

RADIATION HEALTH BASICS

What is the difference between alpha, beta, gamma and neutron radiation?

Gamma rays and beta particles make up most of the fallout radiation immediately after a nuclear explosion. Gamma rays are the immediate hazard to life.

There are four major types of radiation.

Alpha particles:

Alpha particles cannot penetrate most matter. A piece of paper or the outer layers of skin is sufficient to stop alpha particles.

Radioactive material that emits alpha particles (alpha emitters) can be very harmful when inhaled, swallowed, or absorbed into the blood stream through wounds.

Beta particles:

Beta particles can be stopped by a layer of clothing or by a few millimeters of a substance such as aluminum.

Beta particles are capable of penetrating the skin and causing radiation damage, such as skin burns.

As with alpha emitters, beta emitters are most hazardous when they are inhaled or swallowed or absorbed into the blood stream through wounds.

Gamma rays and X-rays:

Gamma rays and X-rays are penetrating. Several feet of concrete or a few inches of lead are required to stop them. Gamma rays are the reason why it is best to shelter in a basement or a centrally located room in a high rise.

Gamma rays and X-rays are a radiation hazard for the entire body.

While gamma rays and X-rays can easily pass completely through the human body, some fraction of the energy will always be absorbed by body tissue.

Neutrons:

Neutrons are only a hazard close to and during the initial blast (within a few miles of ground zero).

Neutrons are particles and are very penetrating. Several feet of concrete or another material rich in hydrogen (such as water) are required to stop them.

Neutrons are a radiation hazard for the entire body.

Neutrons interact with tissues in the body and have the potential to cause damage.

What type of radiation is most harmful?

It depends on whether your exposure to radiation is internal or external.

Alpha particles are the most harmful internal hazard as compared with gamma rays and beta particles. Radioactive materials that emit alpha and beta particles are most harmful when swallowed, inhaled, absorbed, or injected.

Gamma rays are the most harmful external hazard.

Beta particles can partially penetrate skin, causing "beta burns". Alpha particles cannot penetrate intact skin.

Gamma and x-rays can pass through a person damaging cells in their path.

Neutron radiation present during nuclear reactions, within a few miles of ground zero, is as penetrating as gamma rays.

What Happens When People Are Exposed to Radiation?

Radiation can affect the body in a number of ways, and the adverse health effects of exposure may not be apparent for many years.

These adverse health effects can range from mild effects, such as skin reddening, to serious effects such as cancer and death, depending on 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 was exposed.

Exposure to above-normal levels of radiation can lead to fatigue, nausea and vomiting, and changes in the blood.

Exposure to very large doses of radiation can lead to radiation sickness, with symptoms such as loss of appetite, hair loss, diarrhea, or even death within a few days or months. This is called Acute Radiation Syndrome (NYCDHMH, 2011).

Exposure to lower doses of radiation may lead to an increased risk of developing cancer or other adverse health effects later in life (USEPA, 2011).

What is Acute Radiation Syndrome/Sickness (ARS)?

You can only get Acute Radiation Syndrome (ARS) from short-term exposure to a large amount of radiation.

ARS occurs when most of the body was exposed to high levels of radiation.

The radiation must reach internal organs.

ARS only occurs in extreme circumstances.

Initial symptoms may begin from minutes to days after exposure. Symptoms include skin burns, nausea, and/or vomiting.

These symptoms may come and go in the first few days.

Symptoms may completely go away and the person may feel healthy.

Additional symptoms can occur weeks and months after exposure: loss of appetite, fatigue, fever, nausea, vomiting, diarrhea, seizures, and/or a coma.

People with ARS typically also have some skin damage. This damage can start to show within a few hours after exposure and can include swelling, itching, and redness of the skin (like a bad sunburn). There also can be hair loss (CDCb, 2011).

This stage of serious illness can last for months.

ARS can lead to death.

Seek medical attention immediately if you think you are suffering from ARS.

Are there specific protective actions for pregnant women?

Tell emergency workers that you are pregnant so that they can check your health and the health of your baby.

Call or visit your doctor or OB/GYN as soon as possible.

Should nursing mothers continue to breastfeed?

Some harmful substances can be passed through breast milk. If you are near an incident, you may have been exposed to radiation or radioactive contamination.

If you think you have been contaminated by radioactive fallout, medical workers may tell you to use formula.

Tell emergency workers that you are breastfeeding so they can tell you if it is safe to continue to breastfeed.

Potassium iodide (KI)

Only take this if local officials tell you to do so. KI only protects the thyroid gland and does not protect against any other radiation exposure. It should only be taken in an emergency that involves the release of radioactive iodine, as would happen after the explosion of a nuclear bomb (CDPH, 2011).

To find out more, read “Frequently Asked Questions About KI (Potassium Iodide)” at the New Jersey Department of Health and Senior Services (NJDHSS) website:

http://www.state.nj.us/health/er/documents/ki_faq.pdf