

Russia's war renews nuclear disaster fears. What to know about the dangers of radiation.

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Russia's war in Ukraine has renewed fears of nuclear disaster in a world that hasn't seriously grappled with the health effects of radiation since the 2011 Fukushima crisis.

Disaster could come in several forms:

- A radioactive release from a [nuclear reactor](#)
- A conventional bomb loaded with radioactive material
- And the [worst-case scenario](#): a nuclear bomb

Experts say the deliberate use of nuclear weapons represents the worst possible outcome because it could lead to retaliation and escalate into a global nuclear war.

In the absence of that kind of war, experts say there are medicines that can help protect people from some types of nuclear disaster. And understanding the risks and the kinds of [radiation](#) people are exposed to are key to treating potential exposures.

In the case of a nuclear disaster in the U.S., the federal government maintains stockpiles of treatments distributed around the country so they can be delivered anywhere within 12 hours. These include treatments such as iodine pills and medicine to produce white blood cells, which counteract different kinds of radiation exposures.

Why is radiation dangerous?

The term "radiation" is commonly used as a shortened description of ionizing radiation, which strips electrons from molecules and can scramble DNA.

Radioactivity occurs naturally—from the cosmic rays that bombard the Earth to those released from certain kinds of rocks—and can be used for things like X-rays. But too much exposure to radiation typically raises the risk of developing cancerous tumors, according to the Centers for Disease Control and Prevention.

Nuclear materials like the fuel for [power plants](#) or bombs are typically refined from naturally occurring radioactive ore, with the difference largely being a question of how highly concentrated they are.

What are the risks and treatment if nuclear power plant radioactivity is released?

A leak from Zaporizhzhia nuclear power plant is among the highest risk, experts told U.S. TODAY, because Russia has deliberately targeted the area. Zaporizhzhia is Europe's largest nuclear power station and has been under Russian control since shortly after the invasion.

The U.N. International Atomic Energy Agency is trying to establish a safety zone around the plant because while [nuclear power plants](#) are built to withstand many natural disasters, few are designed to survive direct military attacks, said Edwin Lyman, a nuclear expert with the Union of Concerned Scientists. An attack on the plant could potentially release intense radiation in a small area and weaker radioactive particles over a wider area.

"The fact that Russia would want to seize that plant, it's not surprising," said Lyman. "I think it's sort of inevitable. And it's something the industry never wanted to think about."

The Chernobyl Nuclear Power Plant, which is also in Ukraine, is not considered a serious potential source of radiation leakage, in part because its 1986 meltdown led to its shutdown and removal of its nuclear fuel system. However, the Health Physics Society says there could be small, localized releases of radioactive material if the area is disturbed.

What happened following the Chernobyl meltdown could be the same as for Zaporizhzhia: A relatively small number of plant operators exposed

to intense radiation, and then broader contamination carried in the wind and water absorbed into the land and animals. Nuclear power plants are designed to avoid the kind of explosion created by a nuclear bomb.

According to the CDC, exposure to Acute Radiation Syndrome only happens to people exposed to intense radiation, generally in a very short period of time. That could be someone working in a [nuclear power plant](#) during a meltdown, or someone near the site of nuclear weapon's detonation.

For these people, specialized treatments to protect their bone marrow and stomach lining—vomiting and nausea are common signs of ARS—are available but not widely distributed, according to the U.S. Nuclear Regulatory Commission.

For the public, authorities often have stockpiles of potassium iodide pills, especially in areas close to nuclear power plants. The iodide pills help prevent the thyroid gland from absorbing radiation, which could lead to tumors, but do not treat other kinds of radiation exposure, according to the CDC.

Authorities typically maintain stockpiles of the pills but don't give them out unless there's a confirmed release, and even then, they are typically given to people 40 and younger because they are most at risk for developing thyroid problems later in life.

For people who are near a reactor accident but not immediately harmed, the CDC recommends they get or stay inside to avoid any potentially radioactive dust or smoke, remove and bag up any potentially contaminated clothing, and then shower to remove any particles on exposed skin and hair.

What are the risks and treatment for a dirty bomb?

Federal officials say a "dirty bomb" would typically be created by taking conventional explosives and adding in radioactive materials that would be dispersed by the explosion. It wouldn't cause as big of an explosion as a nuclear weapon—nor release the same kind of intense radioactivity—but would potentially disperse radioactive particles over a large area, potentially causing panic and evacuations.

Protection for exposure to a dirty bomb is similar to that of a reactor incident: Get or stay inside, get rid of potentially contaminated clothing, and then shower.

Potassium iodide pills would likely not be recommended for that kind of radiation exposure, the CDC says, but a treatment based on a drug called Prussian blue could be used.

Radiogardase, the brand name, was approved by the FDA in 2003 to help treat cesium or thallium exposure. Those radioactive substances are often used in medical treatments for cancer, but [federal officials](#) say they could also be used in a dirty bomb because they are more widely available. The [federal government](#) maintains a stockpile of Prussian blue and other drugs to treat radioactivity exposure.

What are the risks and treatment for a nuclear weapon?

A nuclear explosion is the worst combination of all: an intense blast of radioactivity followed by the fallout of radioactive particles that would contaminate the air, water and ground, along with animals and other food sources.

The same advice follows for people near an explosion but not harmed: get inside, get rid of contaminated clothing, and shower. The U.S.

government stockpiles would also come into play.

Lyman, the nuclear expert, said the key question is whether those treatments can be effectively distributed following a nuclear attack on the United States.

"If you had a large nuclear weapon detonated, and you had hundreds of thousands of people affected, you'd need to treat them in a day," he said. "Having the drugs is one thing. Having a plan to actually use them is another. I wouldn't count on those interventions. Prevention is where you have to put most of your effort."

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