

What is radiation sickness?

Radiation sickness — known as acute radiation syndrome (ARS) — occurs after exposure to a large amount of radiation within a short period. Early symptoms can include skin irritation, nausea, vomiting, high fever, hair loss and burns to the skin. Other symptoms can include diarrhea, weakness, fatigue, loss of appetite, fainting, dehydration, inflammation of tissues, bleeding from the nose, mouth, gums or rectum, and anemia. People exposed to radiation will get ARS only if:

- The radiation dose was high.
- The radiation was penetrating, reaching internal organs.
- The person's entire body, or most of it, received the dose.
- The radiation was received in a short time, usually within minutes.

The first symptoms will start within minutes to days after exposure and may come in waves, with a seriously ill stage lasting from a few hours up to a few months. People with radiation poisoning will generally show skin damage within a few hours of exposure. This can include swelling, itching and a redness of the skin, similar to a sunburn.

What is a high dose of radiation?

High is relative. All of us are exposed to radiation on a regular basis. Every time you get an X-ray, you are exposed to radiation. There may be more radon gas in your basement than there should be — but it might not be enough to make you sick, unless you're exposed to it for decades. But doses from radiation therapy to treat cancer may be high enough to cause some ARS symptoms.

Even a minuscule amount of certain materials can result in exposure to a high dose of radiation. Traces of polonium-210 were found in the urine of former Russian spy Alexander Litvinenko, who died in a London hospital on Nov. 23, 2006. He accused the Russian government of poisoning him to silence him. Litvinenko fell ill shortly after eating a sushi dinner with a contact.

As polonium-210 decays, it gives off a great deal of energy. A half-gram will reach a temperature of 480 C quickly. A very small amount would make you very sick.

A very high dose of radioactive materials would need to be ingested or inhaled to cause damage. Radiation generally has a very short range, so it only harms nearby tissue. Your whole body would need to be exposed, and the high dose (more than 1,000 millisievert) would have to be received in a short time, like a few minutes.

How much is dangerous?

Any amount of radiation can be dangerous because it can disrupt normal cell processes.

But at low doses, the body can replace any cells that die because of exposure.

At high doses, the body can't replace the dying cells fast enough and tissues and organs may begin failing. To get light radiation sickness symptoms, you would need to be exposed to more than 1,000 mSv of radiation within a short time.

The dose from an X-ray is too low to cause radiation sickness, while doses from cancer treatments might be high enough to cause some symptoms. Emissions from cellphones and microwaves are also low.

What does radiation do to the body?

Radiation causes atoms, the basic building block of the body's cells, to become electrically charged which can be potentially dangerous.

Natural background radiation causes only low levels of damage, which can be repaired by the body.

However, when the body is exposed to unnaturally high levels of radiation it cannot combat the damage caused.

Among the cells that are most sensitive to radiation are those that line the intestine (crypt cells), white blood cells that fight infection and the cells that make red and white blood cells.

The impact on these cells leads to the classic early symptoms of radiation sickness.

For instance, damage to the intestine cells stimulates nausea, vomiting and dehydration.

Radiation penetrates the body and is wholly or partially absorbed by soft and hard tissue.

Radioactive fallout in the form of particulate matter can be swallowed or breathed in.

What are the symptoms?

There are many symptoms of radiation sickness, and their severity varies greatly depending on the dosage. The initial symptoms include:

- Nausea
- Vomiting
- Diarrhea
- Fatigue

These symptoms may be followed by:

- Headache
- Shortness of breath
- Rapid heartbeat
- Inflammation of the mouth and throat
- Worsening of tooth or gum disease
- Hair loss
- Dry cough
- Heart inflammation with chest pain
- Burning
- Permanent skin darkening
- Bleeding spots anywhere under the skin
- Haemorrhage
- Anaemia

In severe cases, where the radiation exposure has been severe - approximately 10 gray (gray are measures of radiation) or more - death may occur within two to four weeks.

Those who survive six weeks after the receipt of a single large dose of radiation to the whole body may generally be expected to recover