



Fourth Lecture 15/10/2023

Radiation Protection Course

Lecturer

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Chapter Five

Occupational radiation exposure

- Occupational radiation exposure in Fluoroscopy: refers to the radiation exposure that healthcare professionals may encounter while using fluoroscopy equipment during medical procedures.
- Fluoroscopy: (التنظير الفلوري) is a medical imaging technique that uses a continuous X-rays beams to obtain real-time moving images of the internal structures of a patient's body. It is commonly used in various medical specialties, including radiology, cardiology, orthopedics, gastroenterology, and urology. Fluoroscopy provides dynamic, continuous images that can help healthcare professionals visualize and monitor the function of various organs and systems.

In some types of examination, much higher-quality images can be obtained, often with reduced dose, by injection of contrast media. These are chemical solutions that absorb X-rays more effectively than the body organs or fluids and so give enhanced images. This technique is commonly used in angiography, which is concerned with investigations of blood vessels. Two common contrast agents used in fluoroscopy are:

1. Iodine-Based Contrast Media: These contrast agents (عوامل التباين) contain iodine and are often used in vascular studies and to enhance the visibility of blood vessels during angiography. They are injected into a blood vessel (intravenously) to make the blood vessels more visible under X-ray.

2. Barium Sulfate: Barium sulfate is a contrast agent used in procedures such as barium swallow studies and barium enemas to visualize the gastrointestinal tract. It is usually ingested by the patient or introduced rectally, and it appears white on X-ray images, providing good contrast with the surrounding tissues.

Image Formation: As the X-rays pass through the patient, they are attenuated (absorbed and scattered) to varying degrees by the different tissues within the body. Dense structures, such as bones, absorb more X-rays and appear as bright areas on the fluoroscopy monitor, while less dense tissues appear darker.



Mammography: is a specialized medical imaging technique used primarily for the early detection and screening of breast cancer in women. It works by using low energy x-rays to create detailed image of the breast tissue to detect any abnormalities, such as tumors or suspicious masses. Mammograms are a crucial tool in breast cancer diagnosis and prevention because they can detect cancer at an early



Computed Tomography(أجهزة التصوير الطبقي المحوسب): refers to a computerized x-ray imaging procedure in which a narrow beam of x-rays is aimed at a patient and quickly rotated around the body, producing signals that are processed by the machine's computer to generate cross-sectional images of internal structure, or "slices." These slices are called tomographic images and can give a clinician more detailed information than conventional x-rays. Once a number of successive slices are collected by the machine's computer, they can be digitally "stacked" together to form a three-dimensional (3D) image of the patient that allows for easier identification of basic structures as well as possible tumors or abnormalities.



Here are some of its key applications and uses:

Diagnostic Imaging: CT scans are commonly used for diagnosing various medical conditions. They provide detailed images of bones, organs, blood vessels, and soft tissues, which can help healthcare professionals identify a wide range of diseases and disorders.

Trauma Assessment (تقييم الصدمات): CT scans are crucial in emergency medicine for assessing and diagnosing injuries resulting from accidents or trauma, such as fractures, internal bleeding, and head injuries.

Cancer Diagnosis and Staging: CT scans are essential tools for detecting and staging various types of cancer, helping doctors determine the extent of cancer spread within the body.

This table summarizes the key differences between fluoroscopy and CT, highlighting their

Aspect	Fluoroscopy	Computed Tomography(CT) scan
Principle of Operation	Real-time imaging using continuous X-ray beam	Cross-sectional imaging using rotating X-ray tube and detectors
Applications	<ul style="list-style-type: none"> • Real-time monitoring during medical procedures • Dynamic imaging • Barium swallow studies • Cardiac catheterization • Angiography 	<ul style="list-style-type: none"> • Detailed anatomical imaging • Identifying tumors, fractures, and internal bleeding • Pre-surgical planning • Radiation therapy guidance
Exposure Time	Prolonged exposure due to real-time imaging	Relatively quick, usually a few seconds per scan
Image Type	Moving, real-time images	Static cross-sectional images, often reconstructed into 3D
Radiation Dose	Lower than conventional X-ray, but higher than CT	Higher than fluoroscopy, lower than conventional radiography (efforts made to minimize radiation)

Surgery: refers to the potential exposure of healthcare workers, particularly those involved in surgical procedures, to ionizing radiation. This exposure occurs when medical procedures or interventions that utilize X-rays or other forms of ionizing radiation are performed in a clinical setting. Surgeons, nurses, radiologic technologists, and other support staff who are present during these procedures may be at risk of radiation exposure due to their proximity to the radiation source.