

levothyroxine sodium (L-thyroxine, T₄)

Eltroxin[✳], Levo-T, Levotheroid,
Levoxyl, PMS-Levothyroxine
Sodium[✳], Synthroid, Thyro-Tabs,
Unithroid

Pharmacologic class: Synthetic thyroxine hormone

Therapeutic class: Thyroid hormone replacement

Pregnancy risk category A

Action

Synthetic form of thyroxine that replaces endogenous thyroxine and increases thyroid hormone levels in body. Thyroid hormones help regulate cell growth and differentiation and increase metabolism of lipids, protein, and carbohydrates.

Availability

Powder for injection: 200 mcg/vial in 6- and 10-ml vials, 500 mcg/vial in 6- and 10-ml vials

Tablets: 25 mcg, 50 mcg, 75 mcg, 88 mcg, 100 mcg, 112 mcg, 125 mcg, 137 mcg, 150 mcg, 175 mcg, 200 mcg, 300 mcg

Indications and dosages

➤ Hypothyroidism; some types of thyroid cancer

Adults: All dosages are highly individualized. Initially, 0.05 mg PO, increased in increments of 0.025 mg q 2 to 3 weeks depending on cardiovascular status. Maintenance dosage is 0.2 mg daily, adjusted within first 4 weeks of therapy. For patients who can't tolerate oral doses, adjust I.M. or I.V. dose to about one-half of oral dosage.

➤ Congenital hypothyroidism

Children over age 12: Up to 150 mcg or 2 to 3 mcg/kg P.O. daily

Children ages 6 to 12: 100 to 150 mcg P.O. daily

Children ages 1 to 6: 75 to 100 mcg P.O. daily

Infants ages 6 to 12 months: 50 to 75 mcg P.O. daily

Infants ages 3 to 6 months: 25 to 50 mcg P.O. daily

Infants up to 3 months: 10 to 15 mcg/kg P.O. daily

➤ Myxedema coma or stupor

Adults: Initially, 0.4 mg rapid I.V., followed by 0.1 to 0.2 mg I.V. daily; maintenance dosage is 0.05 to 0.1 mg I.V., adjusted based on T₄ level. Once patient is clinically stable, convert to P.O. therapy.

➤ Thyroid-stimulating hormone suppression

Adults: 2.6 mcg/kg P.O. daily for 7 to 10 days

Dosage adjustment

- Cardiovascular disease
- Psychosis or agitation
- Elderly patients

Contraindications

- Hypersensitivity to drug, its components, or tartrazine
- Acute myocardial infarction
- Thyrotoxicosis
- Adrenal insufficiency

Administration

- Be aware that all dosages are highly individualized.
- Give tablets on an empty stomach 30 minutes to 1 hour before first meal of day.
- If patient can't swallow tablets, crush them and sprinkle into a small amount of food, such as applesauce. For infants and children, dissolve tablets in a small amount of water, non-soybean formula, or breast milk and administer immediately.
- Don't give oral form within 4 hours of bile acid sequestrants or antacids (which interfere with levothyroxine absorption).

- Reconstitute Synthroid powder for injection with 5 ml of 0.9% sodium chloride injection; shake until clear and use immediately.
- Be aware that levothyroxine sodium preparations aren't bioequivalent. Patient should consistently use same brand or generic product, with dosing based on weight, age, general physical condition, and duration of symptoms.
- Know that when drug is used for thyroid-stimulating hormone suppression test, radioactive iodine (^{131}I) is given before and after 7- to 10-day course.

Route	Onset	Peak	Duration
P.O.	Unknown	Unknown	Unknown
I.V.	6-8 hr	24 hr	Unknown
I.M.	Unknown	Unknown	Unknown

Adverse reactions

CNS: insomnia, irritability, nervousness, headache

CV: tachycardia, angina pectoris, hypotension, hypertension, increased cardiac output, **arrhythmias, cardiovascular collapse**

GI: vomiting, diarrhea, abdominal cramps

GU: menstrual irregularities

Metabolic: hyperthyroidism

Musculoskeletal: accelerated bone maturation (in children), decreased bone density (in women on long-term therapy)

Skin: alopecia (in children), diaphoresis

Other: heat intolerance, weight loss

Interactions

Drug-drug. *Aminoglutethimide, amiodarone, anabolic steroids, antithyroid drugs, asparaginase, barbiturates, carbamazepine, chloral hydrate, cholestyramine, clofibrate, colestipol, corticosteroids, danazol, diazepam, estrogens, ethionamide, fluorouracil, heparin (with I.V. use), insulin, lithium, methadone, mitotane, nitroprusside, oxyphenbuta-*

zone, perphenazine, phenylbutazone, phenytoin, propranolol, salicylates (large doses), sulfonyleureas, thiazides: altered thyroid function test results

Antacids, bile acid sequestrants: interference with levothyroxine absorption
Anticoagulants: increased anticoagulant action

Beta-adrenergic blockers (selected): decreased beta blocker action

Cardiac glycosides: decreased cardiac glycoside blood levels

Cholestyramine, colestipol: levothyroxine inefficacy

Theophyllines: decreased theophylline clearance

Drug-diagnostic tests. *Thyroid function tests:* decreased values

Drug-food. *Foods high in iron or fiber, soybeans:* decreased drug absorption

Precautions

Use cautiously in:

- cardiovascular disease, severe renal insufficiency, diabetes mellitus
- elderly patients
- pregnant or breastfeeding patients.

Patient monitoring

- Check vital signs and ECG routinely.
- Monitor thyroid and liver function test results.
- Evaluate for signs and symptoms of overdose, including those of hyperthyroidism (weight loss, cardiac symptoms, abdominal cramps).
- Monitor closely for drug efficacy.
- Monitor patients with Addison's disease or diabetes mellitus for worsening of these conditions.
- Watch for signs and symptoms of bleeding tendency, especially in patients receiving anticoagulants concurrently.

Patient teaching

- Caution patient or parent to avoid getting overheated, as in hot environment or during vigorous exercise.

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- Tell patient or parent to report adverse effects, including signs or symptoms of hyperthyroidism or hypothyroidism.
 - Instruct patient to minimize GI upset by eating small, frequent servings of healthy food.
 - Instruct patient to avoid driving and other hazardous activities until he knows how drug affects concentration and alertness.
 - Inform parents that child may lose hair during first few months of therapy; reassure them that this effect is usually transient.
 - Tell patient he may require lifelong therapy and will undergo regular blood testing.
 - As appropriate, review all other significant and life-threatening adverse reactions and interactions, especially those related to the drugs, tests, and foods mentioned above.