Department of Public Health
CITY OF PHILADELPHIA

*Philadelphia Department of Public Health*
**Division of Disease Control**

THOMAS A. FARLEY, MD, MPH
*Health Commissioner*

CAROLINE JOHNSON, MD
*Deputy Health Commissioner*

STEVEN ALLES, MD, MS
*Director, Division of Disease Control*

# *Health Notification*

## Public Health Preparedness Recommendations For Wawa Welcome America Festival

**June 29, 2017**

The City of Philadelphia will host multiple events this weekend through Tuesday, July 4 as part of the Wawa Welcome America Festival in celebration of the July 4th holiday. Hot weather is expected during this holiday period. Healthcare facilities should be prepared for both naturally occurring events that might result in increased illness, as well as the possibility of terrorism resulting in civilian casualties. The Philadelphia Department of Public Health (PDPH) recommends that healthcare facilities review their emergency response and disaster preparedness plans before the upcoming holiday with the possibly heightened potential for terrorism and disease transmission. Specific recommendations include:

- Evaluate facilities and personnel to ensure safety and security.
- Ensure that appropriate staff understand their roles in an emergency and communications protocols.
- Update clinical providers on biological, chemical, and radiological agents.
    - Information for clinical management and protection of healthcare workers is attached and available online at https://hip.phila.gov.
    - Additional resources on these threats may be found at http://emergency.cdc.gov/bioterrorism/ and www.atsdr.cdc.gov.
- Review procedures that address medical treatment of mass casualties, including crush injuries, decontamination protocols, the use of personal protective equipment and triage protocols.
- Review procedures that address medical treatment of blast and bombing injuries.
    - Information can be found at http://emergency.cdc.gov/masscasualties/blastinjuryfacts.asp.
- Prepare to treat individuals suffering from heat related illnesses, and intoxication from alcohol and other recreational drugs.

The PDPH reviews data daily from multiple sources to facilitate the recognition of disease outbreaks. However, PDPH relies on clinicians to report **by telephone** conditions that require immediate notification, including any outbreak or unusual presentation or cluster of disease. Indicators of naturally occurring outbreaks or possible biological terrorism are:

- An unusual temporal or geographic clustering of illness (e.g., persons who attended the same public event or gathering).
- Increase in serious lower respiratory illness with negative tests for common bacteria and viruses.
- Patients presenting with clinical signs and symptoms that suggest an infectious disease outbreak (e.g., ≥2 persons presenting with an unexplained febrile illness associated with sepsis, pneumonia, respiratory failure, or rash or a botulism-like syndrome with flaccid muscle paralysis, especially if occurring in otherwise healthy persons).
- An unusual age distribution for common diseases (e.g., an increase in chickenpox-like illness in adult patients).
- Single cases of disease due to uncommon, non-indigenous agents (e.g., anthrax, plague, tularemia) in patients with no history suggesting an explanation for illness.
- Large number of cases of acute flaccid paralysis with prominent bulbar palsies, suggestive of a release of *botulinum* toxin.

Call PDPH to report conditions requiring immediate notification, or to obtain public health consultation. PDPH will also facilitate diagnostic testing requiring public health laboratory services.

- During normal business hours, call 215-685-6740
- After business hours, call 215-686-4514, press 1 for Unified Dispatch, and ask to speak with the on-call person for Disease Control

Department of Public Health
CITY OF PHILADELPHIA

# SUMMARY OF BIOLOGICAL WARFARE AGENTS

| Agent | Clinical Syndrome | Incubation Period | Diagnostic Samples | Diagnostic Assay | Patient Isolation Precautions | Treatment | Post-Exposure Prophylaxis (PEP) | Comments |
|---|---|---|---|---|---|---|---|---|
| **Anthrax** | Inhalational - febrile prodrome, respiratory distress, bacteremia, meningitis. CXR - wide mediastinum<br>Cutaneous - ulcer;<br>GI syndrome – less likely | 1-5 days (up to 42 days described) | Sputum, blood, CSF; stool, ulcer swab or biopsy (BSL-2) | Gram stain, culture, PCR | Standard (no person to person transmission). | Cipro 400 mg IV q 8-12 or doxycycline 100 mg IV q 12; plus 1 or 2 additional abx (e.g., rifampin, vancomycin, penicillin, chloramphenicol, clindamycin, imipenem, clarithromycin); switch to po to complete 60 days (1 agent) | Cipro 500 BID or doxycycline 100 mg BID for 60 days, plus 3-dose regimen of anthrax vaccine (available through CDC, IND protocol) | If organism susceptible to penicillin, PEP for pregnant women and children can be changed to oral amoxicillin |
| **Brucellosis** | Febrile prodrome, osteoarticular disease, genitourinary infection, hepatitis; endocarditis and CNS involvement rarely | 5-60 days, occasionally months | Serum; blood, bone marrow (BSL-2) | Serology; culture | Standard precautions; contact isolation if draining lesions | Doxycycline 200 mg/d po plus rifampin 600-900 mg/d po x 6wks | Doxycycline and rifampin for 3 wks if inadvertently inoculated | Trimethoprim-sulfamethoxazole can be substituted for rifampin, although 30% relapse rate |
| **Plague** | Pneumonic – fulminant pneumonia, septicemia; Bubonic less likely | 2-3 days | Blood, sputum, lymph node aspirate; serum (BSL-2/3) | Gram, Wright, Giemsa or FA stain; culture; Serology | Pneumonic – droplet precautions until patient treated for 3 days | Streptomycin 1gIM twice daily x 10 days, or gentamicin, doxycycline, ciprofloxacin, chloramphenicol | Doxycycline 100 mg po q 12 h x 7 days; ciprofloxacin 500 mg po BID x 7 days | Vaccine not protective against pneumonic infection |
| **Q fever** | Fever, systemic symptoms, pneumonia, hepatosplenomegaly | 10-40 days | Serum (BSL-2) | Serology | Standard precautions | Tetracycline 500 mg po QID x 5-7 days; doxycycline 100 mg po BID x 5-7 days | Doxycycline or tetracycline: start 8-12 d post-exposure x 5 days | Vaccine available - investigational |
| **Tularemia** | Ulceroglandular; typhoidal (septicemic) – fever, weight loss, pneumonia | 2-10 days | Serum; Blood, sputum, ulcer swab, lymph node aspirate (BSL-2/3) | Serology; Gram stain, culture (PCR and DFA if available) | Standard precautions | Streptomycin 1g IM twice daily, or gentamicin 5 mg/kg IM or IV daily or ciprofloxacin x 10 days; OR doxycycline or chloramphenicol x 14 days | Doxycycline 100 mg po q 12hrs x 14 days; Ciprofloxacin 500 mg po twice daily X 14 days | Transfer culture to BSL-3 after initial isolation of organism |
| **Smallpox** | Fever, systemic toxicity, vesicular rash with centrifugal distribution, lesions synchronous in stage of development | 7-17 days | Pharyngeal swab, vesicular fluid, scab material **(BSL-4)** | ELISA, PCR, viral isolation | Airborne precautions | None (cidofovir effective in vitro) | Vaccine within 4 days of exposure, VIG (0.6 ml/kg IM within 3 days) if vaccine contraindicated | Pre-exposure and post-exposure vaccination recommended if > 3 yrs since last vaccination |
| **Viral encephalitides** | VEE: fever, headache, malaise, photophobia, vomiting; WEE/EEE: febrile prodrome, somnolence, delirium | VEE 2-6 days; WEE/EEE 7-14 days | Serum; CSF (BSL-2) | Serology; Viral isolation | Standard precautions | Supportive | None | Vaccines available, although poorly immunogenic |
| **Viral hemorrhagic fevers** | Fever, myalgia, hypotension, hemorrhagic features | 4-21 days | Serum; blood, formalin-fixed tissue biopsy **(BSL-4)** | Serology; Viral isolation, PCR, immunohistological detection of antigen in tissue | Contact precautions (consider additional precautions if massive hemorrhage) | Supportive; ribavirin for CCHF/arenaviruses; antibody passive for AHF, BHF, Lassa, CCHF | None | Aggressive management of hypotension, secondary infections |
| **Botulinum** | Ocular symptoms, skeletal muscle paralysis – symmetric, descending; respiratory failure | 1-5 days | Serum, stool (BSL-2), gastric aspirate, vomitus | Mouse bioassay for toxin detection; culture | Standard precautions | DOD heptavalent antitoxin serotypes A-G; CDC trivalent equine antitoxin serotypes A, B, E | None | Skin testing for hypersensitivity before equine antitoxin administration |
| **Staphylococcal enterotoxin B** | Fever, headache, cough, respiratory distress, GI symptoms | 1-6 hours | Nasal swab, serum, urine (BSL-2) | Antigen detection (toxin) – ELISA; serology | Standard precautions | Supportive | None | Vomiting and diarrhea may occur if toxin is swallowed |

**Important contact information:**

Philadelphia Department of Public Health…….215-685-6740; After-hours on-call: 215-686-4514
Philadelphia Police/Fire/Emergency……911
Poison Control Center……800-222-1222
Pennsylvania Department of Health……..1-877-PA-HEALTH; After-hours on-call: 717-787-3350

Bucks County Department of Health ……215-345-3318; After-hours on-call: 267-718-1939
Chester County Department of Health……610-344-6225; After-hours on-call: 610-733-4919
Delaware County State Health Center……..610-447-3250; After-hours on-call: 610-378-4352
Montgomery County State Health Center……..610-278-5117; After-hours on-call: 610-275-1222
Camden County NJ Department of Health……856-374-6000; After-hours on-call: 856-783-1333
New Jersey Department of Health……609-826-5964; After-hours: 609-392-2020

**Clues to a possible bioterrorist attack: single cases of disease due to uncommon, non-indigenous agents in patients with no history suggesting an explanation for illness; clusters of patients with similar syndrome with unusual characteristics (e.g., unusual age distribution) or unusually high morbidity and mortality; unexplained increase in the incidence of a common syndrome above seasonally-expected levels (e.g., increase in influenza-like illness during summer), or with negative tests for influenza and other respiratory viruses). Contact Division of Disease Control at 215-685-6740 (215-686-4514 if after hours) to report suspected cases, access diagnostic testing or obtain more information.**

Version July 2017

Department of Public Health
CITY OF PHILADELPHIA

# SUMMARY OF CHEMICAL WARFARE Agents

| Agent | Signs | Symptoms | Onset | Diagnostic Tests | Treatment |
|---|---|---|---|---|---|
| **Biotoxins**:<br>Ricin | Clusters of acute lung or GI injury;<br>Circulatory collapse and shock, tracheobronchitis, pulmonary edema, necrotizing pneumonia;<br>dehydration | **Ingestion**: Nausea, diarrhea, vomiting, fever, abdominal pain<br>**Inhalation**: chest tightness, coughing, weakness, nausea, fever | Ingestion: 18-24 hours<br><br>Inhalation: 8-36 hours | ELISA using respiratory secretions, serum, and direct tissue | **Ingestion and Inhalation:**<br>No antidote<br>Supportive care<br>For Ingestion charcoal lavage. |
| **Nerve Agents**:<br>Sarin;<br>Tabun;<br>Soman;<br>Cyclohexyl Sarin;<br>VX;<br>Novichok agents | Pinpoint pupils;<br>Bronchoconstriction;<br>Respiratory arrest;<br>Hypersalivation;<br>Increased secretions;<br>Diarrhea;<br>Decreased memory/concentration/confusion;<br>Loss of consciousness;<br>Seizures | **Moderate exposure**:<br>Diffuse muscle cramping, runny nose, difficulty breathing, eye pain, dimming of vision, watery eyes, blurred vision, sweating, cough, chest tightness, headache, muscle tremors<br><br>**High exposure**: Same as above also, sudden loss of consciousness, seizures, flaccid paralysis (late sign) | Liquids: minutes to hours<br><br>Aerosols: seconds to minutes | Red blood cell or serum cholinesterase (whole blood)<br>Treat based on signs and symptoms; lab tests only for later confirmation | **Inhalation and dermal absorption**:<br>Atropine (2mg) IV; repeat q 5 minutes, titrate until effective, average dose 6 to > 15mg<br>[use IM in the field before IV access] establish airway for oxygenation<br>Pralidoxime chloride (2-PAMCI) 600-1800mg IM or 1.0g IV over 20-30 minutes (max. 2g IM or IV per hour)<br>Additional doses of atropine and 2-PAMCI depending on severity<br>Diazepam or lorazepam to prevent seizures if >4mg atropine given<br>Ventilatory support |
| **Cyanides**:<br>Hydrogen cyanide;<br>Cyanogen chloride | **Moderate exposure**: Metabolic acidosis, venous blood-O2 level above normal, hypotension, pink skin color<br><br>**High exposure**: Same as above plus coma, convulsions, cessation of heartbeat and respirations | **Moderate exposure**: Giddiness, palpitations, dizziness, nausea, vomiting, headache, eye irritation, hyperventilation, drowsiness, restlessness<br>**High exposure**: Immediate loss of consciousness, convulsions and respiratory failure leading to death within 1 to 15 minutes | Seconds to minutes | Bitter almond odor associated with patient can suggest cyanide poisoning; metabolic acidosis; Cyanide (blood) or thiocyanate (blood or urine) levels<br>Treat based on signs or symptoms; lab tests only for later confirmation. | **Ingestion, inhalation and dermal absorption**:<br>100% oxygen by face mask; intubation with 100% FiO2 if indicated<br>Amyl nitrate via inhalation, 1 ampule (0.2mL) q 5 minutes<br>Sodium nitrite (300mg IV over 5-10 minutes) and sodium thiosulfate (12.5g IV)<br>Additional sodium nitrite should be based on hemoglobin level and weight of patient. |
| **Blister Agents/Vesicants**:<br>Sulfur mustard; lewisite; nitrogen mustard; mustard lewisite; phosgeneoxime;<br>T2 Mycotoxins | Skin erythema and blistering;<br>Watery and swollen eyes, upper airways sloughing with pulmonary edema; metabolic failure; bone marrow suppression with neutropenia and sepsis (especially sulfur mustard, late) | Burning, itching, red skin,<br>Mucosal irritation (prominent tearing, and burning and redness of eyes), eyelid edema, shortness of breath, nausea and vomiting, cough, chest tightness, sore throat. | Sulfur mustard: hours to days<br><br>Lewisite: minutes | Body can often smell of garlic, horseradish or mustard;<br>Oily droplets on skin from ambient sources;<br>Urine thiodiglycol;<br>Tissue biopsy*<br><br>(*US Army Medical Research Institute of Chemical Defense) | **Inhalation and dermal absorption:**<br>Mustards: no antidote<br>Lewisite and lewisite mustard: British Anti-Lewisite (BAL or Dimercaprol) IM (rarely available)<br>Thermal burn therapy; supportive care (respiratory support and eye care)<br>T2 Mycotoxins:<br>No antidote<br>Supportive care |
| **Lung/Choking/ Pulmonary Agents**:<br>Chlorine;<br>Phosgene;<br>Sulfur dioxide;<br>Bromine | Pulmonary edema with some mucosal irritation leading to acute respiratory distress syndrome or non-cardiogenic pulmonary edema; Pulmonary infiltrate | Shortness of breath, chest tightness, wheezing, laryngeal spasm, mucosal and dermal irritation and redness, coughing, burning sensation of eyes and throat, blurred vision | 1-24 hours (rarely up to 72 hours); may be asymptomatic period of hours | No tests available. Use history to help identify source and exposure characteristics. | **Inhalation:**<br>No antidote<br>Management of secretions; O2 therapy;<br>Treat pulmonary edema with PEEP to maintain PO2 above 60mm Hg. |
| **Riot Agents:**<br>Chloroacetophenone<br>Chlorobenzylidenemalonitrile (CS)<br>Chloropicrin | Ocular signs include lacrimation, erythema, corneal injury, blepharospasm. Respiratory signs: rhinorrhea, cough, dyspnea, tachypnea, wheezing or rales, hypoxemia, pulmonary edema. Skin: erythema, blistering | Eye irritation and redness, blurred vision, cough, hoarseness, shortness of breath, sore throat, dysphagia, salivation, oropharyngeal and nasal burning | Seconds to minutes, delayed onset dermatitis (8 hours) rarely | No tests available. Use history to identify source and exposure characteristics. | **Inhalation, mucous membrane, dermal contact:**<br>No antidote, clothing removal and eye irrigation.<br>Respiratory support with supplemental oxygen, bronchodilators if severe respiratory injury. Effects usually short-lived. |

**Important contact information:**

Philadelphia Department of Public Health…….215-685-6740; After-hours on-call: 215-686-4514
Philadelphia Police/Fire/Emergency……..911
Poison Control Center……..800-222-1222
Pennsylvania Department of Health……..1-877-PA-HEALTH; After-hours on-call: 717-787-3350

Bucks County Department of Health ……..……215-345-3318; After-hours on-call: 267-718-1939
Chester County Department of Health…….610-344-6225; After-hours on-call: 610-733-4919
Delaware County State Health Center……..610-447-3250; After-hours on-call: 610-378-4352
Montgomery County State Health Center……..610-278-5117; After-hours on-call: 610-275-1222
Camden County NJ Department of Health…..……..856-374-6000; After-hours on-call: 856-783-1333
New Jersey Department of Health……..……609-826-5964; After-hours: 609-392-2020

**FOLLOW HOSPITAL PROCEDURES FOR RESPONDING TO CHEMICAL HAZARD EMERGENCIES. VICTIMS MAY PRESENT TO EMERGENCY DEPARTMENTS WITHOUT WARNING OR PRIOR DECONTAMINATION. IF THERE IS SUSPICION OF CONTAMINATION, DON PERSONAL PROTECTIVE EQUIPMENT AND DECONTAMINATE PATIENT BEFORE ENTRY INTO BUILDING.**

**Clues to a possible chemical attack include clusters of patients with similar syndromes or with unusual characteristics. To report suspected cases, access diagnostic testing or to obtain more information contact the Division of Disease Control at 215-685-6740. After hours call 215-686-4514 and ask for the on-call staff for the Division of Disease Control. More information concerning treatment of chemical exposure can be found on the Centers for Disease Control and Prevention's website at http://emergency.cdc.gov/chemical/.**

Version July 2017

Department of Public Health
CITY OF PHILADELPHIA

# SUMMARY OF ACUTE MEDICAL MANAGEMENT FOR RADIATION EXPOSURES

## General Guidelines

*Healthcare workers should wear a gown, double gloves, shoe covers, mask (N95 preferred), and cap as adequate protection when treating patients contaminated with radioactive material. Reassign pregnant staff to non-radiation areas.*

1. **Stabilize the patient first, followed by definitive treatment of serious injuries**
2. **Assess external contamination by use of a handheld detection meter and decontaminate as appropriate**
3. **Assess internal contamination and administer specific chelator/excretion enhancing agent**
   Consider if high survey readings persist following decontamination.
   High readings around the nose and mouth may reflect inhalation or ingestion of radionuclides
4. **Obtain a complete blood count (CBC) with differential as soon as possible, and repeat every 8 hours**
5. **Approximate dose exposed and manage acute radiation syndrome (ARS)**

## Assessment of Radiation Exposure and Contamination

| Type of Radiation Exposure | Actions |
|---|---|
| **External Exposure:** All or part of the body is exposed to an external radiation source. | Approximate the absorbed dose and follow ARS management guidelines (see below). Decontamination not indicated. Chelation/excretion enhancing/uptake blocking therapy not indicated. |
| **External Contamination:** Radioactive particles present on skin or clothing, resulting in a continuing external exposure. | Decontaminate by removing external layer of clothing by cutting and rolling clothes away from face and place in a double bag and save. Wash skin and hair with soap and water and avoid splashing. Approximate the absorbed dose and follow ARS management guidelines (see below). Chelation/excretion enhancing/uptake blocking therapy not indicated. |
| **Internal Contamination:** Radioactive particles are inhaled, ingested, or absorbed through open wound contamination. | Identify isotope and administer appropriate chelation/excretion enhancing treatment (see right). Perform external decontamination as outlined above if appropriate. Approximate the absorbed dose and follow ARS management guidelines (see below). |

## Management of Acute Radiation Syndrome (ARS)

*Definition of ARS: A combination of clinical signs and symptoms developing over a period of hours to weeks due to a whole or partial body exposure to ionizing radiation > 1 Gray.*
*Tissues and organs most sensitive to damage include bone marrow, skin, intestinal crypt cells, spermatocytes*

**Estimate radiation exposure dose to assess prognosis and guide medical management**

Obtain a complete blood count (CBC) with differential immediately. Document time of exposure and onset of vomiting

| **Dose approximation** | **<2 Gray** | **2-4 Gray** | **4-6 Gray** | **6-8 Gray** | **>8 Gray** |
|---|---|---|---|---|---|
| **Onset of vomiting after exposure** | >2 hours | 1-2 hours | 30 minutes -1 hour | 10-30 minutes | <10 minutes |
| **% Lymphocyte decrease after exposure (may discontinue Q8H CBCs after 48 hours if no decrease observed)** | | | | | |
| After 24 hours | 0-20% | 20-38% | 38-60% | 60-78% | >78% |
| After 48 hours | 0-33% | 33-56% | 56-78% | 78-96% | >96% |
| **Degree of ARS** | Mild | Moderate | Severe | Very Severe | Lethal |
| **Treatment recommendations*** | Supportive Care**, No antibiotics, No cytokine therapy | Supportive Care, Quinolone, Initiate cytokine therapy (G-CSF:filgrastim or pegylated G-CSF: pegfilgrastim)*** | Supportive Care, Quinolone, Initiate cytokine therapy (G-CSF:filgrastim or pegylated G-CSF: pegfilgrastim)*** | Supportive Care, Quinolone, Initiate cytokine therapy (G-CSF:filgrastim or pegylated G-CSF: pegfilgrastim)*** | Supportive Care, No quinolone, No cytokines. |

*Follow Infectious Diseases Society of America guidelines for febrile neutropenia (ANC <500 x $10^9$ cells/L)
**Supportive care: 1) Maintenance of vascular and hemodynamic stability through IV fluids & blood products (leukoreduced and irradiated)
2) Keeping a clean patient environment through strict hand washing, scrub attire, gloves, gowns and masks for staff and visitors
3) Encourage early enteral feeding to maintain gut mucosal barrier 4) Consider anti-emetics and anti-diarrheal agents
***Use doses recommended by Radiation Emergency Medical Management (REMM) https://www.remm.nlm.gov/cytokines.htm
Additional cytokines are not FDA approved to treat radiation exposures, and require an FDA Emergency Use Authorization (EUA). These additional cytokines can be found in the REMM link.

## Specific Treatment Guidelines for Internal Radiation Contamination

The following agents are to be used after internal radiation contamination has been confirmed, and the specific isotope identified. Avoid breastfeeding after any internal contamination. Medications in bold are the preferred medications to give.

| Isotope | Medication | Dose/Route/Schedule for Preferred Medications | Contraindications/Side effects/Comments |
|---|---|---|---|
| Americium Curium Plutonium | **Ca-DTPA** ** (Calcium diethylenetriaminepenta acetate) | Adults: 1g IV once, Children <12 years: 14mg/kg not to exceed 1g IV once. Continued chelation based on contamination assessment, switch to Zn-DTPA for additional chelation therapy (see below). | No known contraindications. Pregnancy category C (use Zn-DTPA). More effective than Zn-DTPA during the first 24 hours after exposure. Causes mineral deficiency, monitor serum electrolytes including zinc and magnesium. Use with caution in patients with hemachromatosis. Avoid breastfeeding during treatment. |
| | **Zn-DTPA ** ** (Zinc diethylenetriaminepenta acetate) | Adults: 1g IV QD, Children <12 years: 14mg/kg not to exceed 1g IV QD. Continued chelation based on contamination assessment | No known contraindications. Use for continued therapy after Ca-DTPA used during first 24 hours after exposure, or as first line for pregnant patients and when Ca-DTPA is unavailable. Avoid breastfeeding during treatment. |
| Cesium Thallium | **Prussian Blue** [ferric hexacyanoferrate (II)], (Radiogardase)** | Adults: 3g PO TID, Children ages 2-12: 1g PO TID. Treat for a minimum of 30 days then re-assess contamination | No known contraindications. Side effects may include constipation and electrolyte abnormalities (monitor serum electrolytes). May color feces blue. Taken with food will stimulate biliary secretion and enhance isotope elimination. No data on safety among neonates and infants. Avoid breastfeeding during treatment. |
| Cobalt | **DTPA*** ETPA* (ethylenediaminetetraacetic acid) | See above information for DTPA. For Dose/Route/Schedule information for other suggested medications, see link below for additional information on isotopes. | |
| Iodine | **Potassium Iodide** (KI)** | Age 12-40 years: 130mg PO QD, 3-12 years: 65 mg PO QD, 1 month-3 years: 32 mg PO QD <1 month: 16 mg PO QD. Treat daily until exposure risk no longer exists. | Used to prevent thyroid cancer. Contraindicated for iodine hypersensitivity. May cause thyrotoxicosis in overdose. Follow TSH in neonates to avoid transient hypothyroidism. Repeat dosing not recommended for infants unless exposure persists. Treatment not recommended for patients older than 40 unless very high levels of exposure (>5 Gy). Pregnant and breast feeding women are to receive only one dose. |
| Strontium | **Aluminum Hydroxide*** Calcium IV* Calcium Carbonate* Calcium Phosphate* Barium Sulfate* Sodium Alginate* | Adults: 60-100 mL (1200 mg) Children: 50 mg/kg, not to exceed the adult dose. For Dose/Route/Schedule information for other suggested medications, see link below for additional information on isotopes. | |
| Tritium | **Oral fluids** (water) | Oral water to tolerance all patients | Administer oral water to tolerance and avoid water intoxication. Follow serum electrolytes. |
| Uranium | **Sodium Bicarbonate*** (NaHCO3) | Adults: 4g PO initially, followed by 2g PO Q4H until urine pH between 8 and 9. Pediatric doses: 84-840 mg/kg PO in divided doses Q4-6H until urine pH in desired range. IV: 2 ampules (44.3meq each; 7.5%) in 1000cc normal saline @ 125cc/hr until desired urine pH obtained. | Maintain urine pH between 8 and 9. Follow serum BUN/creatinine for signs of renal toxicity. |

*Agent not FDA approved for treatment of internal radiation contamination. For non-FDA approved agents, clinicians are advised to consult with a health physicist and a hospital pharmacist for dosing and schedule recommendations.
**Agent included in the managed inventory of the Strategic National Stockpile (SNS)
Report suspected cases of internal contamination to Philadelphia Department of Public Health (PDPH) at 215-685-6740, after hours: 215-686-4514. PDPH can coordinate ordering of SNS medications through the Office of Emergency Management and the Pennsylvania Department of Health (PA DOH)

For additional information on isotopes, see: https://www.remm.nlm.gov/int_contamination.htm#isotopestable
For more general information see: http://emergency.cdc.gov/radiation/
or call the Armed Forces Radiobiology Research Institute (AFRRI) at 301-295-0530.