

SUMMARY OF CHEMICAL WARFARE AGENTS

Agent	Signs	Symptoms	Onset	Diagnostic Tests	Treatment
Biotoxins: Ricin	Clusters of acute lung or GI injury; Circulatory collapse and shock, tracheobronchitis, pulmonary edema, necrotizing pneumonia; dehydration	Ingestion: Nausea, diarrhea, vomiting, fever, abdominal pain Inhalation: chest tightness, coughing, weakness, nausea, fever	Ingestion: 18-24 hours Inhalation: 8-36 hours	ELISA using respiratory secretions, serum, and direct tissue	Ingestion and Inhalation: No antidote Supportive care For Ingestion charcoal lavage.
Nerve Agents: Sarin; Tabun; Soman; Cyclohexyl Sarin; VX; Novichok agents	Pinpoint pupils; Bronchoconstriction; Respiratory arrest; Hypersalivation; Increased secretions; Diarrhea; Decreased memory/concentration/confusion; Loss of consciousness; Seizures "SLUDGE": Salivation, Lacrimation, Urination, Diarrhea, Gastrointestinal cramps, Emesis	Moderate exposure: Diffuse muscle cramping, runny nose, difficulty breathing, eye pain, dimming of vision, watery eyes, blurred vision, sweating, cough, chest tightness, headache, muscle tremors High exposure: Same as above also, sudden loss of consciousness, seizures, flaccid paralysis (late sign)	Liquids: minutes to hours Aerosols: seconds to minutes	Red blood cell or serum cholinesterase (whole blood) Treat based on signs and symptoms; lab tests only for later confirmation	Inhalation and dermal absorption: Atropine (2mg) IV; repeat q 5 minutes, titrate until effective, average dose 6 to > 15mg [use IM in the field before IV access] establish airway for oxygenation Pralidoxime chloride (2-PAMCl) 600-1800mg IM or 1.0g IV over 20-30 minutes (max. 2g IM or IV per hour) Additional doses of atropine and 2-PAMCl depending on severity Diazepam, midazolam, or lorazepam 10mg IV/IM/IO to prevent seizures Ventilatory support
Cyanides: Hydrogen cyanide; Cyanogen chloride	Moderate exposure: Metabolic acidosis, venous blood-O2 level above normal, hypotension, pink skin color High exposure: Same as above plus coma, convulsions, cessation of heartbeat and respirations	Moderate exposure: Giddiness, palpitations, dizziness, nausea, vomiting, headache, eye irritation, hyperventilation, drowsiness, restlessness High exposure: Immediate loss of consciousness, convulsions and respiratory failure leading to death within 1 to 15 minutes	Seconds to minutes	Bitter almond odor associated with patient can suggest cyanide poisoning; metabolic acidosis; Cyanide (blood) or thiocyanate (blood or urine) levels Treat based on signs or symptoms; lab tests only for later confirmation.	Ingestion, inhalation and dermal absorption: 100% oxygen by face mask; intubation with 100% FIO2 if indicated Amyl nitrate via inhalation, 1 ampule (0.2mL) q 5 minutes Sodium nitrite (300mg IV over 5-10 minutes) and sodium thiosulfate (12.5g IV) Additional sodium nitrite should be based on hemoglobin level and weight of patient.
Blister Agents/Vesicants: Sulfur mustard; lewisite; nitrogen mustard; mustard lewisite; phosgeneoxime; T2 Mycotoxins	Skin erythema and blistering; Watery and swollen eyes, upper airways sloughing with pulmonary edema; metabolic failure; bone marrow suppression with neutropenia and sepsis (especially sulfur mustard, late)	Burning, itching, red skin, Mucosal irritation (prominent tearing, and burning and redness of eyes), eyelid edema, shortness of breath, nausea and vomiting, cough, chest tightness, sore throat.	Sulfur mustard: hours to days Lewisite: minutes	Body can often smell of garlic, horseradish or mustard; Oily droplets on skin from ambient sources; Urine thiodiglycol; Tissue biopsy* (*US Army Medical Research Institute of Chemical Defense)	Inhalation and dermal absorption: Mustards: no antidote Lewisite and lewisite mustard: British Anti-Lewisite (BAL or Dimercaprol) IM (rarely available) Thermal burn therapy; supportive care (respiratory support and eye care) T2 Mycotoxins: No antidote Supportive care
Lung/Choking/ Pulmonary Agents: Chlorine; Phosgene; Sulfur dioxide; Bromine	Pulmonary edema with some mucosal irritation leading to acute respiratory distress syndrome or non-cardiogenic pulmonary edema; Pulmonary infiltrate	Shortness of breath, chest tightness, wheezing, laryngeal spasm, mucosal and dermal irritation and redness, coughing, burning sensation of eyes and throat, blurred vision	1-24 hours (rarely up to 72 hours); may be asymptomatic period of hours	No tests available. Use history to help identify source and exposure characteristics.	Inhalation: No antidote Management of secretions; O2 therapy; Treat pulmonary edema with PEEP to maintain PO2 above 60mm Hg.
Riot Agents: Chloroacetophenone Chlorobenzylidenemalonitrile (CS) Chloropicrin	Ocular signs include lacrimation, erythema, corneal injury, blepharospasm. Respiratory signs: rhinorrhea, cough, dyspnea, tachypnea, wheezing or rales, hypoxemia, pulmonary edema. Skin: erythema, blistering	Eye irritation and redness, blurred vision, cough, hoarseness, shortness of breath, sore throat, dysphagia, salivation, oropharyngeal and nasal burning	Seconds to minutes, delayed onset dermatitis (8 hours) rarely	No tests available. Use history to identify source and exposure characteristics.	Inhalation, mucous membrane, dermal contact: No antidote, clothing removal and eye irrigation. Respiratory support with supplemental oxygen, bronchodilators if severe respiratory injury. Effects usually short-lived.

Important contact information:

Philadelphia Department of Public Health.....215-685-6740; After-hours on-call: 215-686-4514
Philadelphia Police/Fire/Emergency.....911
Poison Control Center.....800-222-1222
Pennsylvania Department of Health.....1-877-PA-HEALTH; After-hours on-call: 717-787-3350

Bucks County Department of Health215-345-3318; After-hours on-call: 267-718-1939
Chester County Department of Health.....610-344-6225; After-hours on-call: 610-733-4919
Delaware County State Health Center.....610-447-3250; After-hours on-call: 610-378-4352
Montgomery County State Health Center.....610-278-5117; After-hours on-call: 610-275-1222
Camden County NJ Department of Health.....856-374-6000; After-hours on-call: 856-783-1333
New Jersey Department of Health.....609-826-5964; After-hours: 609-392-2020

FOLLOW HOSPITAL PROCEDURES FOR RESPONDING TO CHEMICAL HAZARD EMERGENCIES. VICTIMS MAY PRESENT TO EMERGENCY DEPARTMENTS WITHOUT WARNING OR PRIOR DECONTAMINATION. IF THERE IS SUSPICION OF CONTAMINATION, DON PERSONAL PROTECTIVE EQUIPMENT AND DECONTAMINATE PATIENT BEFORE ENTRY INTO BUILDING.

Clues to a possible chemical attack include clusters of patients with similar syndromes or with unusual characteristics. To report suspected cases, access diagnostic testing or to obtain more information contact the Division of Disease Control at 215-685-6740. After hours call 215-686-4514 and ask for the on-call staff for the Division of Disease Control. More information concerning treatment of chemical exposure can be found on the Centers for Disease Control and Prevention's website at <http://emergency.cdc.gov/chemical/>.