

# Board Question

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A 7 yo M presents to your ED with the c/o of breathing “funny” after the child was playing in the neighbors backyard field with his siblings. They were playing hide and seek and the child hid in the garden. Family states that the child has a history of eczema. Allergies to nuts and bees. Physical Exam: lethargic, drooling, emesis and urine on clothing, hyperactive bowel sounds, diaphoretic, twitching, dyspneic, slightly bradycardic, wheezing throughout lung fields, but alert.

# What is your optimal management of this patient?

- A. IVF, 100% O2 via face mask, expose pt, IM epinephrine, diphenhydramine, dexamethasone
- B. IVF, 100% O2 via face mask, expose pt, Nebulized albuterol, ipratropium, dexamethasone
- C. IVF, 100% O2 via face mask, expose pt, ET intubation, atropine, pralidoxime
- D. IVF, 100% O2 via face mask, expose pt, call respiratory team, call poison control center

# Correct answer: C

- ▶ IVF, 100% O<sub>2</sub> via face mask, expose pt, ET intubation, atropine, pralidoxime

This is a case of organophosphate poisoning. The neighbor used insecticides in his garden and Raid to keep the Florida cockroaches from going into his backyard. The abundant secretions, urination, diaphoresis, and respiratory difficulties highlight the diagnosis. Atropine and pralidoxime are the antidotes. See below for more on dosing and mechanism of action.

Incorrect:

A. IVF, 100% O<sub>2</sub> via face mask, expose pt, IM epinephrine, diphenhydramine, dexamethasone -> **trx for anaphylaxis** and

B. IVF, 100% O<sub>2</sub> via face mask, expose pt, Nebulized albuterol, ipratropium, dexamethasone -> **trx for asthma exacerbation**

- ▶ Even though this child has a history of eczema and allergies and it might make you think it is an asthma exacerbation or anaphylaxis reaction, the emesis, defecation, diaphoresis should make you expand your differential.

Incorrect:

D. IVF, 100% O<sub>2</sub> via face mask, expose pt, call respiratory team, call poison control center

- ▶ This would be inappropriate because this patient is deteriorating and needs more aggressive supportive care.

# Organophosphate poisoning

- ▶ These agents bind to acetylcholinesterase (AChE) and block its function.
- ▶ AChE is important to break down acetylcholine in the synapses and neuromuscular junction
- ▶ Too much acetylcholine in the body leads to toxicity mainly affecting the autonomic nervous system, neuromuscular junction, and CNS.
- ▶ Organophosphates and carbamates are found in pesticides, insecticides, and chemicals like Raid. They are absorbed through the skin, lungs, and GI tract



# Signs and Symptoms

## DUMBELLS

- ▶ Defecation
- ▶ Urination incontinence
- ▶ Miosis
- ▶ B's
- ▶ Emesis
- ▶ Lacrimation
- ▶ Salivation

## Killer B's

- ▶ Bradycardia
- ▶ Bronchoconstriction
- ▶ Bronchorrhea

# Other areas affected

## CNS

- ▶ Seizures
- ▶ Lethargic

## Nicotinic receptors

- ▶ Tachycardia
- ▶ Mydriasis

## Neuromuscular Junction

- ▶ Fasciculation
- ▶ Weakness
- ▶ Paralysis

# What to do?

- ▶ Aggressive supportive care (Airway, O<sub>2</sub>/ventilatory mgt, IV boluses)
- ▶ Diazepam if seizures actively present
- ▶ Uncover and Decontaminate
- ▶ Atropine
  - ▶ Competes with acetylcholine at the muscarinic receptors (does not work on nicotinic receptors)
  - ▶ 0.05 mg/kg IV children
  - ▶ Double dose q5 mins until hemodynamically stable and pulmonary symptoms improve (until secretions and bronchospasms resolve)
- ▶ Pralidoxime aka 2PAM
  - ▶ Cholinesterase reactivating agent
  - ▶ Must give with atropine
  - ▶ 10-20 mg/kg per hour IV children. Administer slowly
- ▶ Call Poison Control Center

# Rapid Review

## Organophosphate and carbamate poisoning: Rapid overview

To obtain emergent consultation with a medical toxicologist, call the United States Poison Control Network at 1-800-222-1222, or access the World Health Organization's list of international poison centers ([www.who.int/qho/phe/chemical\\_safety/poisons\\_centres/en/index.html](http://www.who.int/qho/phe/chemical_safety/poisons_centres/en/index.html)).

### Clinical syndromes

#### Acute toxicity

Generally manifests in minutes to hours

Evidence of cholinergic excess

SLUDGE = Salivation, Lacrimation, Urination, Defecation, Gastric Emptying

BBB = Bradycardia, Bronchorrhea, Bronchospasm

Respiratory insufficiency can result from muscle weakness, decreased central drive, increased secretions, and bronchospasm

#### Intermediate syndrome

Occurs 24-96 hours after exposure

Bulbar, respiratory, and proximal muscle weakness are prominent features

Generally resolves in 1-3 weeks

#### Organophosphorus Agent-Induced Delayed Peripheral Neuropathy (OPIDN)

Usually occurs several weeks after exposure

Primarily motor involvement

May resolve spontaneously, but can result in permanent neurologic dysfunction

#### Diagnostic evaluation of acute toxicity

Atropine challenge if diagnosis is in doubt (1 mg IV in adults, 0.01 to 0.02 mg/kg in children)

Absence of anticholinergic signs (tachycardia, mydriasis, decreased bowel sounds, dry skin) strongly suggests poisoning with organophosphate or carbamate

Draw blood sample for measurement of RBC acetylcholinesterase activity to confirm diagnosis

#### Treatment of acute toxicity

Deliver 100 percent oxygen via facemask; early intubation often required; avoid succinylcholine

**Decontamination** if ingestion within 1 hour give single dose activated charcoal, adult 50 g (1 g/kg in children) unless airway not protected or other contraindication. Aggressive dermal and ocular irrigation as needed. Bag/discard clothing.

**Atropine** 2 to 5 mg IV/IM/IO bolus (0.05 mg/kg IV in children)

Escalate (double) dose every 3-5 minutes until bronchial secretions and wheezing stop

TACHYCARDIA AND MYDRIASIS ARE NOT CONTRAINDICATIONS TO ATROPINE USE

Hundreds of milligrams may be needed over several days in severe poisonings

Inhaled ipratropium 0.5 mg with parenteral atropine may be helpful for bronchospasm; may repeat

**Pralidoxime (2-PAM)** 2 g (25 mg/kg in children) IV over 30 minutes; may repeat after 30 minutes or give continuous infusion if severe

Continuous infusion at 8 mg/kg/hour in adults (10 mg/kg/hour in children)

If no IV access, give pralidoxime 600 mg IM (15 mg/kg in children <40 kg). Rapidly repeat as needed to total of 1800 mg or 45 mg/kg in children.

Pralidoxime is given with atropine

#### Benzodiazepine therapy

Diazepam 10 mg IV (0.1 to 0.2 mg/kg in children), repeat as necessary if seizures occur. Do not give phenytoin.

- ▶ EM Cases podcast Quick Hits
- ▶ Up To Date [https://sso.uptodate.com/contents/organophosphate-and-carbamate-poisoning?search=organophosphate%20poisoning&source=search\\_result&selectedTitle=1~28&usage\\_type=default&display\\_rank=1](https://sso.uptodate.com/contents/organophosphate-and-carbamate-poisoning?search=organophosphate%20poisoning&source=search_result&selectedTitle=1~28&usage_type=default&display_rank=1)