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Radiation protection
4th semester
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Q1:- Describe the role of radiation protection officer in radiology department?

- Monitoring site activity against environment Agency permit condition
- 1- Expert inspection & auditing of storage & disposal facilities.
 - 2- Auditing holdings and usage records.
 - 3- Auditing waste accumulation in stores.
 - 4- Performing measurements to check radiation doses, dose rate and activity.
- Arranging for disposal of radioactive ~~sources~~ waste to authorised contractors.
- Managing an inventory of equipment capable of emitting x-rays.

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- Investigating incidents and reports incidents when appropriate to the relevant regulatory authority.
- Advising on training in radiation safety.
- Managing facility or site decommissioning.
- Advising radiation protection supervisors.
- Preparing periodic status reports on radiation safety & management for purposes of university governance.

Q2:- Elaborate the radiation protection measures in a safe radiology department.

- There is a safety plan that indicates the periodic inspection maintenance and calibration of all equipment.
- The safety plan involves the management of radioactive materials used for therapeutic and diagnostic purposes.

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particularly with regard to handling, storing & transportation

- The safety plan involves posting of safety warning on the doors.
- Safety plans indicates monitoring of the staff for radiation exposure at least quarterly.
- The safety plan involves checking female patients for pregnancy before exposure.
- also involves the provisions & regular testing of radiation protection aprons & thyroid & gonad shields for staff & patients.
- The safety plan is implement as evidenced by the dialy practice.
- The radiology department ensure the test are conducted at least annually
 - Automatic exposure control
 - Kvp reproducibility & repeatability
 - Half value layer test.
 - Alignment of collimator & x-ray field.

Q3:- What are radiation hazards that one should be beware off.

→ Radiation injury causes changes in the living tissues causing radiation sickness

→ Somatic Effects:-

harmful to the person.

→ Genetic effects:-

reflected in the offspring.

→ Radiation decomposition is splitting of water into H^+ and OH^- and also splitting of other solvents of the body.

→ Kinetic energy of the incident photons heat up the molecules of the living tissues

→ Incident radiation when traveling through the body tissues knock out the bound electrons free from their parent atom or molecules

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- These free electrons are highly unstable and interact with other atoms & molecules with in the irradiated system.
- Ionization is another process where the radiations interact with matter to form ions.
- High-energy electromagnetic radiation and particle radiation are capable of producing ions in their passage through matter.
- Types of ionizing radiation include alpha α & beta particles, x-rays, gamma rays etc.
- X-ray machines & radio-isotopes are the two important & potential sources of ionizing radiations.
- The delay effects of radiation shortening of life span, leukemia, malignant tumors & cataract. These appear after months or even many year of exposure.

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Q4:- How a radiation technologist can protect him self from radiation. What is annual occupational dose.

Ans :

one of the best ways to be prepared is to understand the radiation protection principle of

→ Time

→ Distance

→ Shielding.

→ Time, distance & shielding actions minimize your exposure to radiation in much the same way as they would to protect you against overexposure to the sun.

→ Time :-

For people who are exposed to radiation in addition to natural background radiation limiting or minimizing the exposure time reduces the dose from the radiation source.

→ Distance:-

just as the heat from a fire reduces as you move further away, the dose of radiation decreases dramatically as you increase your distance from the source.

→ Shielding:-

Barriers of lead, concrete or water provide protection from penetrating gamma rays, x-rays.

→ This is why certain radioactive materials are stored under water or in concrete or lead-lined rooms. e.g. dentists place a lead blanket on patients receiving x-rays of their teeth.

→ therefore inserting the proper shield b/w you & radiation source will greatly reduce or eliminate the dose you receive.