IQRA NATIONAL UNIVERSITY

## Radiation Protection

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## Q:1 Differentiate between deterministic and stochastic effect of radiation.

Ans:

|  |  |
| --- | --- |
| Stochaistic effect | Deterministic effect |
| * Have no threshold levels of radiation dose. | * Have definite threshold levels of radiation dose. |
| * The probability of the effects is promotional to the dose. | * The probability of the effects is proportional to the dose. |
| * A talent period is a seen between the time of exposure and the events to manifest. | * A talent period is seen between the time of exposure and the events to manifest. |
| * Severity independent of dose received. | * Severity may be proportional to the dose received. |
| * Seen when the cells are modified rather than killed. | * Seen when the cells are killed or loose capability to divide. |

## Q:2 Explain briefly the following terms; radiation, radioactivity, non-ionizing radiation, ionizing radiation and harmful radiation.

Ans: Radiation:

Energy that emitted from a source is referred to as radiation. Radiation is energy that travels through spaces. It can be defined as energy released in form of particles. It is the form of waves or moving subatomic particles and rays. We can differentiate radiation in two types.

1. Ionizing radiation b) non-ionizing radiation

Radioactivity:

Radioactivity refers to the particles which are emitted from nuclei as a result of a nuclear instability. Because the nucleus experience the intense conflict between the two strongest forces in nature. It should not be surprising that there are many nuclear isotopes which are unstable and emit some kind of radiation. The most common types of radiation are called alpha, beta and gamma radiation. But there are several other varieties of radioactive decay.

**Ionizing radiation:**

The radiation which has very high energy is called ionizing radiation. It is dangerous and leaves bad impacts on human body. Alpha, beta x-rays are some examples of ionizing radiation. It has high energy and displace electron from their orbit. Creating charge atom and create DNA damage, outright cell death. Ionizing radiation is radiation with enough energy so that during in interaction with an atom it can remove tightly bound electron from orbit causing an atom to become charge or ionized.

**Non-Ionizing radiation:**

The type of radiation low energy radiation no ion charge are produce in this radiation. UV rays, micro waves, radiofrequency waves are some example of non-ionizing radiation. Depend heavily on these for survival. Non-ionizing radiation originates from various sources naturally originated or man-made this radiation refer to any type of electromagnetic radiation that does not carry enough energy per quantum to ionize atom or molecule that is to completely remove in electron from an atom or molecule. These are low radiation energy not enough energy to pull electron from orbit but can excite the electron.

## Harmful radiation:

Harmful radiations are those which damage the cells that make up the human body. The low level of radiations is not dangerous, but medium level can lead to sickness, headaches, vomiting and a fever. High level can kill you by causing damage to your internal organs. It is difficult to treat high radiation exposure that is why they are harmful radiations.

## Q:3 a)Write two basic principles of radiation protection.

1. The principle of justification:

Any decision that alters the radiation exposure situation should do more good than harm. This means that, by introducing new radiation source by reducing existing exposure, one should achieve sufficient individual or societal benefit to offset the detriment it cause.

1. The principle of optimization of protection:

The likelihood of incurring exposures, the number of people exposed and the magnitude of their individual doses should all be kept as low as reasonably achievable taking into economic and societal factors. This means that the level of protection should be the best under the prevailing circumstances maximizing the margins of benefit over harm in order to avoid severely inequitable outcomes of this optimization procedure. There should be restrictions on the doses or risks to individuals from a particular source.-

## Write down the names of radiation protection device.

Ans: protection from external radiation exposure,

Protective devices are ,

1) Lead Apron

2) Lead Collar

3) Lead Gonad Shield

4) Lead Gloves

5) Proper Monitoring

## Q 4: what are features for radiation protection design? Explain briefly.

Ans : CH 36-Designing for Protection features,

* Protective x-ray tube housing

Protective housing to reduce leakage radiation.

* Control panel

Must show exp, conditions and when tube is energized

* SID Indicator

Indicator must be present

Protection features:

* Collimation

Light field variable aperture

X-ray beam and light field must coincide with in 2 % of SID

* PBL-positive beam limitation

Auto collimation circa 1974-1994

* Beam alignment
* Operator shield

It must not be possible to expose in a room outside of the operator booth

Portable x-ray must have >2m tether for exposure

* Fluosoropic protection

Divergence of x-ray beam mean the ese or entrance skin exits lessoned for the required exit exposure as ssd is increased

## Q 5: what is GM counter how it can be used as a radiation protection device ?

Ans: Ans : Geiger Muller Counter :

* The Geiger counter is an instrument used for measuring ionizing radiation used widely in such applications as radiation dosimeter, radiological protection, experimental physics and the nuclear industry.
* It detects ionizing radiations such as alpha particles, Beta particles and gamma rays using the ionization effect produced in a Geiger Muller tube which give its name to the instruments
* In wide ad prominent use as a hand –held radiation survey instruments, it is perhaps one of the world’s best known radiation detection instruments.