



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

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



HAZMAT FOR 1
RECEIVI

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:
 - Questions, Raise Hand Icon
 - Use Left Arrow Button to Indicate to Slow Down Presentation

Instructor

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Acknowledgements

- USAMRICD, USAMRIID
- John G. Benitez, MD, MPH (Vanderbilt)
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- 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, ect.
 - Victims near release site
 - Visible material

Decontamination

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



Problem

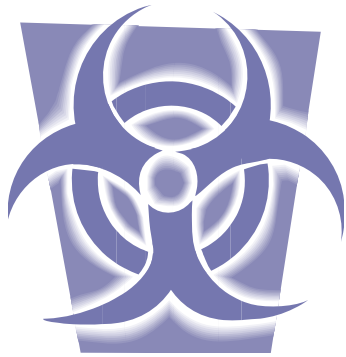
Solution



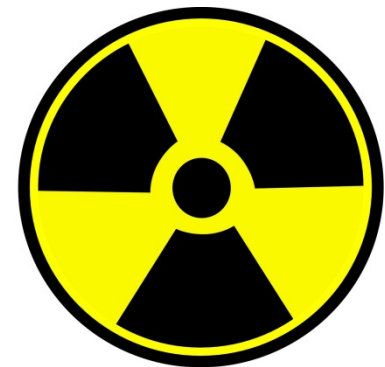
RECOGNITION & RESPONSE

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



www.Primaball.com



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

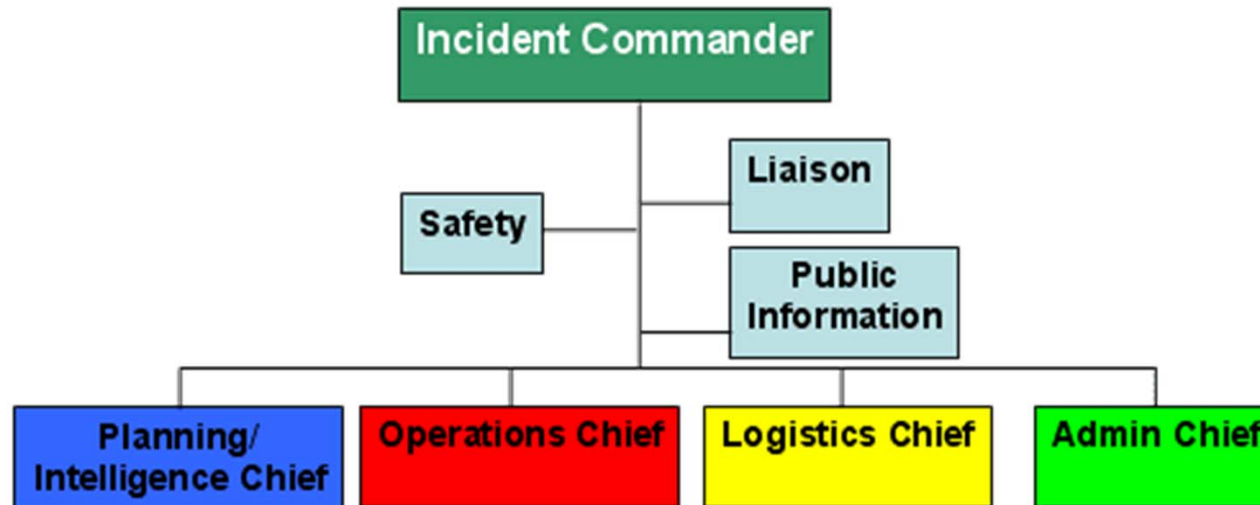
- Decon Team Leader
 - Interviews patient from safe distance and OUTSIDE
 - Determines response based on scope of incident

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)



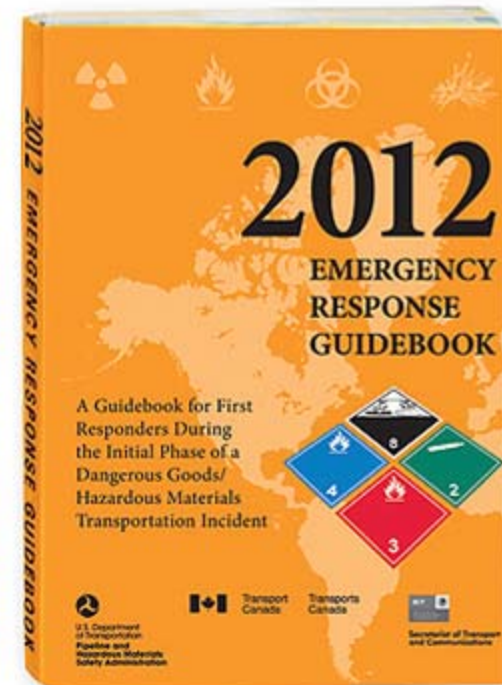
AGENT IDENTIFICATION

Labels/warnings...

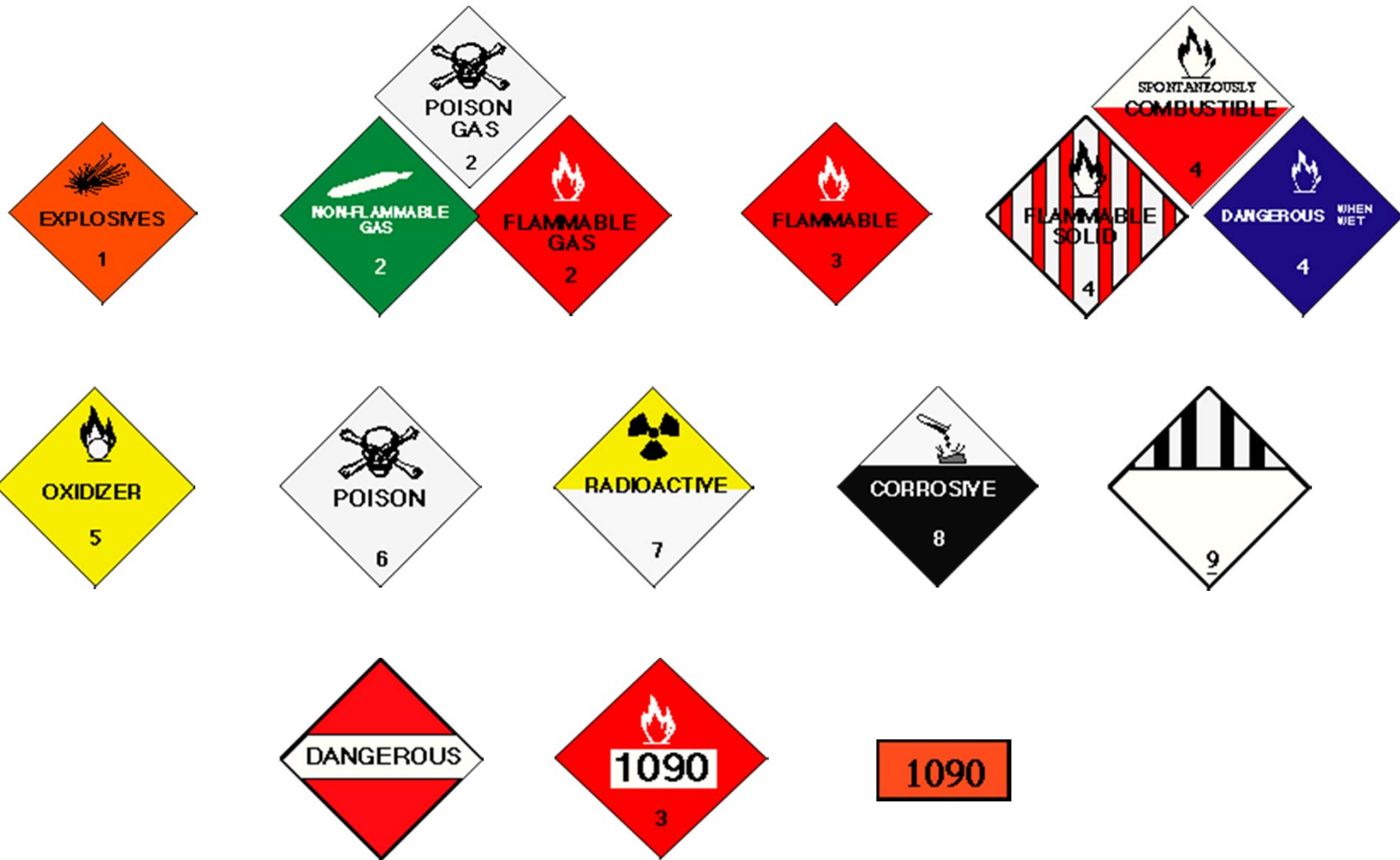
- CAS numbers
(Chemical Abstract Service #)
- Shipping manifesto/label
- Container label
- DOT placards
- Name of product on container

Initial ID/precautions

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



Placards and Labels



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...

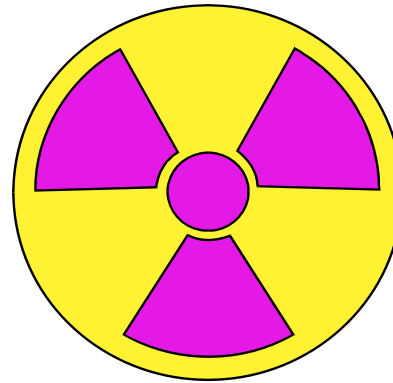
- ID chemical
 - Based on placard information you find
 - Based on signs and symptoms displayed
- Healthcare information
 - Signs and symptoms to watch out for
 - Treatments that may be needed
- **1-800-222-1222**

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

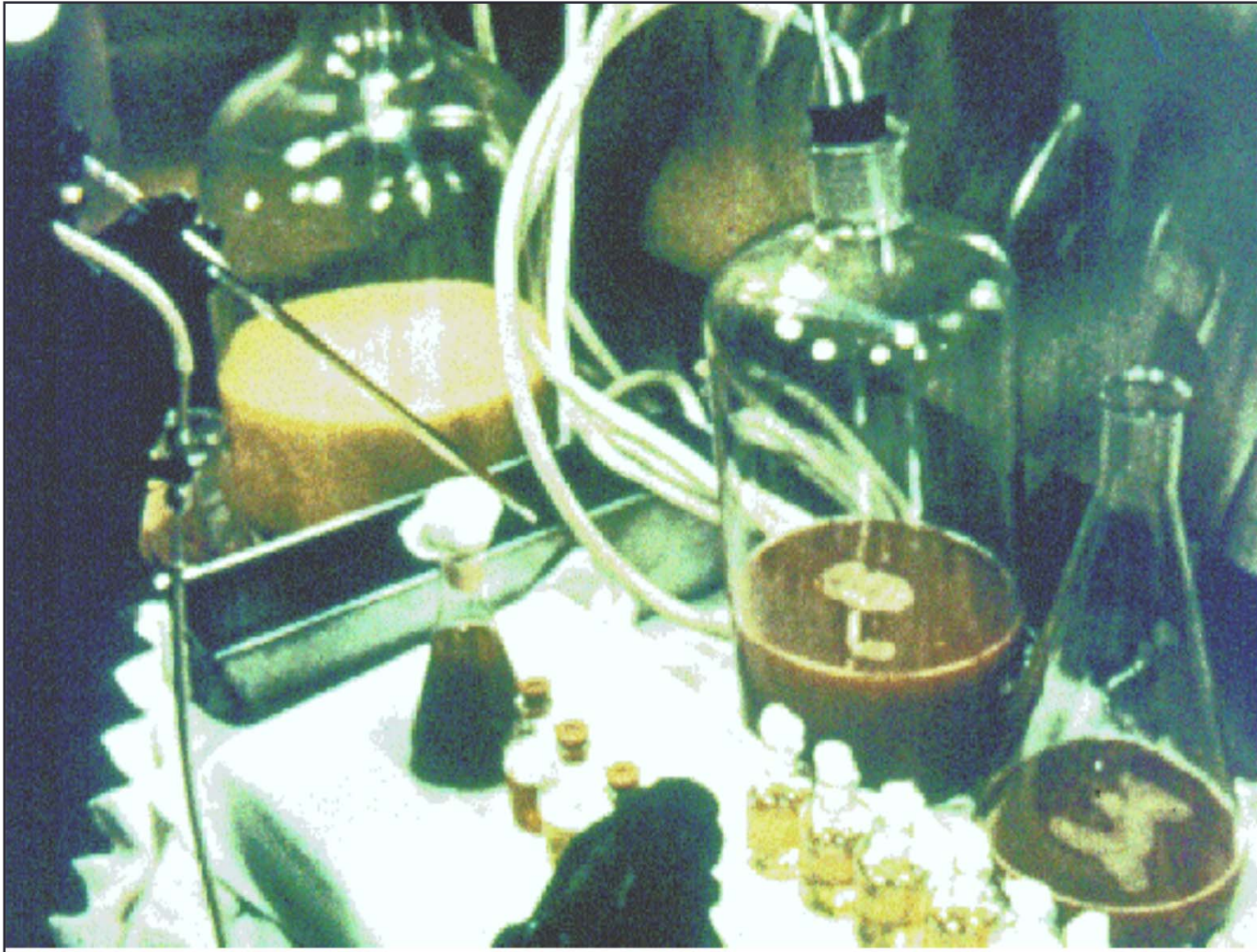
- Home production
- Laboratory / commercial production
- Industrial facilities
- Military sources
- Medical / university research facilities



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



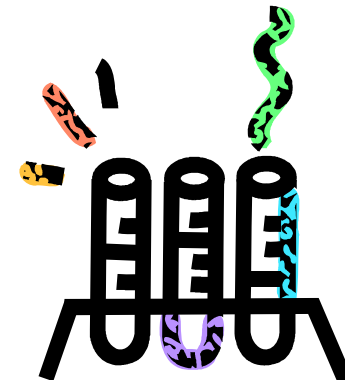
Real Life

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

About 80 % of victims arrive without decontamination

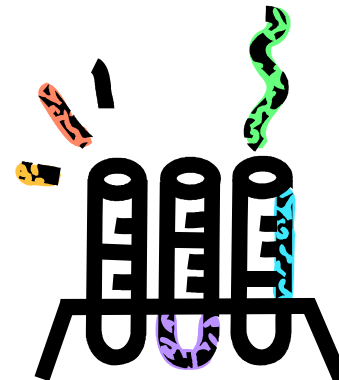
Characteristics and Behavior

- 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



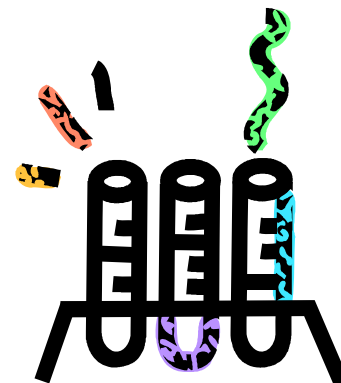
Characteristics and Behavior

- 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



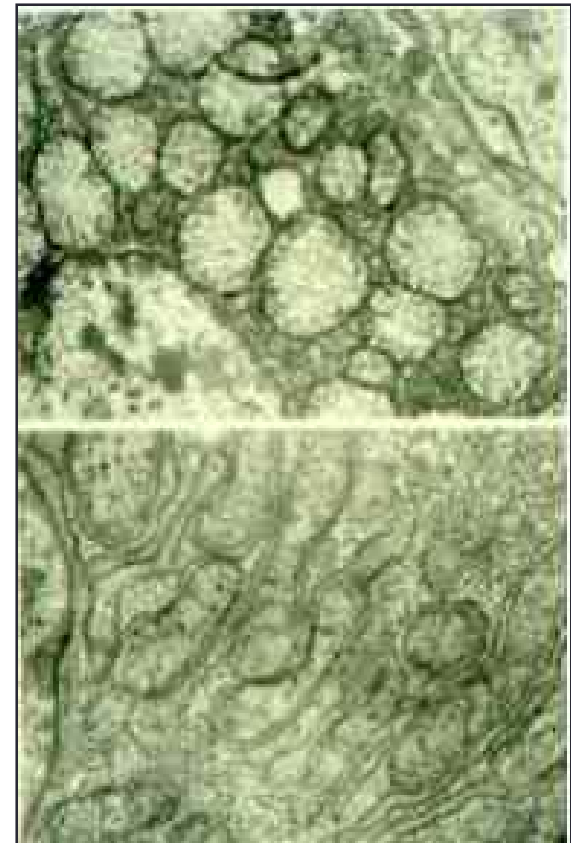
PHOSGENE - Uses/Sources

- **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

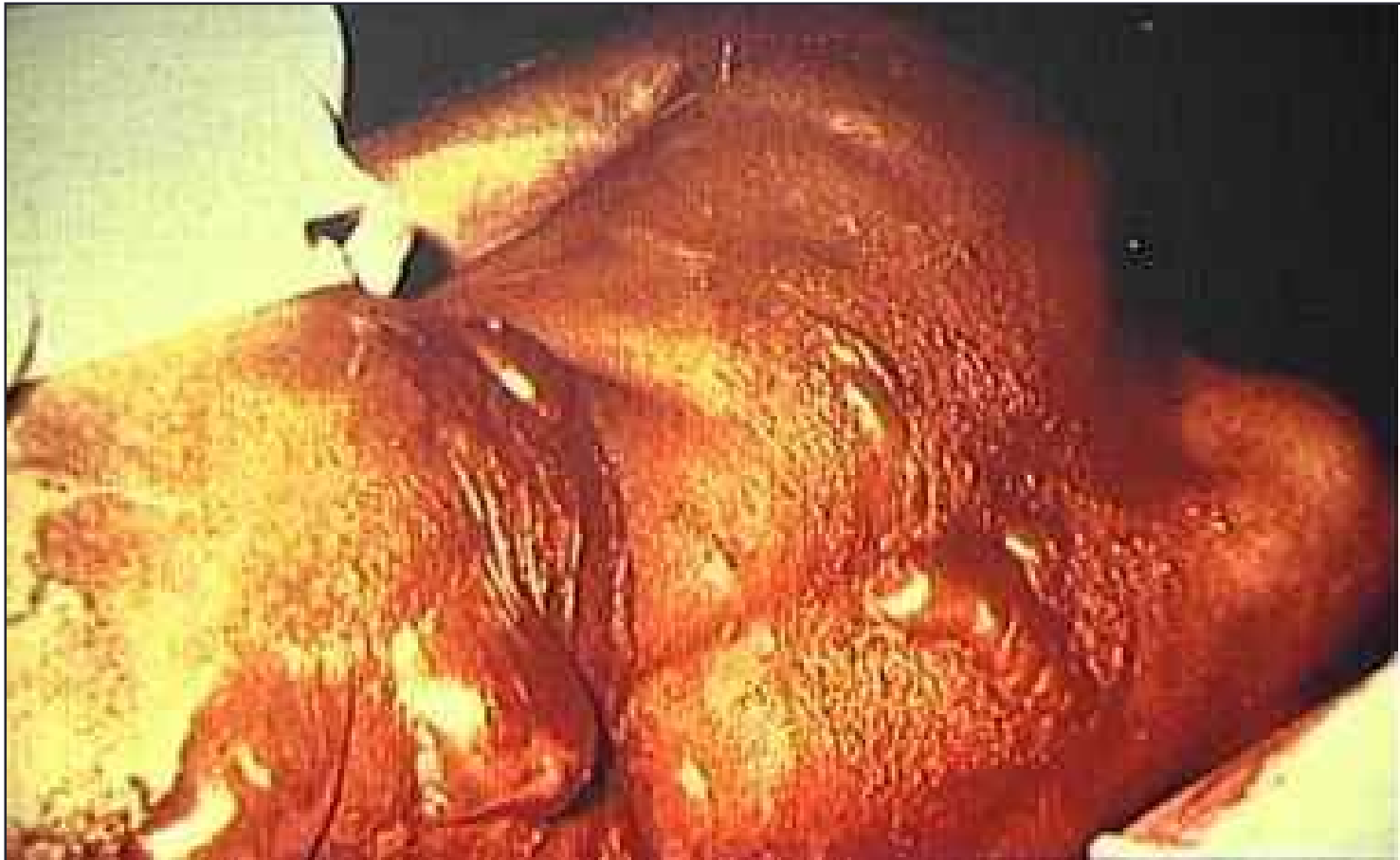


Convalescence 2wks-6months

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

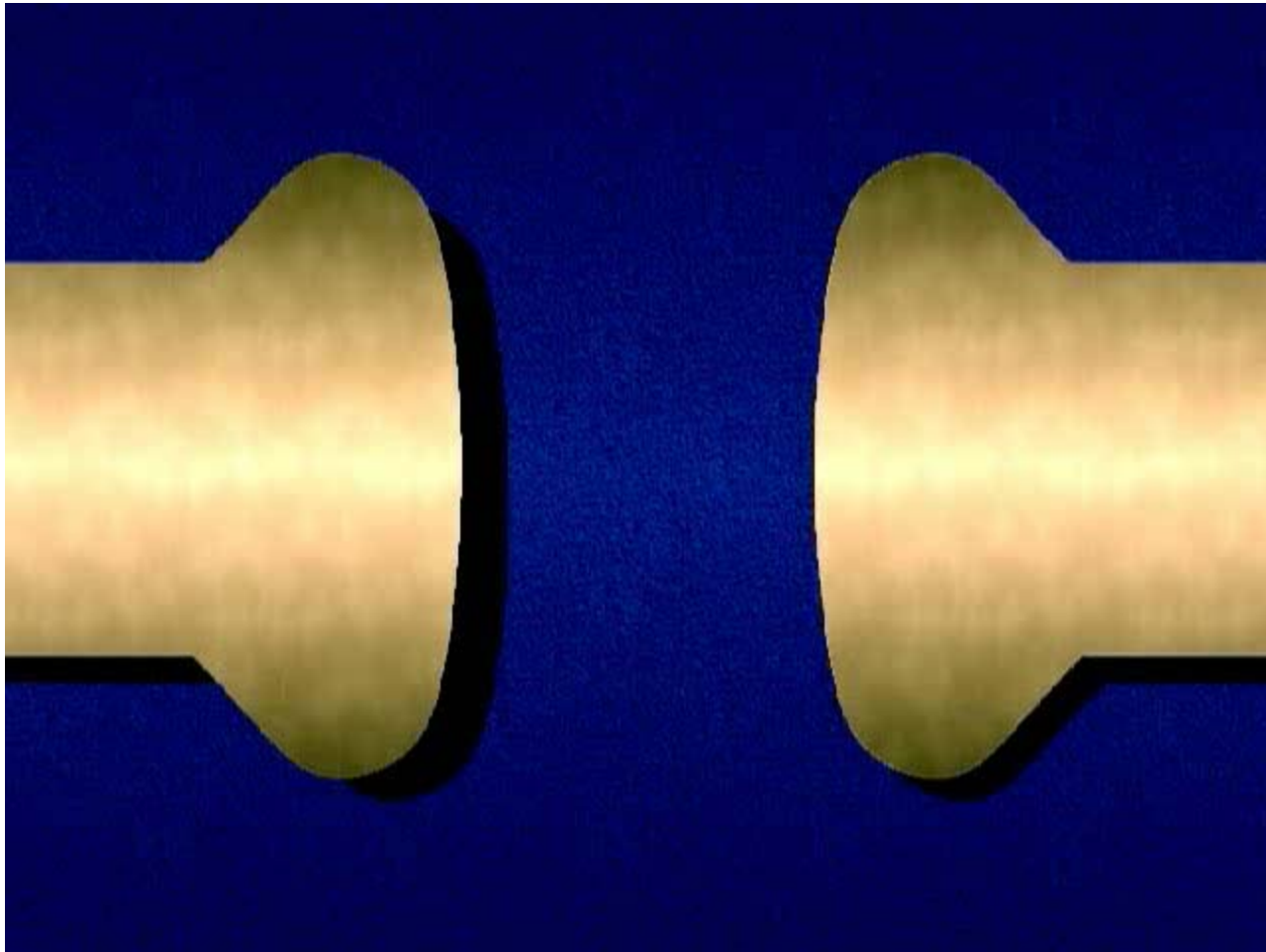
Odor

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

Properties

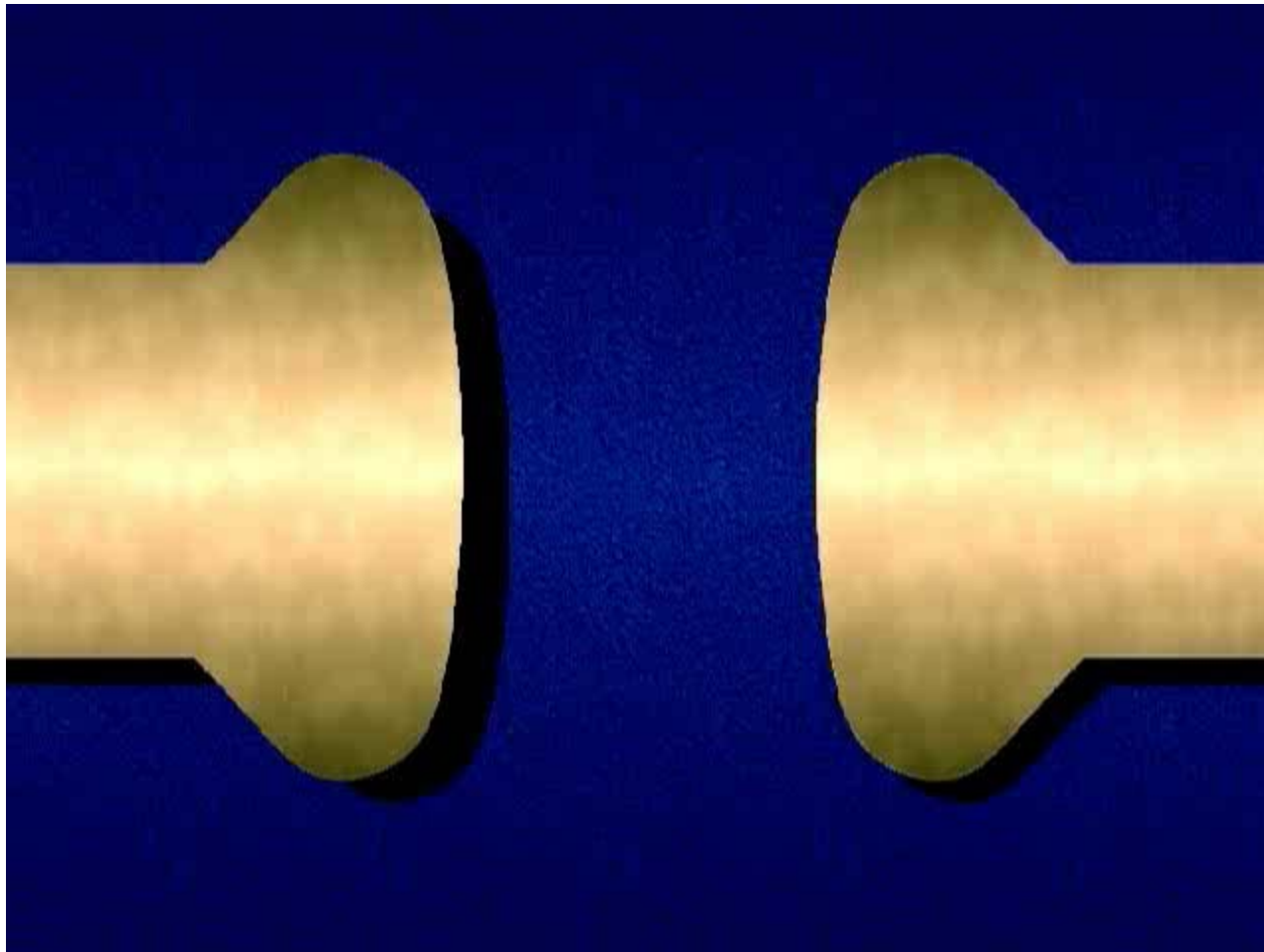
- Volatile
- Volatile
- Persistent

Normal (cholinergic) synapse



But why does the acetylcholine disappear?

...because of acetylcholinesterase!



Signs and Symptoms of NA Exposure

- D iarrhea
- U rination
- M iosis
- B radycardia
- B ronchospasm
- B rhochorrhea
- E mesis
- L acrimation
- S alivation

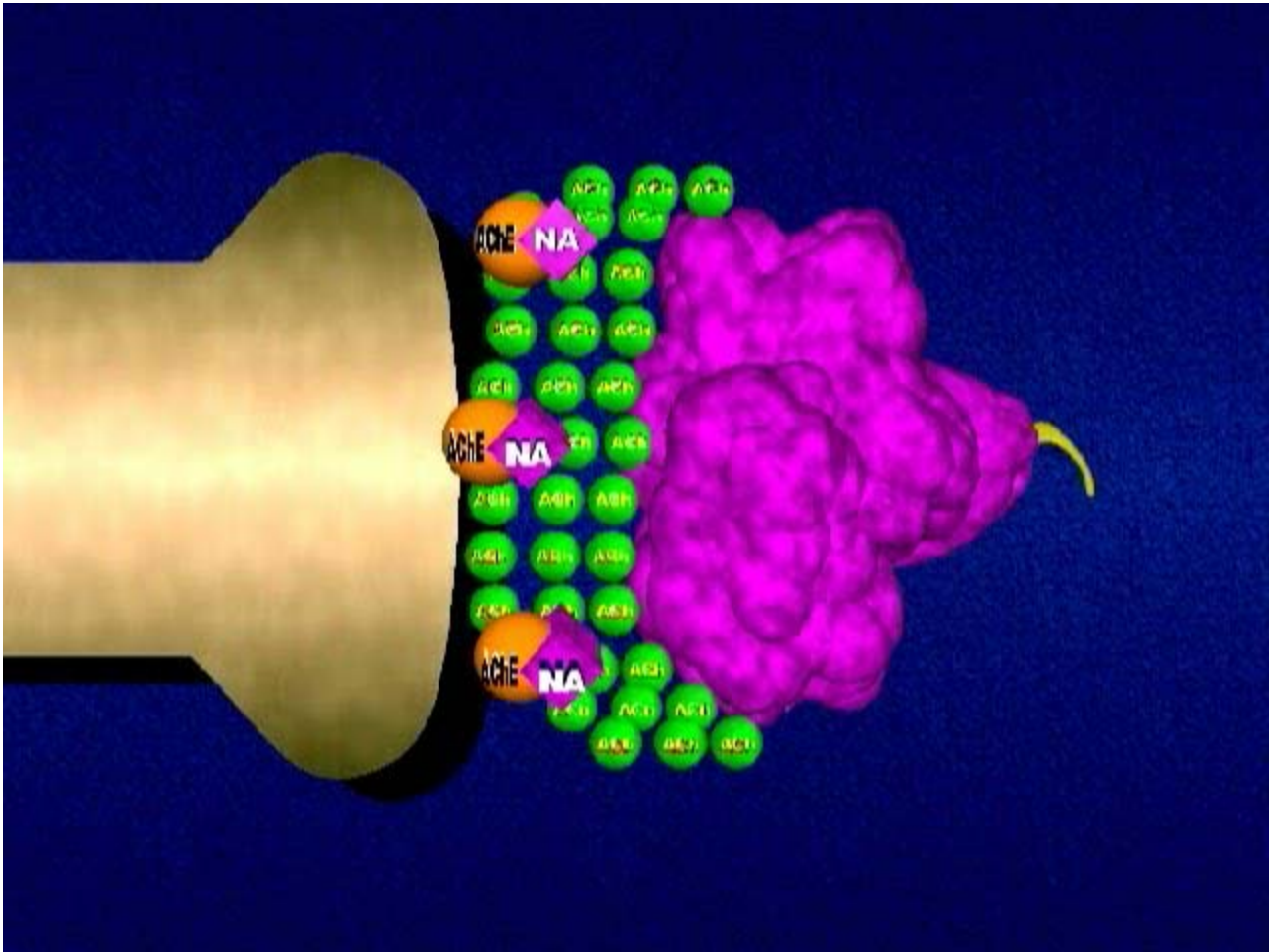
and:

Seizures

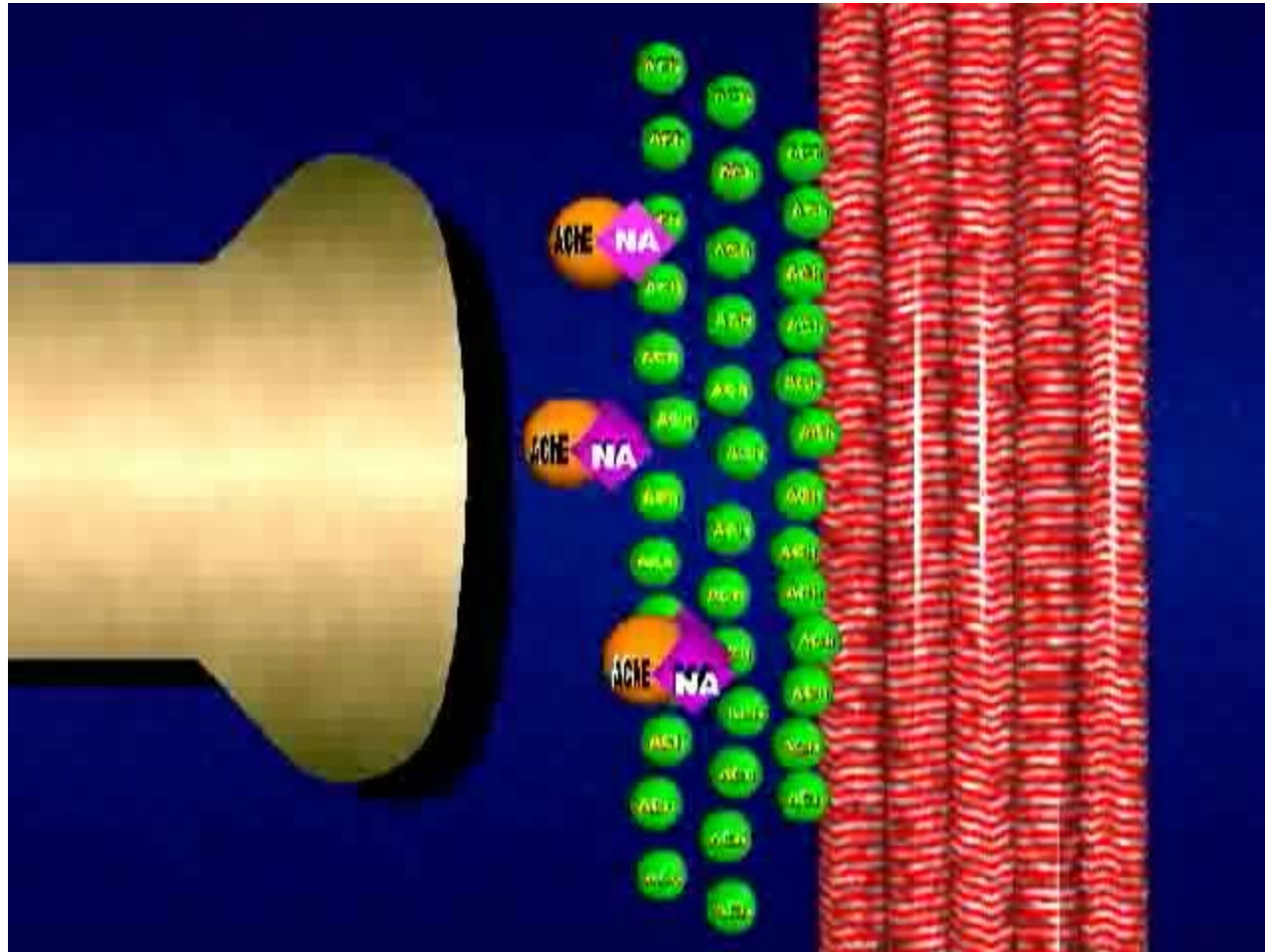
Coma

Death

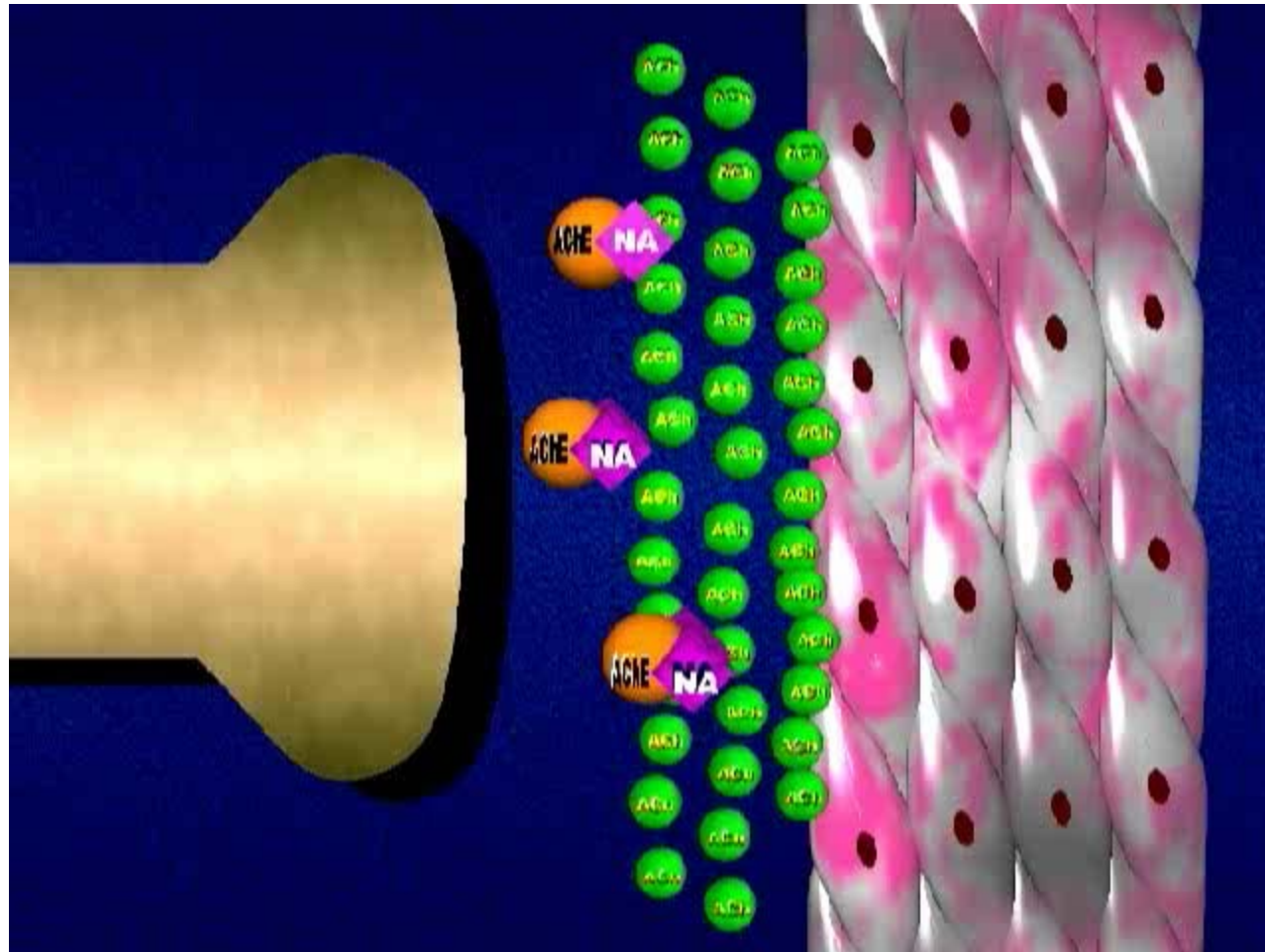
Gland...



Skeletal muscle...



Smooth muscle...



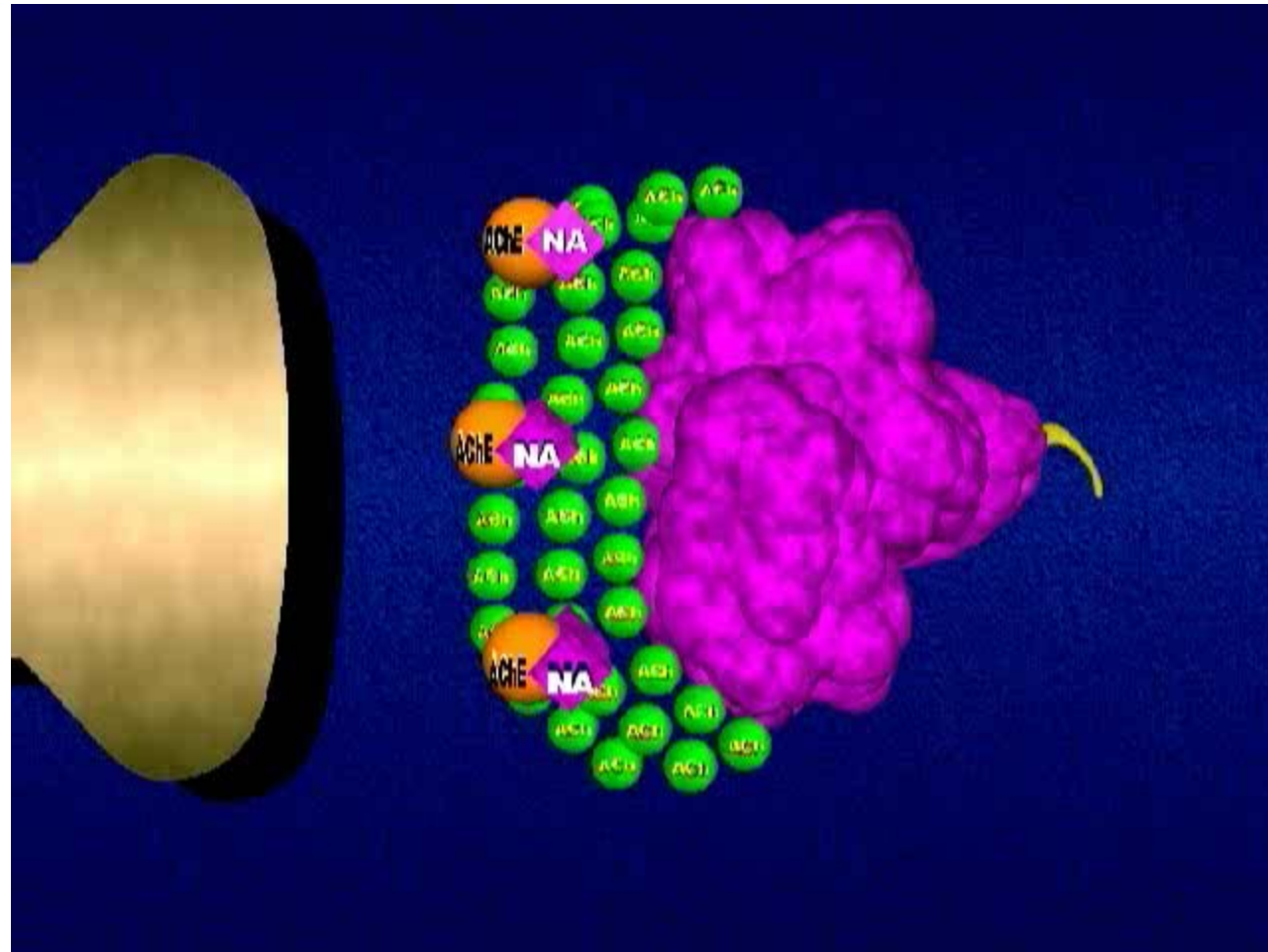
MARK I Kit



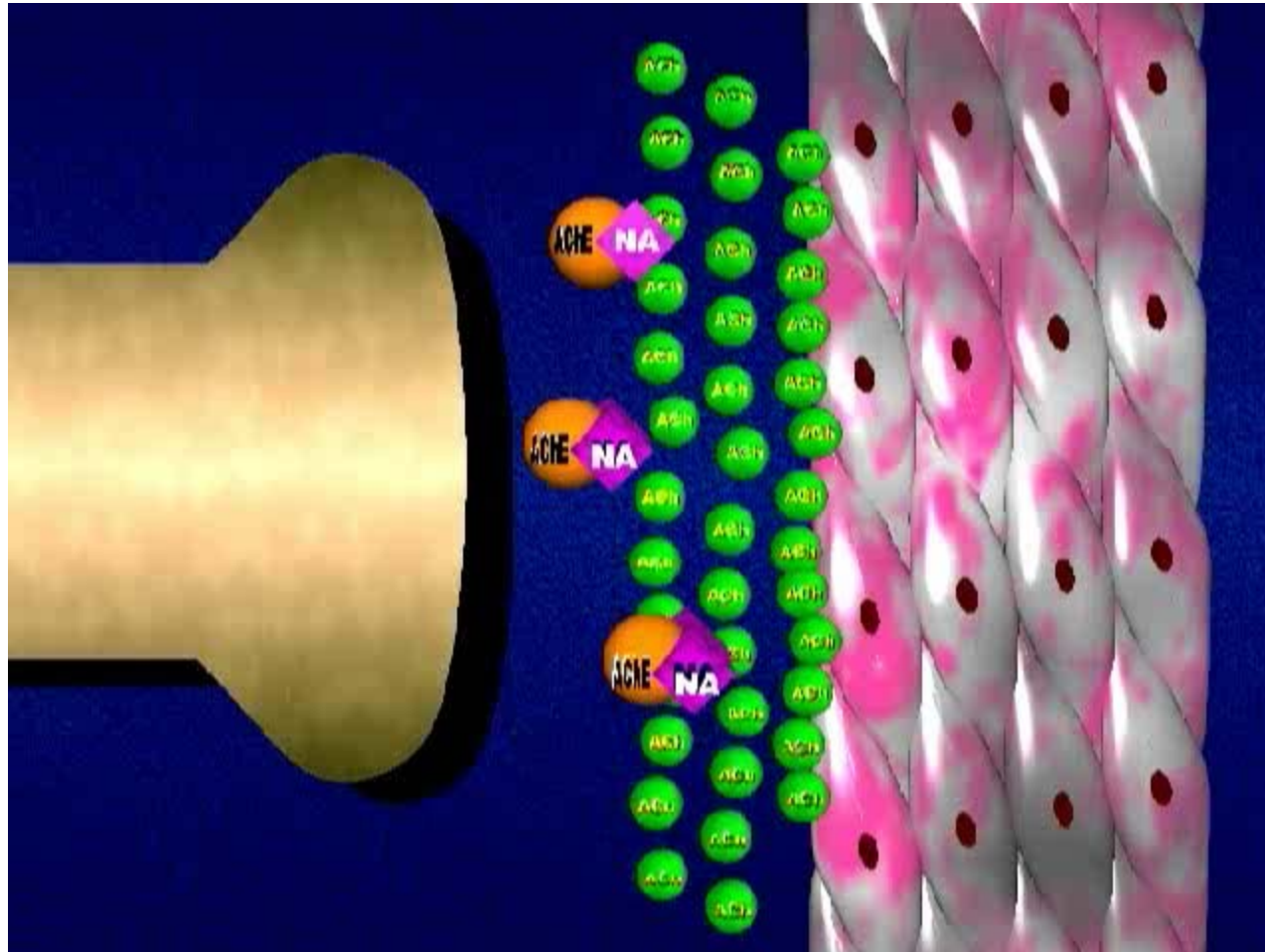
MARK I Kit (atropine use)



Rx with atropine



Rx with atropine...



MARK I Kit (pralidoxime use)

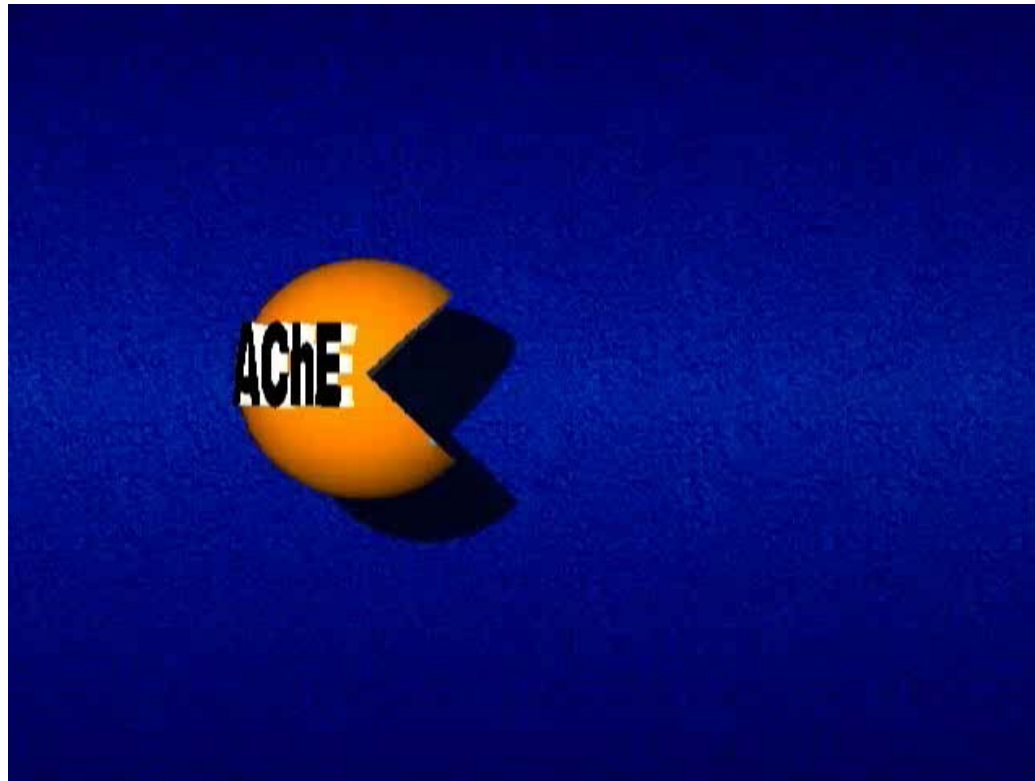


How 2-Pam works



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

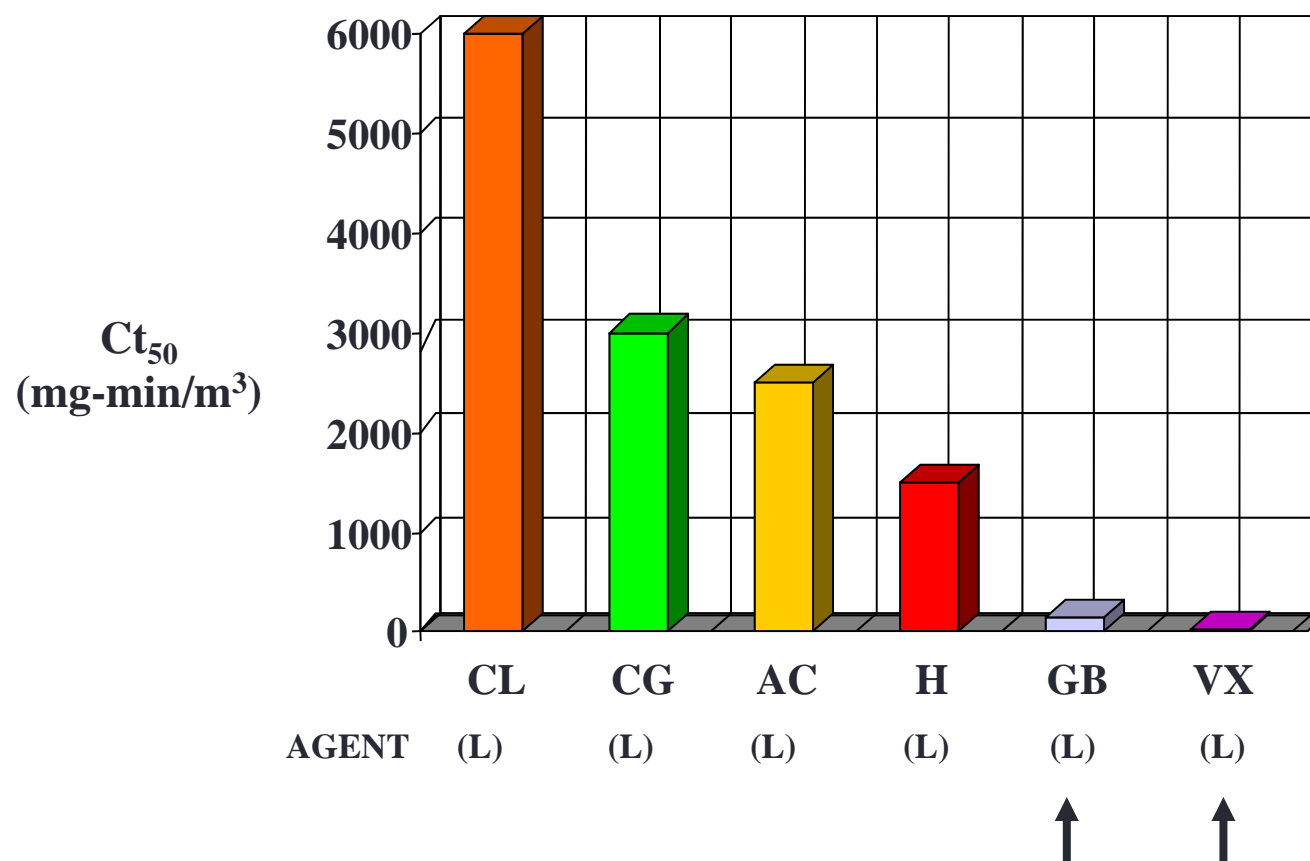
Follow-up Care

- 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

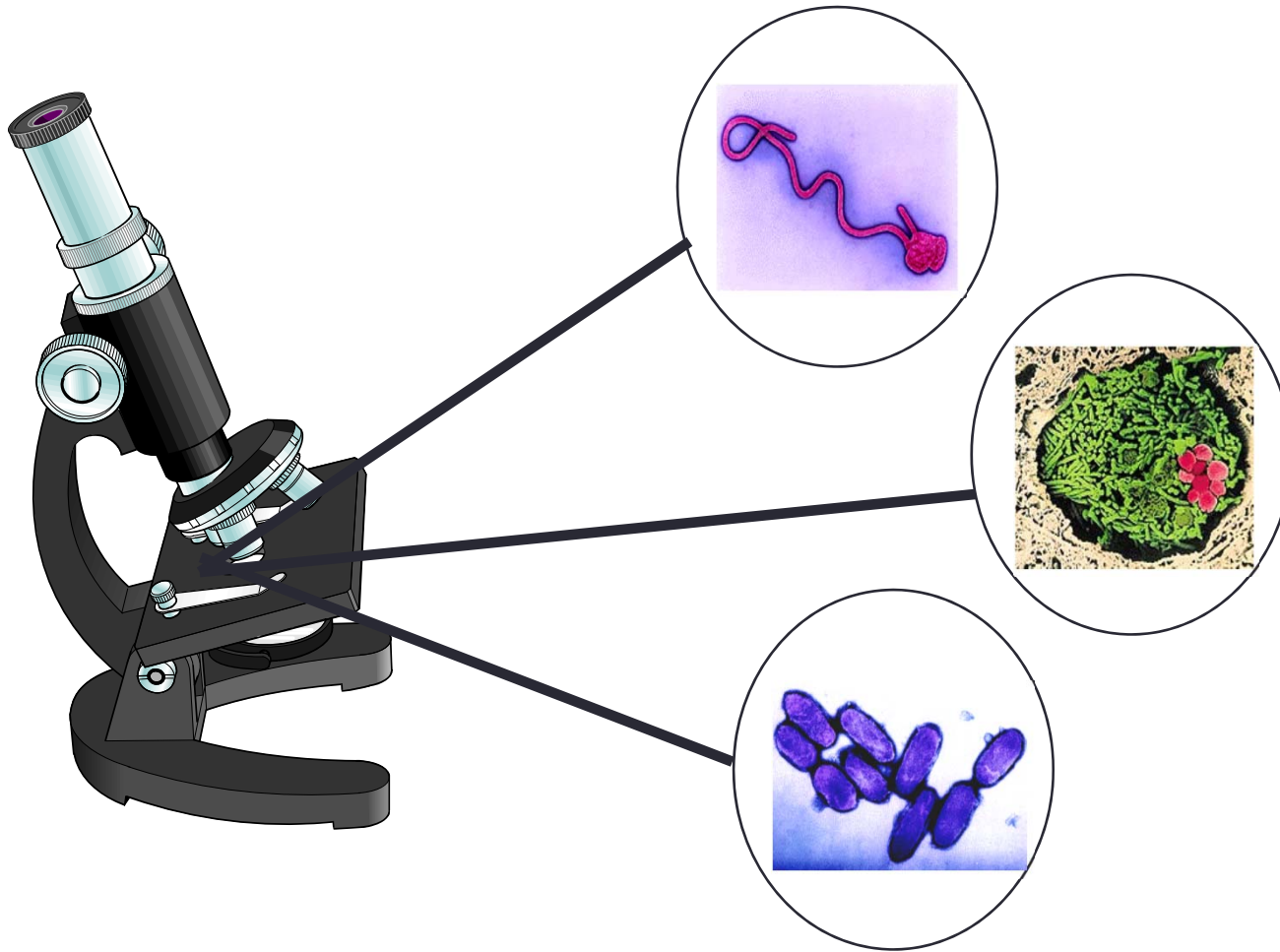
COMPARATIVE TOXICITY OF AGENTS





BREAK

Biological Agents





Biological Agents

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

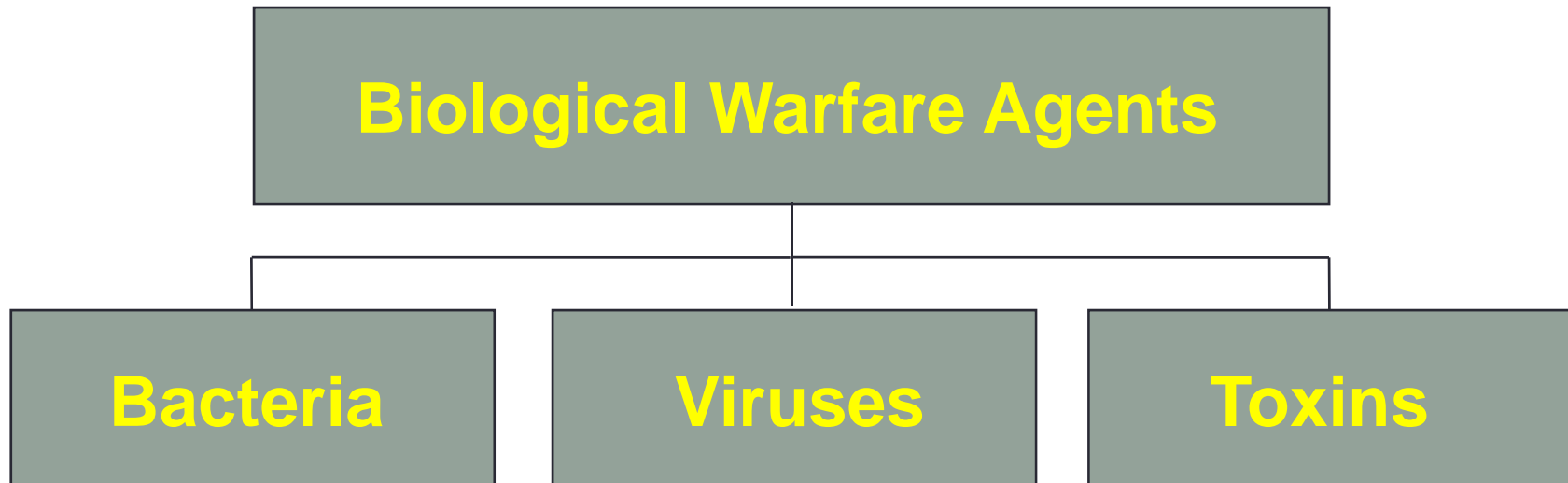
Biological Agent Characteristics

- 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

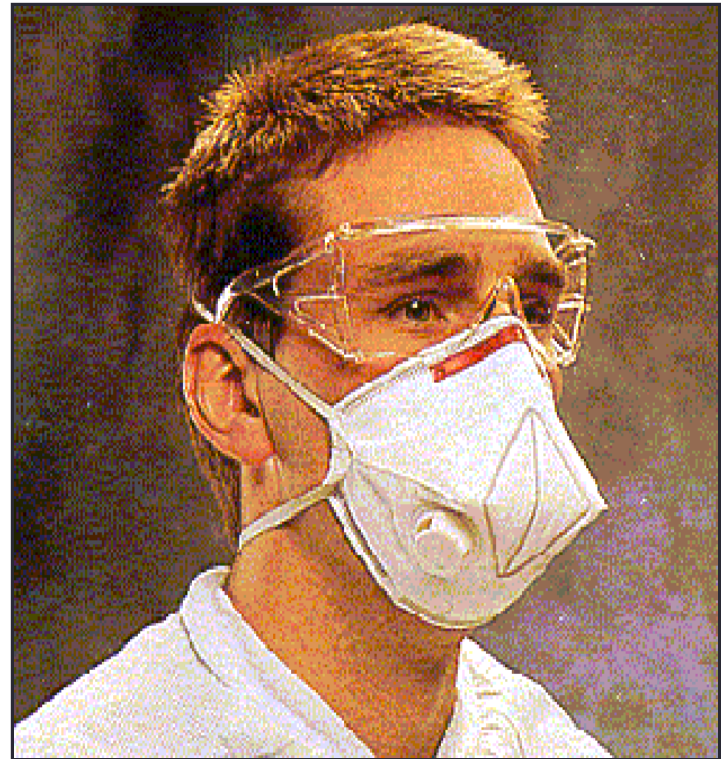
- No documented cases of person-to-person transmission of inhalational anthrax has ever occurred
- Cutaneous transmissions are possible
- Universal precautions required

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
 - Oropharyngeal 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.

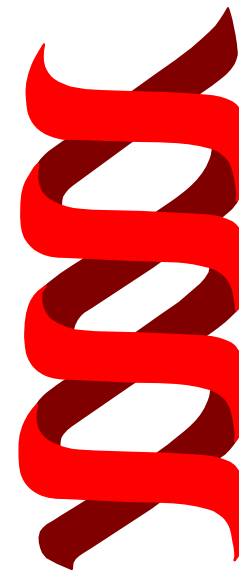


Q Fever

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

Viruses as Biological Agents

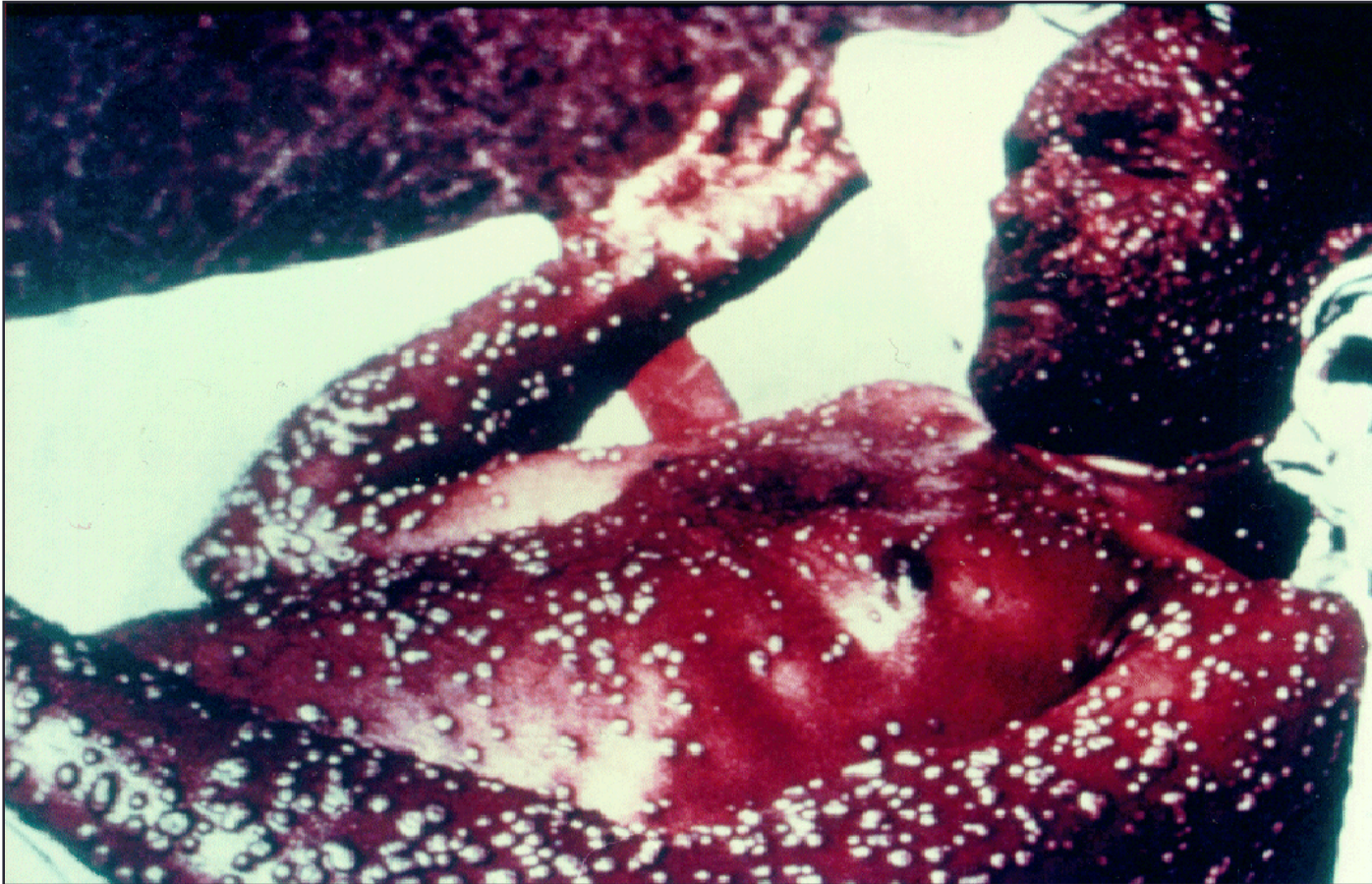
- Smallpox
- Venezuelan Equine Encephalitis (VEE)
- Viral Hemorrhagic Fevers



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

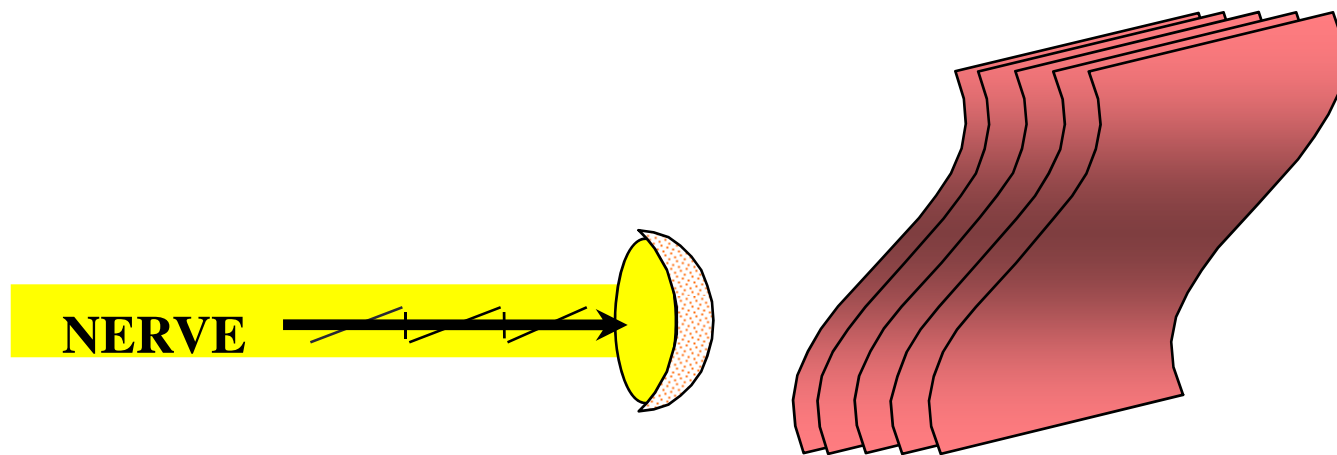
- Most outbreaks of foodborne botulism result from eating improperly preserved home-canned foods, with vegetables canned in oil being the most common source.
- 145 cases/year in the United States
 - 15% foodborne
 - 65% infantile botulism
 - 20% wound
- Toxin can be harvested and delivered as aerosol
- 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



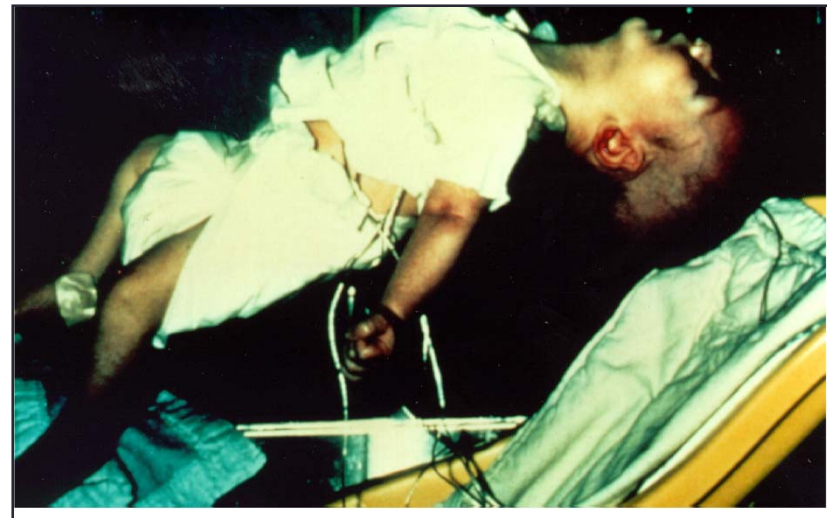
Botulism - Signs & Symptoms

- 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

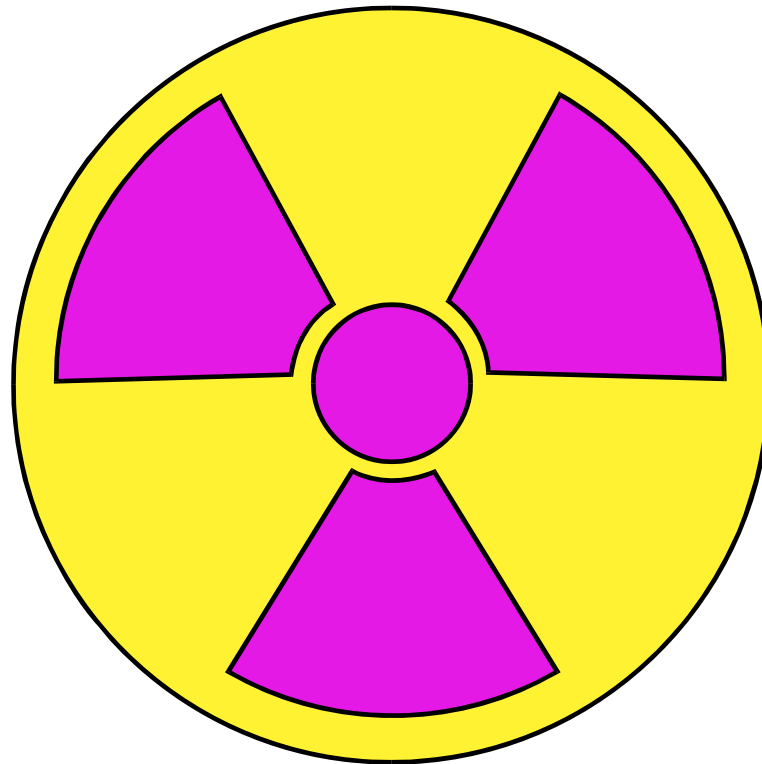
- Initial triage of all biological casualties is Immediate
- Highest priority will be allocating existing resources
 - Isolation rooms away from other patients
 - Mechanical ventilators
 - Personal protective equipment for staff
 - Medications

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

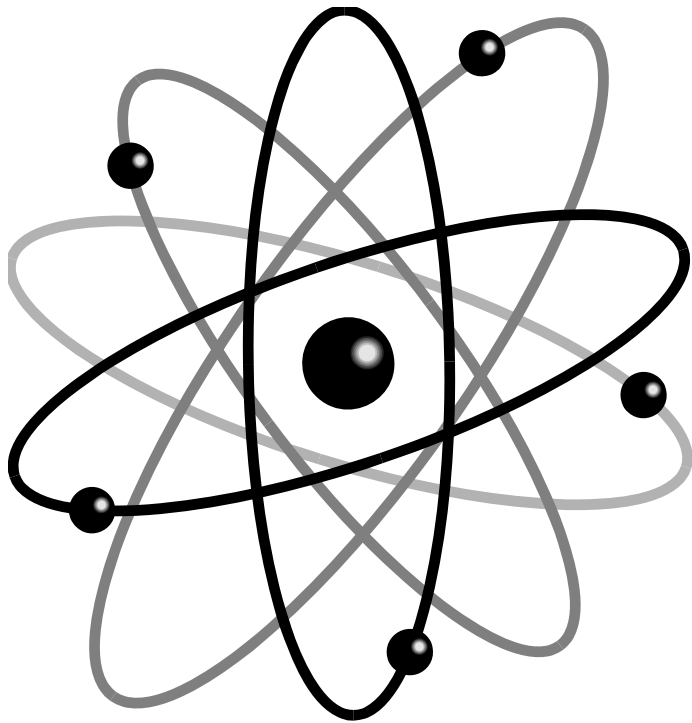




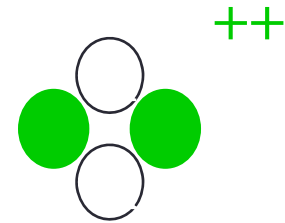
Terms and Definitions

- Ionizing Radiation
- Protection
- Contamination vs. Exposed

Ionizing Radiation



- Alpha particles



- Beta particles



- Gamma rays

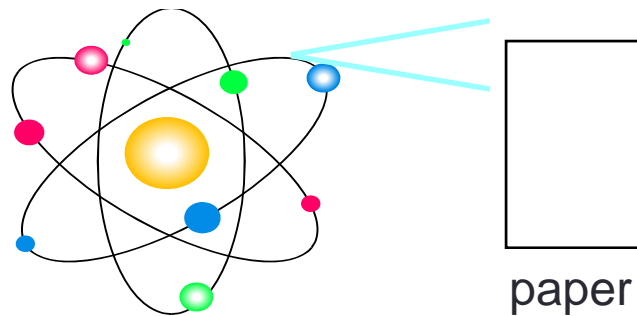


- Neutrons



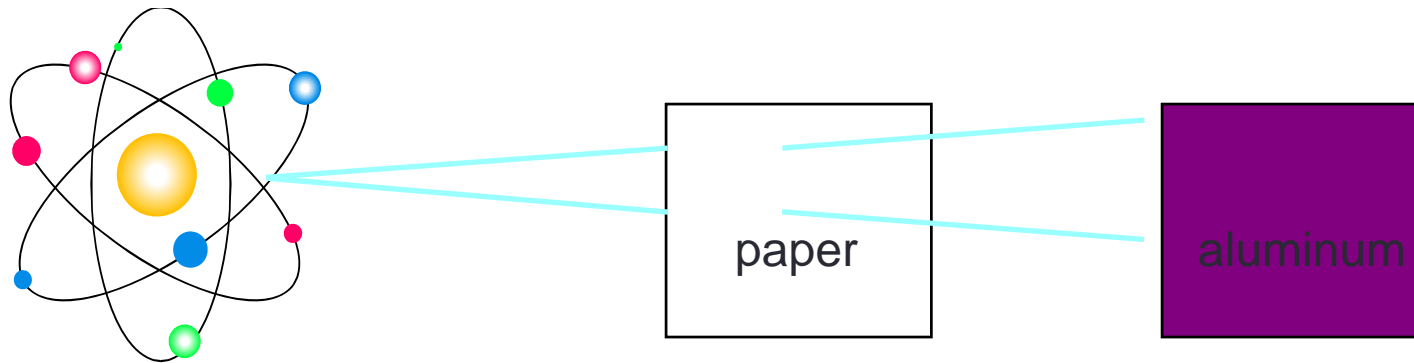
Ionizing Radiation - Alpha

- 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



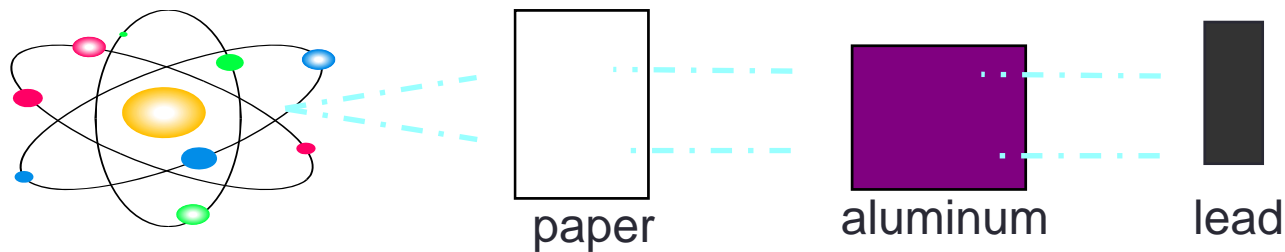
Ionizing Radiation - Beta

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



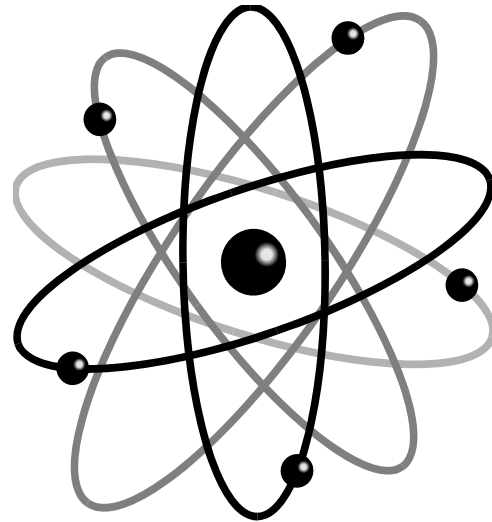
Ionizing Radiation - Gamma Rays

- 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		

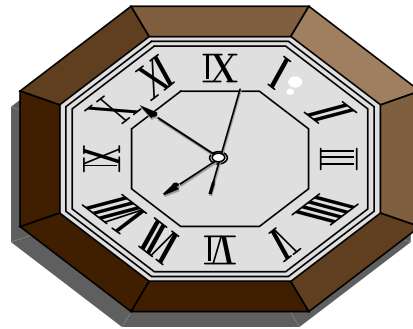
DOE maximum annual occupational limit = 5,000 mrem
DOE maximum emergency dose = 10,000 mrem
(for saving property)
Maximum emergency dose (for saving life) = 25,000 mrem

Health Risks

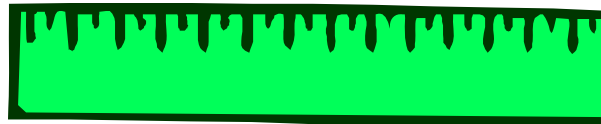
- Risks depend on:
 - Amount
 - Rate
- Categorized as:
 - Acute
 - Chronic

Exposure Protection

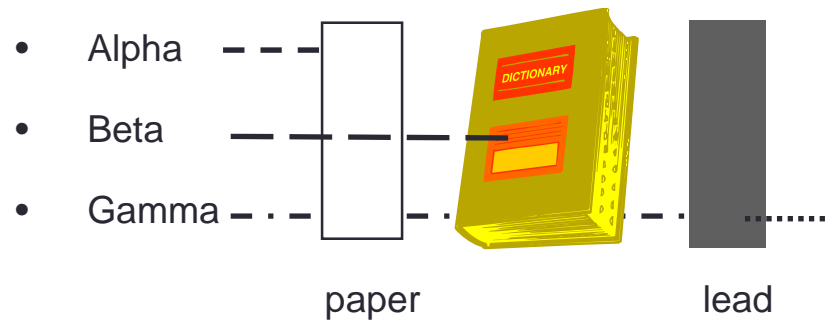
- Time



- Distance



- Shielding

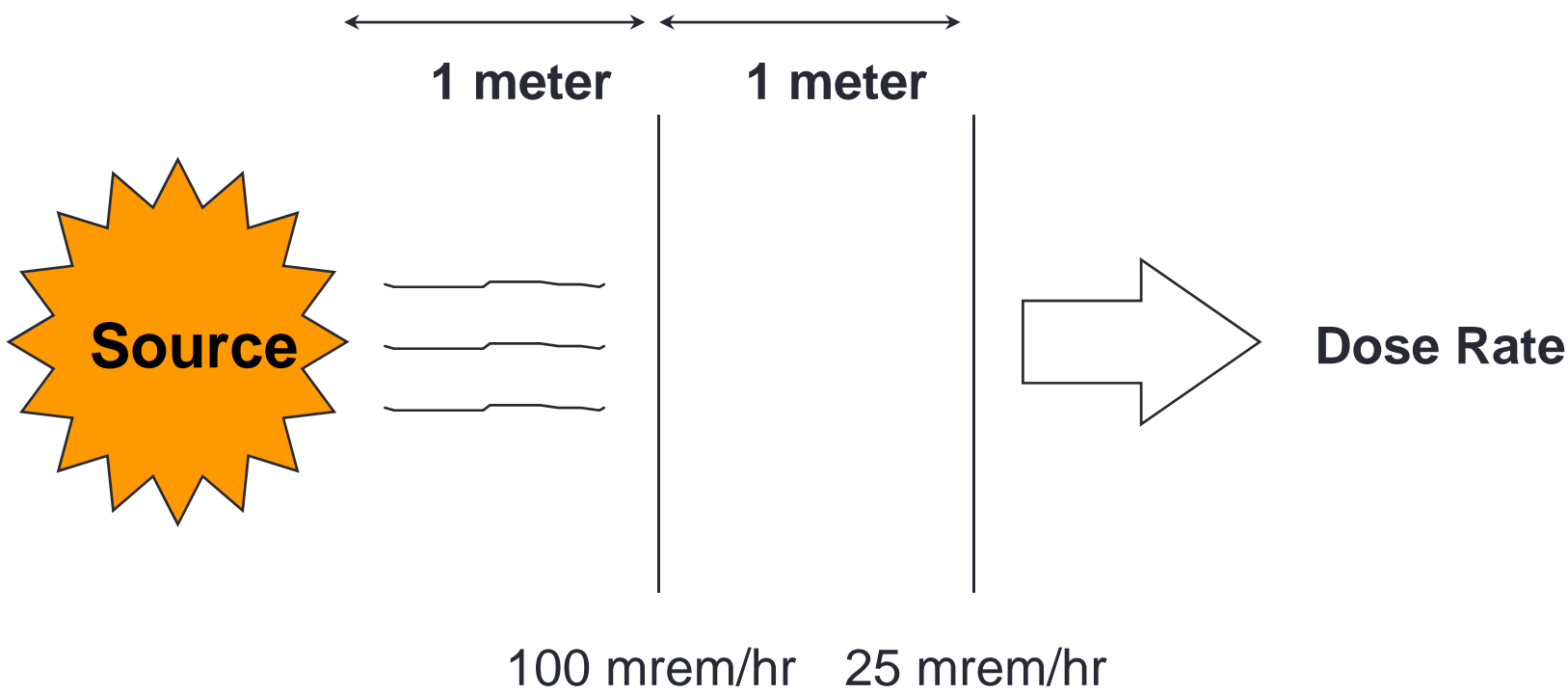


Time

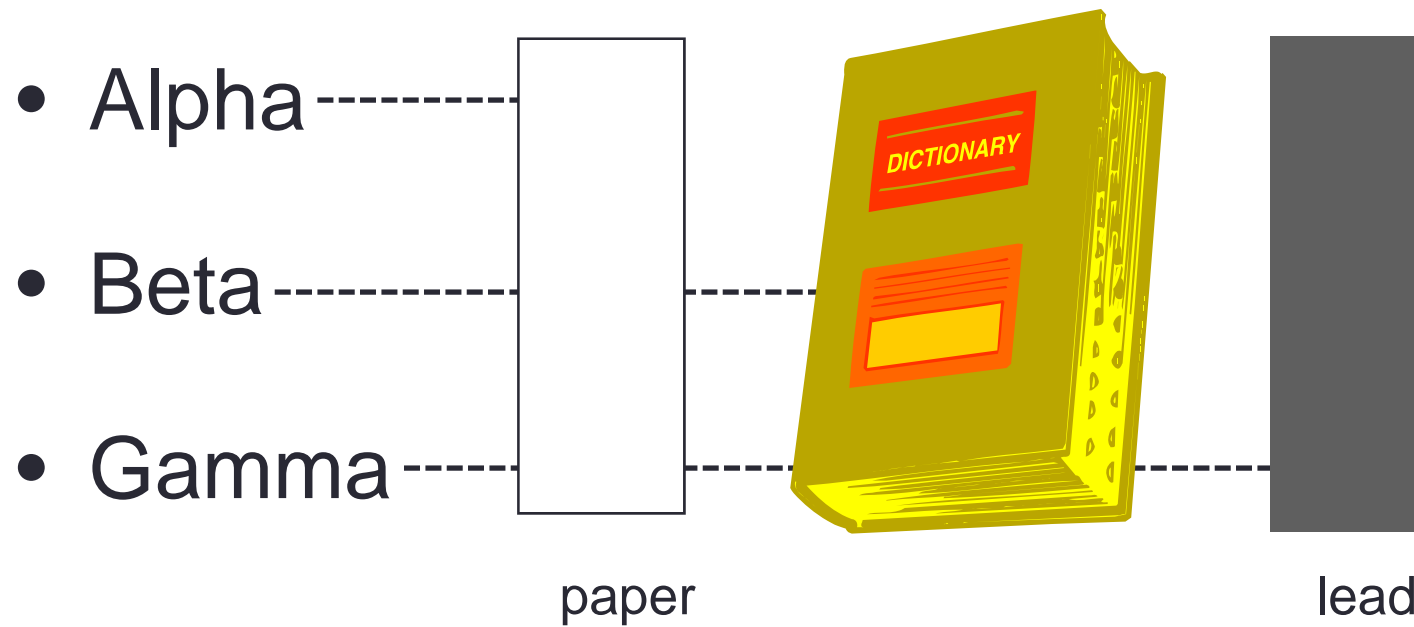


$$100 \text{ mrem per hour} \times 15 \text{ minutes } (.25 \text{ hour}) = 25 \text{ mrem}$$

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



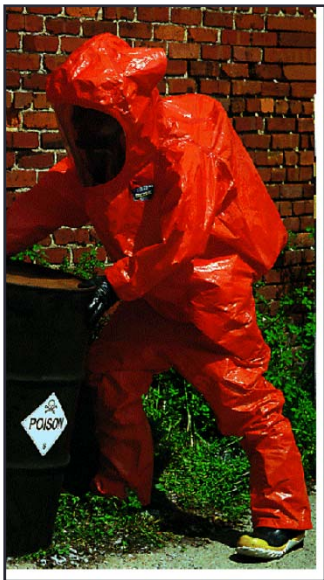
SUPPORT PROTECTION

Levels of Protection

Greater Hazard



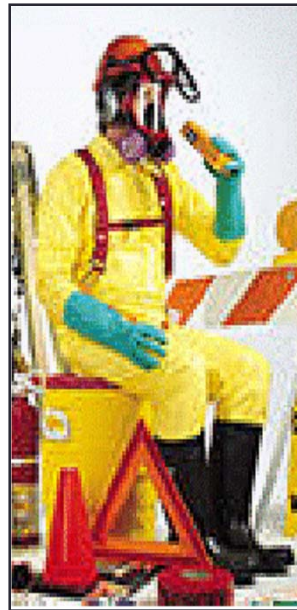
Level
A



Level
B



Level
C



Level
D



Higher Burden



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

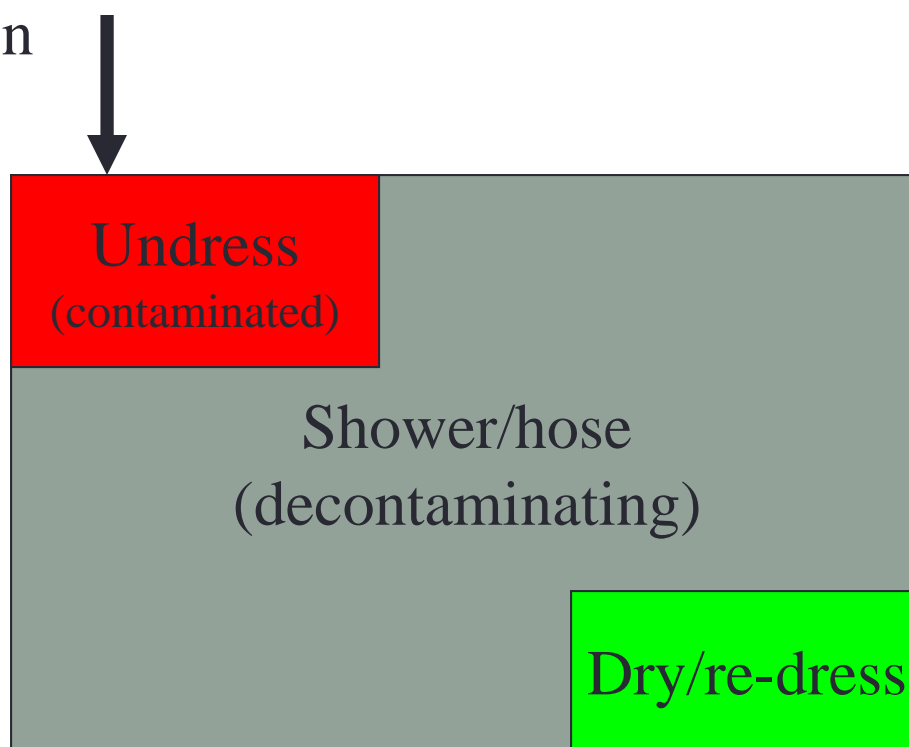
- Risks to person in decon room!
- PPE survey & exam
- Personnel: vital signs before & after!
- Risks:
 - Heat
 - Chemical
 - Equipment malfunction

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

Enter decon



Undress
(contaminated)

Shower/hose
(decontaminating)

Dry/re-dress

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?



QUESTIONS?

Thank You!

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ADDITIONAL RESOURCES

Visit Our Website at:

WRHEPC.URMC.EDU