

# QUICK REFERENCE CHART FOR PHYSICIANS MAJOR CHEMICAL WARFARE AGENTS

FOR DETAILED INFORMATION ON MEDICAL MANAGEMENT GUIDELINES GO TO:

<http://www.state.tn.us/health>, choose chemical terrorism for links to:

<http://www.atsdr.cdc.gov/mmg.html> (latest medical management information on PDF files)

[http://ccc.apgea.army.mil/reference\\_materials/textbook/HTML\\_Restricted/index.htm](http://ccc.apgea.army.mil/reference_materials/textbook/HTML_Restricted/index.htm) (Textbook of Military Medicine)

Tennessee Department of Health, Communicable and Environmental Disease Services 615-741-7247

Agency for Toxic Substances and Disease Registry Emergency Response 404-498-0120

AGENT	TYPE	PHYSICAL PROPERTIES	MAJOR ACUTE SYMPTOMS	TREATMENT	AGENT	TYPE	PHYSICAL PROPERTIES	MAJOR ACUTE SYMPTOMS	TREATMENT
<b>Nitrogen Mustards (H-1, H-2, H-3)</b> <b>Sulfur Mustards (H, HD, HT)</b> 	Blister/Vesicant	<ul style="list-style-type: none"> <li>• Patient can contaminate others if liquid is present on skin or clothes</li> <li>• H-1, H-2, H-3                             <ul style="list-style-type: none"> <li>• Colorless to yellow, oily liquids</li> <li>• Various odors (fishy, musty, fruity, or bitter almond)</li> <li>• Insoluble to sparingly soluble in water</li> </ul> </li> <li>• H, HD, HT                             <ul style="list-style-type: none"> <li>• Yellow to brown oily liquids</li> <li>• Slight garlic or mustard odor</li> <li>• Sparingly soluble in water</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Onset of pain and other clinical effects may be delayed for 1 - 24 hours</li> <li>• Vesicant causing severe skin, eye, and respiratory tract injury</li> <li>• Alkylating agent suppressing the immune system</li> <li>• Neurologic toxin</li> <li>• Rapidly absorbed by the skin</li> <li>• H, HD, HT only                             <ul style="list-style-type: none"> <li>• Gastrointestinal toxin</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• No antidote</li> <li>• Treatment is supportive</li> <li>• If symptoms develop after 12 hours, treat symptoms and send home</li> <li>• If symptoms develop more quickly, admit to the hospital</li> <li>• Patients with laryngitis, shortness-of-breath, a productive cough, pseudomembrane formation should be admitted to the ICU</li> </ul>	Phosgene	Pulmonary	<ul style="list-style-type: none"> <li>• Patient can contaminate others if liquid is present on skin or clothes</li> <li>• Patients exposed to phosgene gas do not pose risk of secondary contamination to others</li> <li>• Gas is much heavier than air</li> <li>• Odor of sweet, newly-mown hay</li> </ul>	<ul style="list-style-type: none"> <li>• Severe pulmonary effects may be delayed up to 48 hours</li> <li>• Corrosive to the lungs and intact skin</li> <li>• Not absorbed by the skin</li> <li>• Some absorption by lungs</li> <li>• Inhalational absorption may result in                             <ul style="list-style-type: none"> <li>• pulmonary edema</li> <li>• necrotizing bronchiolitis</li> <li>• pulmonary thrombosis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• No antidote</li> <li>• Treatment is supportive of respiratory and cardiovascular functions</li> <li>• If the patient has signs and symptoms of severe respiratory injury, admit to ICU for treatment of non-cardiogenic pulmonary edema</li> </ul>
<b>Lewisite (L) and Mustard-Lewisite Mixture (HL)</b> 	Blister/Vesicant	<ul style="list-style-type: none"> <li>• Patient can contaminate others if liquid is present on skin or clothes by direct contact or through off-gassing of vapors</li> <li>• Significant volatility</li> <li>• Lewisite                             <ul style="list-style-type: none"> <li>• colorless to amber to black oily liquid</li> <li>• odor of geraniums</li> </ul> </li> <li>• HL                             <ul style="list-style-type: none"> <li>• liquid with very low freezing point</li> <li>• garlic-like odor</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Immediate onset of pain</li> <li>• Vesicant causing severe skin, eye, and respiratory tract injury</li> <li>• Lewisite is a systemic poison binding with thiol groups</li> <li>• L or HL may cause pulmonary edema, diarrhea, capillary leakage, and subsequent hypotension</li> <li>• Rapidly absorbed by the skin</li> </ul>	<ul style="list-style-type: none"> <li>• British Anti-Lewisite (BAL) can be given by intramuscular injection as an antidote for systemic effects. Seek advice of Regional Poison Control Center (1-800-222-1222) for dosage</li> <li>• BAL should be administered only to patients who have signs of shock or significant pulmonary injury</li> <li>• BAL has no effect on local lesions of the skin, eyes, or airways</li> <li>• Treatment is supportive</li> </ul>	Chlorine	Pulmonary	<ul style="list-style-type: none"> <li>• Patients exposed to chlorine gas do not pose a risk of secondary contamination to others</li> <li>• Greenish-yellow gas</li> <li>• Heavier than air</li> <li>• Acrid, pungent odor</li> <li>• Reacts explosively with many common substances (acetylene, ether, turpentine, ammonia, fuel gas, hydrogen, and finely divided metals)</li> <li>• Water soluble; primarily removed by the upper airways</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid onset of constriction and edema of the airways and lungs with higher doses</li> <li>• Highly corrosive to moist tissues such as eyes, skin, and upper respiratory tract</li> <li>• Hemoptysis and bronchopneumonia may occur</li> </ul>	<ul style="list-style-type: none"> <li>• No antidote</li> <li>• Treatment is supportive</li> </ul>
Phosgene oxime (CX)	Blister/Vesicant Corrosive	<ul style="list-style-type: none"> <li>• Patient can contaminate others if liquid is present on skin or clothes by direct contact or through off-gassing of vapor</li> <li>• Colorless solid or yellow-brown liquid</li> <li>• Disagreeable, penetrating odor</li> <li>• Corrosive to metal, plastic, rubber</li> </ul>	<ul style="list-style-type: none"> <li>• Immediate pain and necrotic lesions of the eyes, skin, and respiratory tract</li> <li>• Does not cause blisters</li> <li>• Rapidly absorbed by skin, eyes, and mucous membranes</li> <li>• Absorption may cause                             <ul style="list-style-type: none"> <li>• pulmonary edema</li> <li>• necrotizing bronchiolitis</li> <li>• pulmonary thrombosis several hours after exposure</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• No antidote</li> <li>• Treatment is supportive</li> <li>• Treat skin lesions in the same manner as for any corrosive lesion</li> <li>• If the burned area is large, patient should be transferred to a Burn Unit with reverse isolation</li> <li>• If the patient has signs and symptoms of severe respiratory injury, admit to ICU for treatment of non-cardiogenic pulmonary edema</li> </ul>	Sarin (GB), Soman (GD), Tabun (GA), & VX	Nerve Agents	<ul style="list-style-type: none"> <li>• Patient can contaminate others if liquid is present on skin or clothes by direct contact or through vapor trapped in clothing</li> <li>• G-series are clear, colorless, tasteless, odorless liquids that are volatile</li> <li>• VX is an amber colored, tasteless, and odorless oily liquid</li> </ul>	<ul style="list-style-type: none"> <li>• Potent acetylcholinesterase inhibitor causing the same signs and symptoms regardless of the exposure route</li> <li>• Readily absorbed by inhalation, ingestion, or dermal contact</li> <li>• Severe exposure to vapor may cause:                             <ul style="list-style-type: none"> <li>• miosis</li> <li>• copious secretions</li> <li>• generalized muscular fasciculation leading to flaccid paralysis</li> <li>• convulsions</li> <li>• apnea</li> <li>• coma</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Atropine and pralidoxime (2-PAM Cl) are antidotes for nerve agent toxicity</li> <li>• 2-PAM Cl must be administered within minutes to a few hours following exposure</li> <li>• Treatment consists of supportive measures and repeated administration of antidotes</li> <li>• Endpoint of treatment is decreased secretions or improved ventilation</li> <li>• See Recommendations for Nerve Agent Therapy below</li> <li>• Mark I kits may have been used in the field. Each kit contains 2 mg atropine and 600 mg 2-PAM Cl</li> </ul>

## RECOMMENDATIONS FOR NERVE AGENT THERAPY

[Sarin (GB), Soman (GD), Tabun (GA), and VX]  
EMERGENCY DEPARTMENT MANAGEMENT

Patient Age	Antidotes		Other Treatment
	Mild/Moderate Symptoms <sup>1</sup>	Severe Symptoms <sup>2</sup>	
Infant (< 20 kg)	Atropine: 0.05 mg/kg IM or 0.02 mg/kg IV; 2-PAM Cl <sup>3</sup> : 15 mg/kg IV slowly	Atropine: 0.1 mg/kg IM or 0.02 mg/kg IV; 2-PAM Cl: 15 mg/kg IV slowly	Assisted ventilation as needed
Child (≥ 20 kg or to age 10)	Atropine: 1 mg IM; 2-PAM Cl: 15 mg/kg IV slowly	Atropine: 2 mg IM; 2-PAM Cl: 15 mg/kg IV slowly	Repeat atropine (2 mg IM or 1 mg IM for infants) at 5 - 10 minute intervals until secretions have diminished and breathing is comfortable or airway resistance has returned to near normal
Adolescent (>10 yrs)	Atropine: 2 mg IM; 2-PAM Cl: 15 mg/kg IV slowly	Atropine: 4 mg IM; 2-PAM Cl: 15 mg/kg IV slowly	Phentolamine for 2-PAM induced hypertension: (5 mg IV for adults; 1 mg IV for children)
Adult	Atropine: 2-4 mg IM; 2-PAM Cl: 15 mg/kg (1 g) IV slowly	Atropine: 6 mg IM; 2-PAM Cl: 15 mg/kg (1 g) IV slowly	Diazepam for convulsions: (0.2 to 0.5 mg IV for infants <5 years; 1 mg IV for children >5 years; 5 mg IV for adults)
Elderly, frail	Atropine: 1 mg IM; 2-PAM Cl: 5 to 10 mg/kg IV slowly	Atropine: 2 mg IM; 2-PAM Cl: 5 to 10 mg/kg IV slowly	

Patients may have received Mark I kits in the field. Each kit contains 2 mg atropine and 600 mg 2-PAM Cl.

<sup>1</sup> Mild/Moderate symptoms include localized sweating, muscle fasciculation, nausea, vomiting, weakness, dyspnea

<sup>2</sup> Severe symptoms include miosis, copious secretions, flaccid paralysis, convulsions, apnea, coma

<sup>3</sup> 2-PAM Cl: Pralidoxime