Radiation Communication Terminology

IRRADIATION/EXPOSURE

Often referred to as exposure, irradiation indicates that something is “in the presence of” a radioactive source. When the source of radiation is removed the exposure stops. A person simply exposed to radiation doesn’t pose a hazard to anybody else. Irradiation alone doesn’t result in contamination, but does result in radiation dose to the person being irradiated.

CONTAMINATION

An object is contaminated if it has radioactive material on it.

- Contamination can be spread from one location to another.
- Normal clothing provides a good barrier against contamination.
- Avoid unnecessary actions that may cause materials to go airborne.
- Monitor personnel and equipment prior to relocating to a non-contaminated area.

QUALIFICATION

Activity describes the rate at which the radioactive material disintegrates.

This rate is used to quantify that amount of radioactive material present. Common units of activity include:

- Disintegration per minute (**dpm**)
- Becquerel (**Bq** – the international unit – equal to 1 disintegration per second)
- Curie (**Ci** – the common unit used in the USA – equal to 37 billion disintegrations per second)

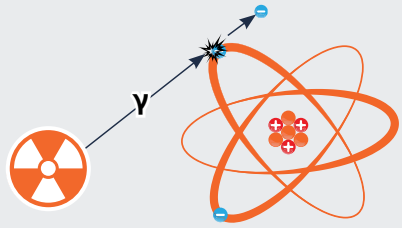
Each radioisotope has its own unique specific activity. A gram of one radioisotope will have a different activity than a gram of another isotope.

Approximate specific activities of some selected radioisotopes:

Cobalt-60	1100 Ci (41 TBq)	per gram
Cesium-137	88 Ci (3.26 TBq)	per gram
Uranium-238	0.3 microCi (11 kBq)	per gram
Iodine-131	120,000 Ci (4440 TBq)	per gram
Strontium-90	150 Ci (5.55 TBq)	per gram
Potassium-40	7 microCi (259 kBq)	per gram
Iridium-192	9,100 Ci (337 TBq)	per gram

IONIZING RADIATION

Ionizing radiation, the radiation associated with radioactive materials or certain devices like x-ray machines, is energy emitted from a source that is capable of removing electrons from an atom (ionization).



When that energy interacts with a person, the amount of energy deposited is called **radiation dose**.

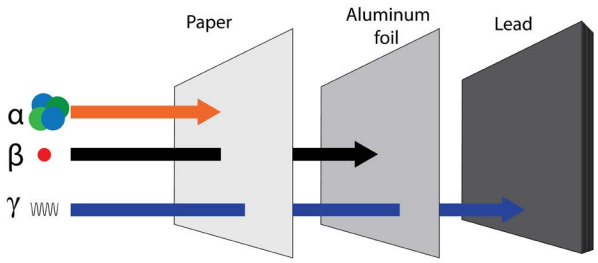
Stochastic effects (or future risk) are largely dependent upon the radiation dose received and are typically associated with lower doses delivered over a longer time (chronic exposures).

Deterministic effects (effects associated with a threshold dose) are largely dependent upon the dose and the rate at which it was received. They can result from large acute exposures and can result in clinically observable effects.

α **Alpha Particles** only travel a few centimeters in air and can be shielded by a piece of paper. Most of them can be shielded by the outer layer of dead skin.

β **Beta Particles** can travel up to a couple of meters in air and millimeters in tissue. For external sources, the skin and lens of the eyes are the organs of primary concern. Thin plastic is a good shield for beta radiation.

γ **Gamma Rays** are packets of energy and are very penetrating. Gamma-emitting sources pose an external hazard since this type of radiation can penetrate the body. Dense materials such as lead are used to shield gamma rays.



SAFETY MESSAGING

The less time a person spends being exposed to a source of ionizing radiation, the lower the radiation dose.

The further a person is away from a radiation source, the lower the dose.

Appropriate shielding can block radiation.