

## NUCLEAR MEDICINE

by  
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Nuclear having to do with the nucleus. In this case it does with the nuclei of atoms of elements.

Medicine: Science of diagnosis and control of diseases. Nuclear Medicine is thus medicine utilizing nuclear changes in atoms of elements known as radioactive elements. This Class of elements e.g. radium Caesium and iodine undergo nuclear transformations with the atomic nuclei disintegrating and giving radiations e.g. Gamma radiation, and particles e.g. alpha or Beta particles.

These emissions travel at different ranges in different media, with the shortest range emission being alpha particle followed by Beta particle.

As they pass through a medium the emissions produce ionization and in some media of living tissues the ionization takes place in the chemical set up of the tissue. This alters normal chemical structure of an affected unit and normal metabolic processes connected with the unit are disrupted.

Measurement of Emissions: the emissions are each measured in energy packets called quanta. The energy per quantum is a measure of its ionizing potential.

Amount of Ionization: This depends on (1) energy of the ionizing quantum, (2) inverse range of quantum in a medium, (3) Radiosensitivity of the medium.

The range of the emissions is so small in living tissues that ionization is confined to a very small unit of the tissue with consequent excessive dose to the tissue. Where this obtains normal function of the tissue is disrupted.

Disease agents are not resistant to radiation effect of these emissions; with the use of nuclear emissions on pathogens the associated disease can be diagnosed and controlled.

### Administration of Radioactive Elements:

The amount depends on:

- (1) Radioactivity of the element.
- (2) The characteristic emission, for example, if it emits strong ionizer less quantity of it is required.

- (3) Radiosensitivity of tissue affected or structure to be dealt with.

All these combined, determine the Radiobiological effect R.B.E. of a given quantum on a given living structure.

To treat and control diseases, radioactive elements are used in various forms in accordance with mainly site of infection. These are:

- (1) As pills for swallowing - in the case of gastrointestinal infections.
- (2) For superficial infections of Tumour growth on the skin; in form of needle which is implanted on the affected spot.

- (3) Injections - for other spots not superficial or accessible via the alimentary tract.

- (4) Gaseous form - for inhalation.

#### Care of Radioactive Drugs:

Radioactive drugs need great care in handling to ensure no accidental entry into the body of either staff or patient.

This can be through:-

- (1) the mouth - injection;
- (2) the nose - inhalation;
- (3) the skin - percolation.

On each occasion causing hazards due to unbalanced and wrong application.

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### IONIZING RADIATION IN MEDICINE

by

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**IONISING RADIATION IN MEDICINE.** This is clearly a big topic which I can hardly do justice to in such a short time. Nevertheless I think we could start by trying to define or explain what one means by ionizing radiation.

**RADIATION** is a term used in physics to denote any form of energy that can be propagated through space - sometimes a material medium is required for the propagation as, for example, in case of sound. However most forms of radiation are capable of travelling through free space.

All "free-space" radiations (except "neutrino") are classifiable as "ELECTROMAGNETIC" OR "CORPUSCULAR" - the latter is associated with atomic particles.

One of the most important and certainly the most familiar forms of radiation is electro-magnetic. This is radiated by matter whenever electric charges (usually electrons) are accelerated. The accelerations of the charges may result purely from the motions associated

with the temperature of the material in which case the radiation is said to be thermal or they may be due to specific processes, such as electrical discharge, high frequency alternating currents, etc.

Electromagnetic radiation occurs over a wide range of wavelengths.