

TERRORISM WITH IONIZING RADIATION GENERAL GUIDANCE

- **Diagnosis: Be alert to following**
 - The acute radiation syndrome (table 1) follows a predictable pattern after substantial exposure or catastrophic events
 - Victims may also present individually, as described in table 2, over a longer period of time after exposure to contaminated sources hidden in the community
 - Specific syndromes of concern, especially with a 2-3 week prior history of nausea and vomiting, are
 - thermal burn-like skin lesions without documented thermal exposure
 - immunological dysfunction with secondary infections
 - a tendency to bleed (epistaxis, gingival bleeding, petechiae)
 - marrow suppression (neutropenia, lymphopenia, and thrombocytopenia)
 - epilation (hair loss)

- **Understanding exposure**
 - Exposure may be known and recognized or clandestine through
 - large recognized exposures, such as a nuclear bomb or damage to a nuclear power station
 - small radiation source emitting continuous gamma radiation producing group or individual chronic intermittent exposures (such as radiological sources from medical treatment devices or environmental water or food pollution)
 - Exposure to RADIATION may result from any one or combination of the following
 - external sources (such as radiation from an uncontrolled nuclear reaction or radioisotope outside the body)
 - skin contamination with radioactive material (“external contamination”)
 - internal radiation from absorbed, inhaled, or ingested radioactive material (“internal contamination”)

- **Confirmation of cases**
 - Contact radiation safety officer (RSO) for help
 - For help in predicting clinical effects, contact
 - nuclear medicine physician
 - Medical Radiological Advisory Team (MRAT) at Armed Forces Radiobiology Research Institute (AFRRI) 301-295-0530
 - Obtain complete blood count
 - absolute lymphocyte count $<1000 \text{ mm}^3$ suggests moderate exposure
 - absolute lymphocyte count $<500 \text{ mm}^3$ suggests severe exposure
 - Acute, short-term rise in neutrophil count
 - Swab mucosa (all body orifices – each nostril, both ears, mouth, rectum)
 - Collect 24 hour stool if GI contamination considered.
 - Collect 24-hour urine if internal contamination with radionuclides is considered

- **Decontamination considerations**

- Exposure without contamination requires no decontamination (RSO measurement)
- Exposure with contamination requires Universal Precautions, removal of patient clothing, and decontamination with water
- For internal contamination, contact the RSO and/or Nuclear Medicine Physician
- Patient with life-threatening condition: treat, then decontaminate
Patient with non-life-threatening condition: decontaminate, then treat

- **Treatment considerations**

- If life-threatening conditions are present, treat them first
- If external radioactive contaminants are present, decontaminate
- If radioiodine (reactor accident) is present, consider giving prophylactic potassium iodide (Lugol's Solution) within first 24 hours only (ineffective later) (Table 3)
- Review <http://www.afri.usuhs.mil> or <http://www.orau.gov/reacts/guidance.htm>

- **Institutional reporting**

- If reasonable suspicion of a radiation event, contact hospital leadership (Chief of Staff, Hospital Director, etc)
- Immediately discuss hospital emergency planning implications

- **Public Health Reporting**

- Contact local public health office (city, county, or State)
- If needed, the FBI (for location of the office nearest you, see <http://www.fbi.gov/contact/fo/info.htm>)

The information in this card is not meant to be complete but to be a quick guide; please consult other references and expert opinion

TABLE 1: ACUTE RADIATION SYNDROME

Whole body radiation from external radiation or internal absorption							
Phase of Syndrome	Feature	Subclinical range		Sublethal range		Lethal range	
		0 – 100 rad (cGy)	100 – 200 rad (cGy)	200-600 rad (cGy)	600-800 rad (cGy)	600-3000 rad (cGy)	>3000 rad (cGy)
Initial or prodromal phase	Nausea, vomiting	none	5-50%	50 – 100%	75-100%	90-100%	100%
	Time of onset		3-6 hrs	2-4hrs	1-2 hrs	<1 hr	<1 hr
	Duration		<24 hrs	<24 hrs	<48 hrs	<48 hrs	<48 hrs
	Lymphocyte count			< 1000 at 24 h	< 500 at 24h		
	CNS function	No impairment	No impairment	Routine task performance Cognitive impairment for 6-20 hrs	Simple and routine task performance Cognitive impairment for >24 hrs	Progressive incapacitation	
Latent phase	Period of no symptoms	> 2 wks	7-15 days	0-7 days	0-2 days	none	
Acute radiation illness (“manifest illness”)	Signs and symptoms	none	Moderate leukopenia	Severe leukopenia, purpura, hemorrhage Pneumonia Hair loss after 300 rad (cGy)		Diarrhea Fever Electrolyte disturbance	Convulsions, ataxia, tremor, lethargy
	Time of onset		> 2 wks	2 days – 2 wks		2-3 days	
	Critical period		none	4-6 wks		5-14 days	1-48 hrs
	Organ system	none		Hematopoietic and respiratory (mucosal) systems		GI tract Mucosal systems	CNS
Hospitalization	%	0	<5%	90%	100%	100%	100%
	Duration		45-60 days	60-90 days	90+ days	2 weeks	2 days
Mortality		low	low	high	Very high	Very high	

Table 2: Symptom clusters as delayed effects after radiation exposures

Headache	1°, 2°, 3° burns
Fatigue	Epilation (hair loss)
Weakness	Ulceration
Anorexia	Lymphopenia
Nausea	Neutropenia
Vomiting	Thrombocytopenia

Diarrhea	Purpura Opportunistic infections
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TABLE 3: Iodine dosages mg

Age group	Dosage in mg
Infants < 1 month	16
Children 1 mo – 3 yrs	32
Children 3-18 yrs	65
Adults	130