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**Paper Radiation Protection**

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**Q NO1: Differentiate between deterministic and stochastic effects of radiation?**

**Ans:-**

|  |  |
| --- | --- |
| **Deterministic effects** | **Stochastic effect** |
| * Deterministic effects are also called non-stochastic effect. * Depend on time of expose. * **Deterministic effects** are health effects that are related directly to the absorbed radiation dose and the severity of the effect increases as the dose increases. * **Deterministic effects** have a **threshold** below which no detectable clinical effects do occur. * The threshold may be very low. * Deterministic effect includes   a) Acute Radiation Sickness  b) Chronic Radiation Sickness | * Stochastic effect is those effect which occur when a person. Receives a high dose of radiation. * There is no threshold dose below which is creatively certain that a stochastic effect cannot occur. * Cancer induction and radiation induced hereditary effects are the two main examples of stochastic effects. * Stochastic effect include   a) somatic stochastic effect  b) Genetic effect |

**QNO2: Explain briefly following terms radiation, radioactivity, non-ionizing radiation, ionizing radiation, and harmful radiation?**

**Ans:**

**-1:- radiation**:-

energy that emitted from a source is refers as radiation. Or

Energy released in the form of particles is radiation.

Radiation is energy that travels through spaces. Two type of radiation

1. Ionizing radiation
2. Non ionizing radiation

**2:-ionizing radiation:-**

* The Radiation which has very high energy is called Ionizing Radiation.
* It is dangerous and leaves bad impact on human body.
* Alpha, beta, x-ray are some examples of ionizing radiation.
* It has high energy and cues damage of DNA and outright cell death

**3:- non-ionizing radiation:-**

* The type of Radiation is low energy Radiation no ion charge are produce in this Radiation.
* Examples of Non-Ionizing Radiation is UV rays, Microwaves, Radiofrequency waves.
* These rays are not directly harmful impact on body.

**4:- radioactivity:-**

* An unstable atomic nucleus emits a form of radiation to become stable. Or

The nucleus decays into a different atoms.

**5:- harmful radiation**

* Harmful radiation is those radiation which damage the cell which make the human body
* Low level of radiation is not dangerous. Medium can cause sickness. and
* High level of radiation can damage cell. Higher expose for a long time can cause cancer.
* Examples are gamma, alpha, beta, and x-ray.

**QNO3:**

**a) Writ two basic principles of radiation protection.**

**Ans:-**basic principle of radiation protection is

1. Time
2. Distance
3. Shielding

**1:- time:-**

* Radiation exposure can be accumulated over the time of exposure
* The time spent checking to the radiation exposure.
* The longer the exposure time, the more radiation exposure to the pain physician.
* Reduce time can remove image blurred.
* Reduce time is reduce patient radiation dose.

**2:- distance:-**

* The greater distance from radiation source can reduce radiation exposure.
* The amount of radiation dose is not inversely proportional to the distance from radiation dose. but
* Inversely proportional to the square of the distance.
* Maintaining greater distance from x-ray generator is more effective method for radiation safety.
* Two steps behind the mobile support structure can decrease about 80% expose.

**b) Write down the names of the radiation protection device.**

Ans:-**name of radiation protection devices:-**

1. Radiation protection apron
2. Radiation protection apron accessories
3. Radiation protection gloves
4. Radiation protection glasses
5. Radiation protection thyroid shielding
6. Radiation protection apron racks
7. Radiation protection barriers and table shields
8. Radiation protection drape shields
9. Patient Radiation protection
10. Veterinary Radiation protection

**QNO4: what are features for radiation protection design? Explain briefly.**

Ans:- **radiographic protection features:-**

1. **Protective x-ray tube housing**

Every x-ray tube must be continued within a protective housing that reduce leakage radiation during use

1. **Control panel :-**

The control panel must indicate the exposure and must positive indication when x-ray tube is energized.

1. **Source to image receptor distance indicators :-**

A source to image receptor distance indicators must be provided this can simply as a tape measured attached to the tube housing or as advanced as lasers.

1. **Collimation :-**

Light localized variable apertures recently collimators should be provided

1. **positive beam limitation :-**

PBL devises is no longer required but continued to be a part of most new radiographic imaging system

1. **Beam alignment :-**

In addition to proper collimation, each radiographic tube should be provided with a mechanism to ensure proper alignment of the x-ray beam and the image receptor.

1. **Filtration :-**

It is normally possible physically to examine and measure the thickness of each component of total filtration.

1. **Reproducibility:-**

For any given radiographic technique, the output radiation intensity should be constant from one exposure to another.

1. **Linearity :-**

When the exposure time remains constant, causing the mAs to increase in proportion to the increase in mA, radiation intensity should be proportional to mAs.

1. **Operator shield :-**

It must not be possible to expose an image receptor while the radiologic technologist stand unprotected outside a fixed protective barrier usually the console booth.

1. **Mobile x- ray imaging system :-**

A protective lead apron should be assigned to each mobile x-ray imaging system

**QNO5: What is GM counter, how it can be used as a radiation protection device?**

**Ans:-Geiger-Muller counter:-**

The gm counter is devise used for the detection and measurement of all type of radiation such as alpha beta and gamma.

Gm counter is a cylindrical tube with a wire in the center consist of pair of electrode surrounded by gas. The electrode have a high voltage across them. Gas used in the tube is helium and argon

**USES OF GM COUNTER:-**

* Operate under even high voltage b/w anode and cathode it 800-1200 volt range.
* In the high voltage charge the initial ionization to where they have enough energy to ionize the other electron in the gas.
* This all happened in the fraction of a second.
* The collection of large no of second’s ions.
* Electronic circuits of G.M counter counts and record the number of pulls.
* If instrument has a speaker the pulse can also produce audible clicks.
* When the volume gas is completely ionized the electron pulse is discharge.
* G.M counter is more sensitive to low level of radiation then ion chamber instrument.

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