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levothyroxine (lee-vo-thye-rox-een)

Classification
Therapeutic: hormones
Pharmacologic: thyroid preparations

Pregnancy Category A

Indications
Thyroid supplementation in hypothyroidism. Treatment or suppression of euthyroid goiter. Adjunctive treatment for thyrotropin-dependent thyroid cancer.

Action
Replacement of or supplementation to endogenous thyroid hormones. Principal effect is increasing metabolic rate of body tissues: Promote gluconeogenesis, increase utilization and mobilization of glycogen stores, stimulate protein synthesis, promote cell growth and differentiation, aid in the development of the brain and CNS.

Therapeutic Effects:
Replacement in hypothyroidism to restore normal hormonal balance. Suppression of thyroid cancer.

Pharmacokinetics
Absorption: Levothyroxine is variably (40–80%) absorbed from the GI tract.
Distribution: Distributed into most body tissues. Thyroid hormones do not readily cross the placenta; minimal amounts enter breast milk.

Protein Binding: 99%.

Metabolism and Excretion: Metabolized by the liver and other tissues to active T3. Thyroid hormone undergoes enterohepatic recirculation and is excreted in the feces via the bile.

Half-life: 6–7 days.

Contraindications/Precautions
Contraindicated in: Hypersensitivity; Recent MI; Hyperthyroidism.

Use Cautiously in:
Cardiovascular disease (initiate therapy with lower doses); Severe renal insufficiency; Uncorrected adrenocortical disorders; Pedi: Monitor infants and infants for cardiac overload, arrhythmias, and aspiration during first 2 wk of therapy. Geri: Extremely sensitive to thyroid hormones; initial dose should be ↓.

Adverse Reactions/Side Effects
Usually only seen when excessive doses cause iatrogenic hyperthyroidism
CNS: Headache, insomnia, irritability.
CV: Angina pectoris, arrhythmias, tachycardia.
GI: Abdominal cramps, diarrhea, vomiting.
Derm: Sweating.
Endo: Hyperthyroidism, menstrual irregularities.
Metab: Heat intolerance, weight loss.
MS: Accelerated bone maturation in children.

Interactions
Drug-Drug: Bile acid sequestrants and orlistat ↓ absorption of orally administered thyroid preparations. May ↓ the effects of warfarin. May ↓ the requirement for insulin or oral hypoglycemic agents in diabetics. Concurrent estrogen therapy may ↓ thyroid replacement requirements. T4 and T3 can cause cardiovascular effects with adrenergics (sympathomimetics).

Drug-Food: Foods or supplements containing calcium, iron, magnesium, or zinc may bind levothyroxine and prevent complete absorption.

Route/Dosage
PO (Adults): Hypothyroidism—50 mcg as a single dose initially, may be ↓ 2–3 mcg/q2–3 wk to 25 mcg/day; usual maintenance dose is 75–125 mcg/day (1.5 mcg/kg/day).

PO (Geriatric Patients and Patients with Increased Sensitivity to Thyroid Hormones): 12.5–25 mcg as a single dose initially, may be ↓ 2–3 mcg/q2–3 wk to 25 mcg/day.

PO (Children < 12 yr): 4–5 mcg/kg/day (100–125 mcg/day).

PO (Children 1–5 yr): 5–6 mcg/kg/day (75–100 mcg/day).

TIME/ACTION PROFILE

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>Levothyroxine PO</td>
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<td>1–3 wk</td>
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<tr>
<td>Levothyroxine IV</td>
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References
PO (Children 6–12 mo): 6–8 mcg/kg/day (50–75 mcg/day).
PO (Infants 3–6 mo): 8–10 mcg/kg/day (25–30 mcg/kg/day).
PO (Infants 0–3 mo or Infants at Risk for Cardiac Failure): 10–15 mcg/kg/day or 25 mcg/day; may be given q 4–6 wk to 50 mcg.

IM, IV (Adults):
- Hypothyroidism—50–100 mcg/day as a single dose.
- Myxedema coma/stupor—300–500 mcg IV; additional 100–300 mcg may be given on 2nd day, followed by daily administration of smaller doses.

IM, IV (Children):
- Hypothyroidism—50–80% of the oral dose.

NURSING IMPLICATIONS

Assessment
- Detect apical pulse and BP prior to and periodically during therapy. Assess for arrhythmias and chest pain.
- Children: Monitor height, weight, and psychomotor development.
- Lab Test Considerations: Monitor thyroid function studies prior to and during treatment. Monitoring thyroid-stimulating hormone serum levels in adults 8–12 wk after changing from one brand to another.

Potential Nursing Diagnoses
- Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation
- Do not confuse levothyroxine with lamotrigine or Lanoxin (digoxin).
- Administer as a single dose with a full glass of water, preferably before breakfast to prevent insomnia.
- Initial dose is low, especially in preterm and cardiac patients. Dose is increased gradually, based on thyroid function tests.

Patient/Family Teaching
- Instruct patient to take medication at the same time each day. Take missed doses as soon as remembered unless almost time for next dose. If more than 2–3 doses are missed, notify health care professional. Do not discontinue without consulting health care professional.
- Explain to patient that medication does not cure hypothyroidism; it provides a thyroid hormone supplement. Therapy is lifelong.
- Advise patient to avoid taking other medications concurrently with thyroid preparations unless instructed by health care professional.
- Instruct patient to inform health care professionals of thyroid therapy.
- Emphasize importance of follow-up exams to monitor effectiveness of therapy. Thyroid function tests are performed at least yearly.

Evaluation/Desired Outcomes
- Resolution of symptoms of hypothyroidism and normalization of hormone levels.

Why was this drug prescribed for your patient?