

This fact sheet answers the most frequently asked health questions (FAQs) about plutonium. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Plutonium is a radioactive material that is produced in nuclear reactors; only trace amounts occur naturally. It has been found to cause lung, liver, and bone cancer in workers. Plutonium has been found in at least 16 of 1,689 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is plutonium?

Plutonium is a silvery-white radioactive metal. Most plutonium is found combined with other substances. Trace amounts of plutonium occur naturally, but large amounts have been produced in nuclear reactors. Trace levels of plutonium can be found in the environment, from past nuclear bomb tests, in several forms called isotopes. The most common plutonium isotopes are plutonium-238 and plutonium-239.

Each radioactive isotope of an element constantly gives off radiation, which changes it into an isotope of a different element or a different isotope of the same element. This process is called radioactive decay.

The half-life is the time it takes for half of the atoms of a radionuclide to undergo radioactive decay and change it into a different isotope. The half-life of plutonium-238 is 87.7 years. The half-life of plutonium-239 is 24,100 years. The half-life of plutonium-240 is 6,560 years.

What happens to plutonium when it enters the environment?

- Plutonium released during atmospheric testing of nuclear weapons, which ended in 1980, is the source of most of the plutonium in the environment worldwide.
- Plutonium is also released to the environment from research facilities, waste disposal, nuclear fuel reprocessing facilities,

nuclear weapons production facilities, and accidents at facilities where plutonium is used.

- Plutonium can be transported in the atmosphere usually when it is attached to particles in the air.
- It can be deposited on land or water by settling or by rain.
- Plutonium can stick to particles in soil, sediment, and water.
- Plutonium isotopes will undergo radioactive decay in the environment.

How might I be exposed to plutonium?

- Everyone is exposed to very low levels of plutonium in air. Very low levels may also be found in drinking water and food.
- Exposure to higher levels could occur from an accidental release during its use, transport, or disposal.
- Workers at nuclear facilities using plutonium may be exposed to higher levels of it.
- People who live near facilities that use plutonium in their operations may be exposed to it from releases to the air.

How can plutonium affect my health?

You may develop cancer depending on how much plutonium is in your body and for how long it remains in your body. The types of cancers you would most likely develop are cancers of the lung, bones, and liver. These types of cancers have occurred

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in workers who were exposed to plutonium in air at much higher levels than is in the air that most people breathe.

How likely is plutonium to cause cancer?

The Department of Health and Human Services (DHHS), International Agency for Research on Cancer (IARC), and the EPA's Office of Air and Radiation consider plutonium to be a human carcinogen.

How can plutonium affect children?

Studies in young animals have shown that a larger amount of the plutonium deposited in the lung will move to growing bones. Therefore, it is possible that the bones of children could be more severely affected by plutonium than the bones of adults; however, this has not been shown in humans or laboratory animals.

Studies in animals have also shown that a larger amount of plutonium that enters the gut of newborn animals is absorbed into the body.

We do not know if plutonium causes birth defects or affects the ability to have children, although some plutonium that reaches the blood can be found in ovaries and testes.

How can families reduce the risks of exposure to plutonium?

- People do not generally live near facilities that use plutonium in their operations. Some people may be slightly more exposed to plutonium due to releases of plutonium through filtered stack-emissions or waste water. Any releases are to be within regulatory limits. Disposal sites are deep underground and away from the public.
- Breathing plutonium-contaminated air is the most dangerous way to be exposed to plutonium. If you know or suspect that plutonium has been released to the air, you should leave the area immediately.

Is there a medical test to determine whether I've been exposed to plutonium?

Plutonium can be measured in the urine and feces even at very low levels. These measurements can be used to estimate the total amount of plutonium that has entered the body.

The levels of plutonium in body can be used to predict the kind of health effects that might develop from that exposure.

Has the federal government made recommendations to protect human health?

The U.S. Nuclear Regulatory Commission (USNRC) has recommended an exposure limit of 0.1 rem/year for the general public and 0.5 rem/year for people who work with medical patients. These regulations are for all forms of radiation combined, so they are not only for plutonium.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Plutonium (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

