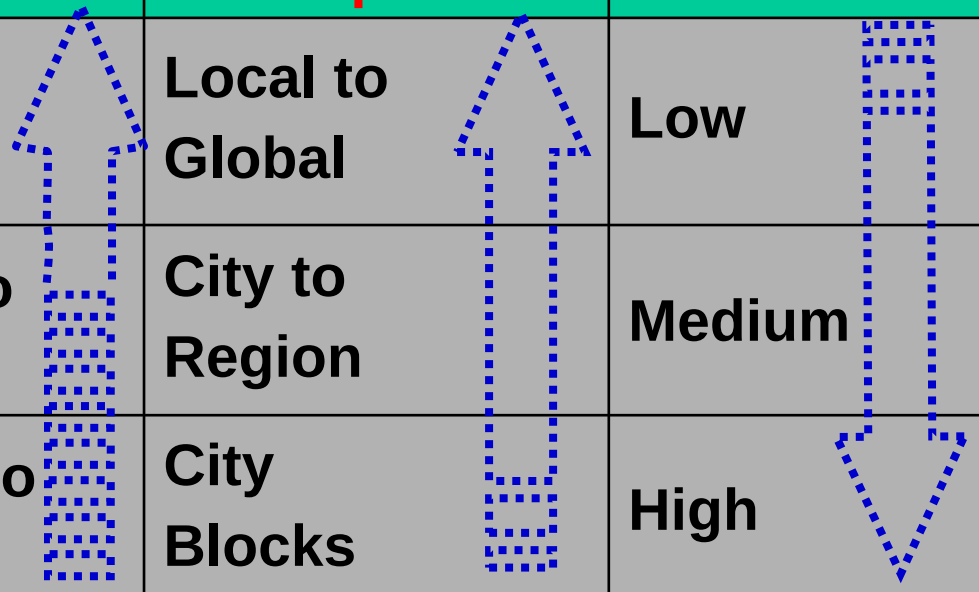
Chemical and Biological Weapons of mass destruction (WMD)

Comparison

AGENTS	SUMMARY CHARACTERISTICS		
	Time To Effects	Potential Impact	Availability
BIO	Days to Weeks	Local to Global	Low
RAD	Minutes to Hours	City to Region	Medium
CHEM	Seconds to Hours	City Blocks	High



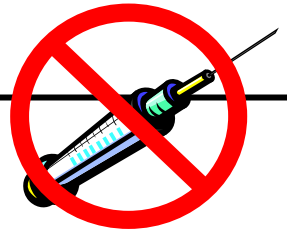
CHEMICAL WMD

Chem-Agent Effects and Treatment

Chem-agents may be solid, liquid, or gas.

HEALTH EFFECTS
• Disorientation • Dizziness • Nausea • Blindness • Serious Injury • Immobilization • Death

MITIGATION
1. Minimize exposure: • Avoid chemical cloud • Cover face to filter breathing 2. Get medical attention: • Skin decontamination • Antidote



Some have no antidote!

Types of Chem-Agents

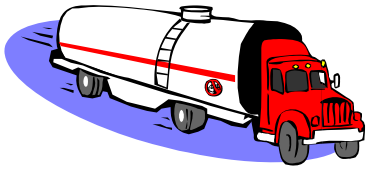
Some chem-agents are persistent, many are not persistent

Persistent chemicals

- remain on surfaces without evaporating or breaking down for more than 24 hours
- can remain for days to weeks

Non-persistent chemicals

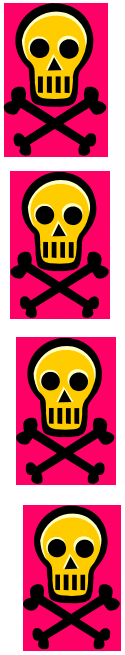
- quickly evaporate and break down
- carried in bulk on commercial carriers



Types of Chem-Agents

Chem-agents are commonly classified by the type of harm they cause.

1. **Nerve Agents –** disrupt nervous system, causes paralysis, fatal quickly
2. **Blister Agents –** destroy skin and tissues, cause blindness, may be fatal
3. **Choking Agents –** lung fills with fluid, cause choking, quick or delayed fatality
4. **Blood Agents –** interferes with oxygen at the cellular level, fatal quickly
5. **Riot-Control Agents –** skin and breathing irritations, rarely fatal



Exposure Pathways

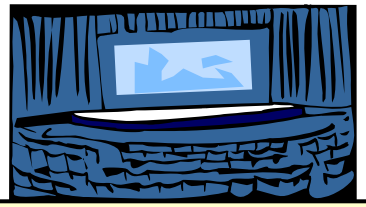
Typical exposure path varies with chemical type

++ Typical path + Possible path -- Unlikely path

Chemical Agent	Pathway		
	Inhalation	Ingestion	Skin or Eye Contact
Nerve	++	+	+ +
Blister	+	--	+ +
Choking	+ +	--	+
Blood	+ +	--	--
Riot-Control	+ +	--	+ +

Chem-Agent Dose

Lethal doses vary among different Chem-agents


Chemical Agent	100% Lethal Air Dose Quantity		
	Domed Stadium	Movie Theater	Boeing 747-400
Nerve	13 Gallons	2 ½ Cups	1.3 ounces
Blister	338 Gallons	4 Gallons	1 Quart
Choking	780 Gallons	9 Gallons	2.3 Quarts
Blood	520 Gallons	6 Gallons	1.5 Quarts
Riot-Control	1820 Gallons	21 Gallons	5.3 Quarts

Note: A barrel holds 44 gallons; tanker trucks carry 1,000 to 12,000 gallons; rail cars carry in excess of 20,000 gallons.

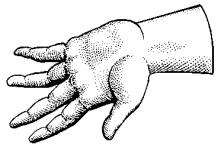
Chem-Agent Detection

- **<u>Some</u> can be seen**

- **<u>Some</u> can be smelled**

- **<u>Some</u> can be tasted**

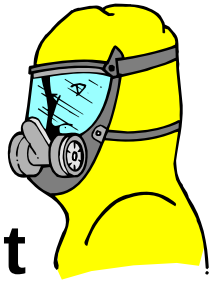
- **<u>Most</u> can be felt (e.g. burning sensation, choking)**



- ***All can be detected by appropriate instruments***

Chem-Agent Response

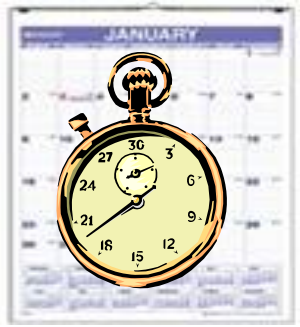
- **Call** in hazmat team
- **Identify** chemical agent
- **Isolate** and contain affected area
- **Evacuate** and shelter-in-place public
- **Provide** needed medical treatment
- **Cleanup** contaminated area



BIOLOGICAL WMD

The Bio-Agent Threat

- Causes disease and death by inhalation, ingestion, or skin contact
- ***Some are Contagious!*** **(transferred from person-to-person)**
- Many multiply in the body
- Symptoms may be delayed
- Some agents have ***NO*** vaccine
- Some survive dormant in the environment for weeks to years

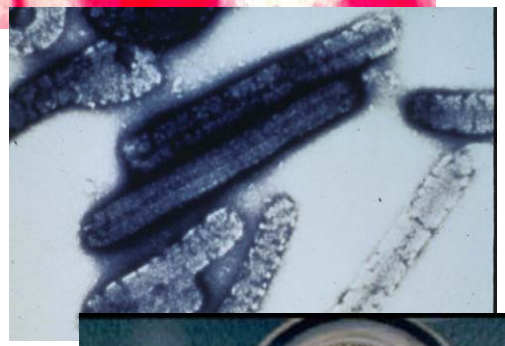


Types of Bio-Agents

1. **BACTERIA**
   - Single-celled organisms
   - Can reproduce
   - Antibiotic treatment

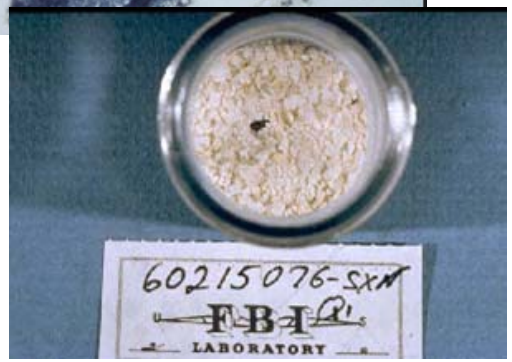
Anthrax (Bacteria)

2. **VIRUSES**
   - Live inside cells
   - Need host to reproduce
   - Vaccine and antiviral treatments



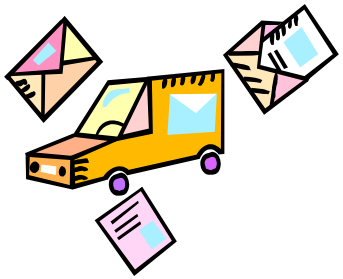
Ebola (Virus)

3. **BIOTOXINS**
   - Non-living (can't reproduce)
   - Produced by organisms
   - Antidote treatment



Ricin (Toxin)

Bio-Agent Delivery



Attacks can be overt or covert – method of delivery is important!

Overt -- *Provides notice, creates panic…*

- aircraft, bombs, missiles

Covert -- *<u>NO</u> notice; spread may be unchecked for days!*

- Spray fine mist (e.g., into HVAC)
- Spread on food, water, surfaces (e.g., mail, vehicles)
- Contagious people and animals

Bio-Agent Dose

A tiny amount of Bio-Agent can be very potent!

- **Inhalation of 1 to 500 bacteria or viruses can cause sickness and death.**
  - 100,000 bacteria fit on a pin head
  - 400 million virus fit on a pin head

- **Inhalation of 0.000002 to 4.8 micro grams of a biotoxin can cause sickness**
  - A sand grain weighs 170 to 13,000 micrograms

Bio-Agent Detection

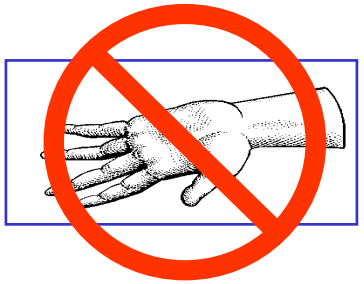
Bio-Agents are identified through symptoms or through time-consuming tests, because they cannot be:

– **Seen**

– **Heard**

– **Smelled**

– **Felt**

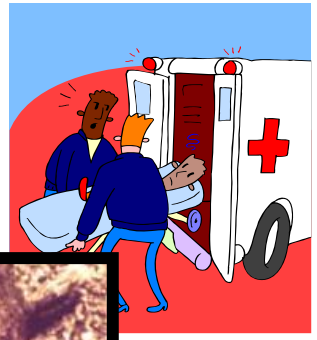


– **Detected quickly by instruments**

Bio-Agent Indicators

Since bio-agents are difficult to detect, it is critical to note indicators!

- **Many patients with same illness at the same time**
- **Symptoms unusual for age**
- **Type of infection rare to region**
- **Dead animals before humans**



Bio-Agent Response

- **Identify:** Bio-Agent(s), source, area affected, population exposed
- **Notify** local medical facilities
- **Isolate** and contain affected areas and population
- **Treat** -- provide vaccine or medications to the affected population
- **Decontaminate** affected areas and population
- **Follow-on Treatment** -- continue medical treatment as appropriate

Bio-Agent Decontamination

- **Physical removal-HEPA vacuum**
- **Liquid decontamination**
- **Foam decontamination**
- **Emulsions**
- **Fumigants**

Different approaches for different situations, and multiple approaches for most situations.