UPUMS RADIOGRAPHER EXAM MEMORY BASED QUESTIONS

Radiotracer used in bone scan

- Technetium-99m (Tc-99m) also called radionucleid
- The radiotracer used in bone scans is typically technetium-99m (Tc-99m) labeled compounds, such as technetium-99m methylene diphosphonate (Tc-99m MDP) or technetium-99m hydroxymethylene diphosphonate (Tc-99m HDP). These radiotracers are injected into the bloodstream and selectively accumulate in areas of increased bone metabolism, making them useful for detecting bone abnormalities such as fractures, infections, tumors, and metabolic bone diseases like osteoporosis.

Collimator used in SPECT

- Parallel-hole collimators routinely used for planar and SPECT imaging, there are special focused collimator options specifically designed for SPECT imaging the brain and the heart.

Si units

- What is the unit used to measure the absorbed dose of ionizing radiation in biological tissue?
- A) Rutherford (Rd)
- B) Gray (Gy)
- C) Sievert (Sv)
- D) Becquerel (Bq)

- Answer: B) Gray (Gy)

Ultrasound Trasducer

- Which type of transducer is commonly used for imaging in cases of suspected ectopic pregnancy?
- A) Linear array transducer
- B) Curvilinear array transducer
- C) Phased array transducer
- D) Transvaginal ultrasound transducer

- Answer D) Transvaginal ultrasound transducer
- Transvaginal ultrasound is commonly used for imaging in cases of suspected ectopic pregnancy. This type of ultrasound involves inserting a transducer into the vagina to obtain detailed images of pelvic structures, including the uterus, fallopian tubes, and ovaries. Transvaginal ultrasound is preferred for evaluating ectopic pregnancies due to its ability to provide high-resolution images of the pelvic organs and its high sensitivity for detecting early signs of ectopic pregnancy, such as the presence of a gestational sac outside the uterus..

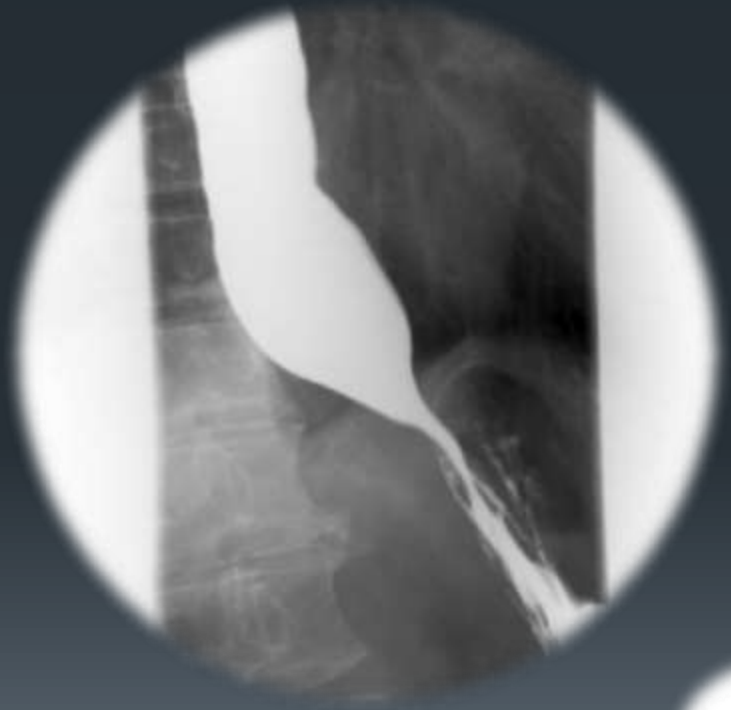
Red Tech

- Which of the following radiological signs is associated with the tapering appearance of the distal small bowel?
- A) Rat Tail Appearance
- B) Bird Beak Sign
- C) Tapvac
- D) Lead Pipe Sign

Answer :- A) Rat Tail Appearance

- Which radiological sign is characteristic of an abrupt narrowing at the gastroesophageal junction, resembling the beak of a bird?
- A) Rat Tail Appearance
- B) Bird Beak
- C) Tapvac
- D) Lead Pipe Sign

- Answer: B) Bird Beak Sign



Red Tech

- Which radiological sign is indicative of a pneumatic distension of the upper gastrointestinal tract with air and fluid?
- A) Rat Tail Appearance
- B) Bird Beak Sign
- C) Tapvac
- D) Lead Pipe Sign

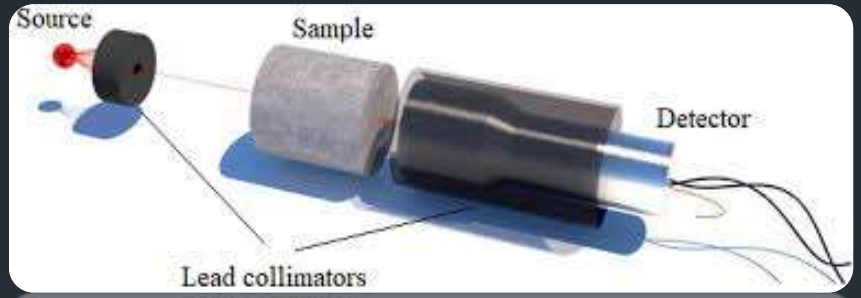
- Answer: C) Tapvac

- Which radiological sign is associated with the loss of haustration and uniform diameter of the colon, often seen in cases of ulcerative colitis?
- A) Rat Tail Appearance
- B) Bird Beak Sign
- C) Tapvac
- D) Lead Pipe Sign

- Answer: D) Lead Pipe Sign

Red Tech

- What type of filter is commonly used in thyroid scans to reduce scatter radiation and enhance image quality?
- A) Aluminum filter
- B) Copper filter
- C) Lead collimator
- D) Tungsten collimator

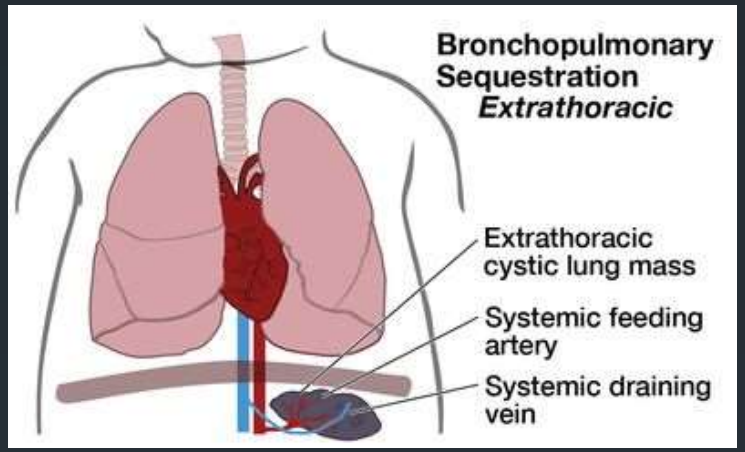


- Answer: C) Lead collimator
- The lead collimator is positioned between the patient and the gamma camera detector to selectively allow gamma rays emitted from the thyroid gland to pass through while blocking scattered radiation from other tissues. This helps in reducing scatter radiation and improving the overall image quality in thyroid scans.

- Which investigation is commonly used to assess the extent of breast carcinoma and determine the stage of the disease?
- A) Mammography
- B) Breast ultrasound
- C) Breast Magnetic Resonance Imaging (MRI)
- D) Biopsy

- Answer: C) Breast Magnetic Resonance Imaging (MRI)
- It is commonly used to assess the extent of breast carcinoma and determine the stage of the disease. MRI provides detailed images of the breast tissue and can help evaluate the size, location, and characteristics of the tumor within the breast, as well as assess for multifocal or multicentric disease. It is often used in addition to mammography and ultrasound for staging breast cancer.

- Which blood vessels typically supply a sequestrated lung?
- A) Pulmonary arteries
- B) Systemic arteries
- C) Coronary arteries
- D) Hepatic arteries



- B) Systemic arteries
- A sequestrated lung is typically supplied by systemic arteries rather than pulmonary arteries. Systemic arteries, which branch off the aorta, provide blood flow to the sequestrated lung tissue. This anomalous blood supply bypasses the normal pulmonary circulation.

- In which year was fluoroscopy discovered?
- A) 1885
- B) 1895
- C) 1905
- D) 1915

- Answer: B) 1895
- Fluoroscopy was discovered in 1895 by the German physicist Wilhelm Conrad Roentgen. Roentgen accidentally discovered the phenomenon while experimenting with cathode ray tubes in his laboratory. He observed that certain materials emitted a fluorescent glow when exposed to cathode rays. This discovery led to the development of fluoroscopy, a technique used in medical imaging to visualize real-time moving images of internal structures of the body

- What effect does placing a half piece of lead in front of a cobalt-60 radiation source have?
- A) It increases the intensity of the radiation beam.
- B) It has no effect on the radiation beam
- C) It partially attenuates the radiation beam.
- D) It completely blocks the radiation beam.

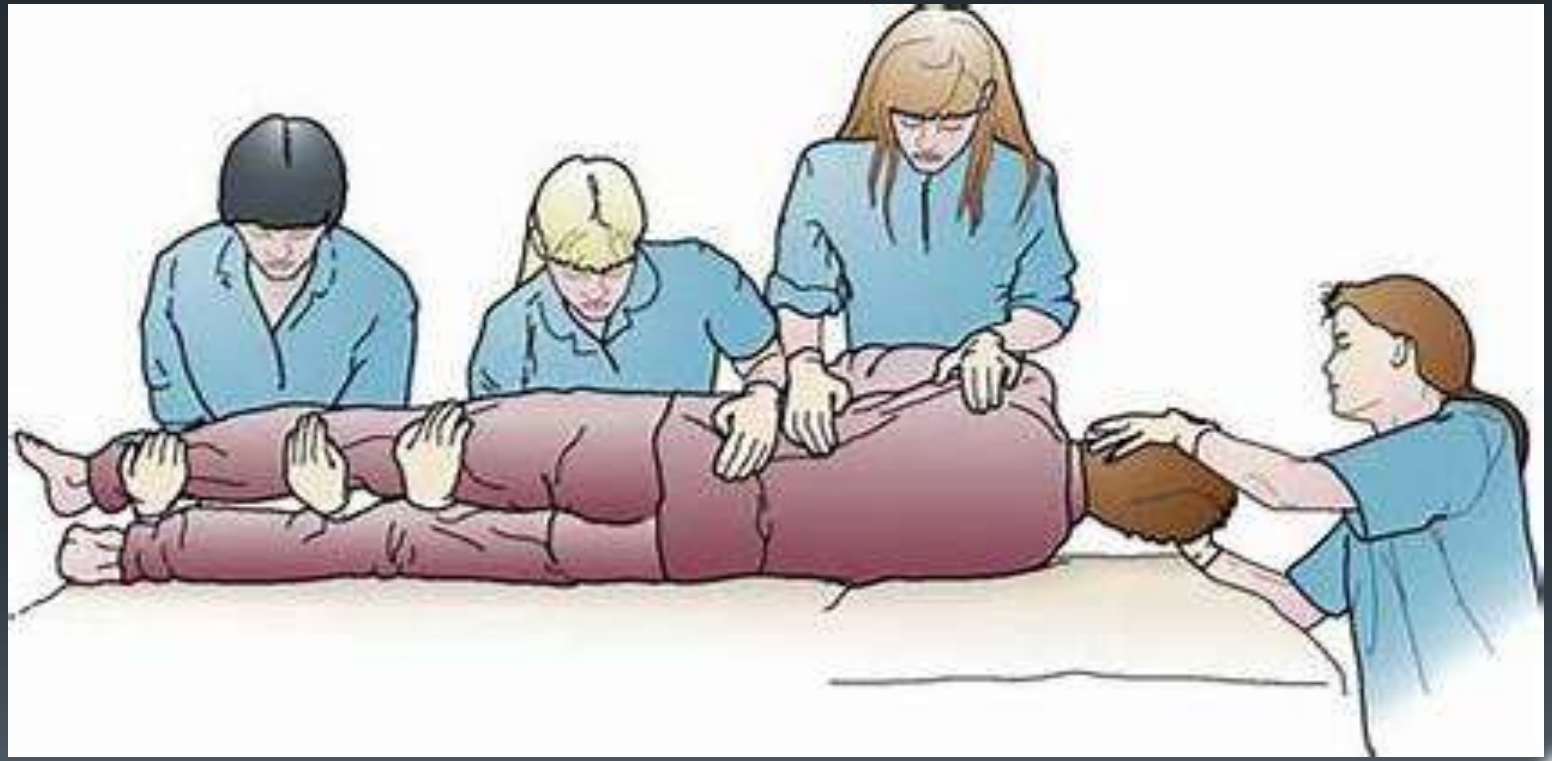
- Answer: C) It partially attenuates the radiation beam.

Placing a half piece of lead in front of a cobalt-60 radiation source partially attenuates the radiation beam. Lead is a dense material that effectively absorbs ionizing radiation, reducing its intensity when placed in its path.

LOGROLLING TECHNIQUE

- In a medical context, "logrolling" refers to a specific technique used to safely move a patient with a suspected spinal injury while minimizing movement of the spine. This technique is commonly used in emergency medicine, trauma care, and spinal injury management. It is crucial to perform logrolling correctly to prevent further injury to the spine. Here's how it's typically done:
- **Assess the Situation**: Before attempting to move the patient, assess the scene to ensure it is safe for both the patient and the rescuers. If the patient is in immediate danger, take appropriate measures to stabilize the scene before proceeding.
- **Call for Assistance**: If available, enlist the help of other trained personnel to assist with the logrolling maneuver. Proper coordination is essential to ensure the safety of the patient and the effectiveness of the technique.
- **Positioning**: Position the rescuers around the patient, with one person at the head, one person at the hips, and one person on each side of the patient's torso. Ensure that everyone is aware of their roles and responsibilities during the maneuver.
- **Stabilize the Head**: The rescuer at the head of the patient is responsible for stabilizing the patient's head and neck to prevent any movement of the cervical spine. This is typically done by placing hands on either side of the patient's head and holding it in a neutral position.

- **Maintain Spinal Alignment**: The other rescuers carefully roll the patient as a unit, keeping the spine in a straight line. They should use coordinated movements to prevent any twisting or bending of the spine during the maneuver.
- **Counting and Communication**: Before starting the logroll, ensure that everyone is ready and knows when to begin. The rescuer at the head typically counts down, and all rescuers move simultaneously to maintain spinal alignment.
- **Rolling the Patient**: On the count, the rescuers gently roll the patient onto their side as a unit, maintaining spinal alignment throughout the movement. The rescuer at the head continues to stabilize the patient's head and neck during the roll.
- **Placing a Spinal Board**: Once the patient is on their side, a spinal board or other appropriate immobilization device can be slid underneath the patient. The rescuers then carefully roll the patient back onto the device, again maintaining spinal alignment.
- **Secure the Patient**: Once the patient is safely positioned on the spinal board, secure them in place using appropriate immobilization devices, such as straps or a cervical collar.
- **Monitor the Patient**: Continuously monitor the patient's vital signs and neurological status throughout the process. If there are any signs of deterioration or further injury, adjust the patient's position accordingly and seek immediate medical attention.



Types of patient transfer technique

- **Assistive Devices Transfer**: Using tools like transfer boards or sliding sheets to move patients between surfaces.
- **Lateral Transfer**: Moving patients horizontally from one surface to another, like from a bed to a gurney.
- **Stand-Assist Transfer**: Helping patients who can bear some weight to stand and transfer to another surface.
- **Mechanical Lift Transfer**: Using devices like Hoyer lifts to move patients who can't bear weight on their own.
- **Slide Sheet Transfer**: Using special sheets to slide patients with minimal resistance, helpful for repositioning in bed.

- **Two-Person Assisted Transfer**: Two caregivers working together to safely move and transfer a patient.
- **Wheelchair-to-Toilet Transfer**: Assisting patients in moving from a wheelchair to a toilet and back.
- **Repositioning in Bed**: Adjusting a patient's position within the bed to prevent pressure ulcers and improve comfort.

Stand – By Assist

- Patient can perform activities without assist but do not do it consistently.
- Examples of stand – by assist (SBA) = verbal cues (VC)

Lateral Transfer

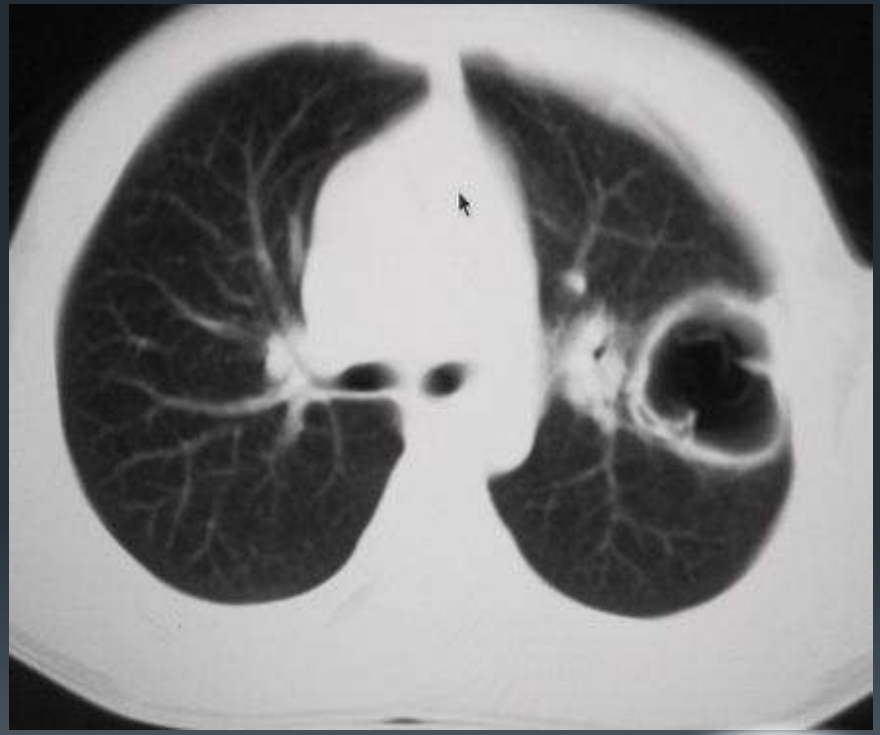
Use hand crank to transfer patient from device to the Totalift Transfer Chair

Red Tech

Water lily appearance

Water Lily Sign:

Appearance: Cystic areas resembling a water lily, with central cavitation and a thin rim of tissue.
Seen In: Radiology imaging studies like MRI or CT scans.
Associated with: Periventricular leukomalacia (PVL), a brain injury primarily affecting premature infants.
Significance: Characteristic finding aiding in the diagnosis of PVL, especially in at-risk premature infants.



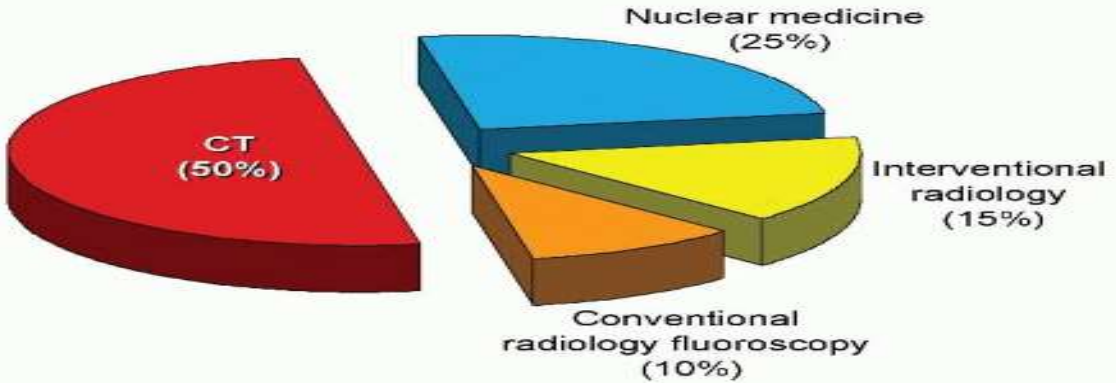
Dose in interventional radiology

TABLE 2: Annual Dose Equivalent for Interventional Radiology Staff in the Cardiac Laboratory

Staff	Dose Equivalent (mSv/y)		*p*
	Two Badges	One Badge	
Physicians	19.84 ± 12.45	1.00 ± 0.72	< 0.001
Nurses	4.73 ± 0.72	0.94 ± 0.57	< 0.001
Radiologic technologists	1.30 ± 1.00	0.51 ± 0.46	0.061

Note—Data are mean ± SD. Level of significance was $p < 0.05$.

Contributions to the Effective Dose from Radiology

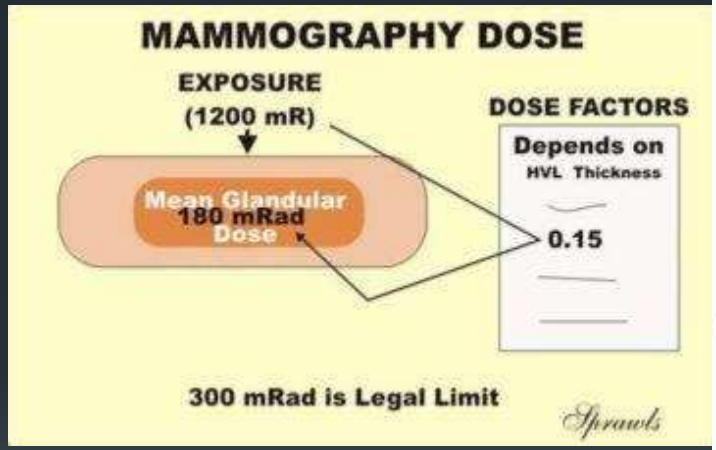


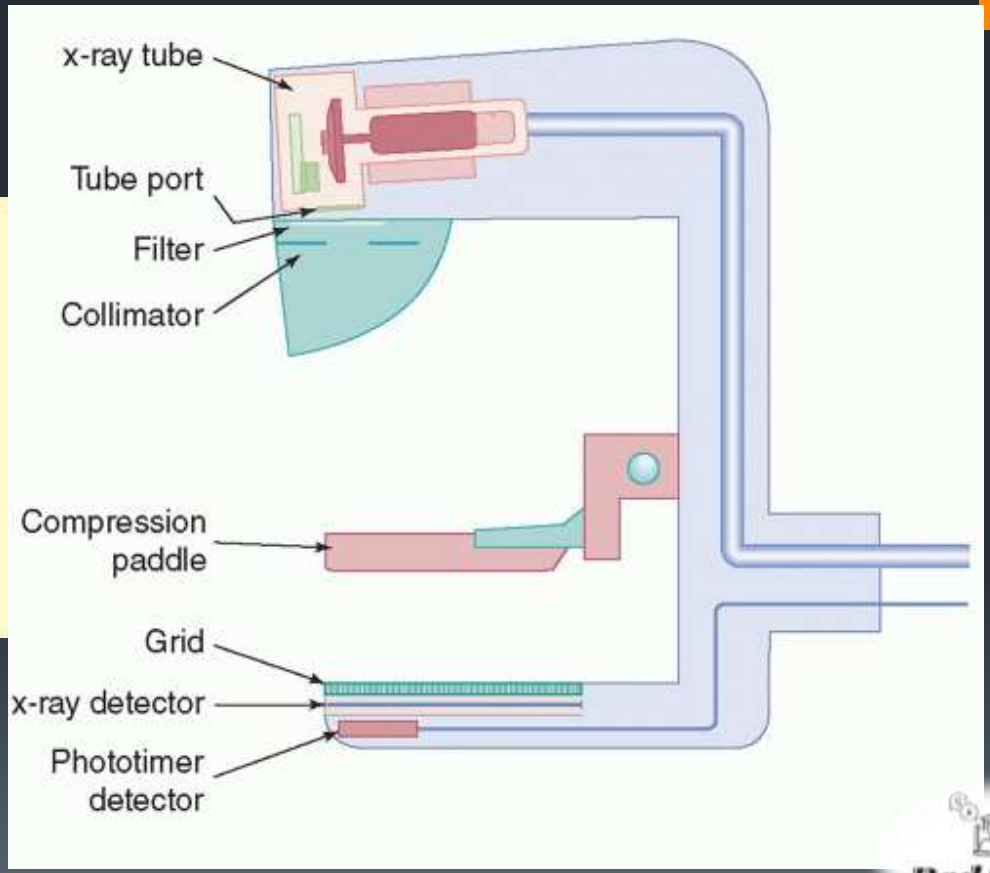
Red Tech

Type of limit	Occupational	Public
Effective dose	20 mSv per year, averaged over defined periods of 5 years	1 mSv in a year
Annual equivalent dose in		
Lens of the eye	150 mSv	15 mSv
Skin	500 mSv	50 mSv
Hands and feet	500 mSv	–

mSv millisievert, 1 sievert is equal to 100 roentgen equivalent in man (rem)

Mammography dose





Best radiology modality for posterior communicating artery

- The best radiology modality for imaging the posterior communicating artery (PCoA) is typically magnetic resonance angiography (MRA). MRA provides excellent visualization of the cerebral vasculature, including the PCoA, without the need for invasive procedures or contrast agents that are required in conventional angiography. MRA offers high-resolution imaging and is particularly useful for assessing vascular anatomy, detecting abnormalities, and evaluating blood flow in the PCoA and surrounding structures.

Ct scan be option.

The Hounsfield unit (HU)

- The Hounsfield unit (HU) scale in CT imaging measures the radiodensity of tissues or materials. It provides a numerical value representing the density, with water being the baseline at 0 HU. The scale extends above and below this baseline, with positive values indicating denser tissues (e.g., bone) and negative values indicating less dense tissues (e.g., air).
- The Hounsfield unit (HU) in CT imaging depends on the density of the tissue or material being imaged. It measures radiodensity, with water as the baseline (0 HU). Positive values represent denser tissues like bone, while negative values represent less dense tissues like air.

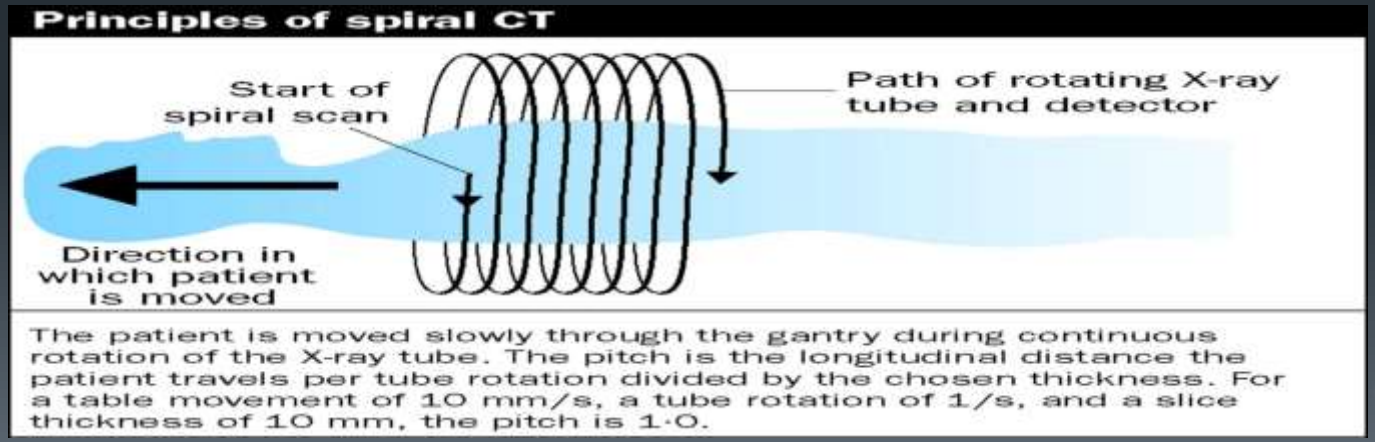
The Hounsfield unit (HU)

- Factors affecting CT Hounsfield units (HU) include tissue composition, kilovoltage (kVp), scanning protocol, beam hardening, scanner calibration, patient size and shape, metallic artifacts, partial volume effect, noise and image reconstruction, and slice thickness. These factors influence the density and attenuation of tissues, impacting HU measurements in CT imaging

Tissue	CT Number (HU)
Bone	+1000
Liver	40 - 60
Whiter mater	−20 to −30
Grey mater	−37 to −45
Blood	40
Muscle	10 - 40
Kidney	30
CSF	15
Water	0
Fat	−50 to −100
Air	−1000

Area covered by spiral CT in 30 seconds

- the area covered by a CT scan in 30 seconds depends on factors like the scanner's speed and slice thickness. Typically, during this time, multiple cross-sectional images (slices) are captured. The specific area covered varies based on scanner parameters and scanning protocol.



Elements used in MRI

- The least usable atom in MRI (Magnetic Resonance Imaging) is typically helium. While hydrogen is the most commonly used atom in MRI due to its abundance in the body and favorable imaging properties, helium is rarely used in clinical MRI imaging. This is primarily because helium is an inert gas with low atomic number and low sensitivity to the MRI process. Additionally, helium is more difficult and expensive to handle compared to other gases used in MRI, such as nitrogen or xenon. Therefore, while hydrogen is the most commonly utilized atom in MRI, helium is among the least used due to its limited applicability and practical considerations.

- The axial view in medical imaging is also known as the transverse or cross-sectional view.
- Contraindications for Intravenous Pyelogram (IVP) include:

Known or suspected allergic reaction to contrast media

Severe renal impairment or renal failure

Pregnancy (especially during the first trimester)

Hyperthyroidism or pheochromocytoma (due to the risk of contrast-induced thyroid storm or hypertensive crisis)

- Investigations for subdural hemorrhage typically involve:
- **Computed Tomography (CT) Scan**: Used initially to quickly assess the presence and extent of hemorrhage.
- **Magnetic Resonance Imaging (MRI)**: Provides detailed information, especially for chronic or subacute cases, and assesses associated brain injuries.

- REM stands for "Roentgen Equivalent Man." It is a unit of measurement used to quantify the biological effect of ionizing radiation on human tissue. The REM takes into account the type of radiation, the energy of the radiation, and the specific tissue being irradiated. It is used to assess radiation dose equivalent and potential health risks associated with exposure to ionizing radiation.
- The thickness of lead aprons in radiology typically ranges from 0.25 to 0.5 millimeters of lead equivalence, with specialized aprons potentially thicker for higher radiation protection.

- In radiology, energy is directly related to the frequency or wavelength of the electromagnetic radiation being used. Specifically, in X-ray imaging, higher energy X-rays have shorter wavelengths and higher frequencies. This relationship is important because it influences the penetration power of the radiation and its ability to interact with and be absorbed by different tissues in the body.
- Radiosensitive materials are substances that undergo damage or changes when exposed to ionizing radiation. Examples include biological tissues, photographic film, electronic components, polymers, and food/pharmaceutical products

Boot shape heart – tetralogy of fallot

‘coeur en sabot’ is a French phrase used in radiology for abnormal appearance of heart
such as clog or wooden shoe shaped heart.