



FACT SHEET

Radiation and Health Effects

- Radiation is a form of energy.
- Radiation comes from man-made sources such as x-ray machines, from the sun and outer space, and from some radioactive materials such as uranium in soil.
- Small quantities of radioactive materials occur naturally in the air we breathe, the water we drink, the food we eat, and even in our own bodies. Radiation that goes inside our bodies causes what we refer to as **internal** exposure.
- **External** exposure is from radiation from sources outside our body, such as radiation from sunlight and man-made and naturally occurring radioactive materials.
- Radiation doses that people receive are measured in units called "rem" or "sievert." (One sievert is equal to 100 rem.) Scientists estimate that the average person in the United States receives a dose of about one-third of a rem per year.
- Eighty percent of typical human exposure comes from natural sources and 20 percent comes from artificial radiation sources, primarily medical X-rays

Health Effects of Radiation Exposure

- Radiation affects the body in different ways, but the adverse health consequences of exposure may not be seen for many years.
- Adverse health effects range from mild effects, such as skin reddening, to serious effect such as cancer and death. These adverse health effects are determined by the amount of radiation absorbed by the body (the dose), the type of radiation, the route of exposure, and the length of time a person is exposed.
- Acute radiation syndrome (ARS), or radiation sickness, is usually caused when a person receives a high dose of radiation to much of the body in a matter of minutes. Survivors of the Hiroshima and Nagasaki atomic bombs and firefighters responding to the Chernobyl nuclear power plant event in 1986 experienced ARS. The immediate symptoms of ARS are nausea, vomiting, and diarrhea; later, bone marrow depletion may lead to weight loss, loss of appetite, feeling like you have the flu, infection, and bleeding. The survival rate depends on the radiation dose. For those who do survive, full recovery takes from a few weeks to 2 years.
- Children exposed to radiation may be more at risk than adults. Radiation exposure to the unborn child is of special concern because the human embryo or fetus is extremely sensitive to radiation.
- Radiation exposure, like exposure to the sun, is cumulative.

Protecting Against Radiation Exposure

The three basic ways to reduce radiation exposure are through:

- **TIME: Decrease** the amount of time you spend near the source of radiation.
- **DISTANCE: Increase** your distance from a radiation source.
- **SHIELDING: Increase** the shielding between you and the radiation source. Shielding is anything that creates a barrier between people and the radiation source. Depending on the type of radiation, the shielding can range from something as thin as a plate of window glass or as thick as several feet of concrete. Being inside a building or a vehicle can provide shielding from some kinds of radiation.

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Other Sources of Information about Radiation

- [The Environmental Protection Agency counterterrorism programs](#)
- [The Nuclear Regulatory Commission](#) can be reached at (301) 415-8200.
- The Federal Emergency Management Agency ([FEMA](#)) can be reached at (202) 646-4600.
- The Radiation Emergency Assistance Center/Training Site ([REAC/TS](#)) can be reached at (865) 576-3131 (ask for REAC/TS).
- [The U.S. National Response Team](#).
- The U.S. Department of Energy ([DOE](#)) can be reached at 1-800-dial-DOE.
- The state radiation control director can be found by contacting The Conference of Radiation Control Program Directors ([CRCPD](#)) at (502) 227-4543.

For information on other radiation emergency topics, visit www.bt.cdc.gov/radiation, or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)