### CBRN Agents Overview

<table>
<thead>
<tr>
<th>Name of Agent</th>
<th>Method of Exposure</th>
<th>Rate of Action / Odor</th>
<th>Signs / Symptoms</th>
<th>Treatment Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulfur Mustard</strong></td>
<td>Skin contact or Inhalation</td>
<td>Delayed (2-24 hours)</td>
<td>No immediate symptoms. Eye pain, red skin, fluid-filled blisters within 2-24 hrs.</td>
<td>+Level B PPE</td>
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<td></td>
<td>- almond, garlic, mustard</td>
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<td>Dyspnea, pulmonary edema within 24 hrs.</td>
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<td><strong>Lewisite</strong></td>
<td>Skin contact or Inhalation</td>
<td>Rapid</td>
<td>Immediate pain, eye and lung burning, breathing blisters, greyish skin</td>
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<tr>
<td><strong>Nitrogen Mustard</strong></td>
<td>Skin contact or Inhalation</td>
<td>Rapid</td>
<td>Eye pain, gritty eyes, reddened skin, large fluid-filled blisters, respiratory damage; smells like almonds</td>
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<tr>
<td></td>
<td>- almond, garlic, mustard</td>
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<tr>
<td><strong>Phosgene</strong></td>
<td>Skin contact or Inhalation</td>
<td>Rapid and Delayed</td>
<td>Ammonia &amp; Chlorine: immediately irritating to eyes, skin, &amp; upper resp. tract.</td>
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<td><strong>Ammonia Chlorine</strong></td>
<td>- Ammonia &amp; Chlorine: pungent</td>
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<td>ALL can cause delayed onset of pulmonary edema within 72 hrs.</td>
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<td></td>
<td>- Phosgene: mown hay</td>
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<td><strong>Tabun Soman Sarin</strong></td>
<td>Inhalation (most likely since volatile) or Skin contact</td>
<td>Very rapid for inhalation</td>
<td>Mild: miosis, rhinorrhea, mild chest tightness, mild shortness of breath, sweating, lacrimation; Dermal: Delay up to 18 hrs. (Novichok onset may be delayed up to 3 days)</td>
<td>+Level B PPE (Level A if concern for vapor exposure)</td>
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<td></td>
<td>- Tabun: fruity</td>
<td></td>
<td>Moderate: vomiting, diarrhea, severe chest tightness, wheezing, profuse airway secretions, respiratory distress, muscle weakness, bradycardia</td>
<td>+Decon with soap &amp; water; Reactive Skin Decon. (Lotion RSDL) if available</td>
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<td></td>
<td>- Soman: camphor, fruity</td>
<td></td>
<td>Severe: unconsciousness, seizures, paralyisis, cyanosis, respiratory failure, apnea</td>
<td>+Aggressive Resp. Support</td>
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<td></td>
<td>- Sarin: VX: odorless</td>
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<td></td>
<td>+Intubation/Ventilation</td>
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<td></td>
<td>- Insecticides: garlic</td>
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<td></td>
<td>(avoid succinyalone)</td>
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<tr>
<td></td>
<td>- Novichok: pungent</td>
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<td></td>
<td>+Antidotes (on back)</td>
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<td>+Supportive Therapy</td>
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<tr>
<td><strong>Cyanide</strong></td>
<td>Ingestion</td>
<td>Rate of RXN= Rapid almonds - smoke inhalation</td>
<td>Headache, dizziness, lethargy, tachycardia, hypotension, resp. depression, coma, death can occur in &lt;5 min.</td>
<td>+Maintain airway; Admin oxygen immediately</td>
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<tr>
<td><strong>Smallpox Variola virus</strong></td>
<td>Inhalation</td>
<td>Incubation 12-17 days</td>
<td>HIGHLY INFECTIOUS! Febrile prorome (fever &gt;102, headache, backache, chills, vomiting, abdominal pain). First lesions appear in oral mucosa, face, forearm</td>
<td>+Protect ALL &amp; Vaccinate +PPE = N95 mask +Completely protect skin &amp; mucous membranes</td>
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<tr>
<td></td>
<td>- Person contact</td>
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<tr>
<td><strong>Ebola, Marburg Viral Hemorrhagic Fevers</strong></td>
<td>Inhalation Person contact</td>
<td>Rate of reaction= variable High mortality</td>
<td>HIGHLY INFECTIOUS! Fever, myalgias, flushing, vomiting, diarrhea, petechiae, bleeding, hypotension, shock</td>
<td>+Protect ALL &amp; Vaccinate +PPE = PAPR or N95 mask +Completely protect skin &amp; mucous membranes +Intensive supportive care</td>
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<tr>
<td></td>
<td>- Person contact</td>
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<tr>
<td><strong>Botulism Botulinum toxin</strong></td>
<td>Ingestion</td>
<td>*Rapid (24-36 hours)</td>
<td>Dizziness, vomiting, double vision, ptosis, dysphagia, progressive weakness of muscles to paralysis and respiratory failure</td>
<td>+Aggressive Resp. Support + Rapid use of antitoxin +Med treatment on back</td>
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<tr>
<td></td>
<td>- Open Wounds</td>
<td>*Illness length may be prolonged</td>
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<tr>
<td><strong>Ricin</strong> Castor Bean Toxin</td>
<td>Inhalation, Ingestion, Injection</td>
<td>18-24 hours</td>
<td>Inhalation - coughing, chest tightness, weakness, fever</td>
<td>+Supportive care + For Ingestion - charcoal</td>
</tr>
<tr>
<td><strong>Tularemia Francisella tularensis</strong></td>
<td>Inhalation Open Wounds</td>
<td>Incubation 1-10 days</td>
<td>No-person-to-person transmission Fever, headache, malaise, general discomfort, irritating cough, weight loss. 30% mortality rate</td>
<td>+Med treatment on back</td>
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<tr>
<td><strong>Anthrax Bacillus anthracis</strong></td>
<td>Inhalation</td>
<td>Incubation 1-6 days</td>
<td>No-person-to-person transmission Contact with spores may cause illness</td>
<td>+Provider Protection from spores +PPE = N95 mask +Completely protect skin &amp; mucous membranes +Med treatment on back +Aggressive treatment for suspected inhalation</td>
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<tr>
<td></td>
<td>- Ingestion</td>
<td>Toxic shock and death within 2-3 days</td>
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<td></td>
<td>- Cutaneous</td>
<td>Reactivation of spores up to 60 days</td>
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<tr>
<td><strong>Plague Yersinial pestis</strong></td>
<td>Inhalation</td>
<td>Incubation 2-10 days</td>
<td>HIGHLY INFECTIOUS! Malaise, fever, tender lymph nodes, skin lesions, chills, headaches, bloody sputum, pneumonia, circulatory failure and death</td>
<td>+Provider Protection +PPE = N95 mask +Completely protect skin &amp; mucous membranes +Med treatment on back</td>
</tr>
<tr>
<td><strong>Radiation</strong></td>
<td>Amount of time exposed, internal versus external, and distance from the irradiation</td>
<td>Slow progression - Thallium: garlic</td>
<td>Nausea, vomiting, severe burns, fatigue, reduced white blood cells ID of radiation type is crucial for treatment: Jodine, Cesium, Thallium, Plutonium, Americium, Curium</td>
<td>+External decon with water +Med treatment on back</td>
</tr>
</tbody>
</table>
Hydroxocobalamin (Cyanokit®)

- **Adult**: 5 grams IV over 15 min. Repeat 5 grams if no improvement
- **Child**: 70 mg/kg IV (pediatric dosing not FDA approved)
- Reconstitute each vial with 200 mL of NS. Administer through separate IV. Causes red skin and urine; interferes with some lab tests (i.e. CO2Hb)

Sodium Thiosulfate IV can be used as adjunctive

DO NOT administer through same IV line as Cyanokit

- **Adult**: 50 mL 25% solution IV
- **Child**: 1 mL/kg 25% solution IV, over 10-20 min.

**Adverse effects include anaphylaxis and serum sickness**

**Refer to package insert for suggested supplements & duration of treatment**

**Cyanide**

**Lewiste**

Tecovirimat (TPOXX)

Available from the CDC: 770-488-7100

- **Adult or Child ≥ 40 kg**: 600 mg PO every 12 hours for 14 days
- **Child 25 to <40 kg**: 400 mg PO every 12 hours for 14 days
- **Child 13 to <25 kg**: 200 mg PO every 12 hours for 14 days

**Live Smallpox Vaccine**

Available from the CDC: 770-488-7100 or Obtain through county or state health departments

Vaccine used prophylactically or for post-exposure up to 96 hours

**Contraindications—allergies**: latex, polymyxin-B, dihydrostreptomycin, chlorotetracycline; or the following: heart disease, eczema, use of systemic corticosteroids (>2 mg/kg or >20 mg/day prednisone for >2 weeks), use of immunosuppressive drugs, radiation therapy, HIV+, immunosuppressive diseases, pregnancy or household contacts of mentioned disease states

**Vaccine Reaction Treatment**

**Vaccinia**

0.6 mL/kg IM, may increase to 1-10 mL/kg IM divided doses depending on symptoms. Available from CDC: 770-488-7100

**Duration of treatment is 5 days**

**Contraindicated**

**Adverse effects include** anaphylaxis and serum sickness

**Refer to package insert for suggested supplements & duration of treatment**

**Atropine Sulfate**

- **Adult**: 2 mg IV or IM q 2-5 min. until resolution of muscarinic signs (bronchospasms & XS secretions)
- **Child**: 0.02 mg/kg (minimum of 0.1 mg) IV/IM until resolution of muscarinic signs (bronchospasms & XS secretions)
- **AtroPEN (atropine)** 0.5 mg IM Auto-Injector
  - 6-18 kg (13-40 lbs): 1 Pen (0.5 mg)
  - 19-28 kg (41-62 lbs): 2 Pens (1 mg)
  - 29-38 kg (63-84 lbs): 3 Pens (1.5 mg)
  - >38 kg (>84 lbs): 4 Pens (2 mg)

*Repeat entire dose every 5 minutes for muscarinic signs

**Mark I Kit/DuoATNA (Auto-Injectors)**

Mark I Kit consists of 2 auto-injectors; DuoDote and ATNAA are single auto-injectors

All Contain: Atropine 2 mg & Pralidoxime 600 mg

**Dose**

**Adult**

- **Mark I Kit**: 1 Kit, DuoDote, or ATNAA
- **DuoDote & ATNAA**: 2 Kits, DuoDotes, or ATNAAs

**Midazolam (Versed, Seizalaman)**

- **Adult**: 5 to 10 mg IV/IM May repeat q 5 min as needed for seizures
- **Child**: 0.2 mg/kg IV/IM May repeat q 10 to 15 min

**Diazepam (Valium)**

Lorazepam is better absorbed for IM route

- **Adult**: 5 to 10 mg IV/IM May repeat q 5 min as needed for seizures
- **Child**: 0.2 to 0.5 mg/kg IV/IM May repeat q 5 to 10 min

**Lorazepam (Ativan)**

- **Adult**: 2 to 4 mg IV/IM May repeat q 5 to 10 min as needed for seizures
- **Child**: 0.05 to 0.1 mg/kg IV/IM May repeat q 5 to 10 min

**Duration of treatment is until no evidence of radiation exists**

**Exposure to Radioactive Iodine**

**Oral Potassium Iodide** (KI or SSKI)[1] (1 mg/mL)

- **Adult or adult sized adolescents**: 130 mg PO or 0.13 mL of SSKI PO
- **child 0-1 month**: 16 mg; >1 month to 2 years: 32 mg
- **2 years to 18 years**: 65 mg

Immediate dosing before or after exposure can block up to 90% 3-4 hours post-exposure dosing can provide only a 50% block

**CAUTION USE with SHELLFISH ALLERGY or PREGNANCY**

**Exposure to Radioactive Cesium or Thallium**

**Oral Prussian Blue**

Available from REAC/TS: 865-576-1005 or Heytex 281-395-7040

**Adult**

- Initially start 3 gm PO 3 times a day; reduce dose to 1 gm orally 3 times a day once Cesium counts <1 Gy or Thallium counts <1 mg/24hr
- *Capsules may be opened and sprinkled on food for ease of administration

**Internal Contamination with Plutonium, Americium, or Curium**

- **Ca-DTPA (pentetetate calcium trisodium) injection - FIRST**
  - **Adult**: 1 gm IV over 3-5 minutes x 1
  - **Child (<12 years)** 14 mg/kg IV over 3 to 5 min to not exceed 1 gm

- **Zn-DTPA (pentetetate zinc trisodium) injection - Maintenance**
  - **Adult**: 1 gm IV over 3 to 5 minutes, refer to FI for duration
  - **Child (<12 years)** 14 mg/kg IV over 3 to 5 min to not exceed 1 gm
  - Refer to package insert for suggested supplements & duration of treatment

**Botulism**

**Hydatrel Botulinum Antitoxin (HBAT)**

Available from the CDC: 770-488-7100

Prior to dose draw diagnostic lab for toxin sub-type ABE and test for equine serum reaction

**Dose**

- **Adult**: 1 vial slowly IV in a 1:10 dilution with 0.9% normal saline (may also give a dose of 1 vial IM)
- **Child**: 80 mg/kg IV or IM

**Adverse effects include** anaphylaxis and serum sickness

**Refer to package insert for suggested supplements & duration of treatment**

**Botulism**

**Recombinant Human Adrenocorticotropic Hormone** (rHACT)

Available from the CDC: 770-488-7100

**Adverse effects include** anaphylaxis and serum sickness

**Refer to package insert for suggested supplements & duration of treatment**