physostigmine (fi-zoe-stig-meen)

Antilirium

**Classification**
Therapeutic: antidotes
Pharmacologic: cholinergics, anticholinesterases

**Pregnancy Category** C

**Indications**
Reversal of CNS effects due to overdose of drugs capable of causing the anticholinergic syndrome, including: belladonna or other plant alkaloids, phenothiazines, tricyclic antidepressants, antihistamines (reverses delirium, hallucinations, coma, and some arrhythmias, but not completely effective in reversing cardiac conduction defects or atrial fibrillation).

**Action**
Inhibits the breakdown of acetylcholine so that it accumulates and has a prolonged effect. Result is generalized cholinergic response, including: Miosis, increased tone of intestinal and skeletal musculature, bronchial and ureteral constriction, bradycardia, increased salivation, lacrimation, sweating, CNS stimulation.

**Therapeutic Effects:**
Reversal of anticholinergic excess.

**Pharmacokinetics**
Absorption: Readily absorbed from subcut and IM sites.
Distribution: Widely distributed; crosses the blood-brain barrier.
Metabolism and Excretion: Metabolized by cholinesterases present in many tissues. Small amounts excreted unchanged in the urine.
Half-life: 1–2 hours.

**TIME/ACTION PROFILE (systemic cholinergic effects / miosis)**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM, IV</td>
<td>3–8 min</td>
<td>unknown</td>
<td>45–60 min†</td>
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<td></td>
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<td>†May be up to 5 hr</td>
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**Contraindications/Precautions**

- Hypersensitivity; Hypersensitivity to bisulfites; Gangrene; Asthma; Diabetes; Cardiovascular disease; Mechanical obstruction of the GI or GU tract; Any vagotonic state; Concurrent use of choline esters or depolarizing neuromuscular blocking agents (decanethonium, succinylcholine).

**Adverse Reactions/Side Effects**

- **CNS:** Seizures, restlessness, dizziness, hallucinations, weakness.
- **EENT:** Lacrimation, miosis.
- **Resp:** Bronchospasm, excess respiratory secretions.
- **CV:** Bradycardia, hypotension.
- **GI:** Abdominal cramps, diarrhea, nausea, vomiting, excess salivation.
- **Derm:** Rash.

**Interactions**

- **Drug-Drug:** Prolongs action of depolarizing muscle-relaxing agents (succinylcholine, decamethonium); avoid concurrent use. Cholinergic effects may be antagonized by other drugs possessing anticholinergic properties, including antihistamines, antidepressants, atropine, haloperidol, phenothiazines, quinidine, and disopyramide.

- **Drug-Natural Products:** Angel’s trumpet, jimson weed, and scopolia may antagonize cholinergic effects.

**Route/Dosage**

- **IM, IV (Adults):**
  - Anticholinergic toxicity—2 mg initially; may be repeated as symptoms recur.
  - Postanesthesia—0.5–1 mg; may be repeated q 10–30 min.

- **IM, IV (Children):**
  - 20 mcg/kg; may repeat every 5–10 min as needed (up to 2 mg total dose).

**Nursing Implications**

- **Assessment**
  - Monitor pulse, respiratory rate, and BP frequently throughout parenteral administration.
  - Monitor neurologic status frequently. Institute seizure precautions Protect patient from self-injury that may be caused by CNS effects of overdose.

- **Contraindicated in:** Hypersensitivity, hypersensitivity to belladonna, gangrene; Asthma, Diabetes, Cardiovascular disease. Mechanical obstruction of the GI or GU tract; any vagotonic state; Concurrent use of choline esters or depolarizing neuromuscular blocking agents (decanethonium, succinylcholine).

- **Adverse Reactions/Side Effects**

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**Nursing Implications**

- **Assessment**
  - Monitor pulse, respiratory rate, and BP frequently throughout parenteral administration. Monitor ECG during IV administration.
  - Anticholinergic Excess: Monitor neurologic status frequently, Institute seizure precautions Protect patient from self-injury that may be caused by CNS effects of overdose.

- **Contraindicated in:** Hypersensitivity, hypersensitivity to belladonna, gangrene; Asthma, Diabetes, Cardiovascular disease. Mechanical obstruction of the GI or GU tract; any vagotonic state; Concurrent use of choline esters or depolarizing neuromuscular blocking agents (decanethonium, succinylcholine).

- **Adverse Reactions/Side Effects**

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  - 20 mcg/kg; may repeat every 5–10 min as needed (up to 2 mg total dose).
Toxicity and Overdose:
Overdose is manifested by bradycardia, respiratory distress, seizures, weakness, nausea, vomiting, stomach cramps, diarrhea, diaphoresis, and increased salivation and tearing.

Antidote: Atropine sulfate 2–4 mg (may be repeated every 5–10 min to control muscarinic effects), pralidoxime chloride 50–100 mg/min (to control neurologic and skeletal muscle effects), and supportive therapy.

Treatment of overdose includes establishing an airway and supporting ventilation, atropine sulfate 2–4 mg (may be repeated every 5–10 min to control muscarinic effects), pralidoxime chloride 50–100 mg/min (to control neurologic and skeletal muscle effects), and supportive therapy.

Potential Nursing Diagnoses
Risk for injury (Indications)

Implementation

IV Administration

- Direct IV: Repeated doses may be needed because of short duration of action.
- Rate: May be given through Y-site at a rate of no more than 1 mg over 1 min (0.5 mg over 1 min for children). Rapid administration may cause bradycardia, increased salivation, which can lead to respiratory distress, or seizures.

Patient/Family Teaching

- Anticholinergic Excess: Explain purpose of medication and need for close monitoring.

Evaluation/Desired Outcomes

- Reversal of CNS symptoms secondary to anticholinergic excess resulting from drug overdose or ingestion of poisonous plants.

Why was this drug prescribed for your patient?