IONIZING RADIATION AND IMAGING. MEDICAL APPLICATIONS

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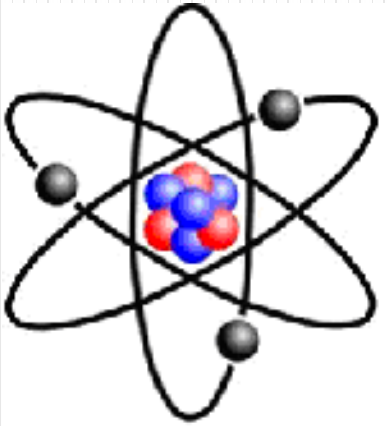

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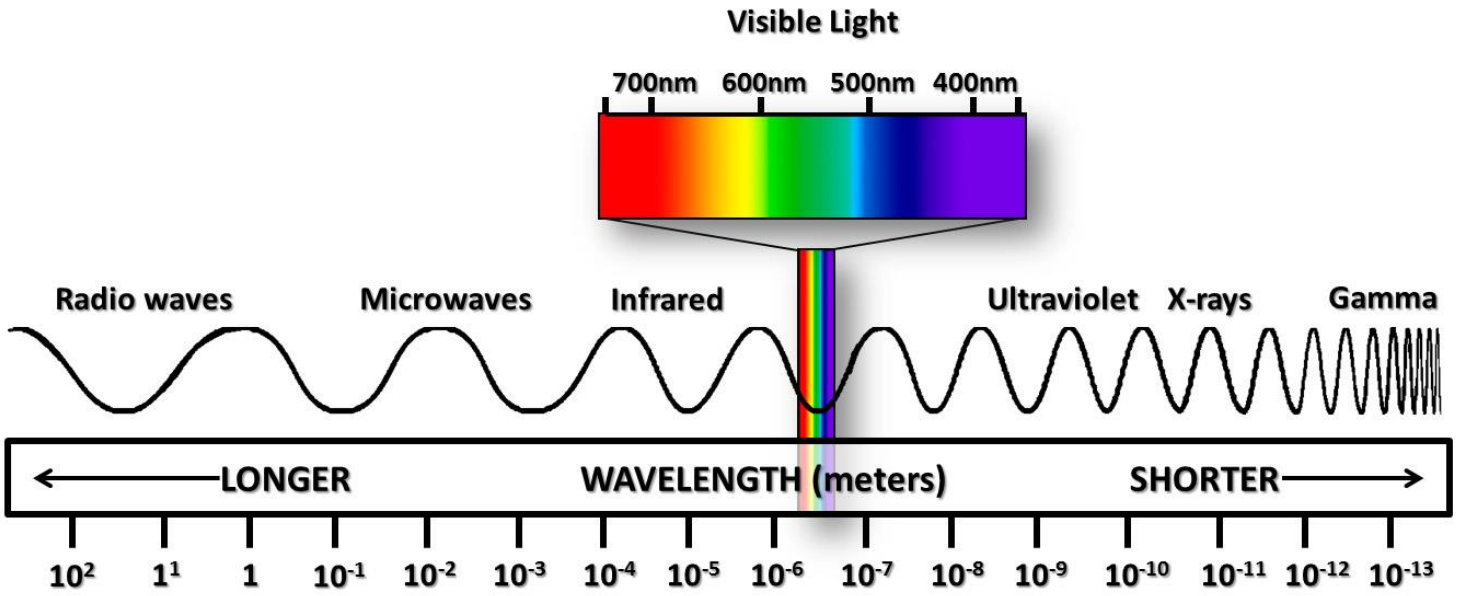
WHAT IS IONIZING RADIATION?

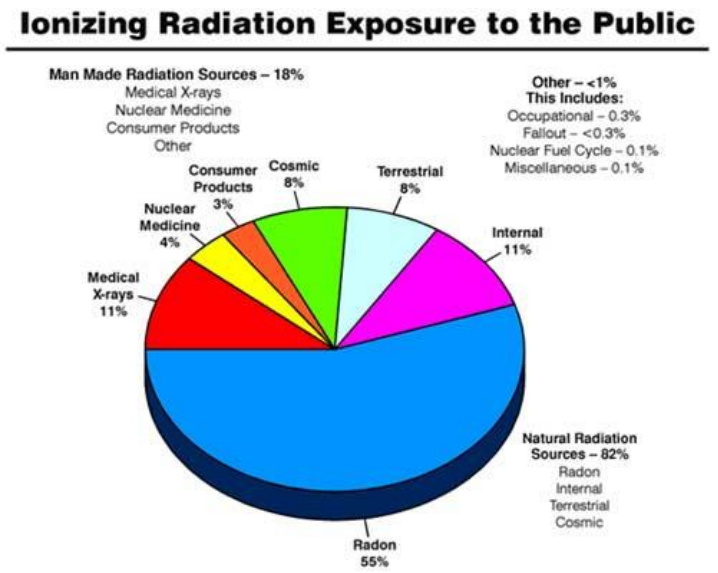
Ionizing radiation is a type of energy released by the atoms in the form of electromagnetic waves (gamma rays, X-rays) or particles (alpha and beta or neutrons).

Able to boot electrons



SOURCES

- Primordial radionuclides
- Cosmic Rays
- Cosmogenic radionuclides
- Rain radioactive
- Radioactive material in the body
- Radiation produced by machines
- Radionuclides produced by machines
- Materials and consumer products technology

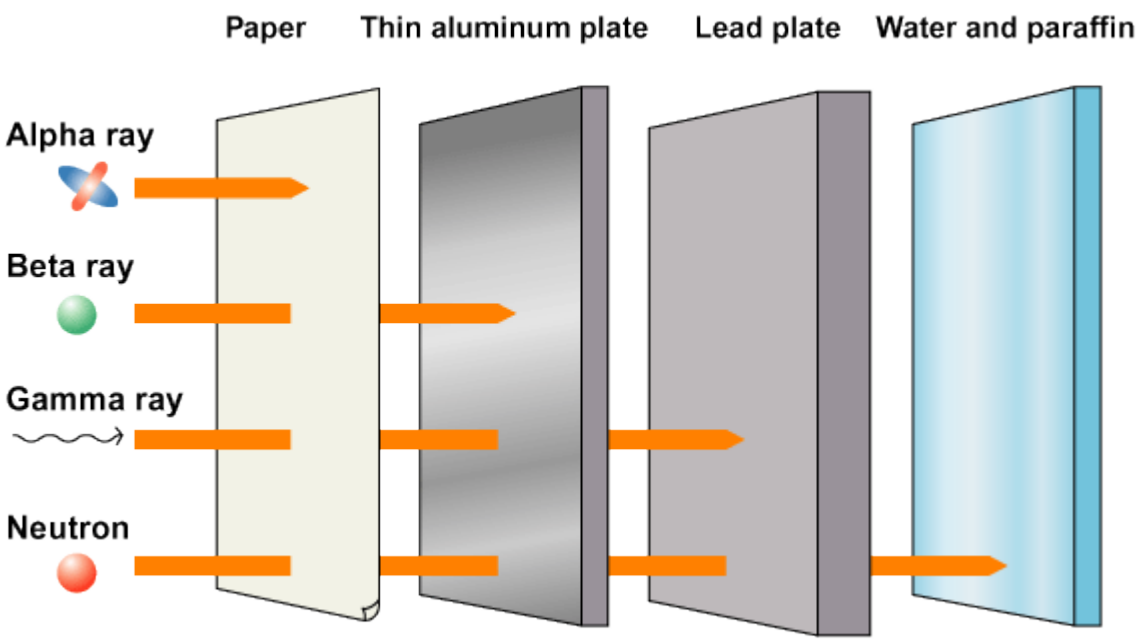


The above chart is taken from the National Council on Radiation Protection and Measurements (NCRP) Report No. 93, "Ionizing Radiation Exposure of the Population of the United States," 1987.

This chart shows that natural sources of radiation account for about 82% of all public exposure while man-made sources account for the remaining 18%.

TYPES

- Alpha particles
- Beta particles
- Gamma radiation
- X-rays
- Neutrons



MEDICAL APPLICATIONS

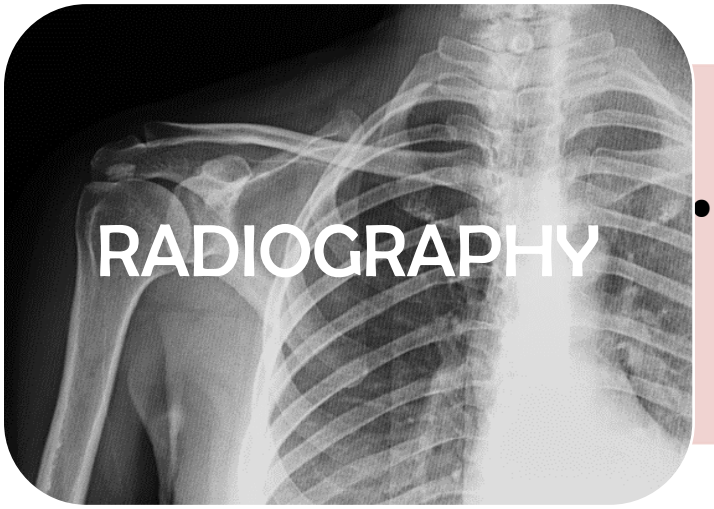
DIAGNOSIS

- Radiology Radiography with X-rays and CAT (computerized axial tomography).
- Nuclear medicine: and PET scan.
- PET / CT.

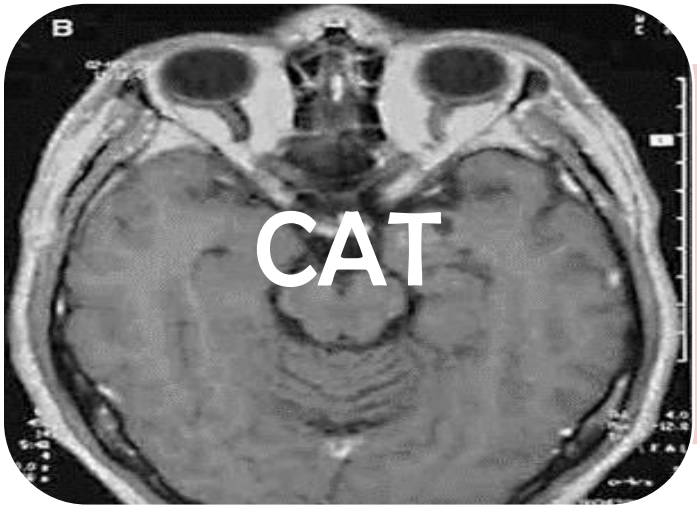
TREATMENT

- Nuclear medicine: Metabolic radiotherapy.
- Radiation therapy (oncology): brachytherapy and radiation beam therapy.

IMAGING: RADIOLOGY

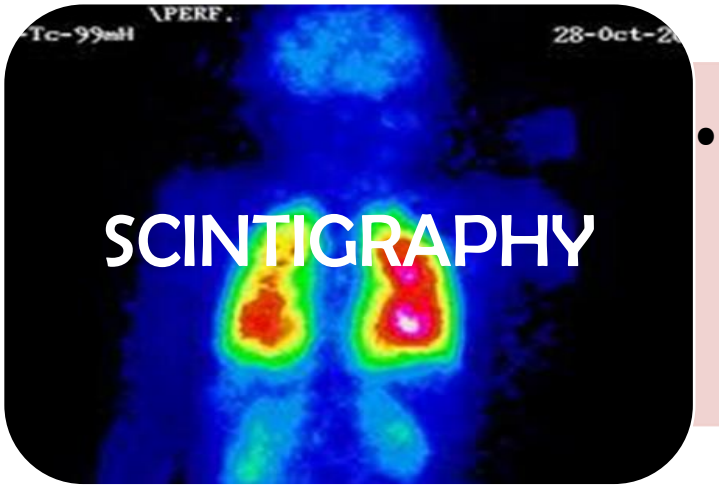


- Technique that creates images inside the body by an X-ray beam

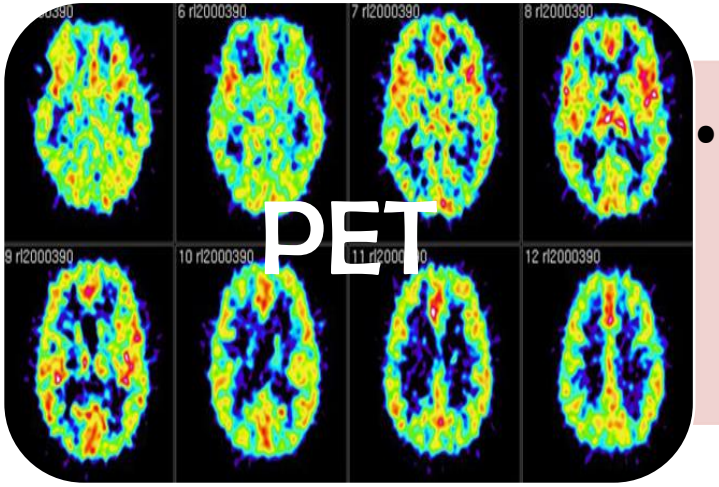


- Radiological examination technique which consists of imaging human body parts in very fine drawings. It is based on the application of X-rays, and the result of each (rays) is collected by an array of detectors which are processed by computer.

IMAGING:
NUCLEAR MEDICINE



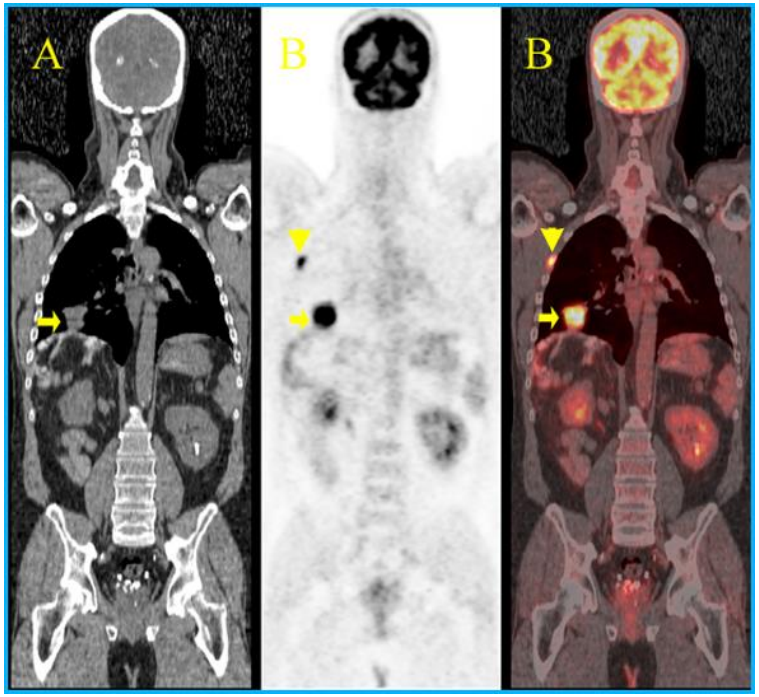
- It involves the injection of a radioactive substance is detected by a specific organ and is captured by a special camera that draws a visual map of the area to explore.



- Technique capable of measuring the metabolic activity of the human body. It is based on detecting and analyzing three-dimensional distribution that adopts inside the body a radiopharmaceutical (18 FDG) Average life ultrashort administered through intravenous injection.

IMAGING: PET/TAC

Hybrid technique between PET and CT. Very sharp images are obtained by mixing both techniques. It is currently the standard technique in diagnosis and monitoring oncohematology.



BIOLOGICAL EFFECTS

STOCHASTIC

- Somatic (somatic cells)
- Hereditary (germ cells)

DETERMINISTIC

- Death of large numbers of cells
- ↑ dose = ↑ gravity

Different effects depending on the tissue

BASIC MEASURES OF PROTECTION

Ionizing radiation is **CARCINOGENIC.** So we have to protect the patient with safety barriers.

DISTANCE

- The radiation dose can be received decreases with the inverse square of the distance to the radiation source.

TIME

- The radiation dose received is directly proportional to the exposure time.

SHIELD

- When the above two factors are not sufficient, you will need to bring an attenuator material.

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