



# MANAGEMENT OF THE PATIENT EXPOSED TO CHEMICAL AGENTS - NERVE AGENTS

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## NERVE AGENTS - Organophosphates

Organophosphates are characterized by the phosphate group that reacts with a serine amino acid within an acetylcholinesterase (AChE) molecule. Acetylcholine is a neurotransmitter that is particularly vital to parasympathetic nervous system functions.

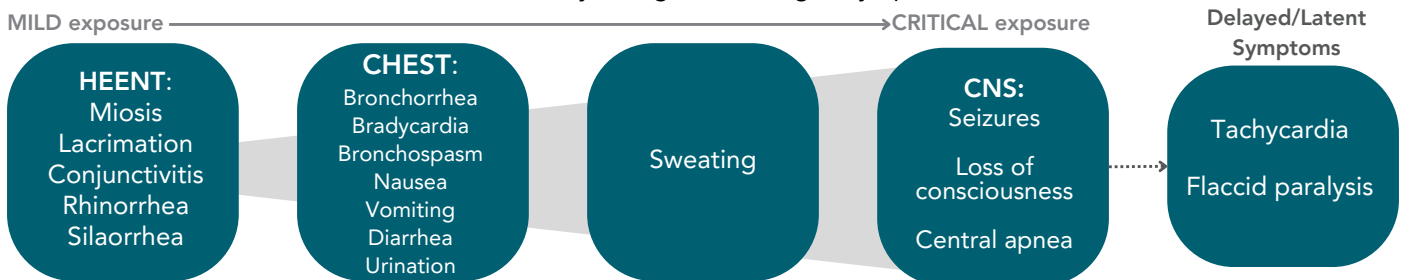
Organophosphates include certain types of chemical warfare agents, some pesticides, and some pharmaceuticals used to treat Alzheimer's Dementia and Parkinson's Disease

**AGING:** Aging refers to the reaction by which an organophosphate attacks a serine residue in the AChE enzyme, inhibiting its function. The toxicity of a given organophosphate depends on the speed and permanence of this reaction. The aging process informs the duration and severity of effects an exposed individual may experience.

Organophosphate Families	
'G' Agents	Soman, Tabun, Sarin
'V' Agents	VX, VG
'A' Agents (Novichok)	A-230, A-234, Substance-33
Pesticides and Carbamate Drugs	Pyridostigmine, Neostigmine, Physostigmine, Malathion, Parathion

Pure forms of these agents are odorless, colorless gases at standard temperatures and pressures (with the exception of VX), and are denser than air.

The **clinical presentation** of patients will be the same regardless of the type of organophosphate. The route of exposure, however, may change the timing of symptoms.



PPE is vital when treating patients exposed to an unidentified nerve agent. Patients can exhale these gaseous agents or carry them on their clothes after initial exposure. Decontamination is also crucial to the safety of the healthcare provider and in ensuring the patient is not continuously exposed as they receive treatment.

Medications and Dosing <i>The time during which treatment will be considered life-saving varies for different agents as they age at varying speeds.</i>				NERVE AGENT EXPOSURE IN CHILDREN Children are at higher physiological risk from nerve agents. They are also less likely to be miotic and may not progress through the same "stages" as adults. <b>DOSING FOR CHILDREN:</b> <u>Atropine:</u> 0.05mg/kg IV/IM/IO if < 10kg 0.5mg > 10 – 19kg 1mg > 20 – 29kg 2mg > 30kg <u>Pralidoxime:</u> 50mg/kg IV/IM to 2000mg/hr <u>Benzodiazepines:</u> Midazolam 0.2mg/kg IV/IM, Diazepam 0.3mg/kg IV/IM
Atropine	Oximes	Anticonvulsants	Adjuncts	
USA Autoinjectors: 0.5mg - 2mg NATO: 5mg - 10mg IV/IO UK NHS: 4 mg + IV  Start with 2mg IV/IM with ability to rapidly uptitrate dosing  Oral ingestion of pesticides tends to require 9mg-10mg of Atropine	USA Autoinjectors: Pralidoxime 600mg IM  International: Obidoxime  New oximes are constantly under development.	USA Autoinjectors: Diazepam 10mg  Midazolam is also a reasonable treatment option. Lorazepam is the least ideal treatment and should only be used as a last resort.  All IV/IM	Will require ventilation, likely for many days.  Other supportive care once symptoms are controlled	

The associated training video to this document was published on 04/05/2024. The training can be viewed on Youtube at Mountain Plains RDHRS. The MPRDHRs JIT Learning Series is funded by Award Number 6 HITEP200043-01-03 from the Administration for Strategic Preparedness and Response (ASPR). This information is not meant to be a substitute for professional medical advice, diagnosis, or treatment. This information is not meant to be a substitute for medical professional advice, diagnosis, or treatment.

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