**TOPIC 6. Means of mass destruction. First aid.**

**CHEMICAL WARFARE AGENTS:**

Divided into two categories Casualty Agents and Incapacitating Agents:

 Casualty Agents (Choking, Nerve, Blood, and Blister) have the ability to cause severe and permanent injury, or even death.

 Incapacitating Agents (vomiting and tearing agents) are usually not lethal.

**CHOKING AGENTS**

***Phosgene (CG):***

* A colorless fog-like gas that characterized by the smell of new-mown hay or green corn. Protective Measures: Protective mask.

Persistency: Will dissipate within 20 min in open terrain, but may persist for up to 10 hrs in shaded areas, low terrain and in temperatures below 68° F.

Signs & Symptoms:

* Eye irritation, throat, lung irritation, cough and dyspnea.
* Most deaths will occur within 24 hrs.

**NERVE AGENTS**

Signs & Symptoms:

* Difficulty breathing, drooling, nausea, vomiting, cramps, involuntary defecation and urination, twitching, seizures, staggering, headache, drowsiness, coma, constricted pupils.
* Very small skin dosages sometimes causes local sweating and tremor with little other effects.

***Tabun (GA):*** A colorless to brownish liquid that emits a colorless vapor. Tabun is odorless in pure concentration, but emits a fruity odor in impure concentrations.

Persistency: Persists 1-2 days under average conditions

***Sarin (GB)***:

A colorless liquid, which emits a colorless vapor.

Sarin is odorless in pure concentrations and has a slightly fruity odor in impure concentrations.

***Soman (GD):***

A colorless liquid that emits a colorless vapor.

Soman has a fruity odor in pure concentrations and a camphor (Vicks Vapor Rub®, mothballs, or strong pine pitch) odor in impure concentrations.

NOTE: This agent ‘ages’ rapidly, resulting in an irreversible agent-AChE (acetylcholinsterase) bond. Use of pyridostigmine bromide (PB) tabs prior to exposure to this agent can ‘preserve’ functional.

Persistency: Persists for 1-2 days under average conditions. Treatment: See Nerve Agent Exposure Treatment.

***V-Agents:***

A colorless to amber liquid, which emits a colorless vapor. V-Agents are odorless when in pure concentration.

Persists for long periods of time under average weather conditions.

#### Treatment:

* (MARK 1) 2 mg of atropine and 600 mg of 2-PAM chloride.

WARNING: Seizures associated with exposure to nerve agents indicate serious and possible lethal exposure. Seizures due to nerve agent exposure must be treated aggressively and prevented if possible. LIQUID EXPOSURE (Liquid on Skin):

LONG TERM CARE OF THE NERVE AGENT CASUALTY:

1. Continue giving atropine injectors every 5 minutes as long as symptoms are present or until IV atropine is available.
2. Suction and ventilate the patient as needed.
3. When possible, safely remove chemical protective gear and perform complete evaluation of the patient.
4. If hypoxia is NOT present, give 1-2 mg (0.02-0.05 mg/Kg) of atropine IV every 10-15 minutes until signs of atropinization occur (secretions stop, muscle fasciculation’s stop, and patient become easy to ventilate)

CAUTION: DO NOT use pupil dilation as a sign of endpoint of atropine therapy: It is unreliable in nerve-agent poisoning.

1. If hypoxia is present or cannot be ruled out, continue giving atropine 2 mg (0.02-0.05 mg/Kg) IM every 10-15 minutes until signs of atropinization occur.
2. Administer pralidoxime:
3. If 3 Mark 1’s have been given (600 mg of pralidoxime each, total of 1800 mg), then begin an IV drip of 10-20 mg/Kg per hour of pralidoxime, to a max dose of 500 mg/hour.
4. If no Mark 1’s have been given or the 2-PAM injectors were not used: Administer an initial IV bolus of 1-2 grams of pralidoxime (25-50 Mg/Kg, max of 2 grams) IVPB over 15-20 minutes, then begin an IV drip at 10-20 mg/Kg per hour as above.

 Continue the pralidoxime drip for 12 hours, or as directed by medical control.

1. If signs of nerve agent poisoning reoccur, treat with atropine and pralidoxime as above.
2. Symptoms may reoccur up to 24 hours after exposure/treatment.

DECONTAMINATION:

1. Bleach slurry or dilute alkali solutions (equipment).
2. In confined areas use steam and ammonia or hot, soapy water (equipment).
3. Warm soapy water for skin decontamination if the above are not available.

**BLOOD AGENTS**

***Hydrogen Cyanide (AC)***:

A colorless gas that emits an odor of bitter almonds. Persistency: Quickly dissipates into the air.

Signs & Symptoms: Irritation to the eyes and skin, low levels cause weakness, headache, disorientation, nausea and vomiting. Increased dosages result in loss of consciousness.

Treatment: Complex, multi-step process. Requires specialized medications, advanced level of care. If patient is still alive after exposure

Decontamination: Aeration under confined conditions. For complete decontamination, use caustic soda with steam.

***Cyanogen Chloride:*** A colorless gas with a sharp and peppery odor.

Persistency: Rapidly disperses, vapor may linger in jungle and forest for some time under suitable weather conditions.

Signs & Symptoms: Highly irritating to the eyes and upper respiratory tract. Low levels cause weakness, headache, disorientation, nausea and vomiting. Increased levels causes loss of consciousness.

Treatment: Treat ABC’s, oxygen and evacuate.

Decontamination: Same as AC.

**BLISTER AGENTS**

***Distilled Mustard (HD):*** An amber-brownish liquid that produces low-lying colorless vapor with a garlic-like odor.

Persistency: 1-2 days under average weather conditions. A week to several months under cold conditions

Signs & Symptoms: Conjunctivitis or inflammation of the eyes, redness of the skin followed by blistering or ulceration, inflammation of the nose, throat, trachea, bronchia and lung tissue. Vapors will cause temporary blindness. Symptoms may be delayed 4-6 hrs after exposure.Treatment: Strong bleach solutions and caustic soda.

Decontamination: Strong bleach solutions and caustic soda for terrain. Live steam for buildings and substructures.

***Levinstein Mustard (H):*** An amber- brownish liquid, which produces a low-lying colorless vapor with a sulfur odor.

Persistency: 1-2 days under average weather conditions. A week to several months under cold conditions.

Signs & Symptoms: Symptoms may be delayed up to 12 hrs after exposure. Skin lesions. Irritation to the nose and throat, hoarseness, loss of voice and persistent cough. Ingestion may cause diarrhea, nausea and vomiting.

Treatment: Same as HD.

Nitrogen Mustard (HN-1, HN-2, HN-3): A pale-to-amber liquid, which produces a colorless vapor.

HN-1 emits a fishy or musty odor. In low concentrations,

H-2 emits a soft soap odor and in high concentrations a fruity odor. HN-3 is odorless.

Persistency: HN-1 and HN-2 persists up to a day or two in moderate climate and less in dry arid conditions. HN-3 persists considerably longer than HN-1 and HN-2. May last for up to a week under cold conditions.

Signs & Symptoms: Irritation to the eyes, nose and throat. Hoarseness, loss of voice and persistent cough. Ingestion may cause diarrhea, nausea and vomiting. Cumulative poison with symptoms delayed up to 12 hrs after exposure.

Treatment: Same as HD. Decontamination: Same as HD.

### ***Phosgene Oxime (CX):***

May be crystalline solid or clear liquid. The crystalline solid is colorless, while the clear liquid has a sharp penetrating and disagreeable odor or pepperish smell.

Persistency: Liquid form 1-2 days under average weather conditions. A week to several months under cold conditions. Crystalline form may lasts for several months in dry, arid and cold conditions.

Signs & Symptoms: Symptoms: Red circle from area of contact. Causes immediate pain from prickly sensation to severe bee sting. Irritates the mucus membranes of the eyes and nose. Effects are instantaneous.

Treatment: No treatment available.

Decontamination: Flush with warm water to dissolve the agent. Bleaches and strong oxidizers will break down the compound. Use strong alkali solutions (sodium hydroxide) with live steam to decontaminate large ground and structural areas.

**BIOLOGICAL AGENTS**

GUIDELINES AND CONSIDERATIONS

* Biological warfare agents are difficult to detect, but relatively easy to protect against. Most biological agents capable of being weaponized require inhalation of the agent for infection
* Immunizations against specific biowarfare agents may be required. Keep immunizations current.
* Avoid water that hasn’t been properly purified and food from the local area if possible.
* Decontamination for most biowarfare agents is done with 5% sodium hypochlorite solution (Clorox bleach out of the bottle is 5% hypochlorite) for equipment, and 0.5% hypochlorite solution for skin (dilute the Clorox solution 1:10 with water). Allow the solution to dry on the equipment and skin. NOTE: For most biological agents, washing with warm soapy water is just as effective for skin decontamination as a bleach solution is.

## **NUCLEAR CONTAMINATION**

:Nuclear/radiation exposure can be divided into several different categories. The patient themselves DO NOT become radioactive from exposure to radiation

NOTE: In some cases, patients can become contaminated with dust or other material that has radioactive material in it. Once this is removed, the patient is cared for in the normal manner.

GUIDELINES AND CONSIDERATIONS

Prevention of exposure depends on the type of threat in the area. In all cases, remember that radiation protection is dependent on:

1) TIME OF EXPOSURE,

2) DISTANCE FROM THE SOURCE, and

3) SHIELDING.

* For a fixed radiation source that is not in particulate form: It is best to limit exposure during rescue.

Move the patient as rapidly as possible, keeping as far away from the radiation source as possible.

* For a particulate radiation source with external contamination (dust/debris containing radioactive material is on the patient): Wear a chemical protective mask with war filters in place to prevent inhalation of dust. Wear an overgarment that can be discarded after leaving the contaminated area. Decontaminate the patient by removing all clothing and washing off any dust.
* For a patient with internal contamination (radioactive material either ingested or driven into wounds): Wear protective clothing as noted above. Once out of the contaminated area, Decontaminate the patient as above. Debride the wounds to remove any particulate matter, if possible. Cover the wounds and Evac the patient, making sure the next echelon of medical care knows that an internally contaminated patient is on the way. Patients who have inhaled, or ingested radioactive material should be evacuated to the next echelon of care.