



Philadelphia Department of Public Health
Division of Disease Control

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Health Notification

Fourth of July Special Events - Public Health Preparedness Recommendations June 27, 2014

The City of Philadelphia is preparing to host several large events as part of the Wawa Welcome America Festival occurring next week in celebration of the upcoming July 4th holiday. While the City of Philadelphia has received no information regarding any threats specific to these events, 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 Division of Disease Control (DDC) recommends that healthcare facilities review their emergency response and disaster preparedness plans before the upcoming holiday period with the possibly heightened potential for terrorism and disease transmission. Specific recommendations include:

- Evaluate facilities and personnel to ensure the safety and security of both
- Ensure that appropriate staff understand their roles in an emergency and communications protocols
- Update clinical providers on biological, chemical, and radiological agents. (Information on these threats is attached and additionally may be found at www.bt.cdc.gov, and www.atsdr.cdc.gov, and www.health.state.pa.us)
- Review procedures that address medical treatment of mass casualties, including 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

DDC reviews data daily from multiple sources to facilitate the recognition of disease outbreaks. However, DDC always relies on clinicians to report **by telephone** conditions that require immediate notification, as well as 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

Please contact the Division of Disease Control (DDC) to report conditions requiring immediate notification, or to obtain public health consultation. DDC will also facilitate diagnostic testing requiring public health laboratory services. During normal business hours, call 215-685-6740; after business hours, contact the Division of Disease Control on-call personnel at 215-686-4514 through Philadelphia City Hall.

Message #: PDPH-HAN-00196N-06-27-14
Philadelphia Department of Public Health

Division of Disease Control • 500 South Broad Street, Philadelphia, PA 19146
215-685-6740 (phone) • 215-686-4514 (after hours) • 215-238-6947 (fax) • www.phila.gov/health/DiseaseControl • hip.phila.gov

SUMMARY OF BIOLOGICAL WARFARE



CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
DIVISION OF DISEASE CONTROL

Agent	Clinical Syndrome	Incubation Period	Diagnostic Samples	Diagnostic Assay	Patient Isolation Precautions	Treatment	Post-Exposure Prophylaxis (PEP)	Comments
Anthrax	<u>Inhalational</u> - febrile prodrome, respiratory distress, bacteremia, meningitis. CXR - wide mediastinum <u>Cutaneous</u> - ulcer; <u>GI syndrome</u> – 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	<u>Pneumonic</u> – fulminant pneumonia, septicemia; <u>Bubonic</u> 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 postexposure 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	Preexposure 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 Health215-345-3318; 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.....609-588-3121; 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 DDC at 215-685-6740 (215-686-4514 if after hours) to report suspected cases, access diagnostic testing or obtain more information.

SUMMARY OF CHEMICAL WARFARE



CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
DIVISION OF DISEASE CONTROL

Agent	Signs	Symptoms	Onset	Diagnostic Tests	Treatment
Biotoxins: Ricin	Clusters of acute lung or GI injury; Circulatory collapse and shock, tracheobronchitis, pulmonary edema, necrotizing pneumonia; dehydration	Ingestion: Nausea, diarrhea, vomiting, fever, abdominal pain Inhalation: chest tightness, coughing, weakness, nausea, fever	Ingestion: 18-24 hours Inhalation: 8-36 hours	ELISA using respiratory secretions, serum, and direct tissue	Ingestion and Inhalation: No antidote Supportive care For Ingestion charcoal lavage.
Nerve Agents: Sarin; Tabun; Soman; Cyclohexyl Sarin; VX; Novichok agents	Pinpoint pupils; Bronchoconstriction; Respiratory arrest; Hypersalivation; Increased secretions; Diarrhea; Decreased memory/concentration/confusion; Loss of consciousness; Seizures	Moderate exposure: Diffuse muscle cramping, runny nose, difficulty breathing, eye pain, dimming of vision, watery eyes, blurred vision, sweating, cough, chest tightness, headache, muscle tremors High exposure: Same as above also, sudden loss of consciousness, seizures, flaccid paralysis (late sign)	Liquids: minutes to hours Aerosols: seconds to minutes	Red blood cell or serum cholinesterase (whole blood) Treat based on signs and symptoms; lab tests only for later confirmation	Inhalation and dermal absorption: Atropine (2mg) IV; repeat q 5 minutes, titrate until effective, average dose 6 to > 15mg [use IM in the field before IV access] establish airway for oxygenation Pralidoxime chloride (2-PAMCl) 600-1800mg IM or 1.0g IV over 20-30 minutes (max. 2g IM or IV per hour) Additional doses of atropine and 2-PAMCl depending on severity Diazepam or lorazepam to prevent seizures if >4mg atropine given Ventilatory support
Cyanides: Hydrogen cyanide; Cyanogen chloride	Moderate exposure: Metabolic acidosis, venous blood-O2 level above normal, hypotension, pink skin color 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 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 Treat based on signs or symptoms; lab tests only for later confirmation.	Ingestion, inhalation and dermal absorption: 100% oxygen by face mask; intubation with 100% FIO2 if indicated Amyl nitrate via inhalation, 1 ampule (0.2mL) q 5 minutes Sodium nitrite (300mg IV over 5-10 minutes) and sodium thiosulfate (12.5g IV) Additional sodium nitrite should be based on hemoglobin level and weight of patient.
Blister Agents/Vesicants: Sulfur mustard; lewisite; nitrogen mustard; mustard lewisite; phosgeneoxime; T2 Mycotoxins	Skin erythema and blistering; 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, 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 Lewisite: minutes	Body can often smell of garlic, horseradish or mustard; Oily droplets on skin from ambient sources; Urine thiodiglycol; Tissue biopsy* (*US Army Medical Research Institute of Chemical Defense)	Inhalation and dermal absorption: Mustards: no antidote Lewisite and lewisite mustard: British Anti-Lewisite (BAL or Dimercaprol) IM (rarely available) Thermal burn therapy; supportive care (respiratory support and eye care) T2 Mycotoxins: No antidote Supportive care
Lung/Choking/ Pulmonary Agents: Chlorine; Phosgene; Sulfur dioxide; 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: No antidote Management of secretions; O2 therapy; Treat pulmonary edema with PEEP to maintain PO2 above 60mm Hg.
Riot Agents: Chloroacetophenone Chlorobenzylidenemalonitrile (CS) 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: No antidote, clothing removal and eye irrigation. Respiratory support with supplemental oxygen, bronchodilators if severe respiratory injury. Effects usually short-lived.

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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/>. CDC Public Response Hotline 1-800-246-2675.

SUMMARY OF ACUTE MEDICAL MANAGEMENT FOR RADIATION EXPOSURES



CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
DIVISION OF DISEASE CONTROL

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 or GM-CSF or pegylated G-CSF)***	Supportive Care, Quinolone, Initiate cytokine therapy (G-CSF or GM-CSF or pegylated G-CSF)	Supportive Care, Quinolone, Initiate cytokine therapy (G-CSF or GM-CSF or pegylated G-CSF)	Supportive Care, No quinolone, No cytokines.

*Follow Infectious Diseases Society of America guidelines for febrile neutropenia (ANC <500 x 10⁹ 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 Strategic National Stockpile Radiation Emergency Medical Management <http://www.remm.nlm.gov/sns.htm>
All cytokines are not FDA approved to treat radiation exposures, and require an FDA Emergency Use Authorization (EUA)

Agent 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

Isotope	Agent	Dose/Route/Schedule	Contraindications/Side effects/Comments
Americium Curium Plutonium	Ca-DTPA ** (Calcium diethylenetriaminepentaacetate)	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 hemochromatosis. Avoid breastfeeding during treatment.
Americium Curium Plutonium	Zn-DTPA ** (Zinc diethylenetriaminepentaacetate)	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	GI lavage and purgatives (charcoal, laxatives). Consider penicillamine* for high dose/potentially fatal exposures.	See footnote	Penicillamine as a cobalt chelator is not FDA approved, but could be considered in high dose exposure cases (>5Gy). Consult with a health physicist and Physician's Desk Reference (PDR) for indications and dosing. Side effects include leukopenia, thrombocytopenia, nephrotic syndrome. Contraindicated in pregnancy (category D). Avoid breastfeeding during treatment.
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 Phosphate* Magnesium Sulfate* Calcium IV*	See footnote	
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 health physicist and hospital pharmacist for dosing and schedule recommendations.

**Agent included in the managed inventory of the Strategic National Stockpile (SNS)

Report suspect cases of internal contamination to PDPH at 215 685 6740, after hours: 215 686 4514.

PDPH can coordinate ordering of SNS medications through Emergency Management and PA DOH

For more information on additional isotopes see: http://www.usuhs.edu/afri/outreach/pdf/nrcp_Report161_2013.pdf

For more general information see: <http://www.bt.cdc.gov/radiation/>

or call the Armed Forces Radiobiology Research Institute (AFRRI) at 301 295 0530.