digoxin (di-gox-in)

Lanoxin; Tikosin

**Classification**
Therapeutic: anti-arrhythmics, inotropics
Pharmacologic: digitalis glycosides

**Pregnancy Category C**

**Indications**
Hearts failure; Atrial fibrillation and atrial flutter (slow ventricular rate); Paroxysmal atrial tachycardia

**Action**
Inhibits the force of myocardial contraction. Prolongs refractory period of the AV node. Decreases conduction through the SA and AV nodes. Reduces automaticity in the AV node. Decreases conduction through the SA and AV nodes. Prolongs refractory period of the AV node.

**Pharmacokinetics**

**Absorption:** 60–80% absorbed after oral administration of tablets; 70–85% absorbed after administration of elixir; 80% absorbed from IM sites (IM route not recommended due to pain/irritation). Widely distributed; crosses placenta and enters breast milk.

**Distribution:** Widely distributed; crosses placenta and enters breast milk.

**Metabolism and Excretion:** Excreted almost entirely unchanged by the kidneys.

**Half-life:** 36–66 hr (2–normal impairment).

**TIME/ACTION PROFILE (antiarrhythmic or inotropic effects, provided that a loading dose has been given)**

<table>
<thead>
<tr>
<th>Route</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Oral</td>
<td>30–120 min</td>
<td>2 hr</td>
<td>2–4 day</td>
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<tr>
<td>Oral</td>
<td>0 min</td>
<td>6 hr</td>
<td>2–4 day</td>
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<tr>
<td>Oral</td>
<td>5–30 min</td>
<td>1 hr</td>
<td>2–4 day</td>
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**Therapeutic Effects:** Increased cardiac output (positive inotropic effect) and slowing of the heart rate (negative chronotropic effect).

**Pharmacodynamic Effects:**

- Increased cardiac output (positive inotropic effect) and slowing of the heart rate (negative chronotropic effect).
- Increases the force of myocardial contraction. Prolongs refractory period of the AV node. Decreases conduction through the SA and AV nodes.
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**Contraindications/Precautions**
Contraindicated in: Hypersensitivity; Uncontrolled ventricular arrhythmias; AV block (in absence of pacemaker); Idiopathic hypertrophic subaotic stenosis; Congenital pericardial; Known alcohol intolerance (often only).

**Use Cautionally in:**
Hypokalemia (risk of digoxin toxicity); Hypocalcemia (risk of toxicity, especially with mild hypokalemia; Hypomagnesemia (risk of digoxin toxicity); Digoxin use (may cause electrolyte abnormalities including hypokalemia and hypomagnesemia); Hypothyroidism; KY-CH (Very sensitive to toxic effects; dose adjustments required for age-related), in renal function and body weight, Myocardial infarction; Renal impairment (slow drug); Required (slow dose should be based on ideal body weight). GFR; although safety has not been established, has been used without adverse effects on the fetus. Lactation: Similar concentrations in mother's milk result in subtherapeutic levels in infant, use with caution.

**Adverse Reactions/Side Effects**

**Cardiovascular:** EKG changes, AV block, SA block, hypotension, bradycardia, atrial tachycardia.

**CNS:** Fatigue, headache, weakness, dizziness, confusion, unsteadiness.

**EENT:** Blurred vision, yellow or green vision.

**GI:** Nausea, vomiting, diarrhea.

**Hemat:** Anemia, blood dyscrasias, coagulopathy, anemia, leukopenia, neutropenia, agranulocytosis, pancytopenia, thrombocytopenia.

**Hepatic:** Hepatitis, jaundice.

**Metab:** Hyperkalemia, hypokalemia, hypomagnesemia.

**Skin:** Exfoliative dermatitis, urticaria, cutaneous vasculitis, Stevens-Johnson syndrome.

**Other:** Drug fever, eosinophilia, rash, fever, eosinophilia, rash, fever, eosinophilia, rash, fever, eosinophilia, rash, fever, eosinophilia, rash, fever.
Drug-Natural Products: Inhibitors and stimulant natural products (also use 2.5–5 mcg/kg given daily as a single dose). 

Route/Dosage

For rapid effect, a larger initial loading/digitalizing dose should be given in several divided doses over 12–24 hr. Maintenance doses are determined for digoxin by renal function. All dosing must be evaluated by individual response. In general, doses required for atrial arrhythmias are higher than those for inotropic effect. 

PO (Geriatric Patients): 

Digitalizing dose—0.5–1 mg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

Adults: 

Digitalizing dose—6–12 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

Children: 

Digitalizing dose—15–30 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

Children 2–5 yr: 

Digitalizing dose—25–35 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

Children 6–10 yr: 

Digitalizing dose—5–7.5 mcg/kg given daily in 2 divided doses.

PO (Children 1–24 mo): 

Digitalizing dose—0.75–1.5 mg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

PO (Children 2–5 yr): 

Digitalizing dose—10–15 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

PO (Children 5–10 yr): 

Digitalizing dose—20–35 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

PO (Children 10–15 yr): 

Digitalizing dose—30–40 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

PO (Children >15 yr): 

Digitalizing dose—40–60 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

PO (Adults): 

Digitalizing dose—60–120 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

PO (Infants): 

Digitalizing dose—2.5–5 mcg/kg given daily as a single dose.

Intravenous (IV) route: 

Digitalizing dose—0.5–1 mg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

Infants (full term): 

Digitalizing dose—20–30 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals.

Children 1–24 mo: 

Digitalizing dose—5–10 mcg/kg given daily as a single dose.

Children 2–5 yr: 

Digitalizing dose—10–15 mcg/kg given daily as a single dose.

Children 5–10 yr: 

Digitalizing dose—15–25 mcg/kg given daily as a single dose.

Children 10–15 yr: 

Digitalizing dose—20–30 mcg/kg given daily as a single dose.

Children >15 yr: 

Digitalizing dose—30–40 mcg/kg given daily as a single dose.

Initial daily dosage should not exceed 0.125 mg.

Evaluation of serum electrolyte levels (especially potassium, magnesium, and calcium) and renal and hepatic function periodically dur-
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Treatment of life-threatening arrhythmias may include administration of digoxin. Correction of arrhythmias resulting from digitalis toxicity may be attempted with potassium salts. If hypokalemia is present and renal function is adequate, potassium salts may be administered. If signs of toxicity occur and are not severe, discontinuation of digitalis glycoside is indicated. If toxicity is severe and patient is still alive, digitalis immune Fab (Digibind) may be used. Triace 0.5 mg b.i.d. or diltiazem 300 mg q.i.d. to 600 mg t.i.d. can be used. Temporary ventricular pacing may be useful in advanced heart block. lidocaine, procainamide, quinidine, propranolol, or phenytoin. Temporary ven-

c consistently with regard to renal function. Patients receiving erythromycin or tetracycline, which kill gut bacteria, may develop toxicity. Toxic effects of digoxin (appears on theory list) due to age-related decreased renal clear-

Observe for signs and symptoms of toxicity. In adults and older children, the first symptoms of digoxin toxicity are usually gastrointestinal disturbances, headache, and other autonomic symptoms. In infants and small children, the first symptoms of overdose are usually cardiac arrhythmias. If these appear, withhold drug and notify health care professional immediately.

Signs of toxicity usually include abdominal pain, anorexia, nausea, vomiting, visual disturbances, fever, and other autonomic symptoms. These symptoms may appear in a patient who has been taking the drug for the first time. If signs of toxicity occur and are not severe, discontinue digitalis glycoside as directed.

If hypokalemia is present and renal function is adequate, potassium salts may be administered. Do not administer if hyperkalemia or heart block exists. Serum levels are normal.

tions are within normal range; assess for clinical symptoms of toxicity even when serum concentra-

High Alert: Digoxin has a narrow therapeutic range. Medication errors associ-

(CONTINUED)

digoxin

ing therapy. With health care professional before giving dose to patient who is hyperka-

Hypokalemia, hypomagnesemia, or hypercalcemia may make the patient more susceptible to digitalis toxicity. Potentially serious or lethal cumulative effects may occur with chronic use of digoxin. Therapeutic serum digoxin levels range from 0.5–2 ng/mL. Serum levels may be drawn 4–6 hr after a dose is administered, although they are usually drawn immediately before the next dose. Bacteria in the GI tract can metabolize a substantial amount of digoxin before it is absorbed. Patients re-

corrected, reinfections are common. Patients receiving erythromycin or tetracycline, which kill gut bacteria, can develop toxicity. Patients receiving erythromycin or tetracycline, which kill gut bacteria, can develop toxicity. Toxin effects of digoxin (appears on theory list) due to age-related decreased renal clear-

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xide, cycloheximide, cyclospycin, cyclocoxin, dapsone, danazol, diazoxide, diaz-
epam, diphenylhydantoin, diphenylpyridazines, diphenylpropanes, diphenyls,
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