



**HAZMAT FOR THE FIRST
RECEIVER:
AWARENESS/REFRESHER
WEBINAR TRAINING (OSHA)**

**Finger Lakes Regional Training Center
University of Rochester Medical Center
Rochester, NY**

AGENDA

- **Attendance**
- **Ground Rules**
- **Presentation**
 - **General Principles**
 - **Chemical**
 - **BREAK**
 - **Biological**
 - **Radiological**
 - **Decon Operations**
- **Evaluation/Certificate**

WEBINAR GROUND RULES

- **Webinar Will Be Recorded**
- **Don't Put Phone on Hold**
- **Use WebEx Icons:**
 - **Use Left Arrow Button to Indicate to Slow Down Presentation**

Instructor

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Acknowledgements

- **USAMRICD, USAMRIID**
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- **Ruth A. Lawrence Poison & Drug Information Center (URMC)**
- **Center for Disaster and Emergency Preparedness (URMC)**
- **Gail Quinlan, RN, MS (URMC)**
- **Robert Passalugo, CIH, Darlene Ace, CIH (U of R)**
- **Kathee Tyo, MS, RN (URMC)**



General Principles of Decon

- **Training Requirements**
- **Recognition and Response**
- **Chemical Identification**



Awareness Level Training

- **WHO: Everyone**
- **WHAT:**
 - How to know if someone...
 - How to keep safe
 - How to alert

Operations Level Training

- **WHO: Decon Team Members**
- **WHAT:**
 - **Didactic and Practical**
 - Recognition of chemicals
 - PPE
 - Recognition of symptoms
 - Clean up
- **When:**
 - **Must be completed annually along with a respiratory questionnaire**

Decontamination

- **Who: Anyone that is contaminated**
 - **Victims**
 - **Responders**
- **What: Anything that is necessary for your hospital to function**
 - **Equipment**
 - **Structures**

Decontamination

- **Where**
 - Uphill, Upwind when possible
 - Designated external sites
- **When: Anytime you suspect contamination**
 - Victim complains of pain, odor, etc.
 - Victims near release site
 - Visible material

Decontamination

- **Why: Prevent worsening of problem**
 - Remove toxic agent
 - Prevent staff/facility contamination





RECOGNITION & RESPONSE

Hazardous Substance

- **Is any substance to which exposure may result in adverse effects on the health or safety of employees. (OSHA)**
- **Includes:**
 - **Substances defined by CERCLA**
 - **Biological agents with disease causing potential**
 - **US DOT substance listed as hazardous**
 - **Substances classified as hazardous waste**



Chemical Hazards

- **69% occur at fixed sites (ATSDR,2007-2008)**
- **91% involve one substance(ATSDR2007-2008)**
- **Most are liquid (40%) or vapors (41%)**
 - **Corrosives**
 - **Pesticides**
 - **Gases**
 - **Paints and dyes**
 - **Volatile organic hydrocarbons**
 - **Other inorganic chemicals**

<http://www.atsdr.cdc.gov/HS/HSEES/annual2008.html#substances>

Contamination Event

- **VERY common**
- **Patients go to CLOSEST* hospital – Self Extricate!**
- **Risk to hospital**
 - **Contamination of staff and facilities**
 - **Need emergency plan**
 - **Need decontamination facility and team**

Emergency Response Plan

- **Train everyone to AWARENESS level**
 - All ED staff
 - Valet
 - Security
 - Information Staff
- **Decon Team Policies, Procedures & Guidelines**
- **Notification Procedure – *After hours & Weekends***
- **ASSUME all are contaminated**

Notification System

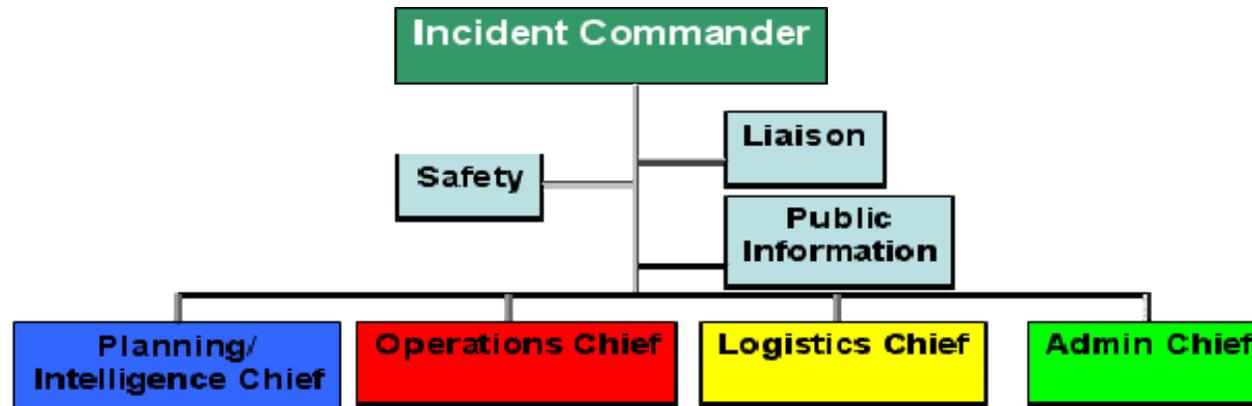
- **Notifies all in ED/Hospital**
 - **HICS / HCC Staff**
 - **Decon members**
 - **Support staff – Security, Engineering**
 - **Specific responsibilities - JAS**
- **Activates Decon team**
- **Access Control/Lockdown**

Activation/Response

- **Decon Team members and support staff**
 - **Prepares the decon room / area ready**
 - **Gets partially dressed, except respirator**
 - **Finalizes PPE and decontaminates victim(s)**

Incident Command System

- ICS should be followed at ALL levels
- Hospital
 - Departmental
 - Specific team (ie, Decontamination)
- At each level, designated person to communicate with.



ICS – Decon Team

- **COMMAND**
- **SAFETY OFFICER (ASST. SAFETY OFFICER-DECON)**
- **OPERATIONS (Haz-Mat Branch Director, Victim Decon Unit Leader)**
- **LOGISTICS (Decon team suit/equipment support)**



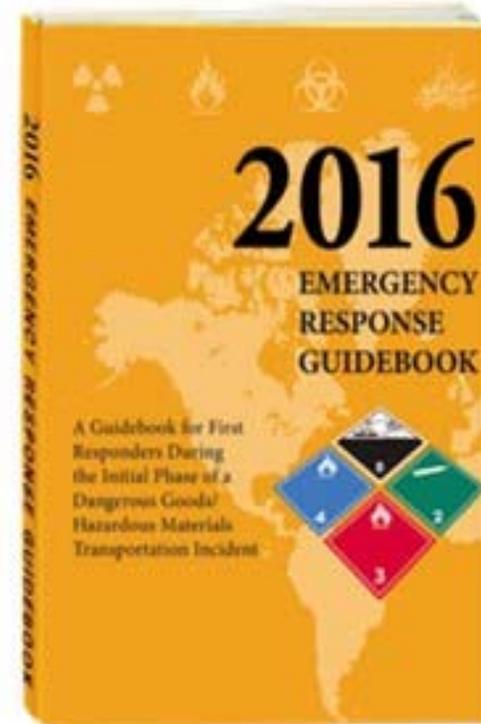
AGENT IDENTIFICATION

Labels/warnings...

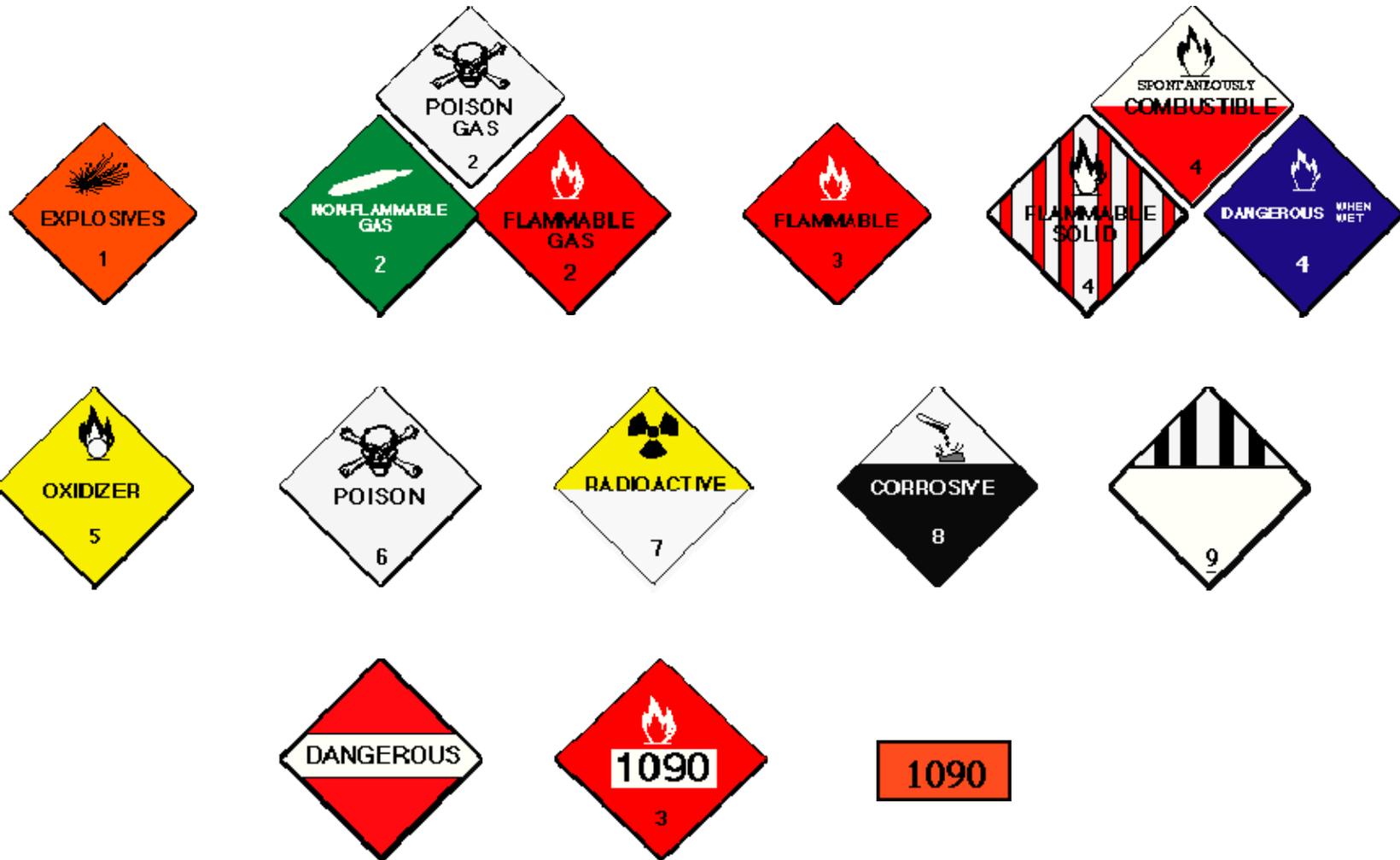
- **CAS numbers**
(Chemical Abstract Service #)
- **Shipping manifesto/label**
- **Container label**
- **DOT placards**
- **Name of product on container**

Initial ID/precautions

- **Emergency Response Guidebook**
- **Quick guide**
 - **General ID**
 - **Occasional specific ID**
 - **General guidance for class of chemical**



Placards and Labels



Other patient's warning...

- I was doing...
- It smelled like...
- It is used for...
- You **HAVE TO USE A RESPIRATOR** to...
- It tasted like...
- There's a <color> warning/placard on it...
- Use Safety Data Sheets (SDS)
- Shipping information – if available

Poison Center will...

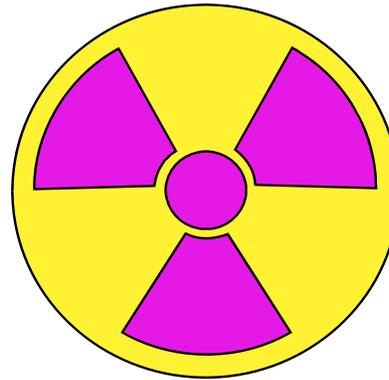
- **ID chemical**
 - Based on placard information you find
 - Based on signs and symptoms displayed
- **Healthcare information**
 - Signs and symptoms to watch out for
 - Treatments that may be needed
- **1-800-222-1222**

WHY???

- **Types of PPE**
- **Types of hazards to providers**
- **Type of Decon**
 - **Dry- removal of clothing**
 - **Wet- removal of clothing and shower**

CBRNE

- Define
 - WMD
 - NBC
 - CBRNE
- Nuclear Devices
- Biological Weapons
- Chemical Weapons



NBC/CBRNE Agent Sources

- **Home production**
- **Laboratory / commercial production**
- **Industrial facilities**
- **Military sources**
- **Medical / university research facilities**

The Fallacies

- It can't happen to us
- NBC agents are so deadly the victims will all die anyway
- There is nothing we can do

Many of the following terrorist examples can happen more commonly right in our own communities.

Chemical Agents



Chemical Agents

- **General Information**
- **Pulmonary Agents**
- **“Blood” Agents**
- **Blister Agents**
- **Nerve Agents**

Tokyo Sarin Attack

- Numbers seeking medical care:
 - 5,510 total at 278 health-care facilities
 - Mild: 984
 - Moderate: 37
 - Severe: 17
 - Deaths: 12
 - Status unknown: >300
- No secondary contamination of health-care workers, but 2 vapor-exposed physicians



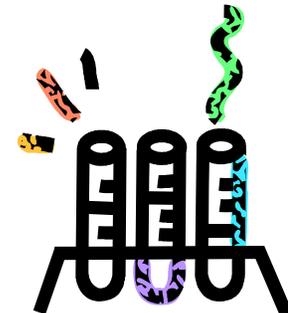
Real Life

- **Most will not wait for EMS to arrive**
- **Most will go to hospitals without decontamination**

About 80 % of victims arrive without decontamination

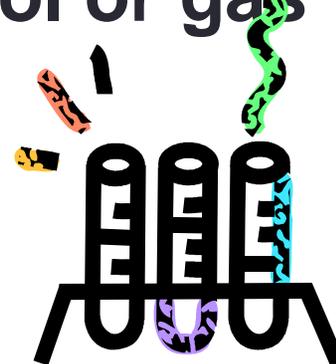
Characteristics and Behavior

- **Generally liquid (when containerized)**
- **Normally disseminated as aerosol or gas**
- **Present both a respiratory and skin contact hazard**
- **May be detectable by the senses (especially smell)**
- **Influenced by weather conditions**



Characteristics and Behavior

- Irritant/Corrosive vs. Drug-Like Effects
- Physical States
 - Vapor/Gases act quickly
 - Liquids act slower
 - Solids
- Normally disseminated as aerosol or gas



Characteristics and Behavior

- **Present both a respiratory and skin contact hazard**
- **May be detected by the senses (especially smell)**
- **All forms of chemicals may cause contamination**
- **Personnel must wear protective equipment during decontamination and immediate patient care**

Chemical Agent Clues

- **Rapid onset of symptoms**
- **Similar signs and symptoms**
- **Absence of traumatic injury**
- **Emergency responders may be affected**
- **Animal or insect die-off**
- **Report of cloud or vapor release**

Routes of Entry

- **Inhalation - vapor or aerosol**
- **Skin (percutaneous) - liquid or vapor**
(vapor if prolonged contact with skin)
- **Ingestion - liquid or solid**
- **Injection - intravenous or intramuscular**

Volatility

- **Tendency of a liquid agent to form vapor**
- **Volatility proportional to vapor pressure**
- **Affected especially by:**
 - **Temperature**
 - **Wind**
 - **Method of delivery**

Persistence

- **Tendency of a liquid agent to remain on terrain, other surfaces, material, clothing, skin**
- **Affected especially by**
 - **Temperature**
 - **Surface material**
- **Persistence is inversely proportional to volatility**

Examples

- **Non-persistent agents (less than 24 hours)**
tabun, sarin, soman, cyanide, phosgene
- **Persistent agents (greater than 24 hours)**
mustard, VX

CHOKING (PULMONARY) AGENTS

- **Disrupts pulmonary function**
 - **Non cardiogenic pulmonary edema**
 - **ARDS (Adult Respiratory Distress Syndrome)**
- **Treatment: Supportive**



CHLORINE CYLINDERS



Ypres, Belgium, April 1915

CHLORINE - Civilian Uses

- Chlorinated lime (bleaching powder)
- Water purification
- Disinfection
- Synthesis of other compounds
 - synthetic rubber
 - plastics
 - chlorinated hydrocarbons



CHOKING (PULMONARY) AGENTS

Phosgene

- **Odor: Newly cut hay**
- **Symptoms: Coughing, choking, vomiting**

Chlorine

- **Odor: Swimming pool**
- **Symptoms: Coughing, choking, vomiting**

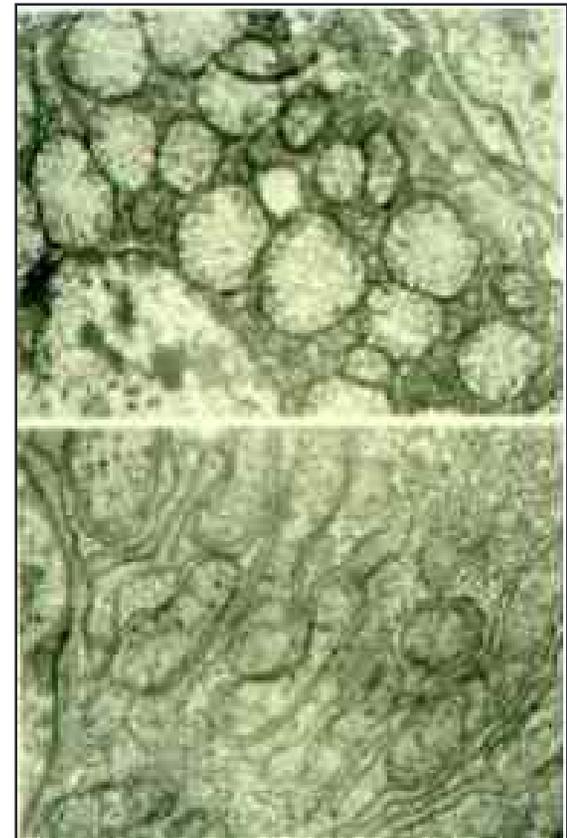
PHOSGENE - Uses/Sources

- **Chemical industry**
 - foam plastics (isocyanates)
 - herbicides, pesticides
 - dyes
- **Burning of:**
 - plastics
 - carbon tetrachloride
 - methylene chloride (paint stripper)
 - degreasers



“BLOOD” AGENTS (CYANIDE)

- **Hydrogen Cyanide (AC)**
- **Cyanogen Chloride (CK)**



Blood Agents

- **Cyanide Gas**
- **Odor: Bitter almonds/musty**
- **Symptom Onset: Rapid**
- **Symptoms: Normal skin color, gasping for air, shock, seizure**

CYANIDE (BLOOD AGENTS)

- **Hydrogen Cyanide (AC), Cyanogen Chloride (CK)**
- **Gas at STP, lighter than air**
- **Mechanism: blocks cell utilization of oxygen**
- **Old treatment: amyl/sodium nitrite and sodium thiosulfate**
- **New treatment: hydroxocobalamin**

BLISTER AGENTS (VESICANTS)

- Sulfur Mustard (H,HD)
- Nitrogen Mustard (HN1, HN2, HN3)
- Lewisite = chlorovinylidichloroarsine (L)
- Mustard / Lewisite mixtures (HL,HT,TL)
- Phosgene oxime (CX)



VESICANTS: SULFUR MUSTARD

- **Sulfur Mustard, Nitrogen Mustard**
- **Oily liquid, heavier than air and water, persistent**
- **Garlic Odor**
- **Mechanism: alkylating agent, DNA and proteins most sensitive targets**
- **Symptom onset delayed**
- **Symptom: Tearing, eye irritation, cough, blisters, and runny nose**
- **Treatment: Treat similarly to burn patients**

BLIND LEADING THE BLIND

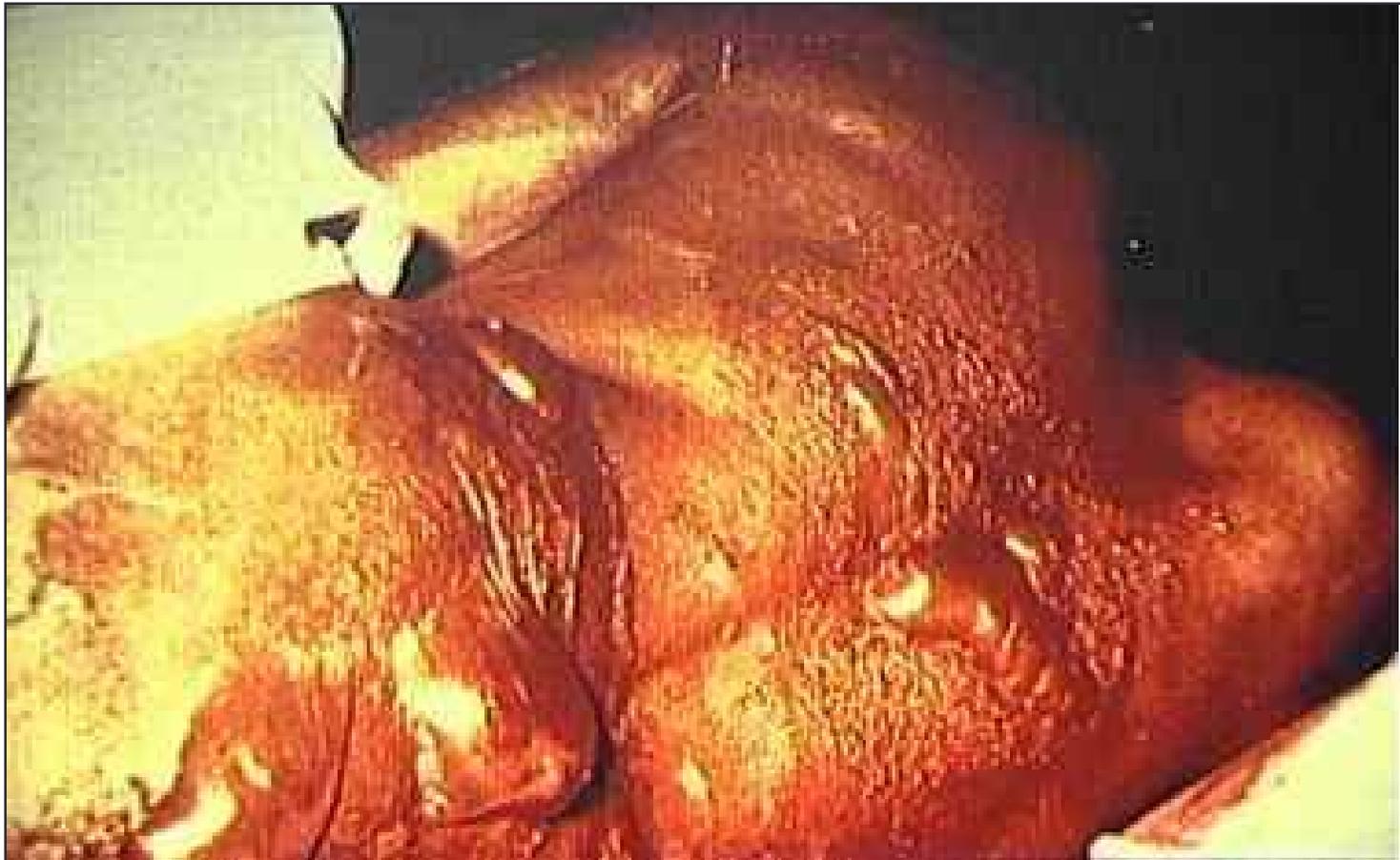


Convalescence 2wks-6months

MUSTARD: EYE



VESICANT EFFECTS



Iran/Iraq War: 90-95% burns, pulmonary injury, bone marrow suppression, sepsis, and eventually died.

NERVE AGENTS (ANTICHOLINESTERASES)

- **Tabun (GA)**
- **Sarin (GB)**
- **Soman (GD)**
- **GF**
- **VX**



Represents three lethal doses of VX

NERVE AGENTS

- **Sarin (GB), VX (persistent)**
- **All liquids initially at STP**
- **Mechanism: inhibits acetylcholinesterase, causes massive cholinergic crisis**
- **More common - Organophosphate Poisoning**

- **Treatment: atropine, oxime, diazepam**

Nerve Agents

Odor

- **Tabun, Sarin: None or fruity**
- **Soman: None**
- **VX: None/Sulfur**

Properties

- **Volatile**
- **Volatile**
- **Persistent**

Signs and Symptoms of NA Exposure

- **D** iarrhea
 - **U** rination
 - **M** iosis
 - **B** radycardia
 - **B** ronchospasm
 - **B** rhochorrhea
 - **E** mesis
 - **L** acrimation
 - **S** alivation
- and:
- Seizures**
 - Coma**
 - Death**

MARK I Kit



DuoDote



Auto-Injectors

- **Finish decontamination after administration**
- **Observe for further symptoms**
- **If needed repeat with another kit**

- **Children**
 - **Will need size appropriate dosing**
 - **No auto-injectors at this time**

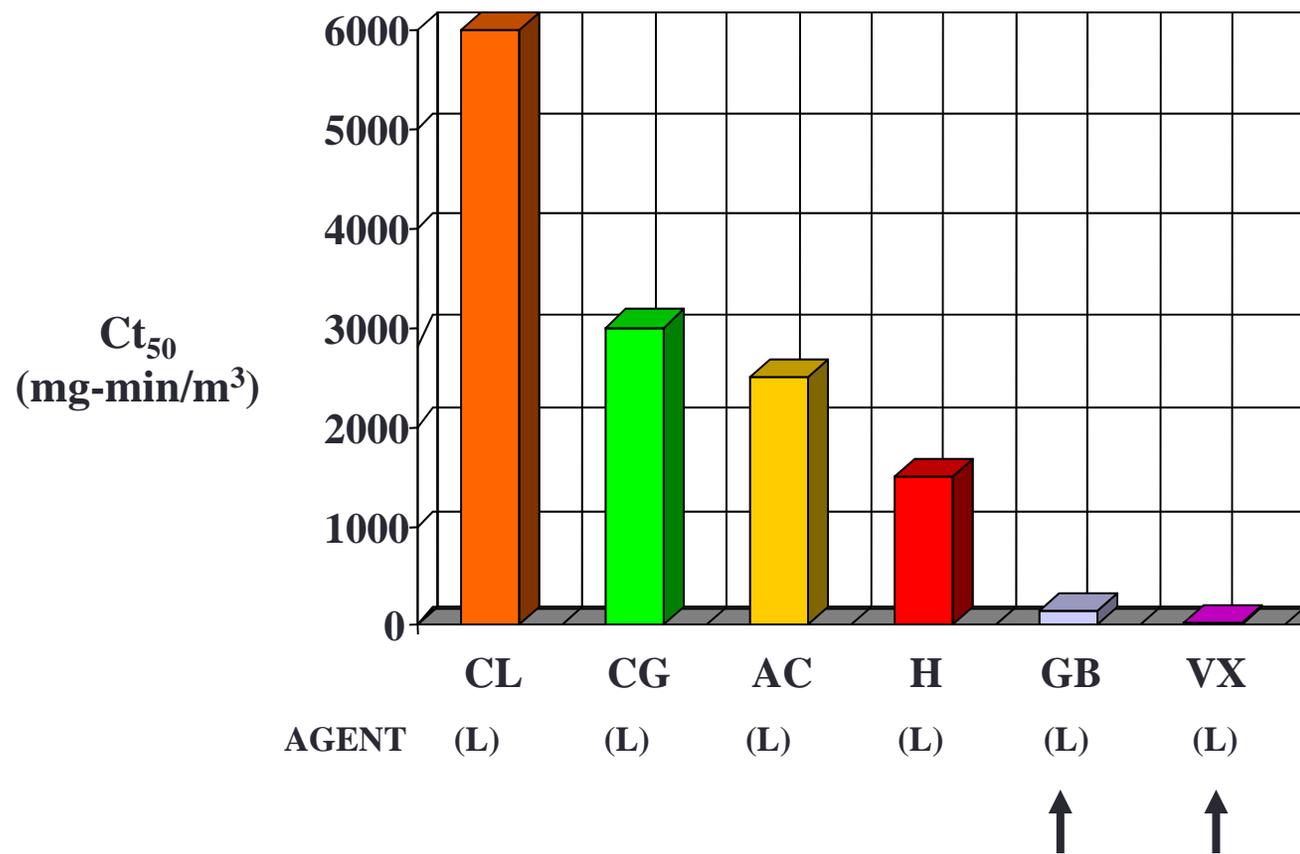
Follow-up Care

- **Notify HazMat Branch Director or Victim Decon Unit Leader**
- **Receiving team and rest of ED should be ready with:**
 - **IV**
 - **Atropine**
 - **Pralidoxime**
 - **Benzodiazepine**
 - **Airway**

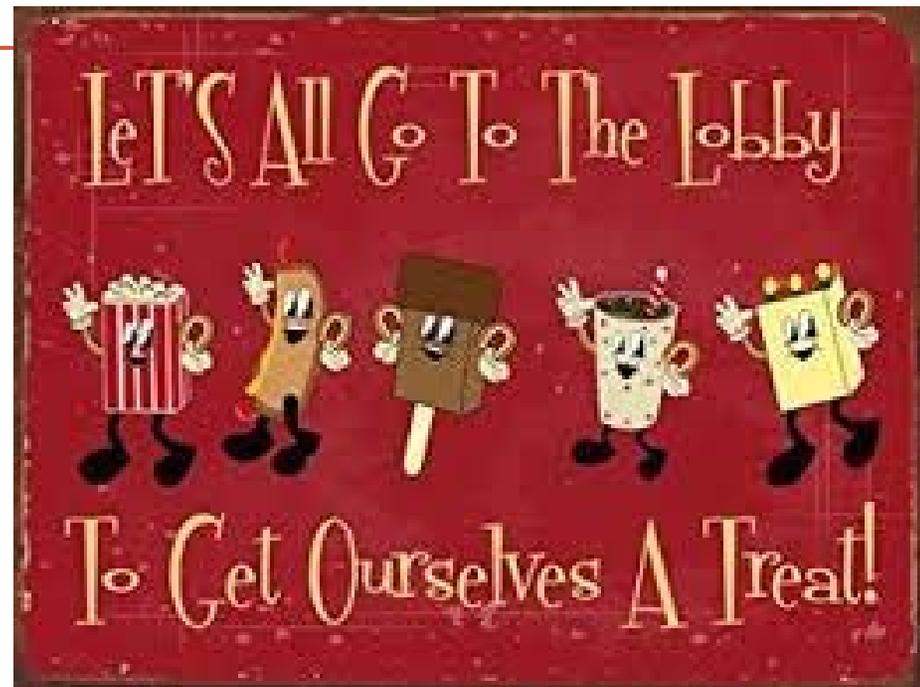
Other Use

- **IF YOU OR ANY DECON TEAM MEMBER BECOMES SYMPTOMATIC:**
 - **Notify HazMat Branch Director or Victim Decon Unit Leader**
 - **Use Auto-Injector kit**
 - **Assist member to decon**
 - **Assist member out of decon for further care**

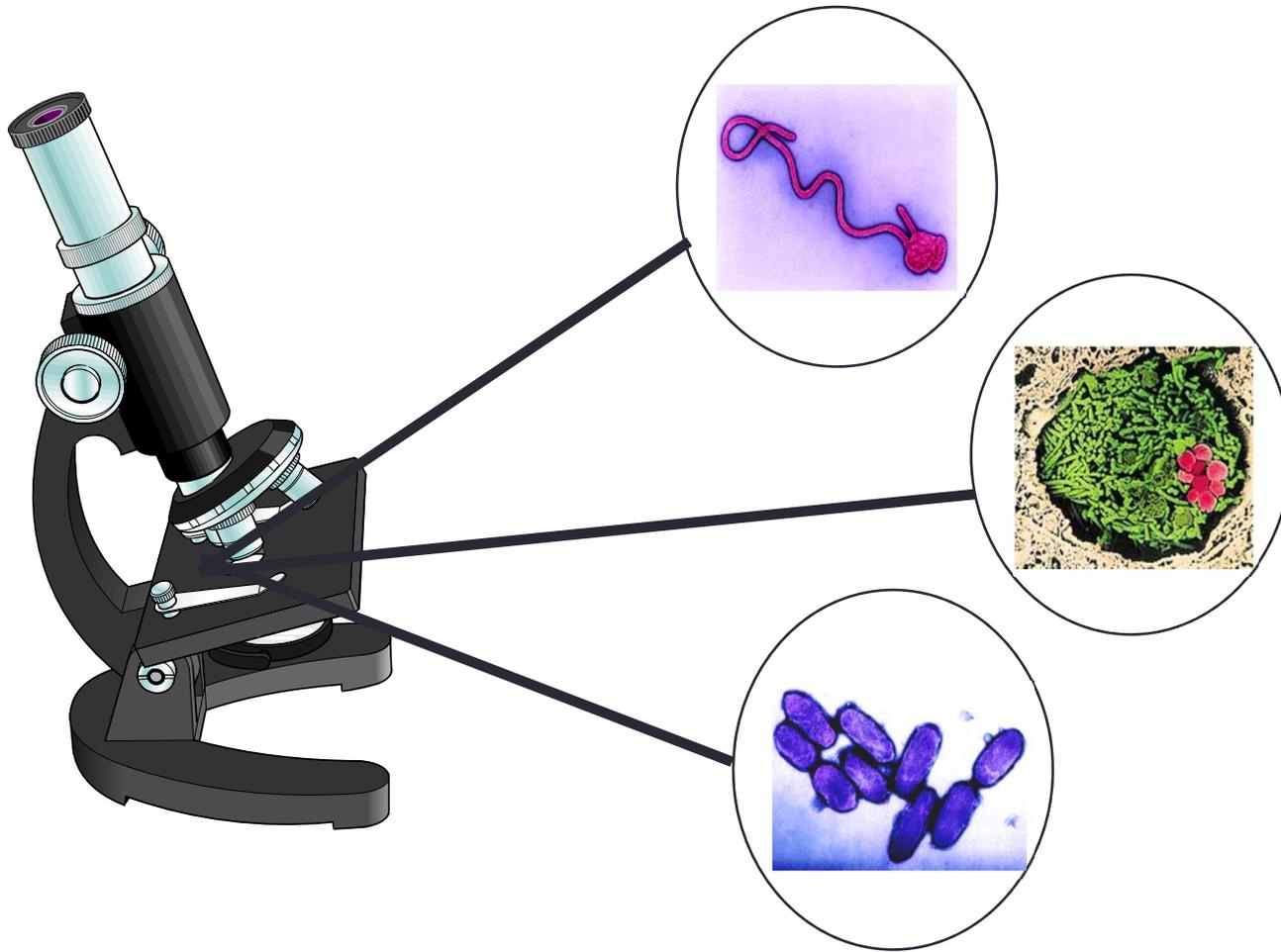
COMPARATIVE TOXICITY OF AGENTS



BREAK



Biological Agents





Biological Agents

- **General Information**
- **Bacterial Agents**
- **Viral Agents**
- **Toxin Agents**

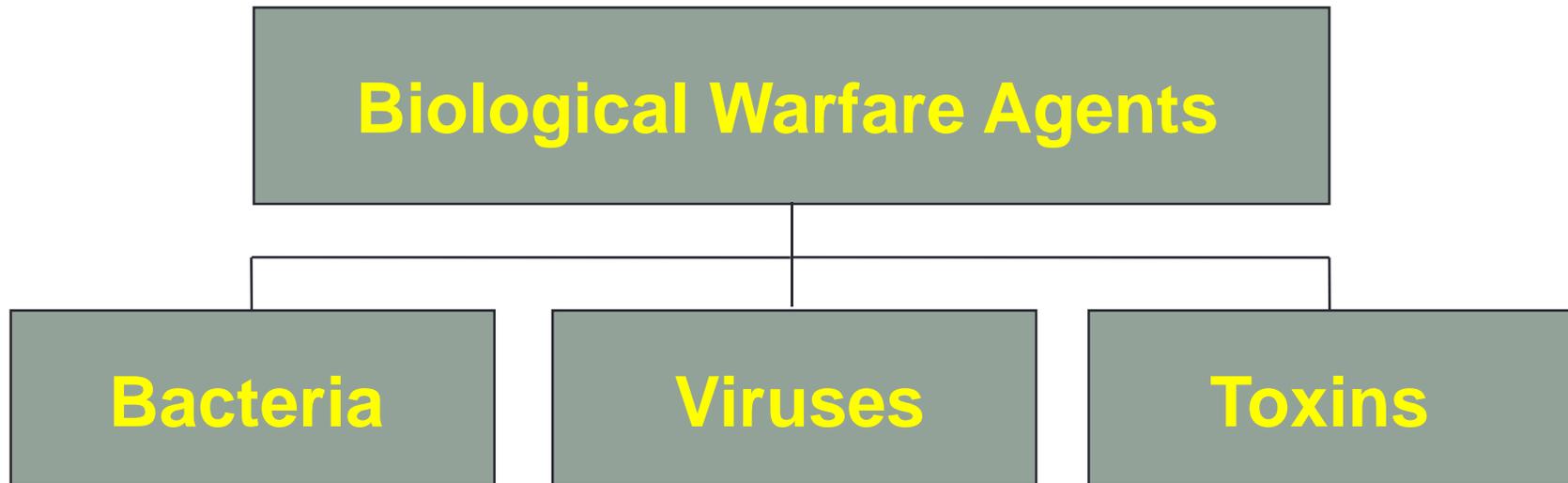
Biological Agent Characteristics

- **Produce delayed effects**
- **Do not penetrate unbroken skin**
- **Non-specific symptoms**
- **Undetectable by senses**
- **Difficult to detect in the field**
- **Do not evaporate**
- **Long incubation period**

Biological Agent Characteristics (continued)

- **Most effectively disseminated as aerosols**
- **Range of effects**
- **Obtained from nature**
- **Multiple routes of entry**
- **Destroyed by environment**
- **Some are contagious**

Classes of Biological Agents



Agents Considered for BW

- **Bacteria and Rickettsiae**
Anthrax spores, Tularemia, Plague, Brucella, Q Fever
- **Viruses:**
Smallpox, VEE, Hemorrhagic fevers
- **Toxins:**
Botulinum toxin, SEB, Ricin, Saxitoxin

Acquisition of Etiological Agents

- **Multiple culture collections**
- **Universities**
- **Commercial biological supply houses,
e.g. Iraq**
- **Foreign laboratories**
- **Field samples or clinical specimens,
e.g. Ricin**

Biological Agents

- **Most toxic per weight**
- **Production technology is easily accessible**
- **Inhalation threat – 1 to 5 micron aerosol**
- **Undetected until numerous casualties**
- **Incapacitating to lethal effects**

BW General Properties

- **Not volatile, must be dispersed as an aerosol**
- **Silent, odorless, tasteless**
- **Relatively inexpensive to produce**
- **Simple delivery technology**
 - **Point source - aerosol generator**
 - **Line source - moving aerosol generator:
auto, airplane, etc**

BW - General Properties 2

- **Inhalation is the most significant route of transmission for BW**
- **Aerosol - 1 to 5 microns ideal size**
- **Other routes of entry: oral, dermal abrasion, or intentional percutaneous**

Biological Detection

- **Mainly of clinical diagnosis**
- **Lab confirmation may be delayed**
- **Unusually bad cases**
- **Syndromic Surveillance - HCS**

Beware of multiple healthy people
with similar complaints

Impact of a BW Release

- **Extensive and prolonged need for medical services**
- **Increased need for PPE**
- **Possibility of a quarantine**
- **Handling remains/mortuary facilities**
- **Multiple jurisdictional challenges**
- **Responding to a “hoax” can be expensive**

Physical Protection (PPE)

- **Only foolproof means of protection**
- **Present equipment is effective**
- **Problem is knowing when to put protective mask on**
- **No universal protection for civilian populations**
- **Limited education programs for civilian populations**

Possible Epidemic Syndromes in BW

- **Influenza syndrome**
- **Pulmonary syndrome**
- **Jaundice syndrome**
- **Encephalitis syndrome**
- **Rash syndrome or cutaneous lesions**
- **Unexplained death or paralysis**
- **Septicemia/toxic shock**

Cutaneous Anthrax



Anthrax - Prevention

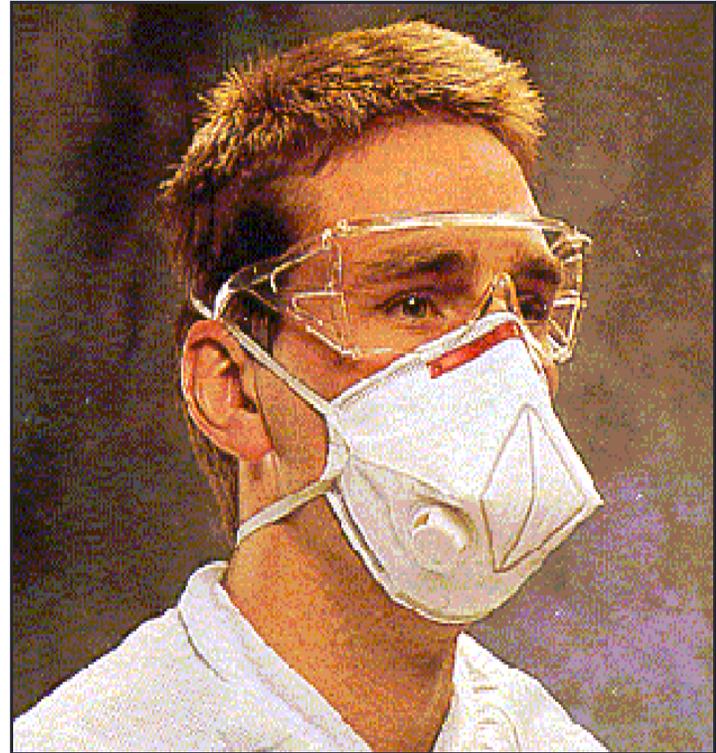
- **No documented cases of person-to-person transmission of inhalational anthrax has ever occurred**
- **Cutaneous transmissions are possible**
- **Universal precautions required**

Plague - Pathogenesis

- **Humans develop disease from either the bite of an infected flea or by inhaling the organism**
 - **Bubonic - infection of a lymph node (usually lower legs)**
 - **Pneumonic - infection of the lungs**
 - **Septicemia - generalized infection from bacteria escaping from the lymph node: toxic shock**
 - **Orophangeal infections are rare, but reported**

Pneumonic Plague Prevention

- **Secondary transmission is possible**
- **Standard, contact, and aerosol precautions for at least 48 hrs until sputum cultures are negative or pneumonic plague is excluded**



Q Fever - Pathogenesis

- **Causes disease in animals (sheep, cattle, goats)**
- **Humans acquire disease by inhaling aerosols contaminated with the organism.**



Viruses as Biological Agents

- Smallpox
- Venezuelan Equine Encephalitis (VEE)
- Viral Hemorrhagic Fevers
- **Non-Agents we see:**
 - Eastern Equine Encephalitis (EEE)
 - West Nile Virus
 - Lyme Disease
 - Ebola (EVD)



Smallpox - Clinical Course

- **7-17 day incubation period followed by myalgias, fever, rigors, vomiting, HA, and backache**
- **May have mental status changes**
- **Discrete rash with pustules develops over face and extremities and spreads to trunk**
- **Infectious until all scabs healed over**
- **All contacts quarantined for at least 17 days**

West Nile Virus

About West Nile virus and humans

Human, animal immune systems usually destroy virus in bloodstream. About 80 percent of those with the virus have **no symptoms**.

About 20 percent have **mild** symptoms:

- Fever
- Headache
- Body aches
- Skin rash
- Swollen lymph nodes

A severe case, 1 in 150, can result in death. The risk is highest for elderly, children and people with impaired immune systems.

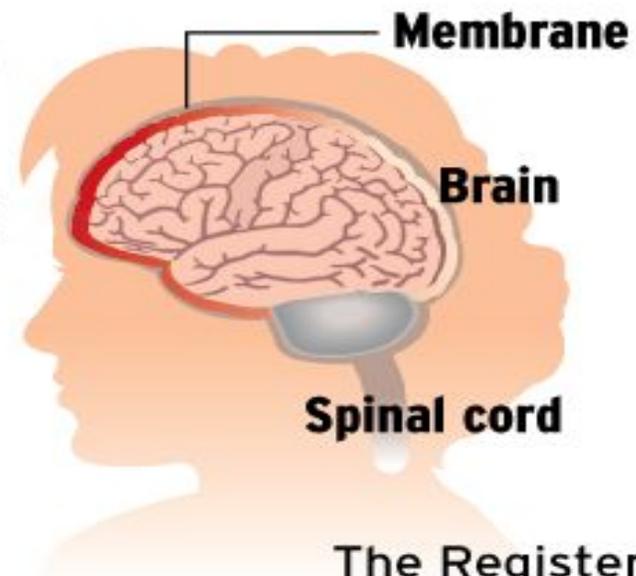
3-14

Number of days it takes for symptoms to appear after being bitten.

If virus survives in body, it can infect membranes around spinal cord and brain (encephalitis).

The virus is spread by mosquitoes that carry it from birds to humans.

Sources: Centers for Disease Control and Prevention



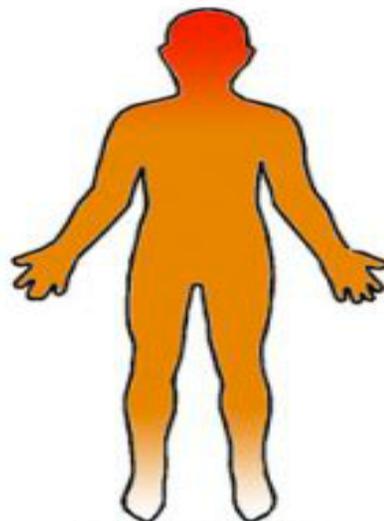
Ebola

Ebola virus' typical path through a human being



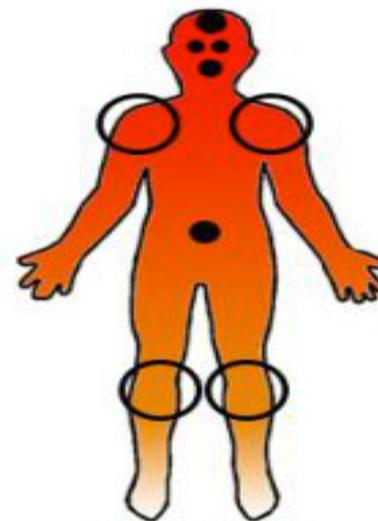
Day 7-9

Headache,
fatigue, fever,
muscle soreness



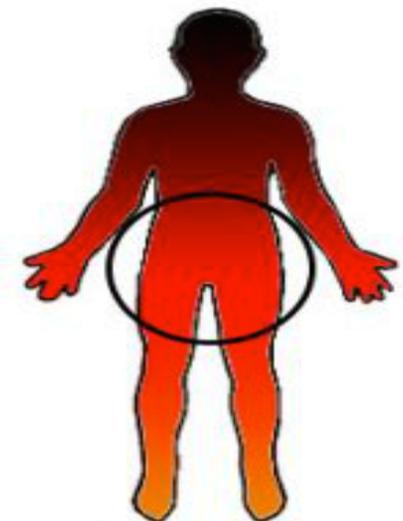
Day 10

Sudden high
fever, vomiting
blood, passive
behaviour



Day 11

Bruising, brain
damage,
bleeding from
nose, mouth,
eyes, anus



Day 12

Loss of
consciousness,
seizures,
massive internal
bleeding, death

Other Viruses

**CHIKUNGUNYA, DENGUE, or ZIKA:
What is local transmission?**

A person who has not traveled recently gets bitten by an infected mosquito where they live, work, or play.

The infographic illustrates the local transmission cycle of Chikungunya, Dengue, or Zika viruses. It features three individuals: a boy on the left who is sick with a fever and being bitten by a mosquito; a girl in the middle who is healthy and being bitten by an infected mosquito; and a girl on the right who becomes sick with a fever and is then bitten by another mosquito. Orange arrows indicate the flow of infection from the first sick person to the healthy person, and then to the second sick person.

A mosquito bites a person who is sick. The mosquito gets infected.

Infected mosquitoes can then bite healthy people and spread the infection.

Within 3–7 days, the person may become sick. Other mosquitoes can bite the sick person, become infected, and bite more people.

Protect yourself from mosquito bites. Use insect repellent.

For more information:
www.cdc.gov/chikungunya • www.cdc.gov/dengue • www.cdc.gov/zika



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

CS2015-4

Terrorist Use of Infectious BW Agents

- **Provisional diagnosis needs to be made quickly**
- **High index of suspicion that BW agents have been used**
- **No time to wait on laboratory results to establish a definitive diagnosis**
- **The time course of the epidemic may aid in diagnosis**

Toxins as Biological Agents

- **Think of them as chemicals!**
 - **Botulinum**
 - **Ricin**
 - **Staphylococcal Enterotoxin B**



Toxins General Characteristics

- **Poisons produced by living organisms that cause effects in humans, animals or plants**
- **More toxic per weight than chemical agents**
- **Not volatile and minimal absorption in intact skin**
- **Not prone to person-to-person transmission**
- **Sudden onset of symptoms, prostration or death**
- **Effects: interfere with nerve conduction; interact with immune system; inhibit protein synthesis**
- **THINK OF IT AS A CHEMICAL!!!!**

Botulism Poisoning - Epidemiology

- **Most outbreaks of foodborne botulism result from eating improperly preserved home-canned foods, with vegetables canned in oil being the most common source.**
- **145 cases/year in the United States**
 - 15% foodborne
 - 65% infantile botulism
 - 20% wound
- **Toxin can be harvested and delivered as aerosol**
- **No person to person transmission**

Ricin - Pathogenesis

- **Potent cytotoxin - a by-product of castor oil production: 5% of mash after oil removed**
- **Over a million tons of castor beans are processed yearly into castor oil**
- **200 times more toxic by weight than VX**
- **Blocks protein synthesis within the cell and thus tissue death**
- **Causes airway necrosis and edema when inhaled**

Ricin - Pathogenesis

- Toxic by multiple routes of exposure
- Can be dispersed as an aerosol
- Effective by inhalation, ingestion, injection



Ricin - Signs & Symptoms

- **Fever, chest tightness, cough, SOB, nausea, and joint pain 4 to 8 hours after inhalation
Airway necrosis and edema leads to death in 36 to 72 hours**
- **Ingestion causes N,V, severe diarrhea, GI hemorrhage, and necrosis of the liver, spleen, and kidneys - shock and death within 3 days**
- **Injection causes necrosis of muscles and lymph nodes with multiple organ failure leading to death**

Ricin - Diagnosis & Treatment

- **DIAGNOSIS**

- Difficult
- Routine labs are nonspecific

- **TREATMENT**

- Supportive - oxygenation and hydration
- No antitoxin or vaccine available
- Not contagious

Staphylococcal Enterotoxin B (SEB)

Pathogenesis

- **Fever producing exotoxin secreted by Staphylococcus aureus - has endotoxin effects**
- **Common cause of food poisoning in improperly handled foods**
- **Symptoms vary by route of exposure**
- **Causes proliferation of T-cells and massive production of various interleukins and cytokines, which mediate the toxic effects**

SEB - Signs & Symptoms

- **3 to 12 hours after inhalation**
 - **Sudden onset of high fever, HA, chills, myalgias, and nonproductive cough**
 - **Severe SOB and chest pain with larger doses**
 - **Chest x-ray usually nonspecific - ARDS in severe cases**
- **Ingestion - Nausea, vomiting and diarrhea develops, which may be severe**

Defense Against BA – Self-Protection

- **Treat every patient with respiratory complaints, a rash or open wounds as an “Infectious Source”**
- **Normal standard universal precautions for most biological agents**
- **HEPA filter mask upgrade for Pneumonic Plague/Smallpox/VHF**
- **Special protective garments are not necessary**
- **Precaution upgrades in areas of the hospital where aerosols could be generated: Lab centrifuges, autopsy facilities**

Defense Against BA - Triage

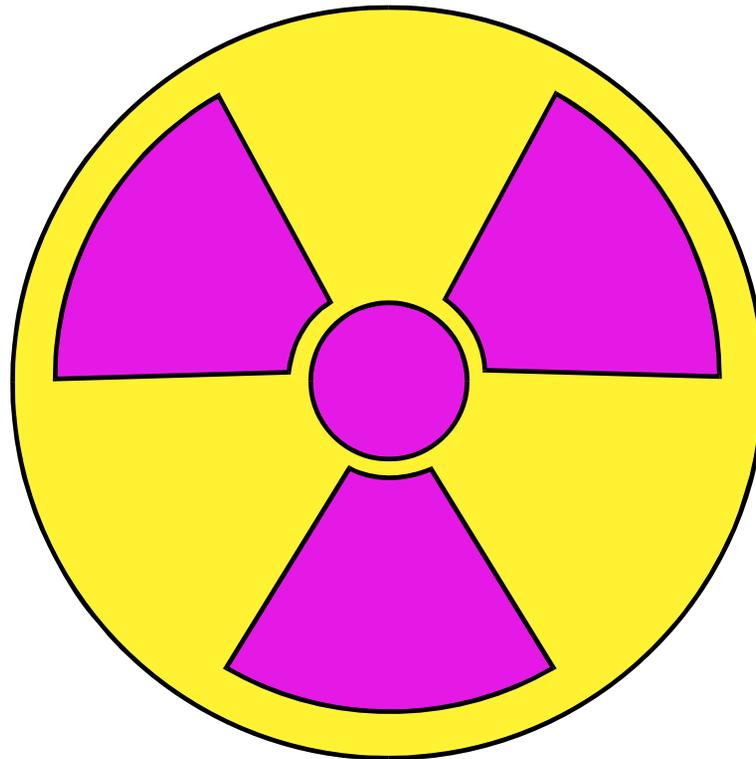
- **Initial triage of all biological casualties is Immediate**
- **Highest priority will be allocating existing resources**
 - **Isolation rooms away from other patients**
 - **Mechanical ventilators**
 - **Personal protective equipment for staff**
 - **Medications**

Key Points

Medical Approach to BA Attack

- **Mandatory universal precautions with all infectious patients prevents spread of infection by containing all bodily fluids and utilizing barrier-protection nursing procedures**
- **Decontamination as appropriate (toxins)**
- **Initiate therapy for what is treatable, but do not delay for infectious identification**

Radiological Materials

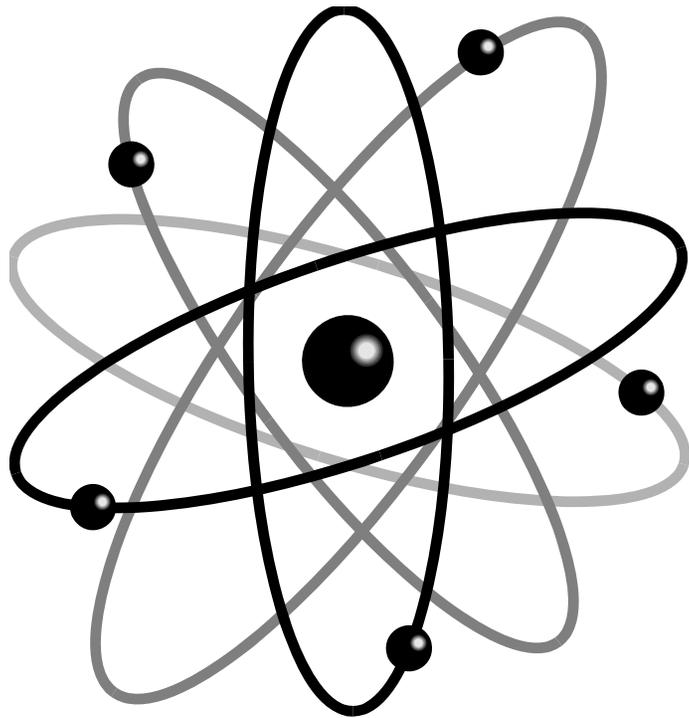




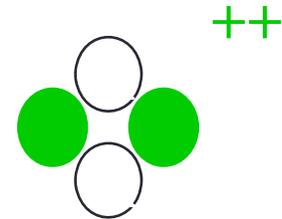
Terms and Definitions

- **Ionizing Radiation**
- **Protection**
- **Contamination vs. Exposed**

Ionizing Radiation



- Alpha particles



- Beta particles



- Gamma rays



- Neutrons



Radiation Exposures

| | | |
|----------------------------------|-----------------------------|----------------|
| Average Annual Exposure | 360 mrem per year | Chronic |
| Chest x-ray | 10 to 30 mrem | |
| Flight | 0.5 mrem every hour | |
| Smoking 1.5 packs per day | 16,000 mrem per year | |
| Mild radiation sickness* | 200,000 mrem | Acute |
| Lethal Dose* | 450,000 mrem | |
| * single acute exposure | | |

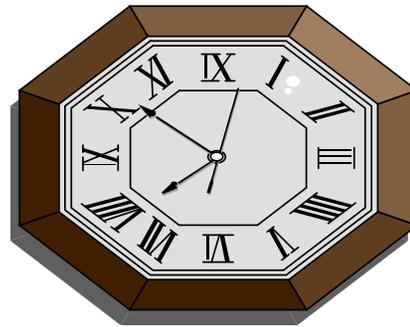
DOE maximum annual occupational limit = 5,000 mrem
DOE maximum emergency dose = 10,000 mrem
(for saving property)
Maximum emergency dose (for saving life) = 25,000 mrem

Health Risks

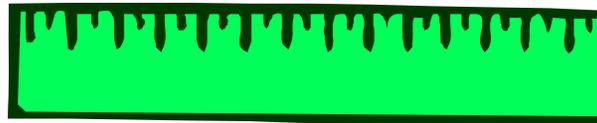
- **Risks depend on:**
 - Amount
 - Rate
- **Categorized as:**
 - Acute
 - Chronic

Exposure Protection

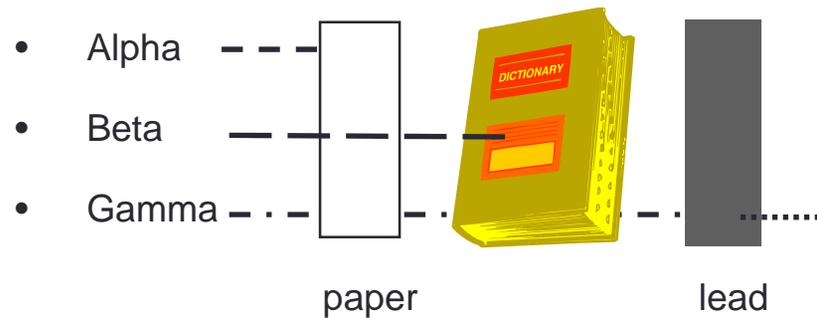
- Time



- Distance



- Shielding



Contaminated vs. Exposed

- **Contaminated victims pose a risk to others**
- **If you are contaminated, you are also exposed**
- **Exposed victims are not necessarily contaminated**
- **Geiger counter to determine if victims are contaminated**

Contaminated vs. Exposed

Easiest way to remember the difference:

- **If you have been near the site of a “Dirty Bomb”...you are assumed to be Contaminated.**
- **If you have ever had an X-Ray, hiked the High Peaks or taken a commercial plane ride...you have been Exposed.**



DECONTAMINATION TEAM

Roles

Chemical ID

PPE

Equipment

Patient Flow

Decon Team Roles

HICS 2014

- HazMat Branch Director
- Detection And Monitoring Unit Leader
- Spill Response Unit Leader
- Victim Decontamination Unit Leader
- Facility/Equipment Decontamination Unit Leader

http://www.emsa.ca.gov/disaster_medical_services_division_hospital_incident_command_system

Decon Team Members

- **Pre-entry assessment**
- **Inspect equipment**
- **Don PPE**
- **Decontaminate as needed**
- **Provide BLS**
- **Clean self/room**
- **Doff PPE**
- **Post-entry assessment**
- **Shower**
- **Debrief**

Donning / Doffing Assistance

- **Utilize appropriate PPE (splash protection)**
- **Prepare PPE**
- **Assist donning/doffing PPE**
- **Monitor team**
- **Assist moving cleaned patients**
- **Assist in PPE removal and exit of Decon team**

Key Questions Prior to Decon

- **Water compatibility of substance**
 - Most OK
- **Dry vs Wet Decon**
- **Level of PPE required**
- **Signs and symptoms of acute exposure**
- **Cleanup and disposal requirements**

Personal Protective Equipment



Level A

Required when the highest potential for exposure to hazards exists and the highest level of skin, respiratory, and eye protection is called for

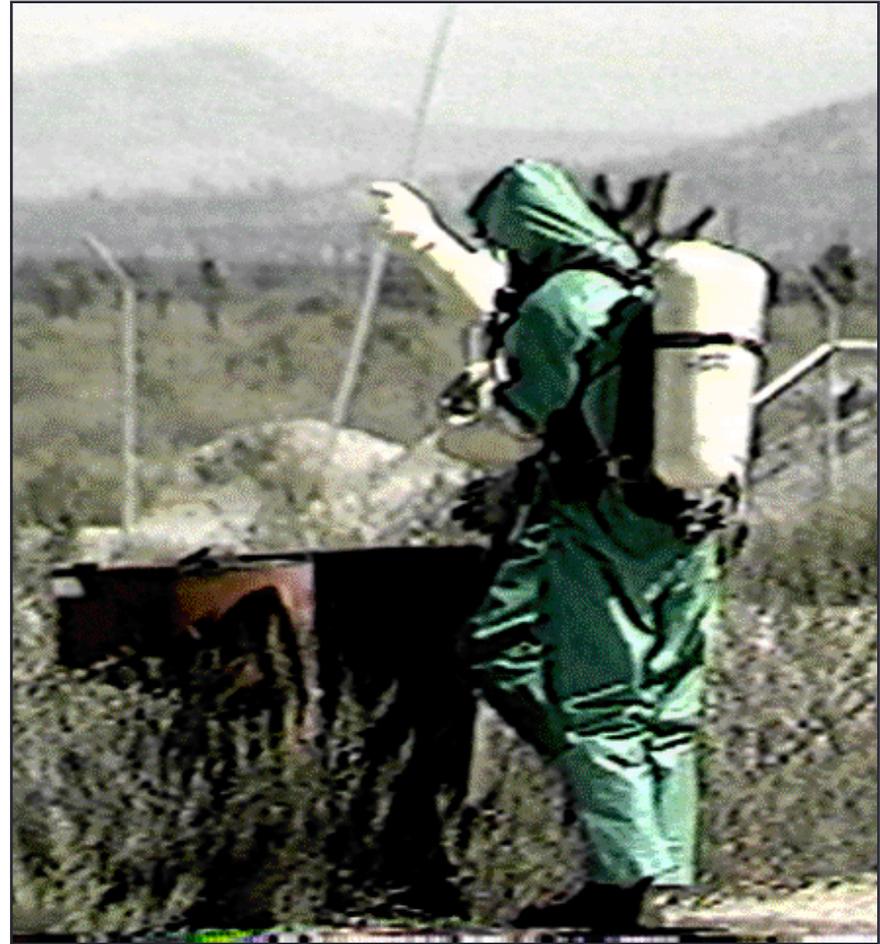


VAPOR PROTECTION

Level B

Required when the highest level of respiratory protection but a lesser level of skin protection is needed

Can be encapsulating or non-encapsulating



LIQUID SPLASH PROTECTION

Level C

Required under circumstances that call for lesser levels of respiratory and skin protection

Can be used with SCBA's or APR's

First Receivers Ensemble



DUST & SOLIDS PROTECTION

Level D

Appropriate
when minimal
skin protection
and no respiratory
protection is required.

Every day uniform!

SUPPORT PROTECTION

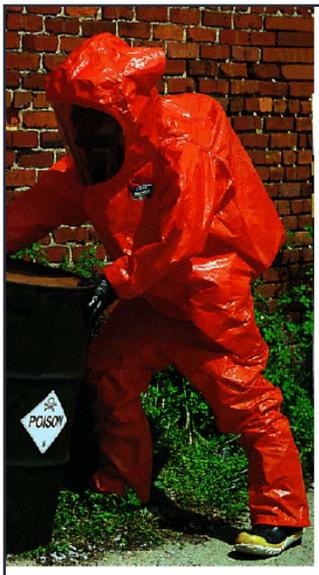


Levels of Protection

Greater Hazard



Level
A



Level
B



Level
C



Level
D



Higher Burden



Equipment Needs

- **Emergency Equipment / anti-dotes in Cold / Cool Zone just outside of the Decon area.**
- **Rescue team should be available in same level PPE or immediately available.**
- **Continuity of Decon Operations**
- **Maintain personnel protection!**
- **Batteries, Cartridges, Soap, Collection Containers (clothes & water) &...**

Back-up or Relief Staff

Radios

IF USED:

- Must go on UNDER PPE
- Make sure all on ONE channel
- Test before putting on, after dressed
- Have backup procedures for communication should radios fail!
- Hand signals, Megaphones or PA Systems

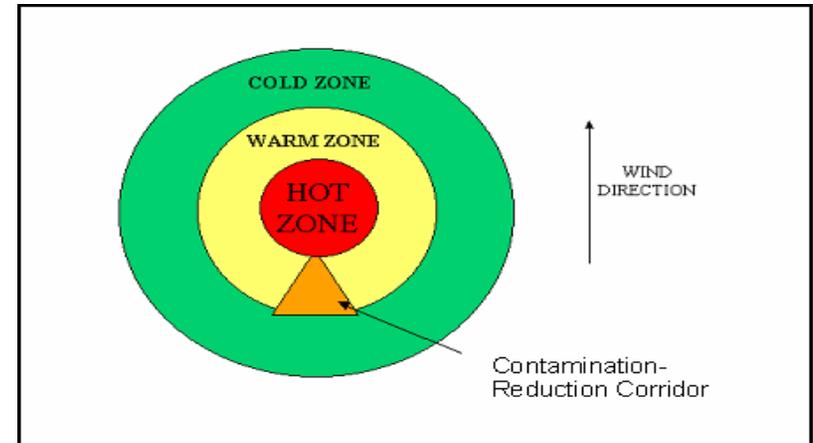
Cautions

- **Risks to person conducting Decon.**
- **PPE survey & exam**
- **Personnel: vital signs before & after!**
- **Risks:**
 - Heat
 - Chemical
 - Equipment malfunction
 - Slips, trips & falls



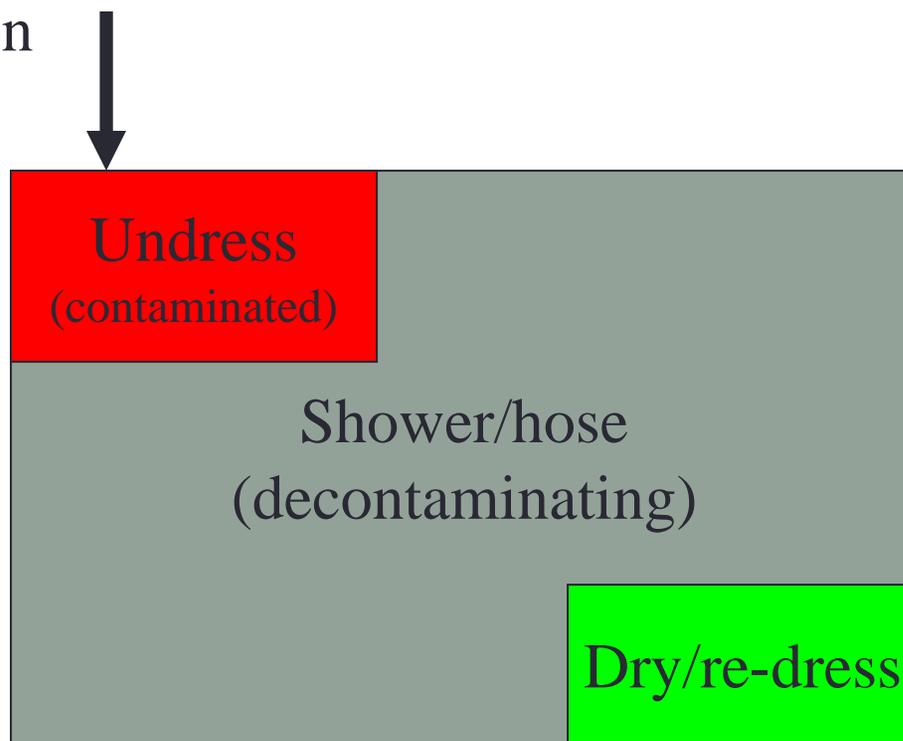
Patient Flow

- **“Hot” zone:**
 - Undress
 - Collect contaminated clothing
- **“Warm” zone: under shower, on stretcher**
 - Shower or wash
- **“Cold” or Cool zone: by door to hallway**
 - Pass to clean stretcher, etc.
 - Assistants to help



Patient Flow

Enter decon



Exit to hospital

Tent (if applicable)

- **Additional training in setting up**
- **Know your facilities policy!**



Conclusion

- **Keep yourself safe!**
- **Keep institution safe!**
- **Only in this manner can we take care of patients.**
- **What is appropriate PPE?**
- **What is our appropriate response?**

REVIEW

1. People exposed to certain biological agents (viruses or bacteria) may not become ill until many days later.

True

2. Following any chemical, biological, or radiation incident, all victims will be decontaminated before arriving at medical care facilities.

False

3. Standard latex medical gloves provide adequate protection for disposing of waste contaminated by a chemical.

False

REVIEW

4. A Department of Transportation (DOT) placard on the back/side of a tanker trunk will not provide any information that could identify the chemical being transported.

False

5. Chemical, biological, and radiation attacks are crimes, and victims' clothing should be saved because it may be used as evidence.

True

REVIEW

6. Level D personal protective equipment (PPE) provides the highest level of protection and is appropriate for highly dangerous chemicals.

False

7. The main effects of all the following chemical agents occur within seconds to a few minutes except one:

- a. Sarin (nerve agent)
- b. Cyanide (blood or tissue agent)
- c. Chlorine (choking agent)
- d. Sulfur mustard (blister agent)
- e. Mace (tearing agent)

d. Sulfur mustard (blister agent)

REVIEW

8. You hear through other employees that a patient that you cared for yesterday has now been diagnosed as having pneumonic plague. The patient had a fever and a cough when you cared for her. What actions should you take?
- a. No action is necessary since pneumonic plague can not be spread person- to-person.
 - b. Ensure that you get vaccinated with the plague vaccine at once so that you do not become ill.
 - c. Notify employer so you can begin a course of antibiotics at once so that you do not become ill.
 - d. Notify your family that you must be quarantined until it becomes known if you will develop plague.
 - e. None of the above
- c. Notify employer so you can begin a course of antibiotics at once so you do not become ill.**

REVIEW

9. Atropine should be administered as soon as possible to victims suffering from which class of chemical agents?

- a. Vomiting agents
- b. Nerve agents
- c. Blood agents
- d. Blister agents
- e. Choking agents

b. Nerve Agents



QUESTIONS?

Thank You!

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