

Acute Radiation Syndrome (ARS)

The ARS describes a collection of symptoms of radiation sickness observed within days or weeks following high radiation doses (> 1 Gy) at high dose rates to the whole body, usually from external sources. The symptoms are associated mainly with four organ systems with different threshold doses. In order of dose required to cause complete failure of system the organs are bone marrow (hematopoietic response), GI, pulmonary, and neurovascular system. The effects are divided into four stages: prodromal, latent, manifest illness, and recover in the table below.

Acute Radiation Syndrome ^a				
Syndrome	Prodromal Stage	Latent Stage	Manifest Illness	Recovery
<i>Hematopoietic</i> > 0.7 Gy (> 70 rad) May occur as low as 0.3 Gy	Symptoms are anorexia, nausea and vomiting; onset occurs 1 h to 2 d after exposure; stage lasts for minutes to days	Stem cells in bone marrow are dying, although patient may appear and feel well; stage lasts 1 to 6 weeks	Drop in all blood cell counts for several weeks; primary cause of death is infections and hemorrhage; survival decreases with increasing dose; most deaths occur within a few months	In most cases, bone-marrow cells will begin to repopulate the marrow; should be full recovery for most in a few weeks to 2 y; death may occur in some at 1.2 Gy (120 rad); LD _{50/60} is ~2.5 to 5 Gy
<i>Gastrointestinal</i> > 10 Gy (> 1,000 rad) Some symptoms may occur as low as 6 Gy	Symptoms are anorexia, severe nausea, vomiting, cramps and diarrhea; onset occurs within a few hours; stage lasts ~ 2 d	Stem cells in bone marrow and cells lining GI tract are dying, although patient may appear and feel well; stage lasts < 1 week	Severe diarrhea, fever, dehydration and electrolyte imbalance; death occurs within 2 weeks	LD ₁₀₀ is ~ 10 Gy (1,000 rad)
<i>Cardiovascular/ Central nervous System</i> > 50 Gy (5,000 rad)	Symptoms are extreme nervousness, confusion, severe nausea, vomiting, watery diarrhea, loss of consciousness and burning sensation of the skin; onset occurs within minutes; stage lasts for minutes to hours	Patient may return to partial functionality; stage may last for hours but often less	Symptoms are return of watery diarrhea, convulsions, and coma; onset occurs 5 to 6 h after exposure; death occurs within 3 d	No recovery is expected

^aAdapted from CDC “A Fact Sheet for Physicians,
www.bt.cdc.gov/radiation/arsphysiciansfactsheet.asp, 2005
