

What is Radioactive Pollution ?

Addition of radiation to environment
by using radioactive elements .





• **Radioactive pollution**, like any other kind of pollution, is the release of something unwanted into the environment and, in this case, the unwanted thing is radioactive material.

• **Radioactive pollution** can be defined as the emission of high energy particles or radioactive substance into air, water or land due to human activities in the form of radioactive waste

Radioactive Decay

- Radioactive decay occurs because unstable isotopes tend to transform into a more stable state. Radioactivity is measured in terms of disintegrations, or decays, per unit time. Common units of radioactivity are the Becquerel, equal to 1 decay per second, and the Curie, equal to 37 billion decays per second.

Radioactive waste

Radioactive waste is usually the product of a nuclear process such as nuclear fission, which is extensively used in nuclear reactors, nuclear weapons and other nuclear fuel-cycles. Radioactive pollution.

Radioactive waste is spread through the earth's atmosphere is called "Fallout".

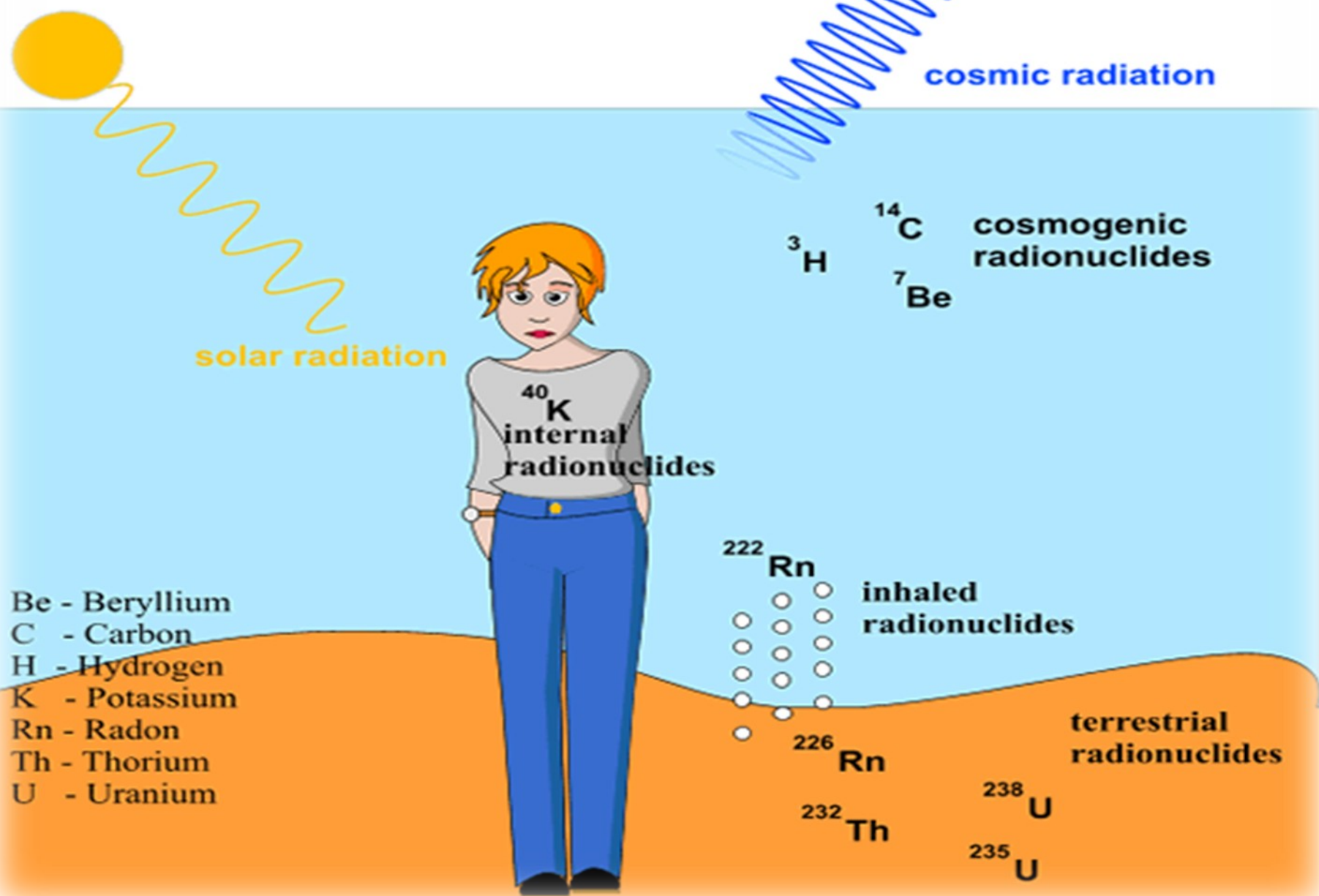
Natural Sources of Radiation

- Cosmic Radiation
- Terrestrial Radiation
- Internal Radiation

Man-Made Sources of Radiation

- Production and reserch of nuclear weapons
- Mining of radioactive ore
- Medical waste
- Nuclear power plants
- Industrial radiography (X-ray imaging)

NATURAL SOURCES OF RADIATION



solar radiation

cosmic radiation

^{40}K
internal
radionuclides

cosmogenic
radionuclides

^3H ^{14}C
 ^7Be

inhaled
radionuclides

^{222}Rn

^{226}Rn

terrestrial
radionuclides

^{232}Th

^{238}U

^{235}U

- Be - Beryllium
- C - Carbon
- H - Hydrogen
- K - Potassium
- Rn - Radon
- Th - Thorium
- U - Uranium

Production of nuclear weapons

- Radioactive materials used in this production have high health risks and release a small amount of radioactive pollution.

Mining of radioactive ore

- Mining these involves crushing and processing of the radioactive ores and this generates radioactive waste which emits alpha particles



Medical waste

- A number of radioactive isotopes are used in medicine, either for treatment or diagnostics. These can be left to decay over a short period after which they are able to be disposed of as normal waste

Nuclear power plants

- Nuclear power plants under current standards produce little radioactive pollution due to safety precautions that must be adhered to. Accidents at these power plants can cause dangerously high radioactive pollution, such as in the case of Chernobyl, and recently in Fukushima of Japan.

Types of pollution

- **Continuous Pollution:** This type of condition exists in uranium mines, nuclear reactors, test labs etc. where the humans are under continuous exposure to radioactive contaminants and protective clothing is required to avoid radiation exposure.
- **Accidental Pollution:** This type of condition exists during accidental exposure to radiations by virtue of equipment failure, radiation leak, faulty protective equipment etc.
- **Occasional Pollution:** This condition exists during isolated experiment or test of nuclear substance.

Uses of Radiation

In medicine

- Radiation and radioactive substances are used for diagnosis, treatment, and research.



In communication

- All modern communication systems use forms of electromagnetic radiation.

Variations in the intensity of the radiation represent changes in the sound, pictures, or other information being transmitted.



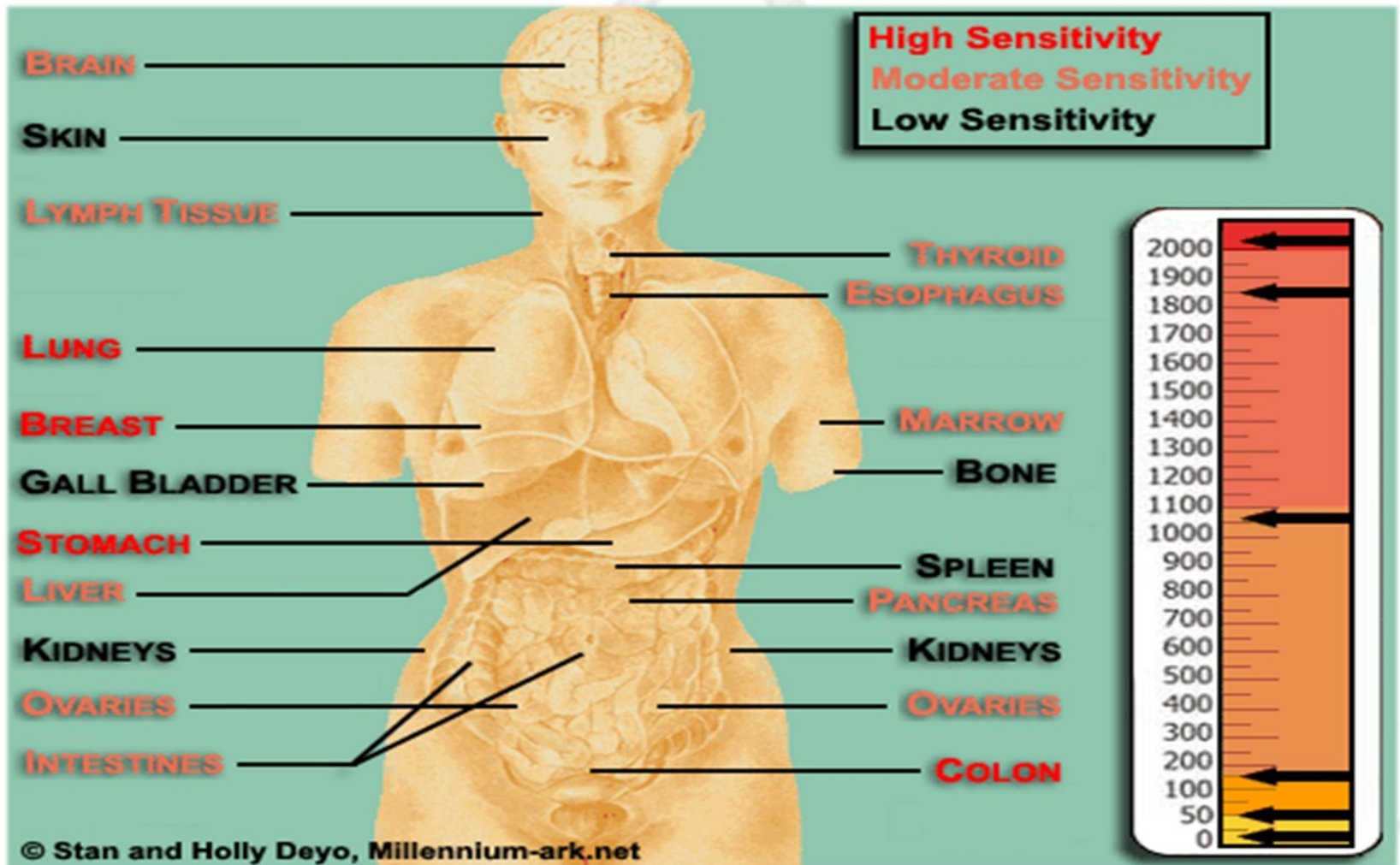
In science

- Researchers use radioactive atoms to determine the age of materials that were once part of a living organism. The age of such materials can be estimated by measuring the amount of radioactive carbon they contain in a process called radiocarbon dating.

- Environmental scientists use radioactive atoms known as tracer atoms to identify the pathways taken by pollutants through the environment.

Effect of Radiation

- Effect on Human body

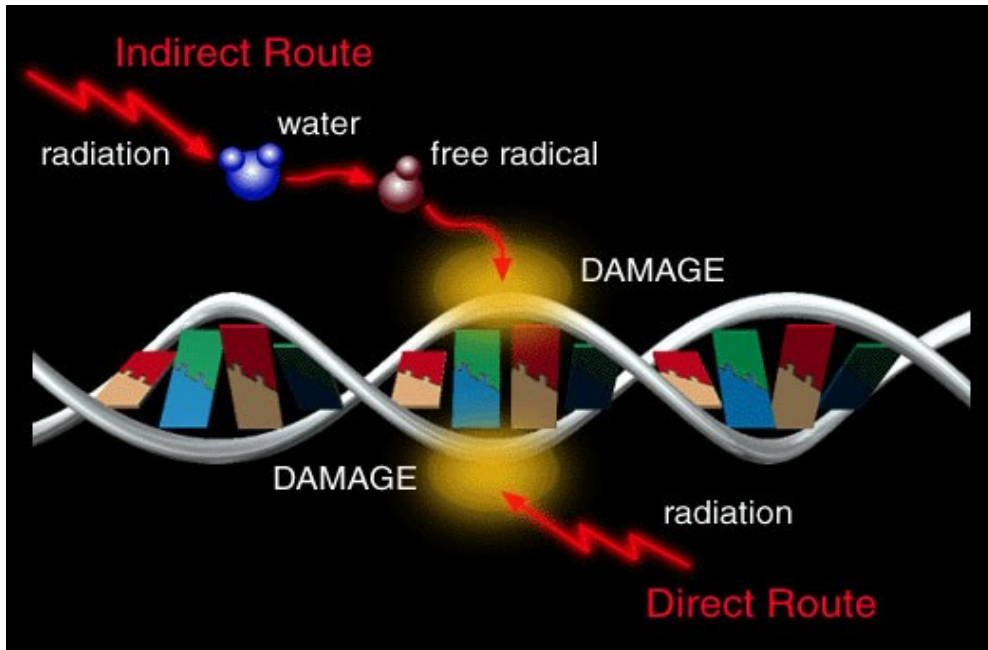


Effect of Radiation

➤ On Human Beings

- The impact of radioactive pollution on human beings can vary from mild to fatal; the magnitude of the adverse effects largely depends on the level and duration of exposure to radioactivity. Low levels of localized exposure may only have a superficial effect and cause mild skin irritation.
- Long-term exposure or exposure to high amounts of radiation can have far more serious health effects. Radioactive rays can cause irreparable damage to DNA molecules and can lead to a life-threatening condition.

- The rapidly growing/dividing cells, like those of the skin, bone marrow, are more sensitive towards radioactive emissions.
- On the other hand, cells that do not undergo rapid cell division, such as bone cells and nervous cells, aren't damaged so easily.
- Rays from radioactive element can cause
 - burns
 - cancers (skin cancer, lung cancer, thyroid cancer)
 - death
 - hair loss
 - heart failure
 - can damage brain cells



Some accidental cases



Almost 99 such nuclear accidents have been occur through out worldwide.

56 of 99,have been occurred only in USA.

**Danger
Radiation Risk**



Fukushima, Japan – 11, march 2011 (INES Level 7)

- **Three Mile Island, United States – 28 March, 1979 (INES Level 5)**
- one of the elements of the power plant's system malfunctioned





**Kyshtym, Russia (former Soviet Union) –
29, september, 1957 (INES Level 6)**



**Chernobyl, Ukraine (former Soviet Union) –
26, april, 1986 (INES Level 7)**

Prevention

- **Safety** measures should be enforced strictly
- **Leakages** from nuclear reactors, careless handling, transport and use of radioactive fuels, fission products and radioactive isotopes have to be totally stopped;
- **Regular** monitoring and quantitative analysis through frequent sampling in the risk areas;
- **Waste** disposal must be careful, efficient and effective.
- appropriate steps should be taken against occupational exposure.
- **Safety** measures should be strengthened against nuclear accidents
- **Preventive** measures should be followed so that background radiation levels do not exceed the permissible limits

- In nuclear reactors, closed cycle coolant system with gaseous coolants of very high purity may be used to prevent extraneous activation products.
- Fission reactions should be minimised.
- In nuclear mines, wet drilling may be employed along with underground drainage.
- Nuclear medicines and radiation therapy should be applied when absolutely necessary and earth minimum doses