NAME = Zohaib Hassan

ID = 15308

Program = Bs radiology 4th

Paper = Radiation protection

Question No 1
Answer

Stochastic effect	Deterministic effect
1) Have no threshold level of radiation doses.	Have difinite threshold level of radiation dose
2) The probability of the effect is proportional to the dose.	The probability of the effect is proportional to the dose.
3) A latent period is seen between the time of exposure and the event of manifest	A latent period is seen blw the time of exposure and the event of manifest

P = 2

Severity independent of dose recieved	Severity may be proportional to the dose recieved.
Seen when the Cell are modified rather then killed.	Seen when the cell or killed or loose capability to device.

P = 3

Question No = 2

Answer

Radiation:-

Energy that is emitted from a source is referred as radiation. Radiation is energy that travel through spaces. it can be defines as energy released in form of particle it is in the form of waves or moving subatomic particles and rays.

We can differentiate Radiation in two types.

1) Ionizing Radiation
2) Non Ionizing Radiation.

1) Ionizing Radiation.

The radiation which has very high energy is called Ionizing radiation. it is dangerous and leaves bad impact on human body. Alph, Beta, X-rays are some example of Ionization radition. it has high energy and displace electron from there orbit. Creating charge atom and create DNA damage, outright cell death. Ionization radiation is radiation with enough energy so that during

an interaction with an atom it can remove tightly bound electron from orbit. Causing the atom to become charged or ionized.

Non Ionizing Radiation.

The type of radiation is low energy radiation no ion charge are produce in this radiation. UV rays, microwaves, radiofrequency ways are some example of Non ionizing radiation. These ray are not directly harmful impact over lives. Depend heavily on these for survival. Non ionizing radiation originate from various sources naturally originated or man made radiation refer to any type of electromagnetic radiation that

does not carry enough energy per quantum to ionize atom atom or molecule that is too completely remove an electron from one atom or molecule. These are low energy radiation not enough radiation to pull electron from orbit but can excite the electron.

Radioactivity :-

"Radioactivity are the spontaneous emission of particle and energy in order to become stable."

Som atom exist in an abnormally excited state characteristics by an unstable nucleus. To reach stability. The nucleas spontaneously emit particle and energy and transfer itself into

another atom. this process is called radioactive disintegration. the atom involved are radionuclides. Any nuclear arrangement is called a nuclide, only nuclei that that undergo radioactive decay are radionuclides.

Harmful Radiation.

- Harmful radiation is those radiation wich damage the cell wich make the human body
- low level of radiation is not dangerous. medium can cause sickness and
- High level of radiation can damage cell. Higher exposure for a long time can cause cancer.
- example are gamma, alpha, beta, and x-rays.

P = 8

Question No = 5
Answer

Geiger - Muller Counter.

G-M Counter is a gas filled detector designed for maximum gas amplification effect. The principle of a GM Counter are shown. The centre wire is maintained at with positive voltage relative to the outer cylindrical electrode the outer electron may be a metal cylinder or a metalic ~~metal~~ film sprayed on the inside of a glass or plastic tube. Some GM-counter have a thin radiation entrance window at one end of a tube the cylinder of the tube is sealed and filled with a special

gas mixture, typically argan plus a quenching gas.

When ionization occur at a GM counter, electron are accelerated toward the centre wire. Gas amplification occur in the GM Counter as in a proportional counter. in addition to ionizing Gas molecule, the accelerating electron also can cause excitation of gas molecule through collision. these excited gas molecule quickly ($\sim 10^{-9}$ sec) return to the ground state through the emission of photons at visible or ultraviolet wavelength. if a UV photons interect in the gas or at the cathode surface by photoelectric absorption. this release another electron wich can triggers a further

electron avalanche as it moves toward the anode.

The avalanche ionization in a GM tube release a large and essentially constant quantity of electrical charge, regardless of voltage applied to the tube or the energy of the ionizing radiation event. The gas amplification factor may be as high as 10^{10}. The larger electrical signal is easily detected with electronic circuit. Thus a GM counter like a proportional counter, can be used to detect and count individual ionizing radiation events. However bc the size of the electrical signal out put is constant regardless of the energy of the radiation detected, a GM counter cannot be used to distinguish b/w

radiation event of of different events.

Owing to the large charge amplification. GM Survey meters are widely used at very low radiation level. They are particularly ~~applicable~~ applicable for leak testing and detection of radioactive contamination. GM Counter ~~etc~~ exhibit strong energy dependence at low photon energies and are not suitable for use in pulse radiation field.

are strong absorbed of UV radiation. Thus the new UV photons that are release during nutralization of the positive ion cloud are quickly absorbed before they can set of another avalanche.

Commonly used quenching gases includ heavy organic vapour and halogen gases. The organic vapour are more effective quenching agent. But have the disadvantages that their molecular fragment donot recombine after dissociation. Thus an organic quenching gas eventually is used up. Typically after approximately multiplication spread alon the entire length of the anode.

Question No = 3(a)
Answer

two basic principle of radiation protection.

- Time

(1) Keep the time of exposure to radiation as short as possible

- Distance

(2) Maintain as large a distance as possible between the source of radiation and the exposed person.

Question No 3 (b)

* Names of Radiation protection device.

1) Radiation protection Aprons.
2) Radiation protection Apron Accessories
3) Radiation protection Gloves.
4) Radiation protection Glasses.
5) Radiation protection thyroid Shield.
6) Radiation protection Apron Racks.
7) Radiation protection Barrier & Table Shields.

Question No = 4
Answer

Radiographic protection features.

Protective x-ray tube housing

every x-ray tube must be contained within a protective housing that reduce leakage radiation use.
leakage radiation must be less then 1mGy/hr at a distance of 1m from the protective housing.

Control Panel.

the control panel must indicate the condition of exposure and must positive indicate when the x-rays

is energized these requirement are usually satisfy with the use of KVP and mAs indicators.

* Xray beam on must be positively and clearly indicate to the radiographic technologist.

- Source to image receptor distance.

A SID indicator must be provided. this can be as simple as a type measure attach to the tube housing.

the SID indicator must be accurate to with in 2% of the indicated SID.

Collimation.

light localized variable aperture rectangular collimator should be provide cones and diaphragms may replace the collimator for spacial examination.

the x-ray beam and the light beam must coinside to within 2% of the SID.

Positive-beam limitation:

Automatic light localized variable aperture collimator were required on all but special xray imaging system manufactured in the united state b/w 1974 and 1974.

The PBL must be accurate to within 2% of the SID.

Beam Alignment

in addition to proper collimation, each radiograph tube should be provided within a machanism to ensure proper alignment of the xray beam and the image receptor.

filtration :

All general purpose diagnostic xray beam must have a total filtration of the lease 2.5 mm Al when operated about 70 kvp.