




**Exposure and Dose**


- Exposure - contact with a contaminant
- Dose - amount taken into the body
- May be ACUTE or CHRONIC

**Routes of Entry/Effects of Exposure**

ACUTE  
High Dose over short time  
Usually recover quickly.  
hang-over, drunkenness, vomiting, unconsciousness



CHRONIC  
Small Dose over long period of time  
liver damage cirrhosis, addiction, alcoholism, death.



**Exposure and Dose**

- Warning properties -  
characteristics of a chemical that can be identified by the senses

**Exposure and Dose**

- Carcinogen - causes cancer
- Mutagen - causes cellular mutation
- Teratogen - causes birth defects

## Signs and Symptoms

- Symptoms of a chemical dose may be immediate or delayed

DERMATITIS (rash) is the most common symptom of chemical exposure.



## Signs and Symptoms of General Chemical Exposure

- Behavior change
- Breathing problems
- Change in complexion
- Coordination problems
- Dizziness
- Drooling
- Diarrhea
- Fatigue
- Irritability
- Irritation of eyes, nose or throat
- Headache
- Lightheadedness
- Nausea
- Sneezing
- Sweating
- Tearing
- Tightness in chest

## Chemical Warfare Agents

- Nerve Agents
- Blood agents
- Blister Agents
- Choking Agents

## Nerve Agents

- Agents that effect the transmission of nerve impulses by reacting with the enzyme cholinesterase, permitting accumulation of acetylcholine and continuous stimulation of muscles and glands.

## Blood Agents

- chemical warfare agents which are inhaled and bind to enzymes which prevent cells from using oxygen.

## Blister Agents

- chemical warfare agents which produce local irritation and damage to the skin, eyes and respiratory tract.

## Choking Agents

- Chemical warfare agents that affect the lungs and result in the accumulation of large amounts of fluid in the alveoli of the lungs (pulmonary edema).

## Irritating Agents

- Riot control agents have a severe effect on the eyes, nose and throat.
- Shortness of breath and coughing follow immediately (within seconds) after exposure.
- Effects decrease and disappear after 15-30 minutes in fresh air.
- Seldom have serious effects (skin blistering).

## Biological Warfare Agents

- "Any biological warfare attack would be by aerosol. Clinical manifestations follow exposure by aerosol within 1 to 7 days depending, in part, on the dose of the organisms."

David L. Brunner

## Pathogens

- are infectious living, reproducing microorganisms that cause disease in humans, animals or plants.

## Toxins

- Non-living poisonous substances produced through metabolic activities of living organisms.

## Initial Treatment

- Depends on route of exposure and particular hazard.

## Other Hazards

- Thermal stress
- Electrical hazards
- Ionizing radiation
- Slip/Trip/Fall hazards



## Confined Space

- Defined as an enclosed space that:
  - Is large enough for a person to enter
  - has limited means of entry/exit
  - not designed for continuous employee occupancy



## Confined space Hazards

- Slip/Trip/Fall
- Asphyxiating atmosphere
- Toxic atmosphere
- Flammable/Explosive atmosphere
- Engulfment
- Mechanical hazards
- Untrained/Unequipped rescuers

