Perils of Physostigmine

- Hot as Hades (hyperthermia)
- Red as a beet (cutaneous flushing)
- Blind as a bat (mydriasis & accommodation loss)
- Dry as a bone (reduced sweating & secretions)
- Mad as a hatter (delirium & hallucinations)

Does this describe a patient recently treated in your emergency department?!

These symptoms outline anticholinergic poisoning; a possible result of many drugs and some plants.

Anticholinergic poisoning

The peripheral manifestations of the blockade of muscarinic receptors include dilated pupils, tachycardia, elevated blood pressure, hyperthermia, warm flushed skin, dry axilla, dry oral membranes, urinary retention, and quiet bowel. Central manifestations include agitation, delirium, hallucinations, combativeness, seizures, and coma. Severe poisoning can be fatal. Depending on the agent and dose ingested, the poisoning can last for days.

Physostigmine as an antidote

An antidote that quickly reverses severe anticholinergic symptoms would be very helpful, especially to rapidly calm a violently agitated patient. An antidote is available; physostigmine reversibly inactivates acetylcholinesterase, boosting the synaptic presence of acetylcholine, and overcoming the anticholinergic agent. However, in 2012, US poison centers reported only 266 instances of antitodal physostigmine use. Why is it not routinely used for anticholinergic poisoning? Many physicians avoid its use because they fear severe complications, including seizures, ventricular arrhythmias, bradycardia, and asystole.

The risk, however, is higher in patients whose EKGs also show the widened QRS characteristic of sodium channel blockade. This combination of findings — anticholinergic action and widened QRS — is caused most often by overdose of tricyclic antidepressants. Physostigmine should be avoided in these patients.

Physostigmine’s utility is further limited by its short duration of action compared to the anticholinergic toxin. It may last as little as 15 minutes and anticholinergic symptoms may return in full force. Repeated dosing is often necessary.

When can physostigmine be used?

Consider physostigmine for severe, life-threatening central or peripheral anticholinergic symptoms (seizures,
distressing hallucinations, hypertension, arrhythmias) that are not responding to standard therapy. In select cases, physostigmine may also be considered as a diagnostic aid for patients with coma or delirium of unclear etiology. Rapid reversal of the symptoms suggests the ingestion of an anticholinergic agent. Symptom reversal is only temporary; physostigmine should not be used continuously just to keep a patient awake.

**How is physostigmine administered?**
If therapeutic use of physostigmine is necessary and the EKG is free of conduction delays, a low dose of physostigmine can be administered by slow IV push under continuous cardiac monitoring. A typical adult dose would be 2 mg of physostigmine infused no faster than 1mg per minute. Infusion must be slow to reduce the risk of serious adverse effects (seizure, arrhythmia, asystole).

Excessive doses beyond what is necessary to counteract anticholinergic effects can lead to the opposite problem - symptoms of cholinergic excess. These include gastrointestinal distress, heavy secretions, bradycardia, and muscle fasciculations and weakness. Atropine should be available at the bedside in case the patient develops iatrogenic cholinergic poisoning.

**When should physostigmine be avoided?**
Physostigmine is contraindicated in patients who have ingested tricyclic antidepressants or other sodium channel blocking agents. It should be used with caution in any patient with unknown ingestions or those with cardiac conduction abnormalities.

For more specific information on possible anticholinergic toxicity and treatment, please contact the Missouri Poison Center at 1-800-222-1222. Healthcare professionals can also call 1-888-268-4195.

**Please Have Ready When You Call (if possible):**
— Detail about the substance involved
— Estimated time of exposure
— An age and name of the patient
— Vital signs and symptoms
— A general idea of background or circumstances

The Missouri Poison Center is only as strong as our hospitals, so please let us hear from you and help us help our community. Why call us? Because we need you.

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**Anticholinergic Sources**

- Atropine
- Antihistamines
- Motion sickness drugs
- Cyclic antidepressants
- Antidiarrheals
- Antispasmodics
- Mydriatics (eyedrops)
- Antiparkinson drugs
- Skeletal muscle relaxants
- Jimsonweed
- Deadly nightshade
- Jerusalem cherry
- Some mushrooms

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**2013 Missouri Poison Center Facts**

- Total number of incoming calls: **74,810**
- Total number of human exposure calls: **54,649**
- Total number of information calls: **20,161**

- Number of poisonings managed at home or on-site: **72%**
- Number of poisonings managed at healthcare facilities: **12,373**
- Number of Missouri hospitals calling: **100%**
Repel the Pests . . . Don’t Poison Your People

Summertime and warm weather invite stinging, biting, and buzzing insects to come back to life. Store shelves are stocked with bug repellents of all sorts: sprays, solids, lotions, and even products that smoke when burned. We’re all shopping for the best product to protect against both mosquitoes and ticks. No matter which form you use, bug sprays are pesticides that are usually safe, but can cause irritation or sickness if not used properly.

Poison Prevention Tip: Make sure to follow the label directions.

No call is too big or too small...just call 1-800-222-1222 to speak with a poison expert.
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The Missouri Poison Center website can be found at:

Public Education Materials

Missouri Poison Center is offering a variety of educational materials FREE of charge including magnets, stickers, and brochures. For a small fee, you can order the Toxic Plants Brochure for your garden club, the Bites and Stings Brochure for your scout troop, or the Poison Look-Alikes Brochure for your child care providers and parents. Please help us teach about poison prevention and spread the word that the Missouri Poison Center is open 24/7 and the call is free and confidential.