

# Nerve Agents/Organophosphates

## Common Agents:

- Tabun (GA), Sarin (GB), Soman (GD), VX, and many organophosphate compounds are used as pesticides and behave in identical fashion. Carbamates exhibit similar presentation but do not bind permanently to acetylcholinesterase. Toxidrome is similar for all and treated the same. Agent identification relies on product label or environmental sampling.
- Typically found in liquid, powder, granule or "smoke" form.

## Mechanism of Action:

- Extremely lipophilic substances which bind to acetylcholinesterase, causing a buildup of acetylcholine at nerve terminals, leading to cholinergic crisis

## Signs/Symptoms:

- Miosis is a key finding!
- "DUMBELS" - **D**iarrhea, **U**rination, **M**iosis, **B**radycardia, **B**ronchorrhea, **B**ronchospasm, **E**mesis, **L**acrimation, **S**alivation, **S**ecretion, **S**weating
- Coma, seizures, weakness may progress to paralysis, muscle fasciculations.

## Triage:

- Immediate (Red) - coma or mental status changes, seizures, fasciculations, respiratory distress, paralysis or collapse
- Delayed (Yellow) - excessive salivation/rhinorrhea/sweating/vomiting/weakness
- Minor (Green) - asymptomatic, or only eye symptoms

## Decontamination:

- **Medical personnel should wear splash proof PPE, and a filtered air respirator that protects against organic agents (e.g. PAPR with appropriate filter) until patients are decontaminated.**
- **Medical personnel have been significantly sickened by secondary exposures to these patients – especially in the setting of suicidal ingestions!**
- Remove all clothing and jewelry.
- Wash skin and hair with soap and water until agent is visibly gone. Some agents, including VX, may require longer periods of time to complete decontamination due to their viscous nature.

## Treatment:

- Atropine
  - **MAY REQUIRE EXTREMELY LARGE DOSES** (and frequent repeat dosing if ingestion)
  - 1-10 mg IV q5 minutes (may give IM if no IV access)
    - Treat until secretions dry allowing effective ventilation / respiration – tachycardia is not contraindication to more atropine, atropine will NOT have effect on pupils in this setting
- Pralidoxime (2-PAM)
  - Adults
    - Bolus 1-2 grams IV over 10-20 minutes (may cause hypertension)
    - Maintenance rate of 500mg /hour IV until 24 hours after symptoms have resolved
  - Children
    - Bolus 25-50 mg/kg IV over 10-20 minutes
    - Maintenance rate 5-10 mg/kg IV per hour until 24 hours after symptoms resolved
- Benzodiazepines
  - Used in adults and children in standard doses for seizures, fasciculations
  - Should be given to ALL severely poisoned patients as will help prevent seizures and likely aids CNS recovery in standard sedation doses (e.g. adult 2mg lorazepam, 10mg diazepam)
  - Phenytoin/Fosphenytoin will not stop or prevent seizures.
  - **Succinylcholine use in exposed patients can lead to prolonged paralysis. Use other agents to induce paralysis during intubation.**

## Mark I Kits:

- Auto-injector containing Pralidoxime 600mg, and Atropine 2mg each
- Intended for IM administration
- May use 1-3 kits per person based on severity of symptoms
- Not intended for self-injection
- Carried by EMS units in the metro area and stocked in bulk supplies in several locations in state
- Function like epi-pen. Remove protective caps, place needle (see arrow) on skin/clothing and press end button to deliver medication.

For more information contact Minnesota Poison Control System at 1-800-222-1222