

## Natural and Artificial Sources of Radiation

### Natural Radiation Sources

The earth and all living things on it are constantly bombarded by radiation from space, similar to a steady drizzle of rain. Charged particles from the sun and stars interact with the earth's atmosphere and magnetic field to produce a shower of radiation, typically beta and gamma radiation. This is what we call **cosmic radiation**

Radioactive material is found throughout nature. It occurs naturally in the soil, water, and vegetation. The major isotopes of concern for terrestrial radiation are uranium and its decay products, such as thorium, radium, and radon. Low levels of uranium, thorium, and their decay products are found everywhere. Some of these materials are ingested with food and water, while others, such as radon, are inhaled.

All people also have radioactive potassium-40, carbon-14, lead-210, and other isotopes inside their bodies from birth. The variation in dose from one person to another is not as great as the variation in dose from cosmic and terrestrial sources. This means that while excess radiation may be harmful to humans, we are slightly radioactive ourselves.

## Synthetic Radiation Sources

81 percent of the average exposure for a person comes from natural sources of radiation. The remaining 19 percent results from exposure to artificial radiation sources. By far, the most significant synthetic source of radiation exposure to the general public is from medical procedures, such as diagnostic X-rays, nuclear medicine, and radiation therapy.

In addition, the public is exposed to radiation from consumer products, such as tobacco (polonium-210), combustible fuels (gas, coal, etc.), luminous watches and dials (tritium), airport X-ray systems, smoke detectors (americium).

Of lesser magnitude, the public is exposed to radiation from the nuclear fuel cycle, which includes the entire sequence from mining and milling of uranium to the disposal of the used (spent) fuel. The substances involved are uranium and its daughter products. The exposure of individuals working with or near radiation is carefully monitored with the use of tiny instruments called dosimeters or film badges.

Examples of industries where occupational exposure is a concern include:

Nuclear Fuel cycle	Industrial Radiography
Radiology Departments (Medical)	Radiation Oncology Departments
Nuclear power plants	Nuclear medicine Departments
National (government) and University Research Laboratories	
Radioisotope thermoelectric generators	