    - Deficiency of this micronutrient can limit the body's ability to maintain euthyroid status
- ***Medical conditions***
  - Hashimoto's disease
    - Autoimmune disorder – patient's immune system attacks own thyroid gland
- ***Drug therapies***
  - Amiodarone, Lithium, Interferon-α, Thalidomide, and Valproic Acid (amongst others)
- ***Injury to the thyroid gland***
  - Radioiodine therapy for the treatment of hyperthyroidism, radiation therapy to the head or neck, or thyroid surgery

Secondary Hypothyroidism: failure of the pituitary gland to stimulate sufficient thyroid gland function (via TSH)

### DRUG THERAPIES *(see chart 1 for comparison of these thyroid replacement options)*

***Levothyroxine (Synthroid®) | Liothyronine (Cytomel®) | Desiccated Thyroid (Armour®; Nature-Throid®)***

### COMMON ADVERSE DRUG REACTIONS

Side effects are generally associated with symptoms of hyperthyroidism due to therapeutic overdose including:

- Fatigue
- Increased Appetite
- Weight Loss
- Heat Intolerance
- Excessive Sweating
- Headache
- Rash
- Nervousness
- Irritability
- Insomnia
- Tremors
- Palpitations
- Diarrhea
- Vomiting
- Hair Loss
- Flushing

### BLACK BOX WARNING

*Drugs with thyroid hormone activity have been used for the treatment of obesity either alone or in combination with other products. In patients with a normally functioning thyroid gland, doses within the range of normal daily hormone requirements are ineffective for weig t loss. Larger doses of these medications may produce serious or even life-threatening toxic effects, especially when ta en in combination with other drugs intended for weight loss.*

### HYPOTHYROIDISM GUIDELINES AND CLINICAL PEARLS

Nationally recognized guidelines are published by the American Association of Clinical Endocrinologists (AACE) in conjunction with the American Thyroid Association (ATA)

- ***Levothyroxine is recognized as the gold standard of therapy*** by these guidelines due to efficacy in resolving the symptoms of hypothyroidism, long-term experience of its benefits, favorable side effect profile, ease of administration, good intestinal absorption, long serum half-life, and low cost
- ***Consistently use a uniform formulation (brand or generic) of levothyroxine*** to prevent variations in dose and clinical response between patient refills
- ***Optimize treatment to the patient's serum TSH levels and clinical response*** using the normal TSH reference range provided by testing facility and patient's historical range
- ***Monitor Serum TSH levels*** 4 to 6 weeks after any dosage change or new drug start that may alter the metabolism of levothyroxine (see Drug-Drug Interactions below)
- ***Guidelines do NOT recommend use of liothyronine monotherapy, combination levothyroxine and liothyronine therapy, or desiccated thyroid*** for routine treatment of hypothyroidism

### COMMON DRUG-DRUG INTERACTIONS for thyroid replacement options

***Drugs that decrease T4 absorption***

Antacids | Simethicone | Bile Acid Sequestrants | Proton Pump Inhibitors
Divalent/Trivalent Cations ($Fe^{2+/3+}$ $Mg^{2+}$/$Ca^{2+}$/$Al^{3+}$ – Containing Drug Products)

***Drugs that alter metabolism of T4***

Phenobarbital | Rifampin

***Drugs that inhibit conversion of T4 to T3***

High Dose Beta-Blockers | Glucocorticoids | Amiodarone

*This quick reference fact sheet is abridged to highlight practical information. It does not represent the full prescribing information available for referenced drug products. Please see the respective product labels for comprehensive information. Any changes in therapy must be discussed with the prescriber prior to initiation.*

# Hypothyroidism

| | Parameters | | | | |
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| **Levothyroxine** | **Adult:**<br>Individualized dose according to clinical response and serum TSH/free T4 concentrations<br><br>**Average Dose:**<br>1.6 mcg/kg/day orally<br><br>**Usual dose:**<br>Ranges from 50 to >200 mcg/day orally<br><br>**Geriatric:**<br>Same as adult does<br><br>**Renal Impairment:**<br>No dose adjustment as listed<br><br>**Hepatic impairment:**<br>No dose adjustment as listed | Administer consistently at the same time each day with a full glass of water; usually in the morning on an empty stomach, at least 30 to 60 minutes before food but also may be administered at night 3 to 4 hours after last meal.<br><br>Do not administer within 4 hours of calcium- or iron-containing products or bile acid sequestrants. | **Adults with primary hypothyroidism:**<br>Monitor serum TSH levels after an interval of 6 to 8 weeks and/or after any change in dose<br><br>**Patients on stable and appropriate dose:**<br>Evaluate clinical response every 6 to 12 months and whenever there is a change in clinical status | **Levothyroxine has a long half-life**.<br>Steady-state concentrations are not achieved until 6 weeks after therapy is initiated or dosage adjustments.<br><br>Full effects of a dose may not be apparent for up to 6 weeks<br><br>**Obese patients:** individual T4 requirements correlate better with lean body weight than total body weight<br><br>**If switching between brand and generic formulations:** The patient should be reevaluated for clinical response to therapy. Repeat TSH and T4 testing is recommended 2 to 4 weeks after to allow for any dose titration. | Recommended as the therapy of choice for treatment of hypothyroidism. |

| Drug | Dosing | Administration | Monitoring Parameters | Special Considerations | Place in Therapy [3,4] |
|---|---|---|---|---|---|
| **Liothyronine** | **Adult:**<br>**Initial Dose:**<br>25 mcg orally daily<br>May increase by 25 mcg/day every 1-2 weeks<br><br>**Maintenance Dose:**<br>25 to 75mcg orally daily<br><br>**Geriatric:**<br>5mcg orally daily<br>Increase by 5mcg every 2 weeks<br><br>**Renal Impairment:**<br>No dose adjustment but use with caution<br><br>**Hepatic impairment:**<br>No dose adjustment | Administer at the same time each day with a full glass of water | **Adults with primary hypothyroidism:**<br>Monitor serum TSH levels periodically after initiation of the therapy or any change in dose<br><br>**To gauge quick response to therapy:**<br>Measurement of total T3 would be most appropriate<br><br>**Patients on stable therapeutic dose:**<br>Evaluate clinical and biochemical response Q 6-12 months and when there is a change in clinical status | Increase dose slowly and monitor for signs/ symptoms of angina<br><br>**Liothyronine has a short half life**<br>and requires multiple daily dosing<br><br>**Use with caution**<br>in patients with underlying cardiovascular disease.<br>• Use the same dose as geriatric patients: mcg orally daily | **Liothyronine monotherapy:**<br>Not Recommended for routine clinical use in hypothyroidism<br><br>**Combination therapy with levothyroxine:**<br>Not Recommended for routine use<br><br>However, combination therapy may help some patients achieve normal TSH values after multiple unsuccessful trials with levothyroxine monotherapy. |

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| **Desiccated Thyroid** | **Adult:**<br>Dosing recommendations based on clinical equivalencies<br><br>**1grain = 60mg-65mg**<br>**1/2grain = 30mg-32.5mg**<br>**1/4grain = 15mg-16.25mg**<br><br>**Initial dose:**<br>30 or 32.5 mg orally daily<br><br>May increase dose in 15 or 16.25 mg increments every 2 to 3 weeks until appropriate dose is determined<br><br>**Geriatric:**<br>Avoid use<br><br>**Renal Impairment:**<br>No dose adjustment<br><br>**Hepatic impairment:**<br>No dose adjustment | Administer with a full glass of water on an empty stomach (30 to 60 minutes before breakfast) to increase absorption | Adequate therapy usually results in normal TSH and T4 levels after 2 to 3 week of therapy | Certain formulations may have a strong odor that does NOT indicate contamination or expiration<br><br>The different formulations of desiccated thyroid are either from porcine or bovine origin<br><br>**DO NOT USE** in patients with a history of hypersensitivity to porcine or bovine products<br><br>**AVOID USE** in elderly patients due to a concern for cardiac toxic effects. Safer products are available<br><br>Desiccated thyroid products ARE listed in the Beer's Criteria<br><br>**DO NOT** recommend for weight loss or mood improvement | Clinical practice guidelines DO NOT recommend the routine use of desiccated thyroid products for the treatment of hypothyroidism<br><br>**Potential role in therapy:**<br>For patients concerned about "Synthetic" drug products and excipients used in them<br><br>**Cons:**<br>Response to therapy is harder to assess in these patients due to fluctuation in thyroid hormone content and manufacturing process. |


**References**

1. DynaMed [Internet]. Ipswich (MA): EBSCO Information Services. 1995 - . Record No. T115914, Hypothyroidism in Adults; [updated 2018 Nov 30]. Available from https://www.dynamed.com/topics/dmp~AN~T115914 . Registration and login required.
2. DynaMed [Internet]. Ipswich (MA): EBSCO Information Services. 1995 - . Record No. T901621, Thyroid Replacement Therapy; [updated 2018 Nov 30]. Available from https://www.dynamed.com/topics/dmp~AN~T901621 . Registration and login required.
3. Jonklaas J, Bianco AC, Bauer AJ, et al. Guidelines for the treatment of hypothyroidism: prepared by the American Thyroid Association Task Force on thyroid hormone replacement. *Thyroid* . 2014 Dec:24(12): 1670-751. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4267409/ . Accessed October 15, 2020.
4. Garber JR, Cobin RH, Gharib H, et al. Clinical practice guidelines for hypothyroidism in adults: cosponsored by the American Association of Clinical Endocrinologists and the American Thyroid Association. *Endocr Pract* . 2012 Nov-Dec;18(6):988-1028. https://journals.aace.com/doi/10.4158/EP12280.GL?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed . Accessed October 15, 2020


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