



Energy Education Center/Emergency Operations Facility/Joint Information Center
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Radiation Fact Sheet

What is Radiation?

Radiation is a type of energy moving in the form of particles or waves. Ionizing radiation is energy emitted from unstable atoms.

We are immersed in a constant sea of radiation:

- » Cosmic from the sun
- » Terrestrial from the earth
- » Medical diagnosis and procedures
- » Consumer products (watches, televisions, food, smoke detectors, airline travel)
- » Atomic weapons fallout (negligible in recent years)
- » Commercial nuclear power plants (2/1000 of cosmic dose at 1-mile)

Exposure vs. Contamination

Exposure – Exposure to ionizing radiation (Gamma, X-Rays, and Neutrons) can penetrate the body. Alpha and Beta are particles, and they do not penetrate very far into the body.

If someone is exposed to external radiation they:

- » Do not become radioactive
- » Pose no hazard to nearby individuals
- » Do not become contaminated

Contamination – Unwanted radioactive material in or on the body, or spread about the environment (radioactive material in unwanted places).

If someone is externally contaminated, they can spread contamination:

- » About 80% can be removed by taking off clothing
- » Most remaining contamination can be removed by gently washing skin and hair

Internal Contamination – Can result from inhalation, ingestion, absorption, puncture or open wound.

Internally contaminated persons present a minimal risk to responders, but are usually externally contaminated as well.



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Biological and Health Effects

Acute and Chronic Radiation Doses

- » Acute Radiation Dose – a large dose received in a short period of time (minutes, hours, days)
 - Overwhelming damage; cells may die before repair can occur
- » Chronic Radiation Dose – a small dose received over a long period of time (months, years)
 - Less damage; fewer number of cells needing repair

How Radiation Affects the Body

- » Genetic effects
- » Cancer (slight risk compared to natural occurrences)
- » Embryo (can be damaged by high doses)

Damage to Cells Exposed to Radiation – Cells can react in four possible ways

- » May pass through the cell without doing damage
- » May damage the cell, but the cell may be able to repair the damage before producing new cells
- » May damage the cell in such a way that the damage is passed on when new cells are formed
- » Cells may die as a result of the damage

Factors Affecting Biological Damage

- » Total Dose – the greater and longer the dose, the greater damage
- » Gender – females are more susceptible
- » Age – developing embryo/fetus, young children and the elderly more susceptible
- » Organs Irradiated – sensitive organs including the intestinal tract, blood, hair follicles, reproductive organs

How to Reduce Exposure

ALARA – As Low As Reasonably Achievable

- » **Time** – Decrease the time spent near the radioactive source
- » **Distance** – Increase the distance between you and the radioactive source
- » **Shielding** – Increase the physical shielding between you and the radioactive source