

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
- Additional Resources
- 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

- Kathee Tyo, MS, RN
 - Kathee_tyo@urmc.rochester.edu
 - 585-463-2956

Acknowledgements

- USAMRICD, USAMRIID
- John G. Benitez, MD, MPH (Vanderbilt)
- 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
- Risk to hospital
 - Contamination of staff and facilities
 - Need emergency plan
 - Need decontamination facility and team

Emergency Response Plan

- Train everyone to AWARENESS level- patients presenting to ED with contamination
- Decon Team Policies and Procedures
- Notification Procedure
- ASSUME all are contaminated

Notification System

- Notifies all in ED/Hospital
 - Specific responsibilities for all
- Activates Decon team
- Access Control/Lockdown

Activation/Response

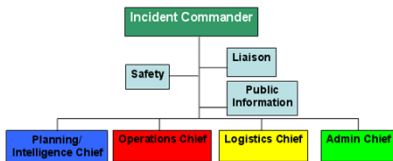
- Decon Team Leader
 - Interviews patient from safe distance and OUTSIDE
 - Determines response based on scope of incident

Activation/Response

- Decon Team members and support staff
 - Gets decon room ready
 - Gets partially dressed, except respirator
 - Finalizes PPE and decontaminates victim(s) upon final say of Decon Team Leader

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** (Decon Team Leader)
- **SAFETY OFFICER**
- **OPERATIONS** (Decon team members)
- **LOGISTICS** (Decon team suit/equipment support)
- **LIAISON** (Decon Team Leader or designee)

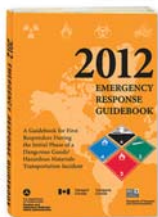
AGENT IDENTIFICATION

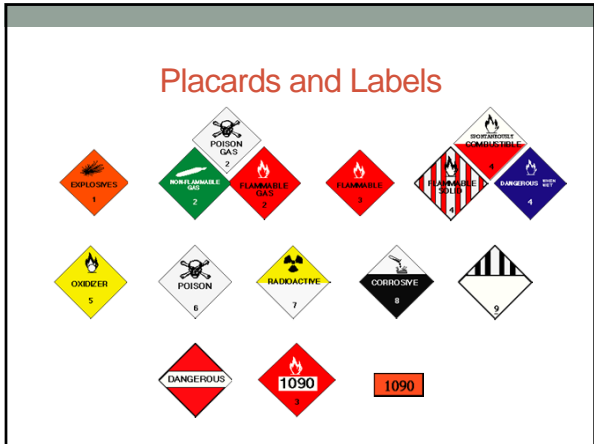
Labels/warnings...

- 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





Other patient's warning...

- 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...

Poison Center will...

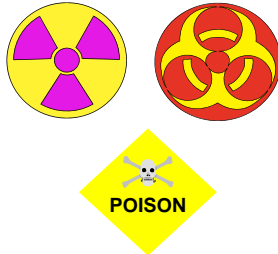
- ID chemical
 - Based on placard information you find
 - Based on signs and symptoms displayed
- Healthcare information
 - Signs and symptoms to watch out for
 - Treatments that may be needed
- **1-800-222-1222**

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



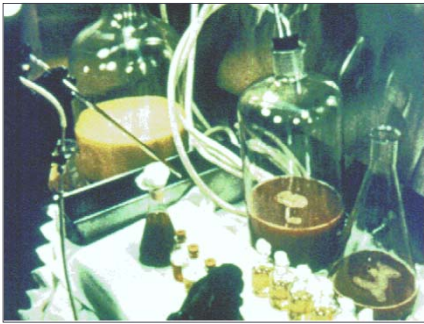
NBC/CBRNE Agent Sources

- 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

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

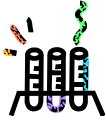
Characteristics and Behavior

- 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

- 42 y/o female
- 2 hrs post exposure
- rapidly inc. dyspnea
- PaO₂ 40 torr (room air)
- CXR: infiltrates -
 - perihilar
 - fluffy
 - diffuse interstitial



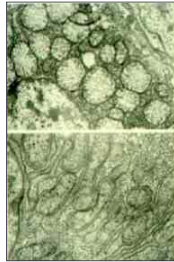
PHOSGENE - Uses/Sources

- **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

Cyanide Treatment

Nitrites + Hemoglobin → MetHemoglobin

metHgb + CN → cyanomethemoglobin

CNmetHgb + thiosulfate → Hgb + thiocyanate

Thiocyanate eliminated renally!

Cyanide Treatment

CN + hydroxocobalamin →
cyanocobalamin (vit. B12)

- Expensive
- Easier to use
- Less toxic
- Eliminated renally
- But interferes with some blood tests x 24 hours!

BLISTER AGENTS (VESICANTS)

- Sulfur Mustard (H,HD)
- Nitrogen Mustard (HN1, HN2, HN3)
- Lewisite = chlorovinylchloroarsine (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

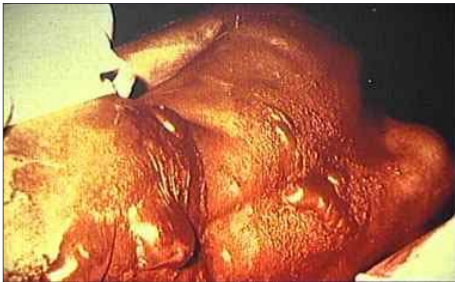


Convalescence 2wks-6months

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

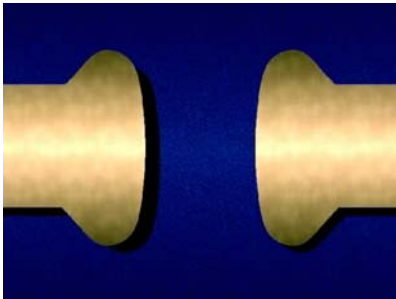
NERVE AGENTS

- Sarin (GB), VX (persistent)
- All liquids initially at STP
- Mechanism: inhibits acetylcholinesterase, causes massive cholinergic crisis
- Treatment: atropine, oxime, diazepam

Nerve Agents

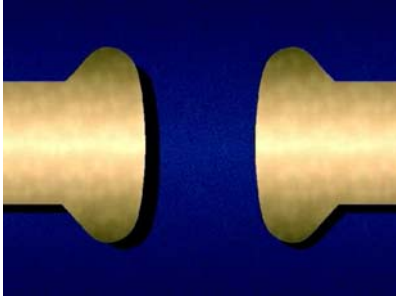
Odor	Properties
• Tabun, Sarin: Non or fruity	• Volatile
• Soman: None	• Volatile
• VX: None/Sulfur	• Persistent

Normal (cholinergic) synapse



But why does the acetylcholine disappear?

...because of acetylcholinesterase!

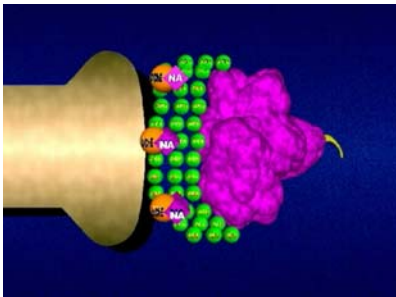


Signs and Symptoms of NA Exposure

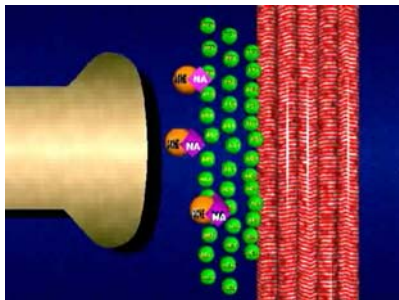
- Diarrhea
- Urination
- Miosis
- Bradycardia
- Bronchospasm
- Rhinorrhea
- Emesis
- Lacrimation
- Salivation

and:
Seizures
Coma
Death

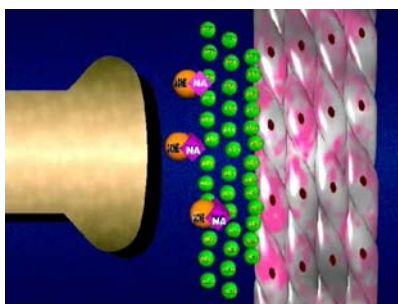
Gland...



Skeletal muscle...



Smooth muscle...



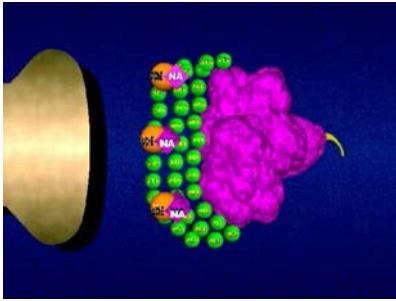
MARK I Kit



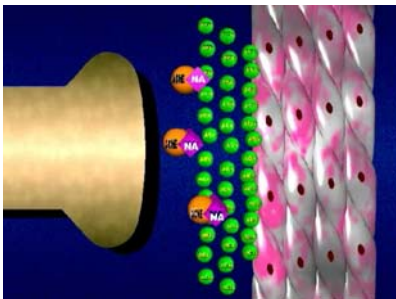
MARK I Kit (atropine use)



Rx with atropine



Rx with atropine...



MARK I Kit (pralidoxime use)



How 2-Pam works



Aging

- Permanent damage to Ache
- Onset varies with agent



MARK I Kit

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

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

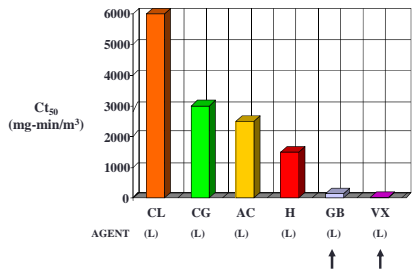
Follow-up Care

- Notify Decon team leader
- Receiving team and rest of ED should be ready with:
 - IV
 - Atropine
 - Pralidoxime
 - Benzodiazepine
 - Airway

Other Use

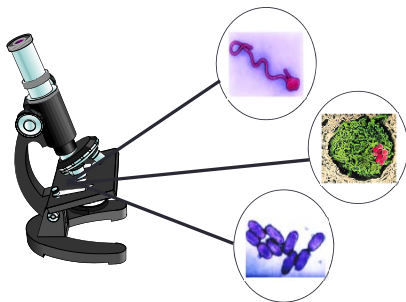
- IF YOU OR YOUR DECON TEAM LEADER SYMPTOMATIC:
 - Notify Decon team leader
 - Use MARK I kit
 - Assist member to decon
 - Assist member out of decon for further care

COMPARATIVE TOXICITY OF AGENTS



BREAK

Biological Agents



Biological Agents

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

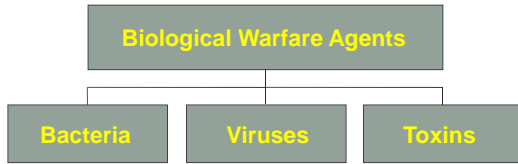
Biological Agent Characteristics

- 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

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

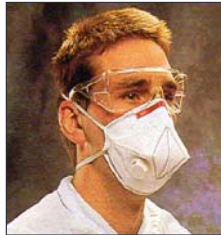
- No documented cases of person-to-person transmission of inhalational anthrax has ever occurred
- Cutaneous transmissions are possible
- Universal precautions required

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



Tularemia - Pathogenesis

- Infectious via inhalation, ingestion, or absorption
- Inhaling only 10 to 50 organisms produces most lethal form of disease, typhoidal form
- Ingestion or absorption causes ulceroglandular form of disease
- Is not spread from person to person



Q Fever - Pathogenesis

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



Q Fever

- Single organism is able to cause infection
- 2 to 3 week incubation period
- Hepatitis, pneumonia, endocarditis
- Can be contagious
- May survive of surfaces up to 60 days

Viruses as Biological Agents

- Smallpox
- Venezuelan Equine Encephalitis (VEE)
- Viral Hemorrhagic Fevers



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

Smallpox



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

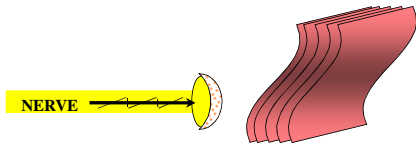
- Most outbreaks of foodborne botulism result from eating improperly preserved home-canned foods, with vegetables canned in oil being the most common source.
- 145 cases/year in the United States
 - 15% foodborne
 - 65% infantile botulism
 - 20% wound
- Toxin can be harvested and delivered as aerosol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

Botulinum Toxin - Pathogenesis

- Neurotoxins produced by Clostridium botulinum - Botulism
- Most lethal compounds per weight - 15,000 times more toxic than VX
- Similar effects whether inhaled or ingested
- Onset of neurologic symptoms
 - After inhalation, 24-72 hours
 - After ingestion, 12-36 hours

Botulism - Pathogenesis 2

- Blocks the release of ACh at the presynaptic terminal of the neuromuscular junction and autonomic nervous system
- Bulbar palsies and skeletal muscle weakness occur



Botulism - Signs & Symptoms

- Descending paralysis
- Bulbar palsies first
 - blurred vision
 - mydriasis
 - diplopia
 - ptosis
 - photophobia
 - dysphagia
 - dysarthria



Botulism - Signs & Symptoms 2

- Soon skeletal muscles become weak, starting in the upper body and moving symmetrically downward
- Symptoms progress acutely to respiratory failure in 24 hours to 2 days (try to obtain antitoxin)
- Patients usually awake and alert



“Floppy” baby
flaccid paralysis

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 - Pathogenesis 2

- Incapacitating - even at sublethal doses
- 80% of exposed develop symptoms
- May be aerosolized and inhaled
- May be introduced into the food supply and ingested

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

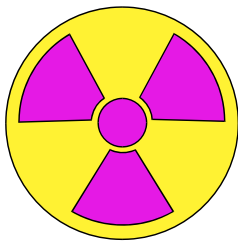
- Initial triage of all biological casualties is Immediate
- Highest priority will be allocating existing resources
 - Isolation rooms away from other patients
 - Mechanical ventilators
 - Personal protective equipment for staff
 - Medications

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
- Report concerns to HOSPITAL ICS (they will report to Public Health Officials, Law Enforcement, and FBI)

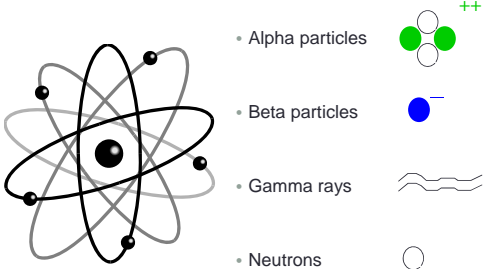
Radiological Materials



Terms and Definitions

- Ionizing Radiation
- Protection
- Contamination vs. Exposed

Ionizing Radiation



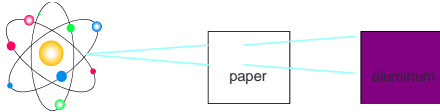
Ionizing Radiation - Alpha

- Alpha particles only travel 1 to 2 inches in air and microns in tissues
- Cannot penetrate the dead layer of the skin
- Can be shielded by a sheet of paper
- Greatest danger is from inhalation or ingestion



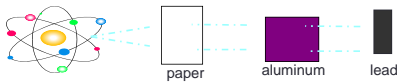
Ionizing Radiation - Beta

- Free electrons
- Penetrate skin but not vital organs
- Shielded by thick clothing or aluminum
- Greatest danger is through inhalation or absorption of beta emitters



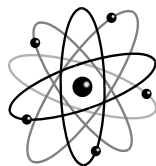
Ionizing Radiation - Gamma Rays

- High energy rays
- Penetrate deep into tissue; require dense shielding
- Primary cause of radiation sickness
- Produced from radioactive decay and are a by-product of a nuclear weapon explosion or reactor accident



Ionizing Radiation - Neutrons

- Uncharged particles
- **Can damage cells on contact**
- Can make material they strike radioactive
- Result of a nuclear weapon explosion
- Penetrates extensively; require special shielding



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

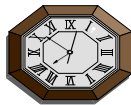
DOE maximum annual occupational limit = 5,000 mrem
 DOE maximum emergency dose (for saving property) = 10,000 mrem
 Maximum emergency dose (for saving life) = 25,000 mrem

Health Risks

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

Exposure Protection

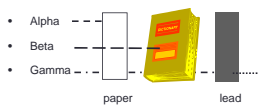
• Time



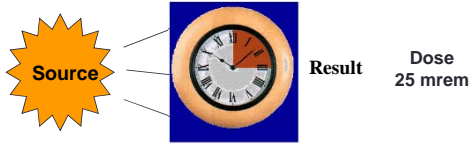
• Distance



• Shielding

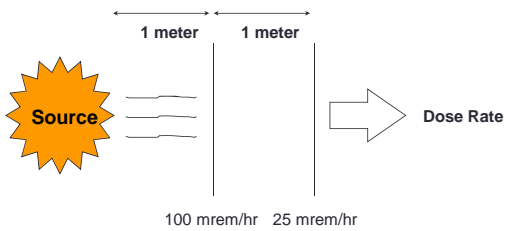


Time

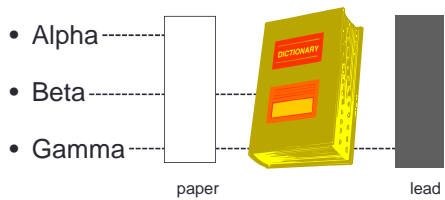


$$100 \text{ mrem per hour} \times 15 \text{ minutes } (.25 \text{ hour}) = 25 \text{ mrem}$$

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

DECONTAMINATION TEAM

Roles
Chemical ID
PPE
Equipment
Patient Flow

Decon Team Duties

- Decon Team Leader
- Decon Operations Team (2, must have training)
- Suit/equipment Support Team (2-4, all must have training)

Decon Team Leader

- Direct patient(s)
 - to staging area
 - remove clothes
- Brief Team
- Monitor team
 - Operations Team
 - Suit/equipment support
- Chemical ID (use poison center)
- Decon team member ONLY communicate with Team Leader!

Decon Team Members (2)

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

Suit/equipment Support

- 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



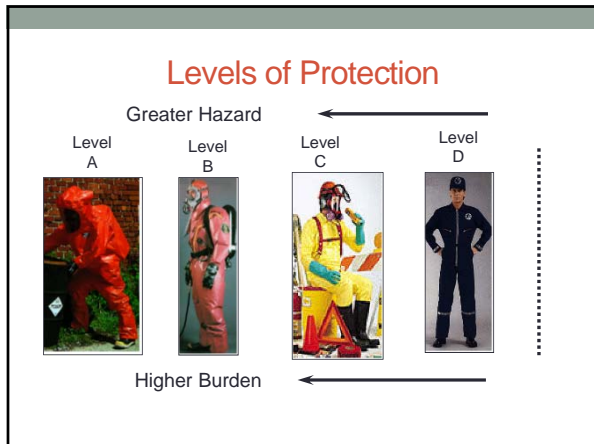
DUST & SOLIDS PROTECTION

Level D

Appropriate when minimal skin protection and no respiratory protection is required



SUPPORT PROTECTION



- ### Equipment Needs
- Crash cart in hallway or near tent
 - Pass to clinical team member when needed
 - Medication
 - Intubation equipment
 - Maintain personnel protection!

- ### Radios
- 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 on top of head = OK
 - Hand(s) to neck = can't breathe

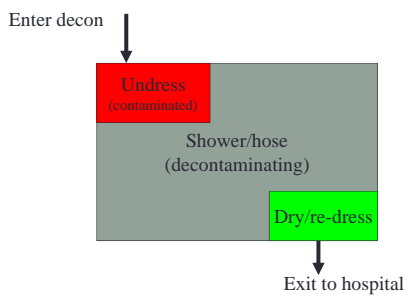
Cautions

- Risks to person in decon room!
- PPE survey & exam
- Personnel: vital signs before & after!
- Risks:
 - Heat
 - Chemical
 - Equipment malfunction

Patient Flow

- Special door from outside (ONLY!)
- “Hot” zone: by exterior door
 - Undress
 - Collect contaminated clothing
- “Warm” zone: under shower, on stretcher
 - Shower or wash
- “Cool” zone: by door to hallway
 - Pass to clean stretcher, etc.
 - Assistants to help

Patient Flow



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.
2. Following any chemical, biological, or radiation incident, all victims will be decontaminated before arriving at medical care facilities.
3. Standard latex medical gloves provide adequate protection for disposing of waste contaminated by a chemical.

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

REVIEW

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

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

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

Thank You!

Finger Lakes Regional Training Center
Anne D'Angelo: anne_dangelo@urmc.rochester.edu
Eileen Spezio: eileen_spezio@urmc.rochester.edu
585-758-7640

Visit Our Website at:
WRHEPC.URMC.EDU

- Select [Preparedness & Response Tools/Resources](#)
- Select [OSHA/Hazmat/Decon](#)