Radiation Injury Treatment Network

CYTOKINE ADMINISTRATION TRIAGE GUIDELINES FOR ACUTE RADIATION SYNDROME (ADULT & PEDIATRIC)

For use in the immediate aftermath of a radiological disaster with mass casualties. These triage guidelines assume constrained resources.

Life saving intervention → **Decontamination** → **Treat trauma & burn injuries** → **Assess estimated absorbed dose** → **Treat ARS**

ASSESS ESTIMATED WHOLE BODY ABSORBED DOSE

Absolute Assessment of Lymphocyte Count x10⁹ cells/L — Time since initial radiation exposure: 24 Hours	96 Hours	192 Hours	Assess Time to Vomiting	Est. Whole Body Rad Dose Range (Gray)	Treatment Category	Treatment Notes
> 1.90	> 0.89	> 0.33	> 5 hrs	< 2	Release and monitor	
1.48 -1.90	0.33 - 0.89	0.044 - 0.33	1 – 2 hrs	2 – 4	Myeloid Cytokine & Supportive Care	Iterative Clinical & Lab Assessment
1.15 – 1.48	0.12 - 0.33	0.006 - 0.044	2 – 5 hrs	4 - 6		
0.89 - 1.15	0.044 - 0.12	< 0.001 - 0.006	< 1 hrs	6 – 8		Provide comfort care where feasible Re-evaluate based on available resources
< 0.89	< 0.044	< 0.0001	< 1 hrs	8+		

CYTOKINE DOSING GUIDANCE

normal supply availability

	Neupogen (Filgrastim)	Neulasta (Pegfilgrastim)	Leukine (Sargramostim)
Adult	10 mcg/kg/day subcutaneous	6 mg subcutaneously (Two doses one week apart)	7 mcg/kg subcutaneous
Pediatric	10 mcg/kg/day subcutaneous	31 – 44 kg 4 mg subcutaneous 21 – 30 kg 2.5 mg 10 – 20 kg 1.5 mg < 10 kg = 0.1 mg/kg	7 mcg/kg subcutaneous
Packaging	Single-dose prefilled syringe: 300 mcg/0.5 mL 480 mcg/0.8 mL	6 mg/0.6 mL	Vial: 500 mcg per mL in multiple-dose vial

IMPORTANT CONSIDERATIONS

- Co-morbidities may alter survival and may be considered if resources are limited.
- If cytokines are not available, consider antimicrobials.
- Time zero is time exposure BEGAN and second time is time when blood is drawn.
- If patient has >2Gy estimated rad. dose with combined injuries (>20% Total Body Surface Area) see Figure 2 in Trauma & Combined Injury by Coleman, C. N., et. al. in link below.
- Patients with >6 Gy exposure should receive cytokines if there are supplies available.
- Dose reconstruction has many complicating factors; in particular when to start counting exposure time, calculation of handling gaps in exposure (i.e. due to sheltering in place), patient location at time of detonation and the dose rate along the patients path through contaminated areas (for more information see https://www.remm.nlm.gov/dosereconstruction.htm).
- 24, 96, 192 hours radiation dose estimates from Medical Management of ARS by Waselenko, J. K. et. al. see Comments.

COMMENTS

- Trauma & Combined Injury (radiation + burn/trauma) considerations: Coleman, C. N., et. al. (2011). Triage and treatment tools for use in a scarce resources-crisis standards of care setting after a nuclear detonation. DMPHP, 5(S1), S111-S121. https://ritn.net/workarea/downloadasset.aspx?id=2147484335

- **FDA Inserts** for additional details related to pediatrics, pregnancy, storage, and adverse event information (dosing for H-ARS determined based on the Animal Rule):
  - **Filgrastim:** https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/103353s5188.pdf
  - **Pegfilgrastim:** https://www.accessdata.fda.gov/drugsatfda_docs/label/2015/125031s180lbl.pdf
  - **Sargramostim:** https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/103362s5240lbl.pdf

- REMM dose estimator from absolute lymphocyte count or time to vomiting. https://www.remm.nlm.gov/ars_wbd.htm

- For alternative triage system: Hick JL, et. al.. Proposed "Exposure And Symptom Triage" (EAST) Tool to Assess Radiation Exposure After a Nuclear Detonation. DMPHP. 2018 Jun;12(3):386-395. https://www.remm.nlm.gov/EAST-tool-notes.htm

- Radiation dose estimates. Waselenko, J. K., et. al.. (2004). Medical management of the acute radiation syndrome: recommendations of the Strategic National Stockpile Radiation Working Group. Annals of internal medicine, 140(12), 1037-1051. https://ritn.net/workarea/downloadasset.aspx?id=2147483832

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