Radiation

CDC 24/7: Saving Lives. Protecting People from Health Threats. Saving Money through Prevention.

Environmental Health

Your environment is everything around you — the air you breathe, the water you drink, the community you live in, the places where your food is grown or prepared, your workplace, and your home. When your environment is safe and healthy, you are more likely to stay healthy. But when your environment exposes you to hazardous substances or dangerous events, your health can be negatively affected.

CDC is committed to saving lives and protecting people from environmental hazards by responding to natural and man-made disasters, supporting state and city public health programs, educating communities, and providing scientific knowledge. We help maintain and improve the health of Americans by promoting a healthy environment and preventing premature death and avoidable illness caused by environmental and related factors. We also identify how people might be exposed to hazardous substances in the environment and assess exposures to determine if they are hazardous to human health. CDC invests in prevention to improve health and save money by reducing health care costs. We remain committed to maximizing the impact of every dollar entrusted to the agency.

Radiation exists all around us. People are exposed to varying amounts of radiation from outer space, rocks and soil, food, water, air, airline travel, medical procedures, fallout from past nuclear weapons testing, and radiation emergencies. CDC protects the public's health from exposures to radiation by identifying and studying harmful exposures, using unique laboratory science to measure exposures, and providing important health communication and education. The 2011 events in Fukushima, Japan underscored the need to maintain CDC's expertise in radiation.

- CDC's **Radiation Studies Program** identifies and studies exposure to radiation and helps people understand their individual risks from radiation in the environment and from manmade sources. For more than 30 years, this program has provided health physics expertise unique to CDC and to HHS, including the Hanford Thyroid Disease Study and dose reconstructions of the Department of Energy's nuclear weapons complex.
- CDC's **Environmental Health Laboratory** uses high-quality laboratory science to measure radionuclides in people to help detect unsafe exposures to radiation.
- CDC helps state and local health departments to prepare for and respond to radiological emergencies by providing extensive training resources, laboratory support, technical assistance, and by deploying public health responders to the emergencies.

Please see *CDC/ATSDR Emergency Preparedness and Response* for more information. (http://www.cdc.gov/nceh/information/program_overviews.htm)

Investigation of Radioactive Contamination After Heart Scans. Every year, about 45,000 CardioGen-82 Positron Emission Tomography (PET) scans are performed in the United States. CardioGen-82 is a medical device used to examine a patient's heart using the radioactive material Rubidium. These devices were voluntary recalled after three people with elevated radioactivity set off traveler screening devices at U.S. airports. The Food and Drug Administration (FDA) asked CDC to help it determine the magnitude and extent of the internal contamination of patients who received CardioGen-82 PET scans. CDC partnered with state and local health officials to assess radiation exposure of 308 people who received CardioGen-82 PET scans in Alabama, Florida, Tennessee, and Pennsylvania. Investigation results found that the radiation levels among the study participants were low and did not exceed regulatory limits established by the Nuclear Regulatory Commission. This investigation:

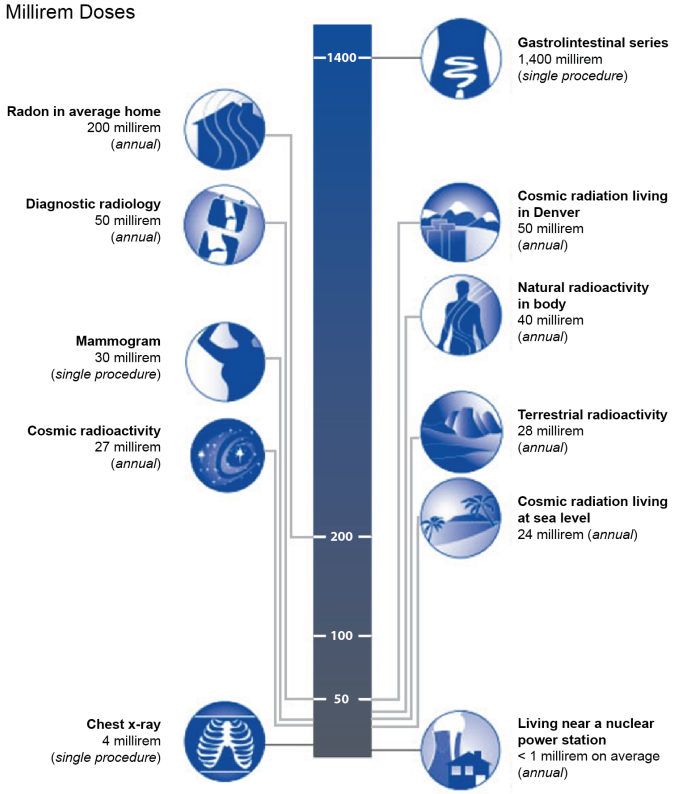
- Reassured the public regarding commonly used nuclear diagnostic imaging technique;
- Provided important information for FDA to evaluate issues related to returning CardioGen-82 to the market;
- Provided important lessons about assessing internal contamination and exposure in people that will be useful in a radiation emergency; and
- Enhanced relationships between state and federal public health radiation protection partners, which are crucial to the resiliency of national radiation preparedness programs.

Laboratory capability to detect and monitor radiologic exposures. CDC's Environmental Health Laboratory uses high-quality, unique laboratory science to measure radionuclides in people (biomonitoring) to help identify unsafe exposures, establish national reference ranges, and track the presence and amount of certain radionuclides in humans over time.

The Environmental Health Laboratory:

- Measures uranium in the urine of participants in the National Health and Nutrition

RELATIVE DOSES FROM RADIATION SOURCES
Millirem Doses



Source: (U.S. Environmental Protection Agency
http://www.epa.gov/radiation/understand/perspective.html)

Radiation has two forms—ionizing and non-ionizing radiation. Non-ionizing radiation has less energy than ionizing radiation. Its uses include lasers, microwaves, infrared lamps and radio waves. The more energetic form of radiation is ionizing radiation. Ionizing radiation is used to generate electric power, treat cancer, take x-rays, and disinfect medical instruments.

Background radiation is what we receive naturally from the earth and cosmic sources. It is the greatest source of human exposure. On average, half of human exposure to radiation is from natural, background radiation. Medical sources of radiation are the second largest source of radiation exposure.[1]

The average annual radiation dose from medical diagnostic imaging exposures to the U.S. population increased three-fold from 1982 to 2005.[2]

The dose from backscatter scans—one type of body-scanning machines used at airports—is about 100,000 times less than what a person receives from natural background radiation in one year.[3]

Radon is estimated to cause more than 20,000 lung cancer deaths each year.[4, 5]

External radiation detection devices cannot detect some radionuclides in the body. CDC's laboratory measurements rapidly and accurately detect radionuclides in urine following ingestion or inhalation of radionuclide-contaminated food, water, or dust.

Examination Survey (NHANES) to provide an ongoing assessment of the U.S. population's exposure by age, sex, and race/ethnicity. CDC's uranium biomonitoring data establish a national reference range that scientists, physicians, and health officials can use to help identify unusual exposures.

- Measures uranium in studies of unsafe exposures and health effects. For example, in collaboration with the University of New Mexico, CDC is measuring uranium in participants of the Navajo Birth Cohort study to investigate associations between adverse birth outcomes or developmental delays in Navajo Nation communities affected by uranium waste.
- Measured radiation exposure to support CDC's investigation of public exposure to radioactive strontium as a result of defective CardioGen-82 generators and provided on-site laboratory training and clinical sample collection for the Florida/FDA EPI-Aid Response.
- Helped the Department of Defense (DOD) assess exposures to radioactive uranium and thorium.
- Assists DOD with inter-laboratory quality assurance and quality control studies to assess radiation exposures.
- Assessed possible radionuclide exposures in several employees of another federal agency who were returning to the U.S. following the Japan nuclear reactor incident.
- Measured uranium along with other elements as part of an assessment of exposure to multiple metals in a high-risk community of Madre de Dios, Peru.
- Measured total uranium in a subset of 500 pregnant women enrolled in the National Children's Study pilot.
- Measured uranium, thorium, and mercury in federal agents thought to have been exposed to these metals.

For more information, visit:
Radiation and Your Health
http://www.cdc.gov/nceh/radiation/
Emergency Preparedness and Response
http://emergency.cdc.gov/radiation/
Division of Laboratory Sciences:
http://www.cdc.gov/nceh/dls/

Reference List

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2. National Council on Radiation Protection & Measurements. 2009. Report No. 160: Ionizing Radiation Exposure of the Population of the United States. Available at: http://www.ncrppublications.org/Reports/160. Accessed 13 Feb. 2013.
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4. US Environmental Protection Agency. 2012. Radon (Rn) Health Risks. Available at: http://www.epa.gov/radon/healthrisks.html. Accessed 02. Feb. 2013
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