Editied Radiology Past Papers

017 and all previous years Questions

General

Question 1:
Regarding lesions that appear hyper-dense on CT-Scan, one is False:
a. Metallic clips
b. Intra-venous contrast.
c. Lipoma.
d. Acute hemorrhage.
e. Calcifications.

Answer: c

High-Yield Context from Slides:
Computed Tomography (CT) uses X-rays to create cross-sectional images. The different structures in the body attenuate the X-ray beam to varying degrees, which are represented as different shades of grey on the image. This is quantified using Hounsfield Units (HU).

- **Density Reference:** Water is the reference point, with a Hounsfield unit of 0.
- **Hyperdense:** Structures with HU values greater than 0 appear whiter on a CT scan. These are termed "hyperdense."
- **Hypodense:** Structures with HU values less than 0 appear darker and are termed "hypodense."

Based on the slides:

- **Fat (as in a Lipoma):** Has a density of -100 HU (Slide 4), making it hypodense. Subcutaneous fat is listed as an important hypodense structure (Slide 5).
- **Metallic clips:** Metals have very high densities, in the 1000s of HU (Slide 5), appearing extremely hyperdense.
- **Intra-venous contrast:** Contrast media used in CT typically has a density of 100-120 HU (Slide 4), making structures containing it appear hyperdense.
- **Acute hemorrhage:** Blood, especially acute hemorrhage where hemoglobin is present, has a density of 50-70 HU (Slide 4). Acute hemorrhage is listed as an important hyperdense lesion (Slide 5).
- **Calcifications:** Calcified structures have a density around 100 HU (Slide 4) and are also listed as important hyperdense lesions (Slide 5).

Therefore, a lipoma, being composed of fat, would appear hypodense, not hyperdense.

Question 2:
About MRI uses, which is the wrong match:
a. MRI FLAIR: calcification
b. MRV: cavernous sinus thrombosis
c. MRI DWI: acute infarct
d. MRI T1 contrasted: intra-axial tumor

Answer: a

High-Yield Context from Slides:
Magnetic Resonance Imaging (MRI) uses a strong magnetic field and radio waves to generate detailed images of organs and tissues. Different MRI sequences are optimized to highlight specific tissue characteristics or pathologies.

- **T1-weighted (T1):**
  - Primarily used to visualize anatomy and localize lesions. Most lesions appear hypointense (darker) on T1.
  - **Hyperintense (brighter) structures on T1 include:** Fat, subacute hemorrhage, melanin-containing tumors (melanomas), and **calcifications** (Slide 74).

- **FLAIR (Fluid Attenuation Inversion Recovery):**
  - This sequence is used to detect abnormal fluids. It works by suppressing the signal from normal free fluid (like CSF), making areas of abnormal fluid (e.g., edema) stand out.
  - On FLAIR: CSF appears hypointense, white matter is hypointense, and grey matter is hyperintense (Slide 74). It is not primarily used for identifying calcifications; calcifications are better visualized on CT or can appear hyperintense on T1 MRI.
- **DWI (Diffusion-Weighted Imaging):**
  - This is the gold standard for diagnosing acute ischemic infarcts (strokes).
  - In an acute stroke, cellular swelling (cytotoxic edema) restricts the diffusion of water molecules. This restricted diffusion causes the infarcted area to appear **hyperintense** (bright) and well-demarcated on DWI sequences (Slide 75).
- **T1 contrasted:**
  - The administration of gadolinium-based contrast agents is crucial for detecting tumors.
  - Tumors often enhance (become hyperintense) after contrast administration on T1-weighted images due to increased vascularity or breakdown of the blood-brain barrier (Slide 80). This is useful for identifying intra-axial tumors.
- **MRV (Magnetic Resonance Venography):** While not detailed specifically for cavernous sinus thrombosis, MRV is a technique used to visualize veins. MRI, in general, can be used to detect thrombosed blood (Slide 73). Cavernous sinus thrombosis is a condition involving a blood clot in a venous sinus, making MRV a suitable imaging modality.

The incorrect match is "MRI FLAIR: calcification" because FLAIR is designed to highlight abnormal fluid by suppressing normal CSF, and calcifications are typically assessed using CT or noted on T1 MRI sequences as hyperintense areas.

Question 3:
All are relative contraindications of contrast except:
a. Food allergy
b. Penicillin allergy
c. Asthma
d. Previous contrast allergy
e. Gluten sensitivity

Answer: d

High-Yield Context from Slides:

- **CT Contrast (Iodine-based):** Iodine-based contrast materials are associated with a higher rate of allergic reactions. If a patient has a history of an allergic condition (general allergies), it increases the risk of an anaphylactic reaction to iodinated contrast. To prepare a patient with a previous history of allergy for a CT scan, corticosteroids may need to be administered (Slide 72).
- **MR Contrast (Gadolinium-based):** Gadolinium is generally safer than iodine regarding allergic reactions. Allergic reactions to environmental substances (e.g., pollen) do not increase the risk of an allergic reaction to Gadolinium. No special precautions are usually needed for general allergies. However, if a patient has a history of an allergic reaction specifically to Gadolinium, an MR scan with contrast should not be performed (Slide 73).
- **Angiography Contrast:** Relative contraindications for angiography (which uses iodinated contrast) include allergy to contrast medium or any general allergic conditions (Slide 94).

The question asks for what is *not* a relative contraindication (or what would be a stronger contraindication).

- Food allergy, penicillin allergy, and asthma represent general allergic predispositions or conditions that can increase the risk of a reaction to iodinated contrast, making them relative contraindications.
- Gluten sensitivity (celiac disease) is an autoimmune disorder and not typically listed as a direct contraindication or risk factor for contrast media reactions in the same way as atopic conditions or previous contrast reactions.
- A **previous contrast allergy** is a significant risk factor. While the slides differentiate between preparing a patient with a "history of an allergic condition" (Slide 72 for CT) and not performing an MR if there's a history of "allergic reaction to Godolinum" (Slide 73 for MRI), a previous severe reaction to the specific class of contrast being considered would

often be a strong relative or even absolute contraindication, or would necessitate a very careful risk-benefit analysis and premedication protocol.

The question is tricky. "Previous contrast allergy" is a very strong relative contraindication, potentially even an absolute one depending on severity and type. The term "relative contraindication" implies that the procedure *can* be done with precautions. If a patient had a severe anaphylactic reaction to contrast previously, it might be considered an absolute contraindication. However, compared to general food allergies or gluten sensitivity, it's a more direct and significant risk factor for a repeat reaction. The answer 'd' implies that "Previous contrast allergy" is NOT a relative contraindication, perhaps suggesting it's an absolute one, or the question is poorly phrased.

Re-evaluating based on the answer 'd' being correct: This means "Previous contrast allergy" is *not* a relative contraindication (it's something else, likely a stronger one, or the question is asking for something that is *not* a contraindication at all). However, the slides clearly list "Allergy: either to contrast medium or any general allergic conditions" as a relative contraindication for angiography (Slide 94). This seems contradictory.

Let's assume the question implies "All are *examples* of relative contraindications *for iodinated contrast* except:"
If "Previous contrast allergy" is
not a relative contraindication, it could be because it's considered an *absolute* contraindication in many contexts, or it necessitates such significant premedication that it's in a different category.
However, the slides group "allergy to contrast medium" with "general allergic conditions" as
relative contraindications for angiography (Slide 94).

Let's consider the other options in the context of being *relative contraindications*:

- Food allergy: General allergic condition - relative contraindication (Slide 94).
- Penicillin allergy: General allergic condition - relative contraindication.
- Asthma: Patients with asthma are often considered at higher risk for contrast reactions.
- Gluten sensitivity: Not typically considered a risk factor for acute contrast reactions.

If the answer is 'd', then "Previous contrast allergy" is being singled out as something *other than* a relative contraindication. This is problematic as it *is* a major concern. Perhaps the question means "All of these general conditions are relative contraindications, but a previous contrast allergy is an even more serious consideration that might push it towards an absolute contraindication or require very specific management beyond just 'relative caution'."

Given the provided answer is 'd', the logic might be: Food allergy, penicillin allergy, and asthma are general conditions that raise a flag for *potential* cross-reactivity or heightened sensitivity, making them relative contraindications where premedication might be considered. Gluten sensitivity is generally unrelated. A *previous direct allergy to contrast itself* is a much stronger predictor of a repeat reaction and might be considered by some as closer to an absolute contraindication or one requiring the most stringent precautions, thus not merely "relative" in the same sense as a general food allergy. This is a nuanced interpretation.

For the purpose of providing context based *strictly on the slides*:
Slide 94 (Angiography): "Relative contraindications include: ... Allergy: either to contrast medium or any general allergic conditions".
This slide categorizes "allergy to contrast medium" as a
relative contraindication. This contradicts the provided answer if the answer implies it's NOT relative.

Let's assume there's a nuance I'm missing or the question is flawed in relation to the provided answer. If the question meant "All are mild/general relative contraindications except:" then a previous direct contrast allergy would be the exception as it's more severe.

Question 4:
Which is wrong:
a. MRI as sensitive as CT for diagnosis of acute infarct
b. DWI shows hyperintensity in acute infarction
c. Haemorrhage appear heterogenous hyperintense in T2

Answer: a

High-Yield Context from Slides:

- **Diagnosing Acute Infarct (Stroke):**

    - **CT:** A non-contrasted CT is often the first study in a suspected stroke to rule out hemorrhagic infarct (Slide 75). However, CT has limited sensitivity for detecting early ischemic changes or edema in an acute ischemic stroke (Slide 75). A CT scan can be normal up to 72 hours after an infarct (Slide 10).
    - **MRI:** MRI, particularly DWI sequences, is the gold standard for diagnosing acute ischemic infarcts.
        - **DWI (Diffusion-Weighted Imaging):** Shows restricted diffusion in the area of ischemia as hyperintensity (brightness) very early after onset (Slide 75).
    - Therefore, MRI (specifically DWI) is *more sensitive* than CT for diagnosing acute ischemic infarcts, especially in the early stages.
- **Hemorrhage on MRI:**
    - The appearance of hemorrhage on MRI is complex and depends on its age (stage of hemoglobin breakdown) and the MRI sequence used.
    - **T2-weighted (T2):**
        - Acute hemorrhage (oxyhemoglobin) can be isointense to hypointense.
        - Early subacute hemorrhage (deoxyhemoglobin) is typically hypointense.
        - Late subacute hemorrhage (intracellular methemoglobin) is hyperintense.
        - Chronic hemorrhage (hemosiderin/ferritin) is markedly hypointense.
        - A general statement from Slide 77: "On a T2 weighted scan, a hemorrhage looks as a heterogenous lesion."
        - Slide 78 (Image caption C): "T2 weighted MRI a heterogenous lesion with a hyperintense rim at the area of basal ganglia" (describing a hemorrhage).
        - Slide 79 (Image caption): "An Axial T2 weighted sequence; showing a heterogenous mass on the left temporal lobe. The mass is hypointense with a hyperintense rim... it is most probably a hemorrhage".
    - The statement "Haemorrhage appear heterogenous hyperintense in T2" is generally consistent with some stages or appearances of hemorrhage as described, particularly the presence of a hyperintense rim or components within a heterogenous lesion.

Based on this:

- Statement 'a' is wrong: MRI (especially DWI) is *more* sensitive than CT for acute ischemic infarct.
- Statement 'b' is correct: DWI shows hyperintensity in acute infarction.
- Statement 'c' is plausible: Hemorrhage can appear heterogenous on T2, and components (like a rim in some cases, or late subacute stage) can be hyperintense.

Question 5:
Which is wrong about MRI:
a. Has ionizing radiation but less than that of CT
b. Contrast used in MRI is relatively safe
c. takes more time to be done than CT

Answer: a

High-Yield Context from Slides:

- **Radiation:**
    - **MRI:** MRI and ultrasound are explicitly stated as **non-ionizing radiations** (Slide 72). MRI is suitable for pediatrics and pregnancy due to the absence of ionizing radiation (Slide 72).
    - **CT:** CT utilizes X-rays, which are a form of ionizing radiation (Slide 30, Slide 11).
- **Contrast Media:**
    - **MRI Contrast (Gadolinium-based):** Generally considered relatively safe, especially compared to iodine-based CT contrast. It is associated with fewer allergic reactions. It can be used with caution in patients with renal failure (Slide 73).
    - **CT Contrast (Iodine-based):** Associated with a higher rate of allergic reactions (Slide 72).
- **Scan Duration & Emergency Use:**

- **MRI:** Takes time (average 15 minutes). Therefore, in an emergency setting, a CT scan is typically used (Slide 73).
- **CT:** Generally faster than MRI, making it more suitable for emergencies.

Based on this:

- Statement 'a' is wrong: MRI does *not* use ionizing radiation.
- Statement 'b' is correct: MRI contrast (gadolinium) is relatively safe.
- Statement 'c' is correct: MRI generally takes more time than CT.

Question 6:
Most attenuation in:
a. liver
b. lung
c. bone

Answer: c

High-Yield Context from Slides:

- **Attenuation:** Attenuation is related to tissue properties and is defined as the ability of a tissue to resist the passage of X-rays through it. The denser the tissue, the more it attenuates X-rays (Slide 12). Tissues with higher attenuation appear whiter (denser) on an X-ray or CT.
- **Order of Attenuation (X-ray):** The slides provide the order of tissues for X-ray attenuation (descending fashion, meaning from most attenuation to least, though the slide phrasing "metal, bone, air (lowest attenuation)" is a bit ambiguous if "lowest" refers to air or the end of the list. However, contextually, air has the *least* attenuation, and metal/bone have the *most*).
  - A clearer interpretation (Slide 12): "Metal, bone, air (lowest attenuation)" means air has the lowest attenuation among these. Therefore, metal and bone have high attenuation.
- **Appearance on Film (X-ray):** "Bones appear white (low penetration), and air filled spaces appear black (high penetration)" (Slide 12). Low penetration implies high attenuation.
- **Densities in Hounsfield Units (CT):**
  - **Bone:** 100 HU (or 1000 on Slide 32 for highest density, indicating compact bone can be very dense). Stated as highest density (Slide 32).
  - **Soft tissue (like liver):** 35-70 HU (Slide 4); 40-60 HU (Slide 32).
  - **Air (in lungs):** -500 HU (Slide 4). Lung parenchyma itself is less dense than solid organs due to air content.
  - **Metal:** 1000s HU (Slide 5).

Comparing the options:

- **Bone:** Has a high HU value (e.g., 100 or even 1000 for compact bone), indicating high attenuation.
- **Liver:** A soft tissue, with HU around 35-70.
- **Lung:** Primarily air-filled, with very low HU (parenchyma itself will be denser than pure air but much less dense than liver or bone).

Therefore, bone has the most attenuation among the given options.

Question 7:
Contrast CT for asthma patient, preparation by:
a. oral prednisolone
b. inhaler steroids
c. IV hydrocortisone

Answer: a

High-Yield Context from Slides:

- **CT Contrast (Iodine-based) and Allergic Reactions:**
  - Iodine-based contrast materials are associated with a high rate of allergic reactions (Slide 72).

    - If a patient has a history of an allergic condition (which can include asthma, as asthmatics may have a higher propensity for hypersensitivity reactions), it increases the risk of an anaphylactic reaction to iodinated contrast (Slide 72).
    - **Preparation for Patients with Allergy History (CT):** "To prepare a patient with a previous history of allergy for a CT scan, we need to administer corticosteroids." (Slide 72).
- **Angiography Contrast (also often iodinated):**
    - Relative contraindications include "Allergy: either to contrast medium or any general allergic conditions" (Slide 94). Asthma would fall under general allergic conditions.

The question asks about preparation for an asthma patient undergoing a contrast CT. Asthma is a condition that can increase the risk of an allergic-like reaction to iodinated contrast. The slides indicate that corticosteroids are used for preparation in patients with a history of allergy.

- **Oral prednisolone:** A commonly used oral corticosteroid for premedication to reduce the risk of contrast reactions.
- **Inhaler steroids:** Primarily act locally in the lungs for asthma management; less likely to be the standard systemic premedication for contrast allergy prevention, though good asthma control is important.
- **IV hydrocortisone:** A systemic corticosteroid, can be used for premedication, especially in more urgent settings or if oral administration is not feasible.

The choice between oral and IV corticosteroids often depends on the urgency and specific institutional protocols. Oral prednisolone is a common premedication regimen, often started 12-24 hours before the procedure.

While the slides don't specify the exact corticosteroid or route for asthma patients, they do state "administer corticosteroids" for allergy history. Oral prednisolone is a standard prophylactic regimen.

Question 8:
Allergy to contrast material in all except:
a. asthma
b. atopy
c. hypothyroid

Answer: c

High-Yield Context from Slides:

- **Risk Factors for Contrast Reactions (Iodinated Contrast):**
    - A history of an allergic condition increases the risk of an anaphylactic reaction (Slide 72).
    - "Allergy: either to contrast medium or any general allergic conditions" is a relative contraindication for angiography (Slide 94).
- **Asthma:** Patients with asthma are generally considered to have an increased risk of allergic-like reactions to contrast media. This falls under "general allergic conditions."
- **Atopy:** Refers to a genetic tendency to develop allergic diseases such as allergic rhinitis, asthma, and atopic dermatitis (eczema). Patients with atopy are at higher risk for contrast reactions. This also falls under "general allergic conditions."
- **Hypothyroid:** Hypothyroidism is a condition where the thyroid gland doesn't produce enough thyroid hormone. It is not typically listed as a risk factor for acute allergic-like reactions to contrast material. While severe hypothyroidism (myxedema coma) can affect drug metabolism and excretion, and some older, high-osmolar ionic contrast agents were thought to potentially affect thyroid function (especially in predisposed individuals), hypothyroidism itself is not a recognized risk factor for *allergic-like reactions* in the same way as asthma or atopy.

Therefore, asthma and atopy are conditions associated with an increased risk of allergy to contrast material. Hypothyroidism is not.

Question 9:
About MRI with contrast, all are wrong except:
a. contraindicated in renal failure grade III
b. contraindicated in the first trimester if contrasted
c. Not contraindicated in 2nd and 3rd trimester
d. Contraindicated in children

Answer: b

High-Yield Context from Slides:

- **MRI Contrast (Gadolinium-based):**
  - **Renal Failure:** "Can be used with caution in patients with renal failure." (Slide 73). Gadolinium contrast agents are associated with a risk of Nephrogenic Systemic Fibrosis (NSF) in patients with severe renal impairment (e.g., GFR <30 mL/min/1.73m²). "Renal failure: GFR <30. It is associated with nephrosclerosis" is listed under contraindications to MRI with contrast on Slide 14. "Renal failure grade III" (moderate chronic kidney disease, typically GFR 30-59) would require caution and use of specific lower-risk gadolinium agents if contrast is essential. So "contraindicated" might be too strong for all Grade III, but high caution and avoidance of higher-risk agents is standard.
  - **Pregnancy:**
    - **MRI without contrast (Slide 14):** "MRI is only contraindicated during the first trimester of pregnancy because there are no sufficient data on its safety. During the second and third trimesters, MRI's can be safely done."
    - **MRI with contrast (Slide 14):** "Pregnancy: contraindicated throughout the whole pregnancy." Gadolinium crosses the placenta and its effects on the fetus are not fully known, so it's generally avoided throughout pregnancy unless absolutely essential and the benefits clearly outweigh potential risks.
  - **Children:** MRI, being non-ionizing, is "suitable for pediatrics" (Slide 72). There's no general contraindication for MRI (with or without contrast) in children, though sedation might be required for younger children to ensure they remain still.

Analyzing the options:

- a. "contraindicated in renal failure grade III": Slide 14 lists GFR <30 (which is severe renal failure, Stages IV/V) as a contraindication. Grade III (GFR 30-59) is a caution/relative contraindication, especially for higher-risk gadolinium agents. So this statement might be considered "wrong" as an absolute contraindication for all of Grade III.
- b. "contraindicated in the first trimester if contrasted": This aligns with Slide 14, which states MRI with contrast is "contraindicated throughout the whole pregnancy." This would include the first trimester.
- c. "Not contraindicated in 2nd and 3rd trimester": This is specifically for *MRI without contrast* (Slide 14). For *MRI with contrast*, it's stated as contraindicated throughout the whole pregnancy (Slide 14). So this statement is wrong.
- d. "Contraindicated in children": This is wrong. MRI is suitable for pediatrics (Slide 72).

The most accurate statement that aligns with the slides, making it the "except" (i.e., the correct statement among a list of wrong ones), is 'b'. MRI with contrast *is* contraindicated in the first trimester (and indeed throughout pregnancy according to Slide 14).

Question 10:
True about the lung:
a. High penetration and low attenuation
b. High / High
c. Low / Low
d. Low / High
e. No/No

Answer: a

High-Yield Context from Slides:

- **Penetration (X-ray):** "Defined as the ability of a ray to go through a certain tissue. The higher the tissue's density, the lower the penetration." (Slide 12). Air has the lowest density, so X-rays penetrate it easily. "Air filled spaces appear black (high penetration)" (Slide 12).
- **Attenuation (X-ray):** "Defined as the ability of a tissue to resist the passage of rays through it. The less dense the tissue is, the lower the attenuation (the rays can pass easily)." (Slide 12). "Therefore, we can order the tissues in a descending fashion as follows: metal, bone, air (lowest attenuation)." (Slide 12). This means air has the lowest attenuation.
- **Lungs:** Lungs are primarily filled with air.

Therefore, for the lung:

- X-rays will pass through the air in the lungs easily, meaning **high penetration**.
- Air offers little resistance to the passage of X-rays, meaning **low attenuation**.

So, "High penetration and low attenuation" is true for the lung.

Question 11:
All of the following are true about US except:
a. does not give ionizing radiation
b. better accuracy in obese
c. can be used to visualize vessels

Answer: b

High-Yield Context from Slides:

- **Ionizing Radiation:**
  - "MRI and ultrasound are non ionizing radiations." (Slide 72).
  - Ultrasound is stated as the "safest radiological modality." (Slide 13).
- **Accuracy in Obese Patients:**
  - Ultrasound image quality can be significantly degraded in obese patients due to increased tissue depth and attenuation of the ultrasound beam by adipose tissue. This often leads to *poorer* visualization and reduced accuracy. (This is general knowledge, the slides don't explicitly state this negative, but they don't claim better accuracy in obese either).
- **Visualizing Vessels:**
  - Ultrasound, particularly with Doppler capabilities (Colored Doppler, Power Doppler, Spectral Doppler), is extensively used to visualize blood vessels and assess blood flow (Slide 17). It can show the flow and velocity of blood, presence or absence of flow, and differentiate arterial/venous flow.

Analyzing the options:

- a. "does not give ionizing radiation": True (Slides 13, 72).
- b. "better accuracy in obese": False. Ultrasound accuracy is generally reduced in obese patients due to beam attenuation by fat.
- c. "can be used to visualize vessels": True. Doppler ultrasound is excellent for vessel visualization and flow assessment (Slide 17).

Therefore, the statement that is NOT true (the "except") is "better accuracy in obese."

Question 12:
All are good conditions for Ultrasound except:
a. Thin patient
b. Children
c. Recent endoscopy
d. Full bladder

Answer: c

High-Yield Context from Slides:

- **Good Conditions for Ultrasound:**
  - **Thin patient:** Generally, less subcutaneous fat means better ultrasound penetration and image quality. (Opposite of obesity challenge).
  - **Children:** Ultrasound is safe (no ionizing radiation - Slide 13) and often well-tolerated in children, making it a good imaging modality.
  - **Full bladder:** A full bladder acts as an acoustic window, displacing gas-filled bowel loops and improving visualization of pelvic organs (e.g., uterus, ovaries). (General US principle, implied when discussing appendix visualization by filling bladder - Slide 21).

    - **Fluid-filled structures:** "Fluids can be clearly seen on an ultrasound. Therefore, any fluid containing structure or any structure that can be filled with a fluid is suitable for ultrasound imaging." (Slide 13).
- **Limitations/Problematic Conditions for Ultrasound:**
    - **Air:** "Air is problematic; you cannot visualize organs containing air." (Slide 13).
    - **Recent endoscopy:** Endoscopic procedures (like ERCP mentioned on Slide 13) often introduce air into the gastrointestinal tract. If an ultrasound is needed, it should be performed *before* such procedures to avoid air artifact obscuring images. "Therefore, if a patient needs an ultrasound and an ERCP, you perform the ultrasound before performing the ERCP in order to avoid errors in reading the image." (Slide 13).

Analyzing the options:

- a. Thin patient: Generally a good condition.
- b. Children: Ultrasound is well-suited for children.
- c. Recent endoscopy: This is a problematic condition because endoscopy can introduce air, which interferes with ultrasound imaging (Slide 13).
- d. Full bladder: Often a required or good condition for pelvic ultrasound.

Therefore, "Recent endoscopy" is not a good condition for ultrasound due to potential air introduction.

Question 13:
Which is wrong:

- Stir sequence is T1 minus fat signal

  Answer: Not provided in the question list, but the statement itself is presented as the item to evaluate.

High-Yield Context from Slides:
The provided slides do not explicitly describe STIR (Short Tau Inversion Recovery) sequences in detail or compare them directly to "T1 minus fat signal."

- **T1-weighted (T1):** Fat is hyperintense (bright) on T1 (Slide 74).
- **Fat Suppression Techniques:** Various techniques exist in MRI to suppress the signal from fat, which can be useful to better visualize pathology that might be obscured by bright fat, or to characterize tissues. STIR is one such technique.
    - **STIR (Short Tau Inversion Recovery):** Is an inversion recovery sequence that suppresses the signal from tissues with a short T1 relaxation time, most notably fat. It is not simply "T1 minus fat signal" in a mathematical subtraction sense, but rather a specific pulse sequence designed to null the fat signal. STIR images are typically T2-like in their weighting (fluid is bright) but with fat suppressed.
    - **Other Fat Suppression (e.g., chemical fat saturation):** These work on a different principle (frequency-selective saturation of fat protons) and are often applied to T1 or T2 weighted images. "T1 minus fat signal" might loosely refer to a T1-weighted image with fat suppression applied, but STIR is its own distinct sequence.

The statement "Stir sequence is T1 minus fat signal" is an oversimplification and not entirely accurate. STIR is a specific inversion recovery sequence that results in fat suppression, and its contrast characteristics are more T2-like (fluid bright, pathology often bright) than purely T1-like with fat removed. A T1-weighted image with fat suppression (using chemical saturation) *would* show T1 contrast characteristics with dark fat.

Without specific slide information on STIR, judging "wrong" is based on general MRI knowledge. The phrasing is imprecise. A more accurate description of STIR would be an inversion recovery sequence that nulls fat signal, often resulting in T2-like weighting with increased conspicuity of fluid/edema.

Question 14:
Best modality for calcification is:

- CT

  Answer: Not provided in the question list, but the statement itself is presented as the item to evaluate with "CT" as the implied correct answer.

High-Yield Context from Slides:

- **Calcification on CT:**

    - Calcifications are hyperdense on CT (HU around 100, Slide 4) and are listed as important hyperdense lesions (Slide 5).
    - CT is excellent for visualizing calcifications due to the significant density difference between calcified tissue and surrounding soft tissues.
    - "The best modality to view a calcified lesion is a CT scan" (Slide 9, regarding brain calcifications).
    - CT scans are the most sensitive study to detect renal stones (which are calcifications) (Slide 30).
- **Calcification on MRI:**
    - Calcifications can appear hyperintense (bright) on T1-weighted sequences (Slide 74).
    - However, MRI is generally not the primary modality for detecting or characterizing calcifications. They can sometimes be subtle or have variable appearances on MRI, and CT is superior for this purpose. The FLAIR sequence is *not* for calcification (as per Question 2 context).
- **Calcification on X-ray:**
    - Calcifications appear radio-opaque (white) on plain X-rays (e.g., abdominal calcifications, Slide 48). X-rays are good for detecting gross calcifications.

Comparing modalities:
CT is consistently highlighted as excellent or the best modality for viewing calcified lesions due to its high sensitivity to density differences. While X-rays can show them and T1 MRI might show them as hyperintense, CT provides superior detail and sensitivity for calcifications.

Therefore, "CT" is indeed the best modality for calcification.

Question 15:
Contraindication for MRI:

- Ferromagnetic substance inside the body

  Answer: Not provided in the question list, but the statement itself is presented as the item to evaluate with "Ferromagnetic substance inside the body" as the implied correct answer for a contraindication.

High-Yield Context from Slides:

- **MRI Contraindications (MRI without contrast, Slide 14):**
    - **"The presence of any ferro-magnetic metals:"**
        - "the MRI machine is essentially a magnet. Therefore, it is contraindicated if the person has any ferro-magnetic devices inside the body. The smaller the metal piece, the higher the damage."
        - "Some non-ferro-magnetic metals are also hazardous. These metals tend to heat up during the procedure." (e.g., in cosmetics, prostheses).
    - **"Any device that contains a battery:"** (e.g., pacemakers, vagal nerve stimulators, cochlear implants) - MRI can cause discharge/malfunction.
    - **"Magnetic strips"** (credit cards, USBs) - data erasure.
    - **Pregnancy (first trimester):** Due to lack of safety data.
- **MRI Contraindications (MRI with contrast, Slide 14):**
    - Pregnancy (throughout).
    - Renal failure (GFR <30).
- **MRI Contraindications (General from Slide 73):**
    - First trimester of pregnancy.
    - Pacemakers (some are MRI compatible up to 1.5 Teslas).
    - **"The presence of a ferromagnetic metal inside the body."**
    - Recent prosthesis installment <6 weeks.

The presence of a ferromagnetic substance inside the body is a critical contraindication due to the strong magnetic field of the MRI machine, which can cause movement, dislodgement, or heating of the object, leading to serious injury. This is

consistently listed as a primary contraindication.

Brain CT and MRI

Question 16:
Concerning Radiological signs of diffuse brain edema in post-traumatic patients, one is False:
a. Small size ventricles.
b. Pseudo-sub-arachnoid sign.
c. Diffuse brain hypo-density.
d. Effacement of basal cistern
e. Loss of gray-white matter differentiation

Answer: b (from Test Bank page 5)

High-Yield Context from Slides (Diffuse Edema - Slide 9):
Signs of diffuse edema on CT:

- **Diffuse hypodensity:** Edema is fluid accumulation, which is less dense than normal brain tissue.
- **Loss of grey-white differentiation:** The density difference between grey and white matter becomes less distinct.
- **Effacement of sulci:** Swelling causes the sulci (grooves on the brain surface) to become compressed and less visible.
- **Decreased size of ventricles:** Swelling compresses the ventricles, making them appear smaller.
- **Pseudosubarachnoid hemorrhage sign:** "In medical causes of diffuse edema, the falx might falsely look hyperdense. This hyperdensity is an illusion due to the surrounding hypodensity caused by the edema. This is known as the pseudosubarachnoid hemorrhage sign."
- **Post-traumatic edema:** "In post-traumatic causes, the edema is usually asymmetrical and it is associated with other signs of injury."

Analyzing the options:

- a. Small size ventricles: Correct, listed as "Decreased size of ventricles."
- b. Pseudo-sub-arachnoid sign: This sign is specifically mentioned in the context of "medical causes of diffuse edema," where the *falx* appears hyperdense. While it's a sign related to diffuse edema, its direct applicability as a primary sign in *post-traumatic* diffuse brain edema needs careful consideration. The question specifies post-traumatic patients. A true subarachnoid hemorrhage can occur post-trauma. The "pseudo" sign is an illusion due to surrounding hypodensity.
- c. Diffuse brain hypo-density: Correct, listed as "Diffuse hypodensity."
- d. Effacement of basal cistern: Correct. Effacement of sulci is listed; basal cisterns are CSF spaces, and diffuse swelling would also compress them. Slide 3 notes that in an atrophied brain (opposite of edema), there's an *increase* in the size of basal cisternae, implying edema would decrease their size.
- e. Loss of gray-white matter differentiation: Correct, listed directly.

The "pseudosubarachnoid hemorrhage sign" (falx appearing hyperdense) is described in the context of *medical* causes of diffuse edema. In post-traumatic diffuse edema, the edema itself (hypodensity, ventricular compression, sulcal/cisternal effacement, loss of G-W differentiation) are the primary signs. While the surrounding hypodensity could theoretically create a relative hyperdensity of structures like the falx in trauma too, the slide specifically links the "pseudo" sign to medical causes. Given this is the option selected as false, the distinction between medical and post-traumatic context for this specific sign is likely key.

Question 17:
Concerning subdural hematoma, one is false:
a. Treated with Bur hole
b. Appears isodense in chronic stage
c. More common in old age
d. Of different ages in children raise the possibility of non-accedental injury
e. Crosses sutures

Answer: b

High-Yield Context from Slides (Subdural Hematoma - Slide 7):

- **Definition:** Bleeding between the arachnoid layer and dura. Usually of venous origin.
- **Surgical Emergency Status:** "Unlike epidural hemorrhage, a subdural hemorrhage is not a surgical emergency." (Though large acute ones with mass effect can become emergencies).
- **Appearance:** Semi-lunar lesion.
- **Typical Patient:** "Elderly who has suffered a minor trauma."
- **Density (depends on age):**
  - **Acute:** Hyperdense (due to hemoglobin in RBCs).
  - **Subacute:** Isodense (due to transformation of hemoglobin to methemoglobin).
  - **Chronic:** Hypodense (due to presence of hemosiderin and ferritin).
  - **Acute on top of chronic:** Fluid-fluid level (hyperdense acute blood collecting below hypodense chronic blood).
- **Treatment:** "Burr hole. Here, we can use a burr hole instead of a craniotomy because blood does not clot (due to trabeculae rupture and CSF leak into the space)."
- **Sutures:** Subdural hematomas can cross suture lines because the subdural space is continuous across them (unlike epidural hematomas, which are limited by dural attachments at sutures). (This is general neuro-radiology knowledge; not explicitly stated on slide 7 but essential for differentiation).
- **Different Ages in Children:** Multiple hematomas of different ages (densities) in a child is highly suspicious for non-accidental injury (NAI) or child abuse. (General pediatric radiology principle).

Analyzing the options:

- a. Treated with Bur hole: Correct, slide 7 explicitly states this as the treatment.
- b. Appears isodense in chronic stage: False. Slide 7 states chronic subdural hematomas are **hypodense**. The **subacute** stage is isodense.
- c. More common in old age: Correct, "typical patient is an elderly..."
- d. Of different ages in children raise the possibility of non-accidental injury: Correct, this is a well-known indicator.
- e. Crosses sutures: Correct, a characteristic feature distinguishing it from epidural hematomas.

Question 18:
Wrong match:
a. Semilunar hypodense and acute subdural haemorrhage
b. Biconvex hyperdense and epidural haemorrhage

Answer: a

High-Yield Context from Slides:

- **Subdural Hematoma (SDH) - Slide 7:**
  - Appearance: **Semi-lunar lesion**.
  - Density:
    - **Acute SDH: Hyperdense**.
    - Chronic SDH: Hypodense.
- **Epidural Hematoma (EDH) - Slide 6:**
  - Typical appearance (90-95%): **Biconvex (lens-shaped) hyperdense lesion**.
  - Atypical appearances include hypodense hemorrhages (e.g., if mixed with CSF or if anemic).

Analyzing the matches:

- a. "Semilunar hypodense and acute subdural haemorrhage":
  - Shape: "Semilunar" is correct for SDH.
  - Density: "Hypodense" is incorrect for *acute* SDH. Acute SDH is *hyperdense*.

    - Therefore, this match is wrong.
- b. "Biconvex hyperdense and epidural haemorrhage":
    - Shape: "Biconvex" is correct for typical EDH.
    - Density: "Hyperdense" is correct for typical EDH.
    - Therefore, this match is correct.

The wrong match is 'a' because an acute subdural hemorrhage is hyperdense, not hypodense.

Question 19:
What is wrong:
a. Extra-axial tumors have wide meningeal attachment
b. Failure to enhance on T1 contrasted imaging rule out intra-axial tumor

Answer: b

High-Yield Context from Slides:

- **Extra-axial vs. Intra-axial Lesions (Slide 3-4, Slide 81):**
    - **Extra-axial:** Lesions present between the brain and the bone. Structures include meninges and vessels.
        - Meningiomas are extra-axial tumors arising from meningeal cells.
        - "If the widest diameter of the mass attaches to the meninges, it is an extra-axial mass." (Slide 81).
        - "If the dura enhance, it is an extra-axial mass. Enhancement of the dura is known as the dural tail sign." (Slide 81, typically associated with meningiomas). This implies wide meningeal attachment/involvement.
    - **Intra-axial (Intraparenchymal):** Lesions within the brain parenchyma (e.g., astrocytomas, metastases).
- **Tumor Enhancement (Slide 4, Slide 80):**
    - **CT:** "Enhancement: if a lesion enhances after injection of a contrast, this indicates a breach in the blood brain barrier." (Slide 4). Tumors are listed as hyperdense pathologies that can look hypodense without contrast but enhance *with* contrast (Slide 6).
    - **MRI:** "The most important sign for detecting a tumor is enhancement. We take a T1 image before injecting a contrast (the tumor usually looks as a hypointense lesion). We inject contrast material, and take another image. A tumor will become a hyperintense lesion after injection of contrast material." (Slide 80).
    - While enhancement is a key feature of many tumors (especially higher-grade ones), not all intra-axial tumors will enhance, or they may enhance minimally or in a specific pattern. For example, some low-grade gliomas may show little to no enhancement.

Analyzing the options:

- a. Extra-axial tumors have wide meningeal attachment: This is generally true, especially for tumors like meningiomas, which are archetypal extra-axial masses arising from the meninges. The "dural tail sign" implies this.
- b. Failure to enhance on T1 contrasted imaging rule out intra-axial tumor: This is wrong. While enhancement is a very important sign for many tumors, its absence does not definitively rule out an intra-axial tumor. Some tumors, particularly certain low-grade types, may not enhance significantly or at all. Other MRI sequences and clinical context are also crucial.

Question 20:
All are seen on CT scan in diffuse edema except:
a. Subarachnoid haemorrhage
b. Loss of grey-white differentiation
c. Small ventricles
d. Effacement of sulci and basement cisterna
e. Brain is diffusely hypodense on CT

Answer: a

High-Yield Context from Slides (Diffuse Edema - Slide 9, also see Q16 context):
Signs of diffuse edema on CT:

- **Diffuse hypodensity:** Edema fluid makes the brain appear less dense.
- **Loss of grey-white differentiation:** The density contrast between grey and white matter diminishes.
- **Effacement of sulci:** Brain swelling compresses the sulci.
- **Decreased size of ventricles:** Brain swelling compresses the ventricles.
- **Effacement of basal cisternae:** (Implied by generalized swelling and ventricular/sulcal effacement). Basal cisterns are CSF spaces that would be compressed.
- **Pseudosubarachnoid hemorrhage sign:** (In medical causes) falx appears relatively hyperdense due to surrounding hypodense edematous brain.

Analyzing the options with respect to *signs of diffuse edema*:

- a. Subarachnoid haemorrhage: This is a distinct pathological entity, not a sign *of* diffuse edema. Subarachnoid hemorrhage (SAH) is bleeding into the subarachnoid space, which would appear as hyperdensity in the sulci and cisterns on an acute CT. While trauma can cause both SAH and diffuse edema, SAH itself is not a feature *caused by* edema.
- b. Loss of grey-white differentiation: Correct sign of diffuse edema.
- c. Small ventricles: Correct sign of diffuse edema (due to compression).
- d. Effacement of sulci and basement cisterna: Correct sign of diffuse edema.
- e. Brain is diffusely hypodense on CT: Correct sign of diffuse edema.

Therefore, subarachnoid hemorrhage is not a sign *of* diffuse edema; it's a separate condition.

Question 21:
The best for diagnosis of brain calcification:
a. MRI
b. CT

Answer: b

High-Yield Context from Slides (Brain Calcification - Slide 9, also see Q14 context):

- **CT for Calcification:**
  - "The best modality to view a calcified lesion is a CT scan." (Slide 9).
  - Calcifications appear hyperdense on CT.
- **MRI for Calcification:**
  - Calcifications can appear hyperintense on T1-weighted MRI (Slide 74).
  - However, MRI is generally less sensitive and specific for calcifications than CT.

The slides are explicit: CT is the best modality for viewing calcified lesions.

Question 22:
The best to diagnose cavernous sinus thrombosis:
a. MRI
b. MRV
c. CT
d. Doppler U/S

Answer: b

High-Yield Context from Slides:

- **Cavernous Sinus Thrombosis:** This is a condition involving a blood clot (thrombus) in the cavernous sinus, which is a venous structure.
- **MRI/MRV:**
  - MRI is generally good for soft tissue and can detect thrombosed blood (Slide 73).

    - **MRV (Magnetic Resonance Venography)** is specifically designed to visualize veins and venous flow. It is a key imaging technique for diagnosing cerebral venous sinus thrombosis, including cavernous sinus thrombosis. The question in the test bank (page 2) has a correct match: "MRV: cavernous sinus thrombosis."
- **CT/CTV (CT Venography):**
    - CT venography can also be used to diagnose venous sinus thrombosis, often showing a filling defect in the affected sinus after contrast administration.
- **Doppler U/S:**
    - Doppler ultrasound is excellent for assessing flow in accessible vessels (e.g., carotid arteries, peripheral veins). However, the cavernous sinus is deep within the skull and not directly accessible for standard Doppler ultrasound evaluation.

Comparing modalities for cavernous sinus thrombosis:

- **MRV** is a non-invasive and highly effective method for diagnosing cerebral venous sinus thrombosis.
- MRI (standard sequences) can also show signs of thrombosis.
- CTV is an alternative.
- Doppler U/S is not suitable for direct evaluation of the cavernous sinus.

Given the options and the common use of MRV for this condition (and its specific mention in relation to it in the test bank question pool), MRV is the best choice among those listed.

Question 23:
Wrong about acute extradural hematoma:
a. biconvex hypodense
b. usually traumatic
c. midline shift
d. brain pressure

Answer: a

High-Yield Context from Slides (Epidural/Extradural Hematoma - Slide 6):

- **Cause:** "A hemorrhage between the periosteum and dura due to rupture of the middle meningeal artery (most common) or due to rupture of the superior sagittal sinus (rare)." Often due to trauma.
- **Typical Appearance:** "The typical hemorrhage (90-95%) looks like a **biconvex (lens-shaped) hyperdense** lesion that is unilateral and supratentorial."
- **Atypical Hemorrhages:** Can be bilateral, venous, infratentorial, not due to trauma. Can also be **hypodense** (e.g., if mixed with CSF, active bleeding showing a swirl sign which has hypodense components, or if patient is anemic – though the slide mentions comparing its density to air in sinuses for hypodense traumatic EDH, suggesting it's still usually denser than air).
- **Midline Shift:** Any significant intracranial mass, including an EDH, can cause midline shift if large enough. (General principle of mass effect, and slide 3 discusses midline shift as an important finding on CT).
- **Brain Pressure:** An EDH is a space-occupying lesion that increases intracranial pressure. If untreated, it's an emergency (Slide 7).

Analyzing the options:

- a. "biconvex hypodense": The shape "biconvex" is typical. However, an *acute* extradural hematoma is typically **hyperdense**. While atypical hypodense EDHs exist, the classic acute presentation is hyperdense. If the question implies the *typical* acute EDH, then "hypodense" is wrong.
- b. "usually traumatic": Correct.
- c. "midline shift": Possible if the hematoma is large enough to cause mass effect.
- d. "brain pressure": Correct, it's a space-occupying lesion that increases intracranial pressure.

The most definitively "wrong" part of statement 'a' for a *typical acute* extradural hematoma is "hypodense."

Question 24:
A hyperdensity can be seen normally in brain CT in all of the following except:

a. Pituitary
b. Tentorium
c. Carotid artery
d. Falx cerebri
e. Eye lens

Answer: a

High-Yield Context from Slides:

- **Normal Calcified Structures (Slide 5):** These will appear hyperdense.
  - Choroid plexus
  - Pineal gland
  - **Falxcerebri**
  - Meninges (which would include the **tentorium cerebelli**, a dural fold)
  - Carotid syphon (calcification in the carotid artery)
  - Basal ganglia (calcification in >70 years of age)
- **Normal Enhancing Structures (Slide 4):** These will appear hyperdense *after contrast administration*. The question asks about normal hyperdensities seen *in general* on a brain CT, which could be with or without contrast, or inherent calcification.
  - **Pituitary gland**
  - Small blood vessels
  - Choroid plexus
  - Pineal gland
  - Meninges
- **Other Structures:**
  - **Carotid artery:** If calcified (carotid syphon, Slide 5), it will be hyperdense. If filled with contrast, it will be hyperdense. Flowing blood without contrast is typically isodense to brain.
  - **Eye lens:** The lens is a dense soft tissue structure. While not explicitly listed with HU values for "normal hyperdensity," it is denser than surrounding vitreous fluid. Compared to CSF or fat, it would be relatively hyperdense.
  - **Pituitary Gland:** Listed as a *normal enhancing structure* (Slide 4). Without contrast, the normal pituitary gland is a soft tissue structure, generally isodense to brain parenchyma. It becomes hyperdense after contrast administration.

Analyzing the options:

- a. Pituitary: Normally isodense without contrast. Becomes hyperdense *with* contrast. If the question implies a non-contrast CT or inherent hyperdensity without pathology, the pituitary is not normally hyperdense.
- b. Tentorium: A dural fold (part of meninges). Meninges can calcify with age (Slide 5) and also enhance with contrast (Slide 4). Calcified tentorium is a normal hyperdense finding.
- c. Carotid artery: Can show hyperdense calcification (carotid syphon, Slide 5) or be hyperdense with contrast.
- d. Falx cerebri: Commonly shows physiological calcification and appears hyperdense (Slide 5).
- e. Eye lens: Denser than vitreous humor. While not as dense as bone or acute blood, it is relatively hyperdense compared to other intraorbital contents like fat or fluid.

The question is slightly ambiguous as it doesn't specify contrast vs. non-contrast. However, if it refers to structures that are *inherently* hyperdense or commonly show *physiological* hyperdensity (like calcification) without contrast:

- Falx and tentorium often calcify.
- Carotid arteries can have calcification.
  The pituitary gland is the most likely answer because its normal state on a *non-contrast* CT is isodense to brain. It only becomes hyperdense with contrast enhancement. The other structures can be hyperdense due to normal physiological calcification even without contrast.

Question 25:
Wrong about MRI sequences:

- white matter is hyperintense compared to cortex in FLAIR

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (FLAIR sequence - Slide 74):

- FLAIR stands for Fluid Attenuation Inversion Recovery sequence.
- Used to detect abnormal fluids.
- The computer device removes the free fluid (normal fluid) in the brain and keeps the abnormal fluids.
- Appearance on FLAIR:
  - **CSF is hypointense** (dark) - this is the key feature, as normal fluid is suppressed.
  - **White matter is hypointense** (dark).
  - **Grey matter is hyperintense** (brighter) - (Note: "cortex" is grey matter).

The statement is "white matter is hyperintense compared to cortex in FLAIR."
According to the slides (Slide 74):

- White matter on FLAIR: **hypointense**.
- Grey matter (cortex) on FLAIR: **hyperintense**.

Therefore, white matter is *hypointense* (darker) compared to the cortex (grey matter which is *hyperintense* or brighter) on a FLAIR sequence. The statement is the opposite of what the slide indicates.

Thus, the statement "white matter is hyperintense compared to cortex in FLAIR" is wrong.

Question 26:
True about cytotoxic edema:

- hyperintense in diffusion weighted sequences

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Cytotoxic Edema & DWI - Slide 75, Slide 9-10):

- **Cytotoxic Edema:**
  - Usually due to an infarct (stroke) (Slide 9).
  - Following an ischemic event, Na/K pumps are disrupted, leading to fluid entrapment inside cells (cellular swelling) (Slide 75).
  - This swelling appears on an MRI scan as a **diffusion restriction** (Slide 75).
  - The edematous region lies in the territory of the infarcted vessel (Slide 9).
- **DWI (Diffusion-Weighted Imaging):**
  - Golden standard for diagnosing ischemic infarct (along with ADC) (Slide 75).
  - In cytotoxic edema (acute stroke), the area of ischemia (restricted diffusion) will look **hyperintense** and well demarcated on DWI (Slide 75).
  - CSF looks hypointense on a DWI sequence (Slide 75).

The statement is "True about cytotoxic edema: hyperintense in diffusion weighted sequences."
This aligns perfectly with the information on Slide 75: "This swelling appears on an MRI scan as a diffusion restriction... the area of ischemia will look hyperintense and well demarcated. On a DWI sequence..."

Therefore, the statement is true.

Question 27:
Wrong about meningioma:

- mostly presents as an intra-axial lesion

Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Meningioma, Intra-axial vs Extra-axial):

- **Meningioma Origin & Location:**
  - Slide 3 (Brain CT scan, presence of focal brain lesion): "On the inner side of the ventricles we have the following structures: choroid plexus, epyndema, and subepydema. Therefore, a meningioma can present as an intraventricular lesion as it originates from cells found inside the ventricles." (This specific statement seems to describe *intraventricular* meningiomas arising from choroid plexus arachnoid cells, which is a specific subtype. Most meningiomas are extra-axial arising from dural arachnoid cap cells).
  - Slide 4: "Extra-axial structures include meninges and vessels." (Meningiomas arise from meninges).
  - Slide 9 (Calcifying lesions): "Extra-axial calcifications: indicate a meningioma." This clearly places typical meningiomas as extra-axial.
  - Slide 81 (Image caption): "An axial brain MRI post contrast showing multiple enhancing masses (arrows) with enhancing dura. These features are suggestive of an extra-axial mass. The most likely diagnosis is meningioma."
- **Intra-axial Lesions:**
  - Within the brain parenchyma (e.g., astrocytoma, metastasis). Slide 3: "Axial: brain stem, cerebral, or cerebellar lesion."
- **Extra-axial Lesions:**
  - Between the brain and the bone (Slide 3).
  - An astrocytoma can *never* present as an extra-axial lesion (Slide 4).
  - An intraparenchymal lesion can *never* be a meningioma because the parenchyma does not contain cells that can produce a meningioma (Slide 3-4). This strongly implies meningiomas are not intraparenchymal (intra-axial).

The statement is "Wrong about meningioma: mostly presents as an intra-axial lesion."
Meningiomas are classically
extra-axial tumors, arising from the meninges. The information on Slide 3-4 and Slide 9 and the image on Slide 81 all support this. The statement on Slide 3 about intraventricular meningiomas refers to a specific location but still arising from arachnoid cells, not brain parenchyma.

Therefore, the statement that meningiomas "mostly present as an intra-axial lesion" is wrong. They mostly present as extra-axial lesions.

Question 28:
Wrong about intracranial hemorrhage:

- intraventricular hemorrhage has a good prognosis

Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Intraventricular Hemorrhage - Slide 6):

- **Intra-axial Hemorrhage:** Can be either intraventricular or cerebral.
- **Intraventricular Hemorrhage (IVH):**
  - "An intraventricular hemorrhage has a **worse prognosis** and leads to the formation of a communicating hydrocephalus."
  - "Sometimes, an intraventricular hemorrhage can be due to an extension of a cerebral hemorrhage."
  - "However, it is rare to find a cerebral hemorrhage that is an extension of an intraventricular hemorrhage."

The statement is "Wrong about intracranial hemorrhage: intraventricular hemorrhage has a good prognosis."
Slide 6 explicitly states: "An intraventricular hemorrhage has a
worse prognosis..."

Therefore, the statement is wrong.

Question 29:
Which is true:

- acute ischemia appears hyperintense on DWI due to cytotoxic edema

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Acute Ischemia, DWI, Cytotoxic Edema - Slide 75, Slide 9-10):
(This is very similar to Question 26)

- **Acute Ischemia:** Leads to cellular swelling (cytotoxic edema) due to Na/K pump disruption (Slide 75).
- **Cytotoxic Edema:** This cellular swelling causes a restriction of water diffusion (Slide 75).
- **DWI (Diffusion-Weighted Imaging):**
  - Detects this restricted diffusion.
  - The area of ischemia (with cytotoxic edema and restricted diffusion) appears **hyperintense** (bright) and well-demarcated on DWI sequences (Slide 75).

The statement is "acute ischemia appears hyperintense on DWI due to cytotoxic edema."
This is a direct consequence of the pathophysiology of ischemic stroke and how DWI visualizes it. Cytotoxic edema causes diffusion restriction, which is seen as hyperintensity on DWI.

Therefore, the statement is true.

Question 30:
Biconvex lesion:

- acute epidural hematoma

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Epidural Hematoma - Slide 6):

- **Epidural Hematoma (EDH):**
  - Hemorrhage between the periosteum and dura.
  - "The typical hemorrhage (90-95%) looks like a **biconvex (lens-shaped) hyperdense** lesion that is unilateral and supratentorial."

The statement is "Biconvex lesion: acute epidural hematoma."
This directly matches the description of the typical appearance of an acute epidural hematoma on Slide 6.

Therefore, the statement accurately describes an acute epidural hematoma.

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Question 31:
Wrong about abdominal imaging:
a. Free gas can normally be seen 7 days after laparotomy
b. Free gas in bile tract can indicate a fistula
c. Most common cause of pathological pneumoperitoneum is spontaneous rupture of a peptic ulcer
d. Diameter of normal colon should be less than 5 cm

Answer: d

High-Yield Context from Slides:

- **Pneumoperitoneum (Free Gas):**
  - "Gas in the peritoneum usually gathers under the right diaphragm." (Slide 45).
  - "The presence of peritoneal gas is normal up to 7 days post laparotomy." (Slide 45).
  - Pathological pneumoperitoneum is due to rupture of a viscus, e.g., ruptured peptic ulcer (Slide 45).
- **Pneumobilia (Gas in Biliary Tree):**
  - "The presence of gas in the biliary tree can be normal or pathological: Recent surgery, Post-ERCP, Gallbladder stones with gallstone ileus, Indicates the presence of a fistula between the gallbladder and gut." (Slide 46).
- **Bowel Diameter (Abdominal X-ray - Slide 42):**

- "The size of the bowel: we accept up to **3cm** diameter of small intestines, **6cm** for large intestines, and **9cm** for the cecum."

Analyzing the options:

- a. Free gas can normally be seen 7 days after laparotomy: Correct, stated on Slide 45.
- b. Free gas in bile tract can indicate a fistula: Correct, one of the pathological causes of pneumobilia (Slide 46).
- c. Most common cause of pathological pneumoperitoneum is spontaneous rupture of a peptic ulcer: Correct, mentioned as an example on Slide 45 and is a common cause.
- d. Diameter of normal colon should be less than 5 cm: False. According to Slide 42, the normal diameter for the large intestine (colon) is up to **6 cm** (and cecum up to 9 cm).

Question 32:
Wrong About contrasted GI imaging:
a. Water contrast has better mucosal lining than barium contrast
b. Water soluble low osmolality is the ideal contrast
c. Barium is contraindicated in perforation

Answer: a

High-Yield Context from Slides (Contrast Material for GI - Slide 51-52):

- **Iodinated Contrast Materials (Water-soluble):**
  - "Low osmolar weight materials."
  - "Can be used in cases of suspected perforation."
  - Disadvantages: Expensive, risk of contrast-induced nephropathy, anaphylactic reactions.
- **Barium Sulfate:**
  - "The most commonly used contrast material in the GIT."
  - **Advantages:** "Excellent opacification," "**Good coating for the mucosa**," "Completely inert (rarely causes anaphylactic reactions)," "Inexpensive."
  - "It is contraindicated in cases of suspected perforation."
- **Ideal Contrast (General Principle):** For many applications where mucosal detail is key and perforation is not suspected, barium provides superior mucosal coating. If perforation is suspected, water-soluble contrast is used. Low osmolality water-soluble contrast is generally preferred over high osmolality to reduce side effects like fluid shifts.

Analyzing the options:

- a. Water contrast has better mucosal lining than barium contrast: False. Barium is noted for its "Good coating for the mucosa" (Slide 52). Water-soluble contrasts are generally poorer at mucosal coating.
- b. Water soluble low osmolality is the ideal contrast: This is generally true when a water-soluble agent *is* indicated (e.g., suspected perforation, pre-op), as low osmolality agents have fewer side effects than high osmolality ones.
- c. Barium is contraindicated in perforation: Correct, explicitly stated on Slide 51. If barium leaks into the peritoneum, it can cause severe peritonitis.

Question 33:
Which is false about Crohn’s disease:
a. skip lesions
b. most common presentation in terminal ileum
c. most common string sign in terminal ileum
d. cause mesenteric adenopathy
e. age of onset is 15-30

Answer: d

High-Yield Context from Slides (Crohn’s Disease - Slide 61-62):

- More severe, transmural inflammation.

- Associated with fistulas and peri-anal disease.
- A barium follow-through shows a cobblestone appearance.
- On a CT scan, we can see the **halo-fat sign** (fibrofatty proliferation surrounding intestines due to inflammation of the mucosa).
- Characterized by the presence of **skip lesions**.
- The terminal ileum is a very common site for Crohn's disease. The "string sign" (marked narrowing of the bowel lumen) is a classic finding, often in the terminal ileum.
- While mesenteric adenopathy (enlarged lymph nodes in the mesentery) can occur in various inflammatory and neoplastic abdominal conditions, the slides for Crohn's specifically highlight the "halo-fat sign" on CT as a characteristic finding related to mesenteric changes (fibrofatty proliferation). Significant mesenteric adenopathy might be more suggestive of other conditions like lymphoma or TB, though some reactive lymphadenopathy can be seen in Crohn's. The "halo-fat sign" is more specific to Crohn's in the provided context.
- Age of onset often occurs in young adulthood (15-35 years is a typical range).

Analyzing the options:

- a. skip lesions: True, characteristic of Crohn's.
- b. most common presentation in terminal ileum: True, terminal ileum is the most frequently involved segment.
- c. most common string sign in terminal ileum: True, the string sign is a classic finding in Crohn's, often in the terminal ileum.
- d. cause mesenteric adenopathy: While some reactive adenopathy can be present, the "halo-fat sign" (fibrofatty proliferation) is the more distinct mesenteric CT finding highlighted. Significant adenopathy is not a primary defining feature emphasized for Crohn's in these slides compared to the halo-fat sign.
- e. age of onset is 15-30: True, common age range.

The "halo-fat sign" is a specific CT finding for Crohn's involving mesenteric fat proliferation. While lymph nodes can be reactive, "mesenteric adenopathy" as a primary distinguishing feature is less emphasized than the halo-fat sign. If "false" means "not a primary or highly characteristic feature described," then 'd' is the most likely.

Question 34:
Which is false about sigmoid volvulus:
a. coffee bean sign
b. lateral border overlap liver shadow
c. apex under right hemidiaphragm
d. chronic volvulus is associated with shouldering-edges

Answer: d

High-Yield Context from Slides (Volvulus - Slide 62):

- Twisting of the colon along with the mesentery.
- **Sigmoid volvulus:**
  - "**coffee bean sign** on X-ray." (This describes the shape of the distended, twisted sigmoid loop).
  - The distended sigmoid loop often rises out of the pelvis, and its apex can point towards the right upper quadrant, potentially reaching under the right hemidiaphragm. Its lateral border can extend quite far superiorly and to the right. Overlapping the liver shadow is plausible depending on the degree of distension and rotation.
- **Midgut volvulus:** "whirlpool sign on CT."
- **Shouldering/Edges:** The term "shouldering" (Slide 53) is used in the context of **strictures** (malignant strictures show abrupt transition referred to as shouldering). It's not a typical descriptor for volvulus itself. Chronic volvulus might lead to ischemic changes or strictures over time, but "shouldering-edges" isn't a primary sign of the volvulus event itself.

Analyzing the options:

- a. coffee bean sign: True, classic X-ray sign of sigmoid volvulus.
- b. lateral border overlap liver shadow: Plausible, the massively distended loop can extend superiorly and to the right.

- c. apex under right hemidiaphragm: Plausible, the loop often points towards the RUQ.
- d. chronic volvulus is associated with shouldering-edges: False. Shouldering is a term for strictures, not directly for volvulus. While chronic issues *could* lead to strictures, it's not a direct association with the volvulus event in the way the other signs are.

Question 35:
Liver hemangioma false:
a. hypointense signal on T2
b. hyperechoic signal on U/S
c. most common benign liver tumor
d. mostly eccentric and subcapsular

Answer: a

High-Yield Context from Slides:
The provided slides do not contain specific information about the imaging characteristics of liver hemangiomas on MRI (T2 signal), ultrasound, or their typical location/prevalence. This question requires general radiology knowledge beyond the provided text.

General Radiology Knowledge (Liver Hemangioma):

- **T2 Signal (MRI):** Cavernous hemangiomas are classically very **hyperintense** (bright, like a "lightbulb") on T2-weighted MRI sequences due to their slow-flowing blood content.
- **Ultrasound (U/S):** Typically appear as well-defined, **hyperechoic** (brighter than surrounding liver) lesions. Atypical features can exist.
- **Prevalence:** They are the most common benign tumor of the liver.
- **Location:** Often subcapsular and can be eccentric. Multiple hemangiomas can occur.

Analyzing the options based on general knowledge:

- a. hypointense signal on T2: False. Liver hemangiomas are typically very *hyperintense* on T2.
- b. hyperechoic signal on U/S: True, this is the classic ultrasound appearance.
- c. most common benign liver tumor: True.
- d. mostly eccentric and subcapsular: True, this is a common presentation.

Question 36:
Diverticulosis, which is wrong:
a. Patients presenting with obstruction need surgery
b. Fistula commonly to vagina and bladder
c. 20% develop diverticulitis
d. Usually with pain and abdominal tenderness

Answer: d

High-Yield Context from Slides (Diverticular disease - Slide 62):

- "An outpouching of the mucosa. It causes increased filling."
- "Can be seen in any part of the GI tract."

The slides provide very limited information on diverticular disease, mainly its definition. The question delves into complications (diverticulitis, obstruction, fistula) and symptoms, which require general knowledge.

General Medical Knowledge (Diverticular Disease):

- **Diverticulosis:** Presence of diverticula. Often asymptomatic.
- **Diverticulitis:** Inflammation/infection of diverticula. This is when symptoms like pain (often LLQ), tenderness, fever typically occur.
- **Complications of Diverticulitis:**
  - Abscess
  - Fistula (colovesical - to bladder is common; colovaginal - to vagina)

    - Obstruction (due to inflammation/scarring)
    - Perforation
- **Need for Surgery:** Obstruction, perforation, recurrent severe diverticulitis, or complicated fistulas may require surgery.
- **Percentage developing diverticulitis:** Estimates vary, but around 10-25% of people with diverticulosis may develop diverticulitis. 20% is a reasonable figure.

Analyzing the options:

- a. Patients presenting with obstruction need surgery: Plausible. Significant bowel obstruction due to diverticular disease often requires surgical intervention.
- b. Fistula commonly to vagina and bladder: True. Colovesical fistulas are the most common type, and colovaginal fistulas also occur.
- c. 20% develop diverticulitis: Plausible.
- d. Usually with pain and abdominal tenderness: This statement describes **diverticulitis** (inflammation). **Diverticulosis** (just the presence of pouches) is often asymptomatic. The question is about "diverticulosis."

Therefore, statement 'd' is wrong because uncomplicated diverticulosis is often asymptomatic. Pain and tenderness are features of diverticulitis.

Question 37:
Barium contrast is absolutely contraindicated in:
a. Tracheoesophageal fistula
b. Perforated Duodenal ulcer
c. Colon CA

Answer: b

High-Yield Context from Slides (Barium Contraindications - Slide 51):

- "Barium sulfate: ... It is contraindicated in cases of suspected perforation."
- If barium leaks into the peritoneal cavity (from a perforated viscus) or mediastinum, it can cause severe inflammation (barium peritonitis/mediastinitis), which is difficult to manage.

Analyzing the options:

- a. Tracheoesophageal fistula (TEF): If barium is swallowed, it could enter the trachea via the fistula, leading to aspiration and chemical pneumonitis. Water-soluble contrast is preferred if a TEF is suspected. This is a strong contraindication or at least a situation where barium is avoided.
- b. Perforated Duodenal ulcer: This is a direct perforation of the GI tract into the peritoneum. Barium is absolutely contraindicated as it can cause severe barium peritonitis (Slide 51).
- c. Colon CA (Cancer): Barium enemas are (or were) used to diagnose colon cancer by showing filling defects or strictures. Cancer itself is not a contraindication unless it's causing a complete obstruction (risk of perforation proximal to obstruction) or if perforation is suspected for other reasons.

Comparing "Tracheoesophageal fistula" and "Perforated Duodenal ulcer":

- Perforated duodenal ulcer leads to spillage into the peritoneal cavity, which is a direct and absolute contraindication for barium due to risk of barium peritonitis.
- Tracheoesophageal fistula leads to aspiration into the lungs. While dangerous, some might argue about "absolute" versus "strong relative" contraindication depending on the specific clinical scenario and alternatives. However, water-soluble contrast is definitely preferred.

Given the explicit statement on Slide 51 about "suspected perforation," a known perforated duodenal ulcer fits this perfectly as an absolute contraindication.

Question 38:
A patient came with urea 10 XNL, all are initial workup except:
a. US
b. IVP
c. Plain abdomen

d. Hand radiography

Answer: d

High-Yield Context from Slides:
This question relates to investigating a patient with significantly elevated urea (10 times the normal limit), which indicates severe renal dysfunction.

- **Ultrasound (US) of Kidneys:** Commonly used as an initial imaging modality in renal failure to assess kidney size, echotexture, look for hydronephrosis (obstruction), and other structural abnormalities. (General use, slides cover renal US for stones, cysts, hydronephrosis - page 20).
- **IVP (Intravenous Pyelogram/Urogram):** This involves injecting iodinated contrast to visualize the urinary tract. In severe renal failure (high urea), IVP is generally contraindicated or of very limited value because:
  1. The kidneys may not be able to concentrate or excrete the contrast effectively, leading to poor or no visualization.
  2. Iodinated contrast can be nephrotoxic and worsen existing renal failure (Contrast-Induced Nephropathy - CIN). Slide 30 mentions ordering non-contrasted CT in cases of renal failure.
- **Plain Abdomen (KUB - Kidneys, Ureters, Bladder X-ray):** Can show renal outlines (if visible), radiopaque stones, or gross calcifications. It's a basic initial film but has limitations.
- **Hand Radiography:** Used to assess for bone changes associated with chronic kidney disease (renal osteodystrophy), such as subperiosteal resorption, particularly in the phalanges. This is relevant in the workup of *chronic* renal failure complications, but might not be the very *initial* imaging workup for the cause of acute severe elevation of urea.

Analyzing "initial workup" for markedly elevated urea:

- US kidneys: Very standard initial step.
- Plain abdomen (KUB): Might be done, low yield but quick.
- IVP: Likely contraindicated or very low yield in severe renal failure.
- Hand radiography: More for assessing complications of established chronic renal failure rather than the immediate cause of a new, severe rise in urea.

The question asks "all are initial workup except."

- US is definitely initial.
- Plain abdomen is possibly initial, though less informative than US.
- IVP is problematic in severe renal failure.
- Hand radiography for renal osteodystrophy is less of an "initial" investigation for *acute* severe uremia compared to imaging focused on the kidneys/urinary tract.

If "initial workup" means looking for the cause and immediate status of the kidneys:
Hand radiography is the least direct "initial workup" for the cause of severely elevated urea. Its findings (renal osteodystrophy) point to chronicity rather than acute cause. IVP is also problematic.

However, if the urea 10xN is a long-standing issue (chronic renal failure), then hand X-ray for renal osteodystrophy *could* be part of the comprehensive workup. But for an *initial* investigation of *why* urea is so high, US is paramount.

Let's reconsider the answer 'd'. If it is 'd', then US, IVP, and Plain Abdomen are considered initial. This makes IVP problematic.
The slides (p30) say a non-contrasted CT is ordered in renal failure.
Perhaps the question is poorly phrased. If a patient has such high urea, an IVP is generally avoided. A hand X-ray for renal osteodystrophy is usually for assessing the
consequences of (often chronic) renal failure, not the primary cause of the high urea itself.

If we assume the high urea represents significant kidney dysfunction, then:

- US: Yes, to check for obstruction, kidney size.
- Plain Abdomen: Maybe, to look for stones.
- IVP: No, due to poor function and contrast risk.
- Hand radiography: Less initial for the *cause* of uremia, more for chronic complications.

Given the provided answer is 'd', it implies US, IVP, and Plain Abdomen are considered initial. The inclusion of IVP as "initial" in severe renal failure is questionable from a clinical best practice standpoint and contradicts the spirit of Slide 30 (using non-contrast CT). However, if we *must* pick one that is *least* initial for elucidating the *cause* of high urea, hand radiography (looking for secondary bone changes) fits.

Question 39:
Striated kidney in IVU in all Except:
a. polycystic kidney
b. medullary spongiosis
c. renal vein thrombosis
d. renal artery stenosis
e. acute nephritis

Answer: d

High-Yield Context from Slides:
The term "striated kidney" or "striated nephrogram" on IVU refers to a pattern of alternating dense and lucent lines in the renal parenchyma during the nephrographic phase. This is typically due to differential opacification of the renal tubules or interstitium.
The slides do not specifically discuss "striated kidney" appearance or its causes in IVU. This question requires external knowledge.

General Radiology Knowledge (Striated Nephrogram):
Causes of a striated nephrogram include:

- **Acute pyelonephritis/nephritis:** Inflammation causes differential tubular function/opacification.
- **Renal vein thrombosis:** Venous congestion can lead to this pattern.
- **Polycystic kidney disease (ARPKD more classically than ADPKD in terms of striations):** Dilated tubules/collecting ducts can give a striated appearance.
- **Medullary sponge kidney:** Dilated collecting ducts in the papillae can contribute to a striated or "brush-like" appearance.
- Ureteral obstruction (acute).
- Hypotension/shock.

Renal artery stenosis typically causes a *delayed* and *prolonged* nephrogram on the affected side, and the kidney may be smaller. A striated pattern is not its classic description.

Analyzing the options based on general knowledge:

- a. polycystic kidney: Can cause striated appearance (especially ARPKD).
- b. medullary spongiosis (medullary sponge kidney): Can cause striated/brush-like appearance.
- c. renal vein thrombosis: Known cause of striated nephrogram.
- d. renal artery stenosis: Classic findings are delayed/prolonged nephrogram and small kidney, not typically striations.
- e. acute nephritis: Known cause of striated nephrogram.

Therefore, renal artery stenosis is the least likely to cause a striated kidney appearance on IVU.

Question 40:
The most specific test to detect gallstones is:
a. ERCP
b. OCG
c. US

Answer: c

High-Yield Context from Slides (Gallbladder Stones - Slide 18):

- "**Ultrasound is the best modality to visualize stones.** Only 15% of the stones will be visible using a plain radiograph."
- "Stones are strong structures that reflect all the waves. Therefore, if there is a stone, shadowing is obvious."
- (The slide also mentions CT for renal stones, Slide 30, but emphasizes US for gallbladder stones).

Other modalities:

- **ERCP (Endoscopic Retrograde Cholangiopancreatography):** An invasive procedure used primarily for therapeutic interventions in the biliary and pancreatic ducts (e.g., stone extraction from CBD, stenting). It can visualize stones in the ducts but is not a primary *detection* test for gallstones *within the gallbladder* due to its invasiveness and risks.
- **OCG (Oral Cholecystogram):** An older X-ray technique where the patient ingests contrast that is excreted into bile and concentrates in the gallbladder. Gallstones appear as filling defects. Largely replaced by ultrasound due to US being non-invasive, radiation-free, and more accurate.

Comparing the options:

- **Ultrasound (US):** Stated as the "best modality to visualize stones" (gallstones) in the slides, highly sensitive and specific, non-invasive.
- ERCP: Invasive, primarily therapeutic for ductal stones.
- OCG: Older, less accurate, involves radiation and contrast.

Therefore, ultrasound is the most specific and generally the best initial test for detecting gallstones.

Question 41:
Regarding Ba enema, one is wrong:
a. Contraindicated in colon perforation
b. Ba sulfate is injected per-rectum
c. Contraindicated in intestinal obstruction

Answer: c

(Note: The test bank also says "-all are true according to slides-". This implies the provided answer 'c' might be debatable based strictly on the slides, or there's a nuance.)

High-Yield Context from Slides (Barium Enema - primarily from Slide 51-52):

- **Barium Sulfate:** "The most commonly used contrast material in the GIT." (Slide 52). For a barium enema, it is indeed administered per-rectum.
- **Contraindications for Barium:**
  - "It is contraindicated in cases of suspected **perforation**." (Slide 51). Barium in the peritoneum causes severe peritonitis.
  - The slides do not explicitly list "intestinal obstruction" as a contraindication for barium enema. Barium *swallow/follow-through* might be problematic in *small bowel* obstruction as barium can become inspissated proximal to the obstruction and worsen it if it doesn't pass. However, a barium enema is introduced from the rectum and is often used to evaluate the colon, even in cases of suspected large bowel obstruction, to identify the level and nature of the obstruction (e.g., tumor, stricture). It can even be therapeutic in some cases of intussusception.

Analyzing the options:

- a. Contraindicated in colon perforation: True. Explicitly stated (Slide 51).
- b. Ba sulfate is injected per-rectum: True. This is the method of administration for a barium enema.
- c. Contraindicated in intestinal obstruction: This is the debatable one.
  - For **small bowel obstruction**, oral barium (barium follow-through) can be problematic.
  - For **large bowel obstruction**, a barium enema can be diagnostic to locate the obstruction. It's not universally contraindicated. In fact, it can be a useful diagnostic tool. If there's concern for perforation *associated* with the obstruction, then it would be contraindicated.

Given the test bank note "-all are true according to slides-", let's re-examine. The slides do not mention intestinal obstruction as a contraindication for barium enema. They *only* mention "suspected perforation" for barium sulfate in general.

If the question intends "intestinal obstruction" to mean a situation where perforation is also highly suspected (e.g., a strangulating obstruction or severe distension risking rupture), then it would become a contraindication due to the risk of perforation. However, as a blanket statement, barium enema is not contraindicated in all intestinal obstructions; it's often used for diagnosing large bowel obstructions.

If we strictly adhere to what's written on *these specific slides*, only perforation is explicitly mentioned as a contraindication. Thus, if "c" is the marked answer, it implies the test writer considers it wrong for a barium enema. The nuance might be that if an obstruction is complete and there's a risk of inspissation or increasing pressure, it might be avoided, but this is not clearly stated.

The test bank note is confusing. If "all are true according to slides" and the answer is 'c', it means statement 'c' is NOT true according to the slides (i.e., it IS a contraindication, or the slides say something that makes it wrong). The slides do NOT list intestinal obstruction as a contraindication. This suggests a potential error in the test bank's note or answer key, or a very specific interpretation is expected.

Assuming the answer key 'c' is correct (meaning statement c is false - i.e., it *is* a contraindication): This would imply a broader interpretation of risk not explicitly detailed in these slides. However, based *only* on the provided slides, 'c' is not listed as a contraindication.

Question 42:
Regarding diaphragmatic hernia, one is wrong:
a. Morgagni hernia is more common on the rt side
b. Bochdalek hernia is more common on the rt side
c. Sliding hernia is more common than rolling type
d. Ba swallow can identify the hernia
d. Plain X-ray can identify the hernia

*(Note: two 'd' options)***Answer:** b

High-Yield Context from Slides (Hernia - Slide 58):

- **Definition:** "Herniation of the stomach into the mediastinum through the oesophageal hiatus in the diaphragm." (This definition focuses on hiatal hernias).
- **2 general types (of hiatal hernia):**
  - **Sliding (axial) hiatal hernia, most common:** GE junction and gastric cardia pass through esophageal hiatus.
  - **Paraesophageal (rolling) hernia rare:** Gastric fundus ± other parts of stomach herniate into chest while GEJ in normal position.
- **Diagnosis:** "To diagnose a hernia, we need a barium meal. A barium meal reaches the stomach and the first part of the duodenum."
- The slides show an image of a "Conventional X-ray showing sliding diaphragmatic hernia" (Slide 58), which implies a plain X-ray *can* sometimes identify it (e.g., by an air-fluid level behind the heart).

General Knowledge (Diaphragmatic Hernias beyond hiatal):

- **Morgagni hernia:** An anterior diaphragmatic hernia, occurring through the foramen of Morgagni (sternocostal hiatus). More common on the **right side**.
- **Bochdalek hernia:** A posterolateral diaphragmatic hernia, occurring through the foramen of Bochdalek. Much more common on the **left side** (approx. 85-90%).
- **Sliding vs. Rolling Hiatal Hernia:** Sliding hernias are indeed much more common than rolling (paraesophageal) hernias.

Analyzing the options:

- a. Morgagni hernia is more common on the rt side: True (general knowledge).
- b. Bochdalek hernia is more common on the rt side: False. Bochdalek hernias are overwhelmingly more common on the **left** side (general knowledge).
- c. Sliding hernia is more common than rolling type: True (Slide 58 for hiatal hernias).
- d. (first one) Ba swallow can identify the hernia: True. Specifically mentioned for hiatal hernia diagnosis (Slide 58).
- d. (second one) Plain X-ray can identify the hernia: True. An image is shown (Slide 58), and large hernias can be visible on plain films.

Question 43:
All are causes of false positives except:
a. Poor hydration
b. Bladder outflow obstruction

c. Poor renal function
d. Huge collecting system
e. Non -fasting state

Answer: e

(This question likely refers to false positives in the context of a specific diagnostic test, probably a functional renal study like a renal scan, given the options. The slides don't give direct context for "false positives" in general.)

High-Yield Context (Likely referring to Renal Scans, e.g., for obstruction):

- **Renal Scans (Nuclear Medicine - Slide 84, 91):** Used to assess renal function, perfusion, and drainage.
  - **DTPA scan:** Measures glomerular filtration. Used in dynamic scans for function (secretion/filtration).
  - **MAG3 scan:** Measures tubular secretion. Used in dynamic scans.
- **Interpreting Obstruction on a Renal Scan:** Delayed transit of the radiopharmaceutical through the collecting system and ureter can indicate obstruction. Diuretic renography (e.g., with Lasix) is often used to differentiate true obstruction from a dilated, non-obstructed system.
- **Factors that can mimic obstruction or affect scan interpretation (leading to "false positives" for obstruction if not considered):**
  - **Poor hydration:** Dehydration can lead to reduced urine flow and delayed clearance of the tracer, mimicking obstruction.
  - **Bladder outflow obstruction / Full bladder:** If the bladder is full or there's outflow obstruction, this can cause back-pressure, dilating the upper tracts and delaying tracer clearance, mimicking ureteric obstruction. (Patients are usually asked to void before and during the study).
  - **Poor renal function:** Kidneys with poor intrinsic function will have reduced uptake and excretion of the tracer, which can complicate the interpretation of drainage.
  - **Huge collecting system (e.g., megacalyces, pre-existing hydronephrosis without current obstruction):** A capacious collecting system will take longer for the tracer to clear even without true obstruction, due to the large volume ("reservoir effect").
  - **Non-fasting state:** Generally, fasting is not strictly required for many standard renal scans unless specific protocols (like for ACE inhibitor renography for renal artery stenosis) are in place. The patient's hydration status is more critical for studies evaluating obstruction.

Analyzing the options as causes of false positives *for obstruction* on a renal scan:

- a. Poor hydration: True, can cause delayed tracer clearance.
- b. Bladder outflow obstruction: True, can cause back-pressure and delayed clearance.
- c. Poor renal function: True, can lead to slow uptake and excretion, complicating drainage assessment.
- d. Huge collecting system: True, can cause delayed clearance due to reservoir effect.
- e. Non -fasting state: Generally not a direct cause of a false positive for obstruction. Hydration is the key.

Therefore, "Non-fasting state" is the least likely to cause a false positive in the context of a renal scan for obstruction.

Question 44:
All true regarding renal study except:
a. DTPA extraction efficiency of 40 percent
b. DMSA coefficient extraction is 10%
c. DTPA represents filtration
d. MAG3 represents secretion
e. DMSA is used for calyceal system evaluation

Answer: a

High-Yield Context from Slides (Renal Scans - Slide 91, implicitly from nuclear med agents):

- **Radiopharmaceuticals for Renal Scans:**
  - **DMSA (Dimercaptosuccinic acid):**

    - "In static images we use a DMSA scan. DMSA goes to the cortex." (Slide 91). It binds to renal cortical tubules. Used for assessing renal cortical morphology, scars, and differential renal function (relative uptake by each kidney).
    - Its extraction efficiency by the kidneys is typically around 40-50% in a single pass. The question states "coefficient extraction is 10%", which seems low for DMSA's primary characteristic of cortical binding.
- **DTPA (Diethylenetriaminepentaacetic acid):**
    - "If you want to scan renal function in terms of secretion or filtration (dynamic scan), use MAG3 and DTPA." (Slide 91).
    - DTPA is primarily cleared by **glomerular filtration**.
    - Its extraction efficiency is relatively low, around 20% in a single pass.
- **MAG3 (Mercaptoacetyltriglycine):**
    - Cleared primarily by **tubular secretion**.
    - Has a high extraction efficiency (around 40-50% or more), making it good for patients with impaired renal function.

Analyzing the options:

- a. DTPA extraction efficiency of 40 percent: False. DTPA extraction efficiency is about 20%. MAG3 has a higher extraction efficiency (around 40-50%+).
- b. DMSA coefficient extraction is 10%: False. DMSA cortical uptake/binding is quite high, reflecting its utility for cortical imaging; its "extraction" into the cortex is efficient (closer to 40-50% retained in cortex). 10% is too low.
- c. DTPA represents filtration: True. Cleared by glomerular filtration.
- d. MAG3 represents secretion: True. Cleared by tubular secretion.
- e. DMSA is used for calyceal system evaluation: False. DMSA is for cortical imaging ("DMSA goes to the cortex"). Agents like DTPA or MAG3, which are excreted into the collecting system, are used to evaluate the calyceal system, pelvis, and ureters (dynamic/excretory phase).

There seem to be multiple incorrect statements here based on general nuclear medicine knowledge.
Let's re-check the provided answer which is 'a'.
If 'a' is the "except" (meaning it's false), then DTPA extraction efficiency is NOT 40%. This is correct (it's ~20%).

Let's evaluate other options based on the answer 'a' being false:

- b. DMSA coefficient extraction is 10%: This is also likely false; it should be higher for cortical agents.
- e. DMSA is used for calyceal system evaluation: This is definitively false.

If the question means "All are true... *except one which is false*", and 'a' is the false one:
"DTPA extraction efficiency of 40 percent" IS FALSE. So this aligns.

Let's assume the question implies one statement is *most* incorrect or that the others are considered "true" in the context of the exam setter's understanding.

- DTPA extraction efficiency is ~20%. So "40%" is false.
- DMSA extraction is much higher than 10% (cortical retention is high). So "10%" is false.
- DTPA is filtration: True.
- MAG3 is secretion: True.
- DMSA for calyceal system: False.

If the answer is 'a', then 'b' and 'e' are also false by general knowledge. This question seems problematic if only one answer is expected to be false. However, "DTPA extraction efficiency of 40 percent" is a clear numerical inaccuracy.

Question 45:
Wrong about Ulcerative colitis:
a. Strictures are common
b. Slightly More common in males
c. 95% in the rectosigmoid area
d. radiation ileitis is a differential diagnosis

e. has malignant potential in many years

Answer: a

High-Yield Context from Slides (Ulcerative Colitis - Slide 62):

- "It mostly involves the colon."
- "Can cause backwash ileitis." (Inflammation of the terminal ileum due to reflux of colonic contents).
- "Toxic megacolon is a major complication."
- "Higher risk of malignancy."
- "Thumb-printing sign, button-shaped ulcers, lead pipe sign (dilation of colon with loss of haustrations)."

The slides do *not* mention:

- Strictures being common (in fact, strictures are more characteristic of Crohn's disease due to its transmural inflammation and fibrotic healing. UC is typically mucosal/submucosal).
- Gender predominance.
- Specific percentage involvement of rectosigmoid (though it typically starts in the rectum and extends proximally in a continuous fashion).
- Radiation ileitis as a differential.

General Medical Knowledge (Ulcerative Colitis):

- **Strictures:** Uncommon in UC. If present, they raise suspicion for malignancy. Crohn's disease is known for strictures.
- **Gender:** Incidence is roughly equal in males and females, some studies suggest slight male predominance but it's not a strong feature.
- **Location:** Almost always involves the rectum (proctitis) and extends proximally in a continuous manner. Rectosigmoid involvement is very common.
- **Differential Diagnosis:** Includes Crohn's disease, infectious colitis, ischemic colitis. Radiation enteritis/colitis can occur in patients who have received pelvic radiation.
- **Malignant Potential:** Increased risk of colorectal cancer, especially with long-standing and extensive disease.

Analyzing the options:

- a. Strictures are common: False. Strictures are uncommon in UC and suggest malignancy or misdiagnosis (possibly Crohn's).
- b. Slightly More common in males: Debatable, not a strong distinguishing feature. Incidence is often quoted as similar.
- c. 95% in the rectosigmoid area: Very high involvement of the rectum is characteristic. "Rectosigmoid" is also commonly involved as it's contiguous.
- d. radiation ileitis is a differential diagnosis: Plausible, especially if symptoms develop after pelvic radiation therapy, though the primary inflammation in UC is colonic. "Backwash ileitis" is a feature of UC, but radiation can also affect the ileum.
- e. has malignant potential in many years: True. Increased risk of colorectal cancer with long duration/extent.

Statement 'a' is the most clearly false characteristic of UC.

Question 46:
Not true about barium enema:
a. Safe to use in perforation
b. Water insoluble material
c. causes constipation and impaction
d. cheap

Answer: a

High-Yield Context from Slides (Barium Enema - Slide 51-52):

- **Barium Sulfate:**

    - "It is contraindicated in cases of suspected **perforation**." (Slide 51).
    - It is a water-insoluble material (it's a suspension).
    - One of its properties is being "Inexpensive." (Slide 52).
- **Side Effects (General Knowledge):** Barium is inert but can cause constipation or, rarely, impaction if not cleared from the colon, especially in patients with pre-existing motility issues or dehydration. Patients are often advised to drink plenty of fluids after a barium study.

Analyzing the options:

- a. Safe to use in perforation: False. Explicitly contraindicated (Slide 51).
- b. Water insoluble material: True. Barium sulfate is a suspension of an insoluble salt.
- c. causes constipation and impaction: True, this is a known potential side effect.
- d. cheap: True, listed as an advantage (Slide 52).

Question 47:
What is wrong:

- Mucosal folds increase in number as we go towards ileum

Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides & General GI Anatomy:

- **Small Intestine Mucosal Folds (Valvulae Conniventes / Plicae Circulares):** These are circular or semi-circular folds of the mucosa and submucosa in the small intestine.
    - They are most numerous and prominent in the **duodenum and jejunum**.
    - They **decrease in number and prominence** as you move distally through the ileum. The distal ileum has fewer and less developed folds compared to the jejunum.
- Slide 61 describes these folds in the context of barium studies: "project in lumen of the bowel and barium lies between theses folds ,which appear a lucent filling defects of about 2-3 mm in width (volvulaeconniventes)."

The statement is "Mucosal folds increase in number as we go towards ileum."
This is anatomically incorrect. Mucosal folds (valvulae conniventes) are most developed in the jejunum and *decrease* in number and size towards the distal ileum.

Therefore, the statement is wrong.

Question 48:
In abdomen Ct, one is wrong:
Per pancreatic hypodense area is pancreatitis

Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Pancreatitis on CT - Slide 62):

- **Acute Pancreatitis:**
    - "On a CT scan, we can see an edematous hypertrophied pancreas with **dirty fat planes**."
    - "Dirty fat planes" refer to inflammatory stranding and haziness in the peripancreatic fat, which often appears as increased density or streaky infiltration in the normally hypodense (dark) fat. Edema fluid in the peripancreatic region would appear hypodense.
- **Chronic Pancreatitis:**
    - "Calcification and atrophy on CT scan."

The statement is "Per pancreatic hypodense area is pancreatitis."

- Inflammation (pancreatitis) often causes inflammatory stranding in the peripancreatic fat ("dirty fat"), which makes the normally hypodense fat appear somewhat *more dense* or hazy, not necessarily a discrete "hypodense area" *as the primary sign*.

- However, fluid collections (e.g., pseudocysts, peripancreatic fluid due to inflammation) associated with pancreatitis *would* appear as hypodense areas. Edema within the peripancreatic tissues can also contribute to hypodensity.

So, a "peripancreatic hypodense area" *can* be a sign of pancreatitis, particularly if it represents a fluid collection or significant edema. However, "dirty fat planes" (stranding, increased haziness in the fat) is the more classic description of the fat changes themselves.

If the statement means *any* hypodense area around the pancreas signifies pancreatitis, it might be too simplistic. But peripancreatic fluid collections (which are hypodense) *are* a feature of pancreatitis.

The question is "one is wrong," implying other (unstated) options might be correct signs.
Is "Per pancreatic hypodense area is pancreatitis" always true or specific enough?

- Simple peripancreatic fluid (e.g., ascites from another cause) could be hypodense.
- However, in the context of suspected pancreatitis, a new peripancreatic hypodense area (fluid/edema) is highly suggestive.

Let's assume the statement implies this finding in a relevant clinical context. Peripancreatic fluid collections or edema are hypodense and are seen in pancreatitis. The term "dirty fat" implies some increased density/stranding *within* the fat, but if there are discrete fluid collections, they will be hypodense. This statement is plausible as a sign. Without other options to compare, it's hard to definitively call it "wrong" based solely on the slides, which mention "dirty fat planes" and "edematous pancreas." An edematous pancreas itself might be slightly hypodense compared to normal, and peripancreatic edema/fluid certainly would be.

Question 49:
In ulcerative colitis barium enema, all true except:

- Normal segment between two affected areas

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Ulcerative Colitis - Slide 62) & General Knowledge:

- **Ulcerative Colitis (UC):**
  - Typically involves the colon, starting in the rectum and extending proximally in a **continuous fashion**.
  - There are generally no "skip lesions" (normal segments between affected areas). Skip lesions are characteristic of Crohn's disease (Slide 62).
  - Barium enema findings can include loss of haustrations ("lead pipe" colon), mucosal granularity/ulcers.

The statement is "In ulcerative colitis barium enema, all true except: - Normal segment between two affected areas."
This means that the presence of a "Normal segment between two affected areas" is
not true for ulcerative colitis. In other words, UC does *not* typically have normal segments between affected areas; it is continuous.

This aligns with the known pathology of UC (continuous inflammation) and contrasts it with Crohn's disease (skip lesions).
Therefore, the statement implicitly claims that "Normal segment between two affected areas" IS a feature of UC, which is incorrect. Thus making the overall premise (that this is the exception to "all true") correct.
To rephrase for clarity: The feature "Normal segment between two affected areas" is characteristic of Crohn's, not UC. UC is continuous. So if a list of true UC features was given, this would be the "except."

Question 50:
Duodenal ulcer, all true except:

- Double contrast is superior to endoscopy in dx

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Stomach and Duodenum - Slide 59):

- Barium meal is used to study the stomach and first part of the duodenum.
- **Ulcers (Benign):** "the ulcers can extend beyond the wall of the lumen and have speculations."
- **Ulcers (Malignant):** "usually found inside a region of a filling defect. They do not have speculations and they have irregular edges."

- The slides do *not* directly compare double-contrast barium studies with endoscopy for duodenal ulcer diagnosis.

General Medical Knowledge (Duodenal Ulcer Diagnosis):

- **Endoscopy (Esophagogastroduodenoscopy - EGD):** Considered the gold standard for diagnosing peptic ulcers (including duodenal ulcers). It allows direct visualization of the mucosa, characterization of the ulcer, and the ability to take biopsies (to rule out malignancy, test for H. pylori).
- **Double-Contrast Barium Meal:** Can show duodenal ulcers as craters or collections of barium, often with radiating folds. It is less sensitive than endoscopy, especially for smaller or shallower ulcers. It also does not allow for biopsy. While good, it's generally not considered *superior* to endoscopy for diagnosis.

The statement is "Duodenal ulcer, all true except: - Double contrast is superior to endoscopy in dx."
This means the assertion "Double contrast is superior to endoscopy in dx" is false.
This aligns with general medical knowledge: endoscopy is generally superior to double-contrast barium meal for the diagnosis of duodenal ulcers due to direct visualization and biopsy capability.

Therefore, the statement implies a false claim, making it the "except" if other (unstated) options were true.

Chest x-ray

Question 51:
Wrong about CXR:
a. Typically its PA view with full expiratory effort
b. The distance between the machine and film is 150-200 cm
c. Heart size is exaggerated on AP view

Answer: a

High-Yield Context from Slides (Chest X-ray Basics - Slide 102-103):

- **Standard Position:** "The standard position is **erect PA**."
- **Inspiratory Effort:** "Inspiratory effort: judged by how many ribs can be visualized. If you can visualize 6-8 anterior ribs and 8-10 posterior ribs, the patient has a **good inspiratory effort**; sometimes, an expiratory phase image might be needed (in cases of a small pneumothorax)."
- **Distance (Source-to-Image Distance - SID):** While not explicitly stated in cm on these slides, standard PA chest X-rays are taken at a relatively long SID (typically 180 cm or 72 inches) to minimize magnification and improve sharpness. 150-200 cm is a correct range.
- **AP vs. PA View:**
  - "On an AP view, the heart shadow looks **exaggerated** due to divergence of X-ray beams." (Slide 103).

Analyzing the options:

- a. Typically its PA view with full expiratory effort: False. The typical PA view is taken with **full inspiratory effort** (Slide 102). Expiratory films are done for specific indications (e.g., suspected small pneumothorax, air trapping).
- b. The distance between the machine and film is 150-200 cm: True. This is the standard range for a PA chest X-ray to minimize cardiac magnification.
- c. Heart size is exaggerated on AP view: True. Explicitly stated on Slide 103.

Question 52:
Wrong About silhouetting:
a. If middle lobe pneumonia, rt heart border is erased.
b. If middle lobe pneumonia, lower surface will be horizontal fissure
c. If left upper pneumonia, left heart border will be silhouetted.

Answer: b

High-Yield Context from Slides (Silhouette Sign - Slide 104):

- "Silhouette sign: a silhouette appears when the lung parenchyma covers an adjacent structure. It helps in locating the anatomical position of the lesion."

- **Silhouettes of the left lung:**
  - **Left heart border:** Lingular pathology; if the opacity extends superiorly, the whole upper lobe is affected.
  - Left heart border + diaphragm: Lower lobe pathology.
- **Silhouettes of the right lung:**
  - **Right heart border:** Middle lobe pathology.
  - Right heart border + diaphragm: Lower lobe pathology or combined middle and lower lobes pathology.
- **No silhouette:** Upper lobe pathology.
- **Anatomy Refresher:**
  - The **right middle lobe** is anatomically adjacent to the right heart border.
  - The **horizontal fissure** (minor fissure) separates the right upper lobe from the right middle lobe. Its lower surface is the superior aspect of the middle lobe.
  - The **lingula** of the left upper lobe is anatomically adjacent to the left heart border.

Analyzing the options:

- a. If middle lobe pneumonia, rt heart border is erased: True. The right middle lobe is adjacent to the right heart border, so consolidation there will obscure (silhouette) the right heart border (Slide 104).
- b. If middle lobe pneumonia, lower surface will be horizontal fissure: False. The horizontal fissure forms the *superior* border of the right middle lobe. The oblique fissure forms its inferior border. The "lower surface" of a middle lobe pneumonia would be related to the oblique fissure if it extended that far, or the diaphragm if it's a very basal consolidation. The horizontal fissure is *above* the middle lobe.
- c. If left upper pneumonia, left heart border will be silhouetted: True, if the pneumonia involves the lingula (which is part of the left upper lobe and is adjacent to the left heart border) (Slide 104).

Question 53:
Wrong about chest imaging:
a. CXR can view nodules <5mm
b. Mediastinal window is better than lung window in viewing heart
c. Spiral CT is the imaging modality of choice for PE

Answer: a

High-Yield Context from Slides & General Knowledge:

- **Nodule Detection on CXR:** Chest X-rays have limitations in detecting small pulmonary nodules. While larger nodules (>1 cm) are often visible, very small nodules (<5-6 mm) can easily be missed, especially if they are not dense or are obscured by overlying structures like ribs or vessels. CT is much more sensitive for small nodules.
- **CT Windows (Mediastinal vs. Lung):**
  - **Lung windows** are optimized to visualize the lung parenchyma, showing fine details of lung tissue, airspaces, and small vessels. The mediastinal structures appear as undifferentiated soft tissue density.
  - **Mediastinal windows** are optimized to differentiate soft tissue structures within the mediastinum, such as the heart, great vessels, lymph nodes, and esophagus. The lungs appear black on mediastinal windows.
  - Therefore, to view the heart and great vessels, mediastinal windows are superior.
- **Pulmonary Embolism (PE) Imaging:**
  - While not explicitly on slide 102-107, **CT Pulmonary Angiography (CTPA)**, which is a type of spiral (helical) CT scan with IV contrast timed to opacify the pulmonary arteries, is the current imaging modality of choice for diagnosing PE in most stable patients.
  - Lung perfusion scan (V/Q scan) is another option, especially if CTPA is contraindicated (Slide 88 discusses V/Q for PE).

Analyzing the options:

- a. CXR can view nodules <5mm: False. CXR is generally insensitive for nodules this small. CT is required.

- b. Mediastinal window is better than lung window in viewing heart: True. Mediastinal windows are designed to show soft tissue structures like the heart.
- c. Spiral CT is the imaging modality of choice for PE: True (referring to CTPA).

Question 54:
Wrong About airway disease:
a. Pneumothorax causes ipsilateral flattening of the diaphragm
b. Large pneumothorax can obliterate the costophrenic angle
c. CT is better in detecting air bronchogram than CXR
d. CT can detect small amount of air in pleura

Answer: b

High-Yield Context from Slides & General Knowledge:

- **Pneumothorax (Slide 106):**
  - Radiolucent area at the periphery of the lung.
  - Visualization of the visceral pleura.
  - Loss of vascular markings beyond the visceral line.
  - **Tension pneumothorax minor criteria:** "Flattening of the ipsilateral diaphragm." So, a pneumothorax (especially tension) *can* cause diaphragmatic flattening.
- **Costophrenic Angle (CPA):** This is the acute angle where the diaphragm meets the chest wall. It is normally sharp.
  - **Pleural effusion** causes blunting or obliteration of the CPA (Slide 105).
  - A **pneumothorax** involves air in the pleural space. While a very large pneumothorax causes lung collapse, the CPA itself is formed by the diaphragm and chest wall. Air in the pleural space above it doesn't typically "obliterate" the angle in the same way fluid does by filling it up. The lung edge will retract away from the CPA, and the CPA might appear deeper or the diaphragm flattened, but "obliteration" is classic for effusion.
- **Air Bronchogram (Slide 104):**
  - Shadow of bronchi/bronchioles due to fluid collection (consolidation) in surrounding alveoli.
  - CT provides much better resolution and cross-sectional views than CXR, making it superior for identifying subtle air bronchograms within areas of consolidation.
- **Detecting Pleural Air (Pneumothorax):**
  - CT is far more sensitive than CXR for detecting small amounts of pleural air (small pneumothoraces).

Analyzing the options:

- a. Pneumothorax causes ipsilateral flattening of the diaphragm: True, especially in tension pneumothorax (Slide 106 minor criteria).
- b. Large pneumothorax can obliterate the costophrenic angle: False. "Obliteration" of the CPA is characteristic of pleural effusion. A pneumothorax will show air in the pleural space, and the lung will retract; the angle itself, formed by diaphragm and ribs, should remain, though it might look different or deeper. Fluid fills and obscures it.
- c. CT is better in detecting air bronchogram than CXR: True. CT has superior resolution.
- d. CT can detect small amount of air in pleura: True. CT is very sensitive for small pneumothoraces.

Question 55:
Wrong about air bronchogram:
a. common in pulmonary edema
b. common in pneumonia
c. associated with a lesion
d. normally visible in 10% of adults

Answer: d

High-Yield Context from Slides (Air Bronchogram - Slide 104):

- "The presence of an air bronchogram: an air bronchogram is defined as the shadow of bronchi and bronchioled. This shadow appears as a result of **fluid collection inside the alveoli**. As a rule, the presence of an opacity with an air bronchogram is diagnostic of a **consolidation**."
- **Causes of Consolidation (and thus air bronchograms):**
  - **Pneumonia:** Alveoli are filled with inflammatory exudate (fluid).
  - **Pulmonary edema:** Alveoli are filled with edema fluid.
  - Other causes include hemorrhage, some tumors (e.g., bronchioloalveolar carcinoma).
- "Lesion" is a general term. An air bronchogram is seen within a "lesion" that is a consolidation (an opacity). So it is associated with a lesion (the consolidation itself).
- **Normal Visibility:** Air bronchograms are a sign of alveolar filling, which is pathological. They are **not normally visible**. Bronchial walls themselves might be visible on CT, but the "air bronchogram sign" implies air-filled bronchi surrounded by opacified alveoli.

Analyzing the options:

- a. common in pulmonary edema: True. Alveoli are filled with fluid.
- b. common in pneumonia: True. Alveoli are filled with exudate.
- c. associated with a lesion: True. It is seen within the opacity/consolidation (the "lesion").
- d. normally visible in 10% of adults: False. Air bronchograms are a sign of pathology (alveolar filling) and are not normally visible on a CXR.

Question 56:
About chest x-ray which is wrong:
a. Right heart border is in contact with right middle lobe
b. Upper most part of the right heart border is in contact with upper lobe
c. aortic notch is in posterior mediastinum
d. left heart border is in contact with left lower lobe

Answer: d

High-Yield Context from Slides (Silhouette Sign & Anatomy - Slide 104):

- **Silhouettes of the right lung:**
  - **Right heart border:** Middle lobe pathology. (Implies RML is in contact with RHB).
- **Silhouettes of the left lung:**
  - **Left heart border:** Lingular pathology; if the opacity extends superiorly, the whole upper lobe is affected. (Implies lingula of LUL is in contact with LHB).
  - Left heart border + diaphragm: Lower lobe pathology.
- **Radiological Divisions of Mediastinum (Slide 103-104):**
  - Anterior: in front of anterior pericardium and trachea.
  - Middle: within pericardial cavity, including trachea.
  - Posterior: behind pericardium and trachea.
  - The aortic arch (which forms the aortic notch/knob on CXR) is generally considered part of the superior mediastinum, arching posteriorly over the left main bronchus. Its descending part is in the posterior mediastinum. The "aortic notch" itself is a component seen within the overall mediastinal shadow.

Analyzing the options:

- a. Right heart border is in contact with right middle lobe: True (from silhouette sign logic).
- b. Upper most part of the right heart border is in contact with upper lobe: False. The right heart border is formed mainly by the right atrium. The right upper lobe is superior and generally not directly in contact with the main silhouette-forming part of the right heart border. The right middle lobe is. The superior vena cava forms part of the upper right mediastinal border, which is adjacent to the RUL. The question says "right heart border."

- c. aortic notch is in posterior mediastinum: The aortic arch begins anteriorly, arches posterosuperiorly, and the descending aorta is in the posterior mediastinum. The "notch" or "knob" is the visible arch. Part of its course is indeed posterior. This is plausible.
- d. left heart border is in contact with left lower lobe: False. The left heart border is primarily in contact with the **lingula of the left upper lobe**. The left lower lobe is posterior and inferior to this.

The question asks "which is wrong."

- 'b' is likely wrong. The right atrium makes the RHB; the RUL is superior to this.
- 'd' is definitively wrong. The LHB is in contact with the lingula (LUL).

Given answer 'd' from the test bank:
"left heart border is in contact with left lower lobe" is FALSE. The left heart border is primarily in contact with the lingula of the left upper lobe.

Revisiting 'b': "Upper most part of the right heart border is in contact with upper lobe." The "heart border" usually refers to the cardiac silhouette itself. The right atrium forms the majority of the right heart border. The superior vena cava (SVC) enters the superior aspect of the right atrium and forms part of the right mediastinal border superiorly, and this part *is* adjacent to the right upper lobe. If "uppermost part of the right heart border" is interpreted to include the SVC confluence, then it could be considered in contact with the RUL. This is more ambiguous than 'd'.

Question 57:
About chest x-ray which is wrong:
a. PA and lateral views are the routine
b. on lateral view, you see all right hemidiaphragm
c. On lateral view, you can’t see the anterior part of left hemidiaphragm

Answer: b

High-Yield Context from Slides & General CXR Interpretation:

- **Routine Views:** PA and lateral views are indeed the standard routine for a comprehensive chest X-ray examination. (Implicitly, as PA is standard - Slide 102, and lateral is mentioned for precise location - Slide 102, and visualizing lower lobes - Slide 103).
- **Identifying Hemidiaphragms on Lateral View:**
  - **Right Hemidiaphragm:** Generally, the entire dome of the right hemidiaphragm is visible from anterior to posterior because it is contrasted against the air-filled right lung.
  - **Left Hemidiaphragm:** The anterior part of the left hemidiaphragm is often obscured ("silhouetted out") by the overlying heart, which has similar soft tissue density. Only the posterior part of the left hemidiaphragm is usually clearly visible, contrasted against the air-filled left lower lobe.

Analyzing the options:

- a. PA and lateral views are the routine: True.
- b. on lateral view, you see all right hemidiaphragm: True. The right hemidiaphragm is usually seen in its entirety.
- c. On lateral view, you can’t see the anterior part of left hemidiaphragm: True. The anterior portion of the left hemidiaphragm is typically obscured by the heart.

The provided answer is 'b'. This means statement 'b' is considered wrong. "on lateral view, you see all right hemidiaphragm." If this is wrong, it implies you *don't* see all of the right hemidiaphragm. This contradicts general teaching, where the right hemidiaphragm is usually fully visible. Perhaps there's a subtle point about the very anterior costophrenic angle being obscured by chest wall soft tissues, but "all" usually refers to the dome.

Let's re-evaluate if there's an error in my understanding or the key:

- Statement 'b' is generally considered true.
- Statement 'c' is generally considered true.

If 'b' is indeed the wrong statement (as per the answer key), then there must be a reason why you *don't* see all of the right hemidiaphragm. This is unusual. Could it be that the gastric bubble under the *left* hemidiaphragm sometimes helps identify the *left* more clearly posteriorly, and the *right* is identified by being higher and continuous? This doesn't make 'b' wrong.

Possible source of confusion: Sometimes, the left hemidiaphragm is only visible posteriorly because the anterior part silhouettes with the heart. The right hemidiaphragm is usually visible throughout its course. If 'b' is wrong, it means you *cannot* see all of the right hemidiaphragm. This is generally not the case. This might be an error in the provided answer key.

Let's assume the answer key 'b' is correct and try to find why 'b' would be wrong.
Perhaps "all" is too absolute. Very anteriorly, it merges with the anterior chest wall. But this is a pedantic point.
Is there any situation where a portion is obscured? If there's right lower lobe consolidation against the diaphragm, that part would be silhouetted. But the question implies a normal view.

If we consider 'b' as wrong, it implies you *cannot* see all of the right hemidiaphragm. This is anatomically and radiologically counter-intuitive for a standard lateral view.

Given the typical rules:

1. The right hemidiaphragm is usually higher than the left.
2. The right hemidiaphragm is usually visible for its entire course from front to back.
3. The left hemidiaphragm is often obscured anteriorly by the heart.
4. Gastric air bubble or splenic flexure air is under the left hemidiaphragm.

Statement 'b' aligns with rule 2. Statement 'c' aligns with rule 3.
There seems to be an issue with the provided answer 'b' if typical radiological interpretation rules apply.

Question 58:
Collapse of the right upper lobe of the lung causes all except:
a. Rt hilum upward
b. Rt horizontal fissure upward
c. Rt bronchus to the contralateral side

Answer: c

High-Yield Context from Slides (Collapse Signs - Slide 105):

- Collapse (signs); can be caused by a foreign body or a tumor.
  - **Transposition of the transverse fissure** (This is the horizontal fissure).
  - **Traction of the hilum.**
  - Tenting of the right diaphragm: only seen in upper and middle lobe pathologies.
  - Tracheal or mediastinal deviation towards the side of the lesion.

Understanding Lobar Collapse (Right Upper Lobe - RUL):

- When the RUL collapses, it typically collapses superiorly and medially.
- **Fissure displacement:** The horizontal fissure (separating RUL from RML) will be pulled **upward**. The oblique fissure (partially bordering RUL posteriorly) may also show some displacement.
- **Hilar displacement:** The right hilum will be pulled **upward** due to the collapsing RUL.
- **Tracheal/Mediastinal shift:** There can be a shift of the trachea and upper mediastinum **towards the side of collapse** (ipsilateral).
- **Diaphragmatic tenting:** The right hemidiaphragm may show upward tenting, especially the anterior portion beneath the RUL.
- **Bronchial displacement:** The right main bronchus or upper lobe bronchus will be involved by the cause of collapse (e.g., tumor) or be pulled/deviated due to the collapse, but it generally does *not* shift to the contralateral side. Bronchi are pulled *towards* the collapsed lung.

Analyzing the options:

- a. Rt hilum upward: True. The hilum is pulled up by the collapsing RUL.
- b. Rt horizontal fissure upward: True. The horizontal fissure forms the inferior border of the RUL and is pulled up.
- c. Rt bronchus to the contralateral side: False. Structures are pulled *towards* the side of collapse. The right bronchus would not shift to the left (contralateral) side; if anything, the trachea might deviate slightly to the right (ipsilateral).

Question 59:
Tension pneumothorax, wrong:
a. pleural line on xray
b. absent lung making ipsilateral
c. horizontal hemidiaphragm ipsilateral
d. mediastinum shift to the ipsilateral side

Answer: d

High-Yield Context from Slides (Tension Pneumothorax - Slide 106):

- **Pneumothorax (Criteria):**
    - A radiolucent area extending at the periphery of the lung parenchyma.
    - Visualization of the visceral pleura (this is the "pleural line on xray").
    - Loss of vascular markings beyond the visceral line (this creates the "absent lung" appearance in that peripheral zone).
- **Tension Pneumothorax:** This is a life-threatening condition where air enters the pleural space during inspiration but cannot escape during expiration, leading to a progressive build-up of pressure.
    - **Major criteria:**
        - **Mediastinal shift to the contralateral side** (away from the side of the pneumothorax).
        - Shifting of the heart ratio (1/3:2/3) - also indicates mediastinal shift.
    - **Minor criteria:**
        - **Flattening of the ipsilateral diaphragm** (the diaphragm on the same side as the pneumothorax can be pushed down and flattened).
        - Widening and flattening of the intercostal spaces on the ipsilateral side.
        - Congestion (increased vascular markings) of the hila (this seems counterintuitive for the collapsed lung side, perhaps referring to the contralateral, compressed lung).

Analyzing the options:

- a. pleural line on xray: True. This is a sign of any pneumothorax, including tension.
- b. absent lung making ipsilateral: True. This refers to the loss of lung markings peripheral to the visceral pleural line on the ipsilateral side.
- c. horizontal hemidiaphragm ipsilateral: True. Flattening (which can lead to a more horizontal appearance) of the ipsilateral hemidiaphragm is a minor criterion.
- d. mediastinum shift to the ipsilateral side: False. In a tension pneumothorax, the increased pressure on the affected side pushes the mediastinum **to the contralateral side** (away from the pneumothorax).

Question 60:
Wrong about CXR:
a. In AP cardiac size is exaggerated
b. easy to do in 5 years old child

Answer: b

High-Yield Context from Slides (Chest X-ray Basics - Slide 102-103):

- **AP View and Cardiac Size:** "On an AP view, the heart shadow looks **exaggerated** due to divergence of X-ray beams." (Slide 103).
- **Performing CXR in Children:** While CXR is a common imaging modality in children, obtaining a good quality image, especially an erect PA view with full inspiration and no rotation, can be challenging in young children (like a 5-year-old).
    - They may not be able to cooperate fully with breath-hold instructions.
    - They might move during the exposure.

    - Immobilization devices or parental assistance (with appropriate shielding) might be needed.
    - Supine AP views are often performed in infants and very young children who cannot stand or cooperate.
    - The statement "easy to do" is relative. Compared to an MRI, it's simpler logistically, but achieving optimal diagnostic quality requires skill and cooperation that may not be "easy" in all 5-year-olds.

Analyzing the options:

- a. In AP cardiac size is exaggerated: True (Slide 103).
- b. easy to do in 5 years old child: This is debatable. While CXRs *are done* in 5-year-olds, it's not always "easy" to get a perfect, cooperative, diagnostic quality image compared to an adult. It often requires specific pediatric techniques and experienced radiographers. If "easy" implies without challenges, then it's likely false.

The answer key indicates 'b' is wrong. This implies that performing a CXR in a 5-year-old is *not* considered "easy," likely due to cooperation and motion issues.

Question 61:
Collapse of right upper lobe, which is wrong:
a. Right hilum is higher
b. Right hemidiaphragm is higher
c. Shift of mediastinum to the left

Answer: c

High-Yield Context from Slides (Collapse Signs - Slide 105, also see Q58 context):

- **Signs of Collapse:**
    - Traction of the hilum.
    - Tenting of the right diaphragm (for RUL/RML collapse).
    - Tracheal or mediastinal deviation **towards the side of the lesion** (ipsilateral).
- **Right Upper Lobe (RUL) Collapse:**
    - The RUL collapses superiorly and medially.
    - The right hilum is pulled **upward**.
    - The right hemidiaphragm may be elevated or show "tenting," especially its anterior portion, due to the volume loss above it. So, "Right hemidiaphragm is higher" is plausible.
    - The mediastinum (including the trachea) shifts **towards the right** (ipsilateral to the collapse).

Analyzing the options:

- a. Right hilum is higher: True. Pulled upward by the collapsing RUL.
- b. Right hemidiaphragm is higher: True. Elevation or tenting of the ipsilateral hemidiaphragm is a sign of upper/middle lobe collapse.
- c. Shift of mediastinum to the left: False. With a right-sided collapse, the mediastinum shifts **to the right** (ipsilaterally). A shift to the left would be a contralateral shift.

Question 62:
Wrong about lobar pneumonia:
a. lower lobe obliterate diaphragm
b. upper left lobe may obliterate left heart border
c. middle right lobe obliterate right heart border
d. inferior left lobe obliterates descending aorta
e. right middle lobe pneumonia is bounded inferiorly by horizontal fissure

Answer: e

High-Yield Context from Slides (Silhouette Sign - Slide 104, Lobar Anatomy):
The silhouette sign helps locate pneumonia:

- **Right Hemidiaphragm Silhouette:** Consolidation in a lobe adjacent to the diaphragm will obscure that part of the diaphragm. The right lower lobe is adjacent to the posterior right hemidiaphragm.

- **Left Heart Border Silhouette:** The lingula (part of the left upper lobe) is adjacent to the left heart border.
- **Right Heart Border Silhouette:** The right middle lobe is adjacent to the right heart border.
- **Descending Aorta Silhouette:** The descending aorta runs in the posterior mediastinum, adjacent to the posterior aspects of the lower lobes. Consolidation in the left lower lobe (posterior basal segments) can obscure the descending aorta.
- **Fissures:**
  - **Horizontal (Minor) Fissure (Right Lung):** Separates the right upper lobe (RUL) from the right middle lobe (RML). It forms the *superior* border of the RML.
  - **Oblique (Major) Fissure (Right Lung):** Separates the RML (anteriorly) and RUL (superiorly) from the right lower lobe (RLL) (posteriorly). It forms the *inferior and posterior* border of the RML.
  - **Oblique (Major) Fissure (Left Lung):** Separates the left upper lobe (LUL, including lingula) from the left lower lobe (LLL).

Analyzing the options:

- a. Lower lobe obliterate diaphragm: True. Consolidation in the basal segments of a lower lobe will obscure the adjacent hemidiaphragm.
- b. upper left lobe may obliterate left heart border: True. If the lingula (part of LUL) is consolidated.
- c. middle right lobe obliterate right heart border: True. These structures are adjacent.
- d. inferior left lobe obliterates descending aorta: True. The posterior basal segments of the LLL are adjacent to the descending aorta.
- e. right middle lobe pneumonia is bounded inferiorly by horizontal fissure: False. The horizontal fissure forms the **superior** border of the RML. The RML is bounded inferiorly (and posteriorly) by the **oblique fissure**.

Question 63:
All are radiological signs that favors cancer of the bronchus except:
a. Peripheral calcified nodule
b. Lymphangitis carcinomatosis
c. Hilar LN

Answer: a

High-Yield Context from Slides & General Oncology:

- **Cancer of the Bronchus (Bronchogenic Carcinoma):**
  - **Hilar Lymph Nodes (LN) / Hilar Adenopathy:** Enlargement of hilar lymph nodes is a common finding in lung cancer, either due to direct tumor spread or metastatic involvement. "Hilar abnormalities: If one hilar appears prominently larger or denser... This increased density is due to the congestion of pulmonary vessels" (Slide 106) - while this mentions congestion, hilar enlargement is also a key sign for tumor/metastasis.
  - **Lymphangitis Carcinomatosis:** This is the spread of cancer cells through the lymphatic vessels of the lungs. Radiologically, it can appear as reticular or reticulonodular opacities, thickened interlobular septa, and peribronchial cuffing. It is a sign of advanced cancer.
  - **Peripheral Nodule Calcification:**
    - **Benign Calcification Patterns:** Certain patterns of calcification within a solitary pulmonary nodule are strongly suggestive of a benign etiology (e.g., old granuloma). These include diffuse, central, laminated (onion-skin), and "popcorn" (hamartoma) calcifications.
    - **Malignant Calcification Patterns:** Malignant nodules are typically non-calcified. If calcification is present, it's often eccentric, stippled, or amorphous. A *densely calcified peripheral nodule following a benign pattern* is unlikely to be cancer.

Analyzing the options:

- a. Peripheral calcified nodule: This is more likely to be benign, especially if the calcification is dense and follows a benign pattern (e.g., diffuse, central, laminated). Malignant nodules are usually non-calcified or have atypical calcification. So, a "peripheral calcified nodule" (implying benign-type calcification) does *not* favor cancer.

- b. Lymphangitis carcinomatosis: True. This is a pattern of malignant spread.
- c. Hilar LN (Hilar Lymphadenopathy): True. Common sign of lung cancer.

Therefore, a "Peripheral calcified nodule" (especially with benign calcification patterns) is the sign that does *not* favor cancer of the bronchus.

Question 64:
All will cause diffuse nodular chest x-ray except:
a. Sarcoidosis
b. Wegener’s

Answer: a (Though this might be nuanced, as sarcoidosis *can* have nodular patterns).

High-Yield Context from Slides & General Knowledge:

- **Diffuse Nodular Pattern on CXR:** This implies multiple, widespread small nodules throughout the lungs.
- **Sarcoidosis:**
  - A multisystem granulomatous disease of unknown etiology.
  - Common CXR findings include bilateral hilar lymphadenopathy.
  - Parenchymal involvement can manifest in various ways, including reticular patterns, nodular patterns (miliary or larger nodules), consolidations, or fibrosis. So, sarcoidosis *can* cause a diffuse nodular pattern, particularly in some stages or forms.
  - Slide 104 mentions sarcoidosis in the differential for cavitations, but its manifestations are diverse.
- **Wegener’s Granulomatosis (Granulomatosis with Polyangiitis - GPA):**
  - A systemic vasculitis affecting small to medium-sized vessels, classically involving the upper respiratory tract, lungs, and kidneys.
  - Lung manifestations are common and can include solitary or multiple nodules, which may cavitate. These nodules can be widespread, leading to a diffuse nodular pattern.

Analyzing the options:

- a. Sarcoidosis: Can present with a diffuse nodular pattern, though hilar adenopathy is more classic.
- b. Wegener’s: Commonly presents with multiple lung nodules, which can be diffuse and may cavitate.

The question asks "except." This implies one of them does *not* (or less commonly) cause a diffuse nodular pattern. Both sarcoidosis and Wegener's *can* cause nodular patterns.

However, if we have to pick one that is "less" likely to be *primarily* described as "diffuse nodular" without other prominent features:

- Wegener's is well-known for multiple (often cavitating) nodules.
- Sarcoidosis, while it can have nodules, is perhaps more famously associated with hilar/mediastinal lymphadenopathy and reticular interstitial patterns, with nodular patterns being one of several parenchymal manifestations.

If the answer is 'a', it suggests that sarcoidosis is considered less likely to *primarily* present as *just* a diffuse nodular pattern compared to Wegener's, or that its other features (like hilar adenopathy) are more dominant. This is a fine distinction, as both can.

Caveat: Without other options or more context from the lecture specifically differentiating these, this question is tough. Both conditions *can* produce nodular lung disease. Perhaps the emphasis is on "diffuse" and one is typically more focal or associated with other dominant findings.

Question 65:
In chest X-ray, one is wrong:
a. Right dome of diaphragm is higher than left
b. Minor fissure appears in anterior Part of 4th space
c. PA X-ray is better than AP
d. Right hilum is higher than the left

Answer: d

High-Yield Context from Slides (CXR Basics - Slide 102, 106, 107):

- **Diaphragm Levels:** "The right diaphragm is usually 2.5 cm higher than the left diaphragm because it is pushed upwards by the liver." (Slide 107).
- **Minor Fissure (Horizontal Fissure):** On a PA CXR, the horizontal fissure on the right typically runs from the hilum to the periphery at about the level of the anterior end of the 4th rib or 4th intercostal space. On a lateral view, it runs horizontally from the oblique fissure towards the anterior chest wall, roughly at the level of the 4th costal cartilage. "Anterior part of 4th space" is plausible.
- **PA vs. AP View:**
  - PA view is standard, minimizes cardiac magnification, and scapulae are rotated out of lung fields.
  - AP view (often portable/supine) causes cardiac magnification and scapulae often overlie lungs.
  - Thus, PA X-ray is generally better for diagnostic quality.
- **Hilar Levels:** "The left hilum is 1cm higher than the right hilum." (Slide 106).

Analyzing the options:

- a. Right dome of diaphragm is higher than left: True (Slide 107).
- b. Minor fissure appears in anterior Part of 4th space: True, this is its typical location on a PA view.
- c. PA X-ray is better than AP: True, for standard diagnostic purposes.
- d. Right hilum is higher than the left: False. The **left hilum** is typically higher than the right hilum (Slide 106).

Question 66:
In supine position X-ray which is wrong:
a. Heart size is exaggerated
b. Diaphragm will be higher
c. Prominent upper zone vessels
d. Pleural fluid will accumulate posteriorly and give a decreased density to the hemithorax
e. A pneumothorax will lie anteriorly and be difficult to detect

Answer: d

High-Yield Context from Slides (AP Supine CXR vs. PA Erect - Slide 103):

- "On an AP view, the heart shadow looks **exaggerated** due to divergence of X-ray beams."
- "A pleural effusion will look as an increased density in the hemithorax; on an AP view it appears as an obliteration of the costophrenic angles." (This describes a moderate effusion. For a supine patient...)
- "A pneumothorax is hard to detect on an AP view. The air will accumulate **in front of the lungs** (anteriorly), and it might be missed."
- "On an AP view, the **diaphragm will appear elevated**, and the lung volumes will appear smaller than they are."
- "The **upper zones look prominent** on an AP view." (This refers to vascular prominence due to redistribution of blood flow in supine position, also beam divergence).

Pleural Fluid in Supine Position (General Knowledge & Slide 105 for erect):

- In an erect patient, pleural fluid collects in dependent areas, blunting costophrenic angles and forming a meniscus (Slide 105).
- In a supine patient, free-flowing pleural fluid layers **posteriorly** along the dependent portion of the pleural space. This causes a diffuse, hazy **increase in density** (opacification) over the affected hemithorax, rather than a decreased density. It can make the lung look veiled. Large effusions can cause near-complete opacification.

Analyzing the options:

- a. Heart size is exaggerated: True (Slide 103).
- b. Diaphragm will be higher: True (Slide 103, appears elevated).
- c. Prominent upper zone vessels: True (Slide 103).
- d. Pleural fluid will accumulate posteriorly and give a decreased density to the hemithorax: False. Fluid is denser than air-filled lung. When it layers posteriorly, it causes an **increased density** (haziness/opacification) of the hemithorax,

not decreased.

- e. A pneumothorax will lie anteriorly and be difficult to detect: True (Slide 103).

Question 67:
Wrong about hilum in chest X-ray:
a. The left hilum is higher than the right because left main bronchus arches over left pulmonary artery
b. normally symmetrical
c. caused by pulmonary arteries and veins
d. prominent in pulmonary hypertension
e. can be pulled upwards or downwards by collapse or fibrosis

Answer: a (The reason given is incorrect, though the fact that left hilum is higher is true)

High-Yield Context from Slides (Hila - Slide 106):

- **Radiological Hilum:** "The radiological hilum includes the pulmonary vessels only." (Anatomical hilum includes artery, vein, lymph nodes, nerves, bronchus).
- **Hilar Markings:** "The hila appear as hyperdense regions lateral to the heart borders. This hyperdensity is the result of the density of the vessels."
- **Hilar Levels:** "The **left hilum is 1cm higher than the right hilum**."
- **Symmetry:** While there's a height difference, the general size and density should be relatively symmetrical. Asymmetry can indicate pathology.
- **Prominence:** "If one hilar appears prominently larger or denser than the other hilum, then there is an abnormality. This increased density is due to the congestion of pulmonary vessels." Pulmonary hypertension causes enlargement of the central pulmonary arteries, leading to prominent hila.
- **Displacement:** "Distortion of the hila can indicate fibrosis or lung collapse." (Slide 106). Fibrosis or collapse can pull the hilum.

Anatomical Reason for Left Hilum Being Higher (General Knowledge):

- The **left pulmonary artery** arches *over* the left main bronchus.
- The **right pulmonary artery** passes *anterior* to the right main bronchus.
- This anatomical arrangement typically results in the left hilum appearing slightly higher than the right on a CXR.

Analyzing the options:

- a. The left hilum is higher than the right because left main bronchus arches over left pulmonary artery: False. The anatomical relationship is the reverse: the **left pulmonary artery arches over the left main bronchus**. This is the reason the left hilum is higher. The statement has the artery and bronchus relationship incorrect.
- b. normally symmetrical: True, in terms of general size and density, allowing for the normal height difference. Significant asymmetry is abnormal.
- c. caused by pulmonary arteries and veins: True. The radiological hilum is primarily composed of these vessels (Slide 106).
- d. prominent in pulmonary hypertension: True. Enlarged central pulmonary arteries make the hila prominent.
- e. can be pulled upwards or downwards by collapse or fibrosis: True (Slide 106).

Question 68:
All cause bilateral small lung except:
a. consolidation
b. bowel distension
c. suboptimal inspiration
d. obesity

Answer: a

High-Yield Context from Slides & General Knowledge (Causes of Apparent Small Lungs/Reduced Lung Volume):

- **Bowel Distension:** Marked abdominal/bowel distension can push the diaphragms upward, reducing the space available for lung expansion and making the lungs appear small.
- **Suboptimal Inspiration:** If the patient does not take a deep enough breath, the lungs will not be fully expanded and will appear small with crowded markings (Slide 102 discusses good inspiratory effort).
- **Obesity:** Massive obesity can restrict diaphragmatic movement and chest wall expansion (splinting), leading to reduced lung volumes ("obesity hypoventilation syndrome" in severe cases). Radiographically, lungs may appear smaller.
- **Consolidation (e.g., pneumonia):**
  - Consolidation is the filling of airspaces with fluid, pus, cells, etc. (Slide 104).
  - Lobar consolidation itself does *not* typically cause a reduction in the volume of the affected lobe; in fact, the lobe may be normal or even slightly expanded (e.g., in Klebsiella pneumonia with bulging fissures).
  - If consolidation is associated with significant atelectasis (collapse), then volume loss occurs. But consolidation alone implies filling, not primary volume loss.

Analyzing the options:

- a. consolidation: False. Consolidation itself fills airspaces but doesn't inherently cause small lungs. If anything, extensive bilateral consolidation would make the lungs appear opacified, not necessarily small in volume unless associated with collapse.
- b. bowel distension: True. Can elevate diaphragms and reduce lung volume.
- c. suboptimal inspiration: True. Leads to apparent small lungs.
- d. obesity: True. Can restrict ventilation and lead to smaller lung volumes.

Therefore, consolidation is the condition that does not directly cause bilateral small lungs.

Question 69:
All of the following cause a radiolucent hemithorax except:
a. PE
b. small lung
c. mastectomy
d. emphysema
e. rotation of patient

Answer: e (This is tricky; rotation *can* cause asymmetry in density, but the others are more direct causes of true radiolucency or apparent lucency).

High-Yield Context from Slides & General Knowledge (Radiolucent Hemithorax):
A radiolucent hemithorax appears darker than the contralateral side, indicating increased X-ray transmission.

- **PE (Pulmonary Embolism):**
  - The "Westermark sign" is a rare finding in PE, representing a region of oligemia (decreased blood flow) distal to an embolus, which can appear as a focal area of increased lucency. A large central PE could potentially cause more widespread oligemia and lucency on one side.
- **Small Lung (e.g., Swyer-James Syndrome, Hypoplastic Lung):**
  - If one lung is hypoplastic or has post-infectious obliterative bronchiolitis (Swyer-James), it can be smaller and appear more lucent due to air trapping and reduced vascularity.
- **Mastectomy:** Removal of breast tissue (which is soft tissue density) on one side will result in less attenuation of X-rays on that side, making the hemithorax appear more radiolucent compared to the side with intact breast tissue.
- **Emphysema:**
  - Characterized by destruction of alveolar walls and air trapping.
  - Affected lung regions (or entire lung in diffuse emphysema) appear hyperlucent due to increased air content and decreased vascular markings. Bullous emphysema or a large bulla can cause marked focal or hemithoracic lucency.
- **Rotation of Patient (Technical Factor - Slide 102):**

    - "If the patient is rotated, a false diagnosis of cardiomegaly might be made."
    - Rotation causes asymmetry in the appearance of the chest. The hemithorax turned away from the film may appear more lucent because X-rays pass through less soft tissue of the rotated chest wall on that side. Conversely, the side turned towards the film may appear denser. So, rotation *can* cause asymmetric lucency.

Analyzing the options:

- a. PE: Plausible (Westermark sign, though rare, implies lucency).
- b. small lung: Plausible (e.g., Swyer-James, due to oligemia and air trapping).
- c. mastectomy: True. Less soft tissue to attenuate X-rays.
- d. emphysema: True. Air trapping and destruction of lung tissue.
- e. rotation of patient: True. Can cause asymmetric lucency due to differing amounts of chest wall traversed by X-rays.

The question asks "except." All listed options *can* cause a radiolucent hemithorax or an *appearance* of one. This question might be flawed, or there's a specific nuance expected.

- PE, emphysema directly affect lung parenchyma/vasculature leading to true lucency.
- Mastectomy affects overlying soft tissue.
- "Small lung" as a cause is a bit vague; it depends on *why* it's small (e.g., Swyer-James involves air trapping and oligemia, hence lucency).
- Rotation is a technical artifact leading to *apparent* differential lucency.

If the answer key is 'e', it might be because rotation is a *technical artifact* causing apparent lucency, whereas the others are *pathological* or *post-surgical* states causing true or more consistent lucency. This is a common way such "except" questions are framed in exams – distinguishing artifact from true pathology.

Let's assume 'e' is the intended answer. The rationale would be that rotation causes an artifactual appearance of radiolucency rather than a true change in the lung or chest wall that inherently leads to increased X-ray transmission due to pathology or surgery.

Question 70:
All the following are signs of collapse due to an opacification on the left upper lung border except:
a. disappearance of the heart border and the upper lobe on the left side
b. collapse of the lung to the left side
c. elevation of the left hemidiaphragm
d. obliteration of aorta
e. ill-defined opacity in the left upper and middle zones

Answer: d

High-Yield Context from Slides (Collapse Signs - Slide 105, Silhouette Sign - Slide 104):
This question describes an "opacification on the left upper lung border" and asks for signs of associated collapse.

- **Signs of Collapse:** Volume loss.
    - Shift of fissures.
    - Hilar displacement towards collapse.
    - Mediastinal shift towards collapse.
    - Elevation of ipsilateral hemidiaphragm (especially for lower lobe collapse, or upper lobe if significant).
    - Crowding of ribs.
- **Left Upper Lobe (LUL) Collapse / Opacification:**
    - The LUL includes the lingula, which is adjacent to the left heart border. Opacification/collapse of the LUL (especially lingula) would cause **disappearance (silhouetting) of the left heart border**.
    - LUL collapse typically occurs anteriorly and superiorly.
    - The left hilum may be elevated.
    - The left hemidiaphragm might be elevated due to volume loss.

    - The opacity itself in LUL collapse often appears as a hazy or ill-defined opacity in the upper and mid zones, sometimes with a characteristic "luftsichel" sign (hyperinflation of the superior segment of the LLL).
- **Aortic Silhouette:** The descending aorta is a posterior structure. LUL collapse is predominantly anterior. While severe LUL collapse might cause some mediastinal shift, direct "obliteration of aorta" is more characteristic of left *lower* lobe pathology adjacent to the descending aorta.

Analyzing the options for LUL opacification/collapse:

- a. disappearance of the heart border and the upper lobe on the left side: "Disappearance of the heart border" (left) is true if lingula is involved. "Disappearance of the upper lobe" is vague, but opacification *is* the upper lobe problem.
- b. collapse of the lung to the left side: "Collapse of the lung" implies volume loss. "to the left side" just states laterality. This is consistent.
- c. elevation of the left hemidiaphragm: True, can occur with significant LUL volume loss.
- d. obliteration of aorta: False. The LUL is not typically adjacent to the descending aorta in a way that its collapse would obliterate the aortic silhouette. This is more typical of LLL pathology.
- e. ill-defined opacity in the left upper and middle zones: True. LUL collapse often presents as such an opacity.

Question 71:
Wrong about pleural effusion:

- visible pleural edge

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Pleural Effusion - Slide 105, Pneumothorax - Slide 106):

- **Pleural Effusion (Erect CXR - Slide 105):**
    - Homogenous dense opacity.
    - Blunting or obliteration of costophrenic angles.
    - Meniscus sign (convex superiorly).
    - Large effusions can cause contralateral mediastinal shift.
- **Pleural Effusion (Supine CXR - Slide 105):**
    - Dense hemithorax (graded, most dense inferiorly).
    - Loss of costophrenic angles and meniscus sign.
- **Pneumothorax (Slide 106):**
    - "Visualization of the **visceral pleura**: the pneumothorax separates the parietal pleura from visceral pleura. The visceral pleura will appear as a thin radio-opaque line along the periphery of the lung." This is the "pleural edge" or "pleural line."

The statement is "Wrong about pleural effusion: - visible pleural edge."
A "visible pleural edge" (the visceral pleural line separated from the chest wall by air) is the hallmark sign of a **pneumothorax**, not a pleural effusion. In a pleural effusion, fluid fills the pleural space, obscuring such an edge.

Therefore, the statement that a "visible pleural edge" is wrong *about pleural effusion* is correct (i.e., it's a true statement about what's wrong concerning effusion). Phrasing is a bit convoluted. It means "A visible pleural edge is NOT a sign of pleural effusion."

Question 72:
Lowest attenuation and highest penetrance in chest X ray in:

- lung alveoli

  Answer: The statement itself is presented for evaluation, with "lung alveoli" as the implied answer.

High-Yield Context from Slides (Attenuation & Penetration - Slide 12):

- **Penetration:** Ability of X-rays to pass through tissue. Higher density = lower penetration. Air has lowest density, so highest penetration.

    - "Air filled spaces appear black (high penetration)."
- **Attenuation:** Ability of tissue to resist X-ray passage. Lower density = lower attenuation. Air has lowest density, so lowest attenuation.
    - "Metal, bone, air (lowest attenuation)."
- **Lung Alveoli:** These are the air sacs of the lungs, normally filled with air.

The statement seeks the structure with the lowest attenuation (X-rays pass easily) and highest penetrance (X-rays go through easily). This describes air-filled structures. Lung alveoli are primarily air.

Therefore, "lung alveoli" (being air-filled) would have the lowest attenuation and highest penetrance among typical chest structures.

Question 73:
Wrong about pleural effusion:

- usually affect the costophrenic angles and do not affect the hemidiaphragm

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Pleural Effusion - Slide 105):

- **Erect CXR:**
    - "Blunting or obliteration of the **costophrenic angles**."
    - "The presence of meniscus sign: fluid accumulation in the pleura will make the overlying lung parenchyma look convex inferiorly." This implies fluid is affecting the contour above the diaphragm.
    - Large effusions can cause mediastinal shift and can compress the lung, potentially affecting the apparent position or contour of the hemidiaphragm.
- While the primary and earliest sign is CPA blunting, a significant effusion will layer over the hemidiaphragm, obscuring its contour and potentially leading to apparent elevation or loss of its sharp outline. The lung base sits on the hemidiaphragm.

The statement is "Wrong about pleural effusion: - usually affect the costophrenic angles and do not affect the hemidiaphragm."

- "usually affect the costophrenic angles": True. This is a hallmark sign.
- "and do not affect the hemidiaphragm": False. Pleural fluid collects in the most dependent parts of the pleural space. In an erect patient, this includes the space between the lung base and the hemidiaphragm. A significant effusion will obscure the hemidiaphragm and can even cause compressive atelectasis of the lower lobe, altering the diaphragmatic contour or causing apparent elevation. The meniscus sign itself indicates fluid layering above the diaphragm.

Therefore, the part "do not affect the hemidiaphragm" is wrong. Pleural effusions certainly affect the radiographic appearance of the hemidiaphragm.

Question 74:
Wrong about chest x-ray:

- hila contain blood vessels and lymph nodes

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Hila - Slide 106):

- "Anatomical Vs. radiological hilum:"
    - "The **anatomical hilum** includes the pulmonary artery, pulmonary vein, lymph nodes, nerves, and bronchus."
    - "The **radiological hilum** includes the pulmonary vessels only."
- "Hilar markings: The hila appear as hyperdense regions lateral to the heart borders. This hyperdensity is the result of the density of the vessels."

The statement is "Wrong about chest x-ray: - hila contain blood vessels and lymph nodes."
This statement is referring to the structures that create the
radiographic appearance of the hila on a chest X-ray.

According to Slide 106, the
radiological hilum (what we see on the X-ray as the hilar shadow) is formed by **pulmonary vessels only**.
While the
anatomical hilum contains lymph nodes, these are not normally visible on a chest X-ray unless they are enlarged or calcified.

Therefore, the statement "hila [as seen on CXR] contain blood vessels and lymph nodes" is wrong because the visible radiological hilum is primarily vessels. Normal-sized lymph nodes don't contribute significantly to the hilar shadow on a plain CXR.

Question 75:
Wrong about middle lobe collapse:

- Lung volume is unchanged

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Collapse - Slide 105):

- "Collapse: (signs); can be caused by a foreign body or a tumor."
- The signs listed (transposition of fissure, traction of hilum, tenting of diaphragm, mediastinal deviation) are all indicative of **volume loss** of the affected lung or lobe.
- "Collapse" by definition means a reduction in air volume of a part of the lung, leading to a decrease in its size.

The statement is "Wrong about middle lobe collapse: - Lung volume is unchanged."
This means the assertion "Lung volume is unchanged" in middle lobe collapse is wrong.
Collapse inherently means
loss of lung volume. If the middle lobe collapses, its volume decreases.

Therefore, the statement "Lung volume is unchanged" is indeed wrong in the context of any lobar collapse, including middle lobe collapse.

Question 76:
Pneumoperitoneum, which is wrong:

- Best modality is standing upright x-ray

  Answer: The statement itself is presented for evaluation.

High-Yield Context from Slides (Pneumoperitoneum - Slide 45):

- "Presence of gas in the peritoneum due to rupture of a viscus ex. In a case of a ruptured peptic ulcer."
- "Gas in the peritoneum usually gathers under the right diaphragm. It will be apparent as a black discoloration below the diaphragmatic muscle on the right side of the X-ray."
- "If we cannot get a proper AP X-ray, a supine X-ray can be used. On the supine X-ray we have 3 signs: Falsiform ligament sign, Ligamentumteres sign, Riglers sign."
- The slides show an image of an erect chest/upper abdomen X-ray demonstrating gas under the diaphragm.

General Radiology Knowledge (Diagnosing Pneumoperitoneum):

- **Erect Chest X-ray:** Considered the most sensitive plain film for detecting small amounts of free intraperitoneal air, as air rises to collect under the diaphragms.
- **Left Lateral Decubitus Abdominal X-ray:** If the patient cannot stand, this view can show free air collecting over the lateral aspect of the liver.
- **Supine Abdominal X-ray:** Less sensitive for small amounts of free air, but specific signs (Rigler's sign, football sign, falciform ligament sign) can be seen.
- **CT Scan:** CT is the **most sensitive** imaging modality for detecting pneumoperitoneum, capable of identifying very small amounts of free air that may be missed on plain X-rays.

The statement is "Pneumoperitoneum, which is wrong: - Best modality is standing upright x-ray."
This implies that the assertion "Best modality is standing upright x-ray" is wrong.
While an erect chest X-ray is very good and often the initial test for suspected pneumoperitoneum,

CT scan is more sensitive and is considered the "best" or gold standard modality for detecting free intraperitoneal air, especially small amounts.

Therefore, the statement "Best modality is standing upright x-ray" is wrong because CT is superior in sensitivity.

Mammography

Question 77:
Recent mammogram showed an oval well-defined mass that is unchanged since 2016. The most appropriate BI-RADS classification is:
a. BI-RADS 2
b. BI-RADS 3
c. BI-RADS 5
d. BI-RADS 1
e. BI-RADS 4

Answer: a

High-Yield Context from Slides (BI-RADS Classification - Slide 71):

- **BI-RADS 0:** Needs additional imaging and further evaluation; cannot assess the image.
- **BI-RADS 1:** Negative findings; there is nothing to comment on (no positive findings).
- **BI-RADS 2: Benign finding; no need for short interval follow up; ex. Involutingfibroadenoma.** (Other examples of BI-RADS 2 include things like cysts, stable post-surgical changes, intramammary lymph nodes, calcified fibroadenomas). A finding that is demonstrably benign and stable over time would fit here.
- **BI-RADS 3: Probably benign finding; <2% malignancy; follow up at 6,12,24 months (Initial short-interval follow up) ex. Fibroadenoma without a calcification.**
- **BI-RADS 4:** Suspicious finding (amorphous calcification); needs biopsy; 2-95% malignancy. (Subdivided into 4A, 4B, 4C with increasing suspicion).
- **BI-RADS 5:** Highly suggestive of malignancy >95% chance of malignancy; appropriate action needs to be taken.

The question describes an "oval well-defined mass" which are features often associated with benign lesions. Crucially, it is "unchanged since 2016." Stability over a long period (several years) is a very strong indicator of a benign nature.

- An oval, well-defined mass that is stable for many years would be classified as BI-RADS 2 (Benign).
- BI-RADS 3 is for probably benign findings that require short-term follow-up to *establish* stability. This mass is already known to be stable.

Therefore, BI-RADS 2 is the most appropriate classification.

Question 78:
The most likely mammographic appearance of a biopsy proven fibroadenoma is:
a. Oval well defined mass
b. Cluster of pleomorphic microcalcifications
C. Area of architectural distortion
d. Microlobulated mass
e. An ill-defined rounded mass

Answer: a

High-Yield Context from Slides (Mammography - Masses, Fibroadenoma):

- **Mass Shapes (Slide 64):**
  - **Round:** coin shaped lesion
  - **Oval:** egg shaped
  - Lobulated: up to 3 lobes; if more than 3 lobes are present, it is considered irregular
  - Irregular
- **Mass Margins (Slide 64):**

- **Well circumscribed (well defined)**
- Obscured
- Microlobulated
- Ill-defined
- Speculated (sun-ray appearance; highly suggestive of malignancy)

- **Fibroadenoma:**
  - Slide 71: "Involutingfibroadenoma" is given as an example of a BI-RADS 2 (benign) finding.
  - Slide 71: "Fibroadenoma without a calcification" is given as an example of a BI-RADS 3 (probably benign) finding.
  - Slide 67 (Popcorn calcifications): "the presence of a popcorn calcification inside an isodense/hypodense well circumscribed mass is diagnostic of an involutingfibroadenoma which is a benign lesion."
- **Malignant Features:**
  - Pleomorphic microcalcifications (Slide 68: indicate high grade DCIS).
  - Architectural distortion (Slide 64: can be primary or secondary sign of malignancy).
  - Ill-defined or speculated margins (Slide 64).
  - Microlobulated margins can be seen in both benign and malignant lesions but raise more concern than well-circumscribed.

General Mammography Knowledge (Fibroadenoma):
Fibroadenomas are common benign breast masses, especially in younger women. Classically, they appear as:

- Oval or round shape.
- Well-circumscribed (well-defined) margins.
- They may or may not have calcifications (coarse, "popcorn" calcifications are typical in older, involuting fibroadenomas).

Analyzing the options:

- a. Oval well defined mass: This is the classic mammographic appearance of a fibroadenoma.
- b. Cluster of pleomorphic microcalcifications: This is highly suspicious for malignancy (DCIS).
- C. Area of architectural distortion: This is often a sign of malignancy.
- d. Microlobulated mass: While some fibroadenomas can be lobulated, "microlobulated" often raises more suspicion than "well-defined."
- e. An ill-defined rounded mass: Ill-defined margins are suspicious for malignancy.

Therefore, "Oval well defined mass" is the most likely appearance.

Question 79:
A mammogram of a woman who had previous breast surgery and radiotherapy showed calcifications at operative site that were assigned BI-RADS2. What was the morphology of these calcifications?
a. Popcorn calcifications
b. Fine pleomorphic microcalcifications
c. Egg shell calcifications
d. Rod like calcifications
e. Fine linear microcalcifications

Answer: c

High-Yield Context from Slides (Benign Calcification Morphology - Slide 67-68):

- **BI-RADS 2 findings are benign.**
- **Benign Calcifications (Slide 67):**
  - Skin calcifications
  - Round calcifications

    - **Eggshell calcifications away from skin: indicate fat necrosis.**
    - Vascular calcifications
    - Popcorn calcifications (involuting fibroadenoma)
    - Plasma cell mastitis: large rod calcifications
    - **Dystrophic: ill defined calcifications usually following a surgery or a biopsy.**
    - Suture calcifications
- **Malignant/Suspicious Calcifications (Slide 68):**
    - Amorphous calcifications (intermediate risk, need biopsy).
    - Pleomorphic (irregular, crushed stone, high grade DCIS).
    - Fine linear branching (high grade DCIS).
- **Fat Necrosis:** Can occur after surgery or radiotherapy. It can present with various appearances, including oil cysts which may develop **eggshell calcifications** (calcification in the cyst wall). Dystrophic calcification (coarse, irregular) is also common post-surgery/trauma/radiation.

The question describes calcifications at an operative site after surgery and radiotherapy, assigned BI-RADS 2 (benign).

- a. Popcorn calcifications: Typical of involuting fibroadenomas.
- b. Fine pleomorphic microcalcifications: Malignant.
- c. Egg shell calcifications: Associated with fat necrosis, which is common post-surgery/radiotherapy.
- d. Rod like calcifications: Associated with plasma cell mastitis/secretory disease.
- e. Fine linear microcalcifications: Malignant.

Given the history of surgery and radiotherapy, fat necrosis is a common benign sequela. Fat necrosis can lead to oil cysts which then calcify with an "eggshell" pattern. Dystrophic calcification is also very common post-surgery/radiation and is benign (BI-RADS 2). Between "Egg shell" and "Dystrophic" (if it were an option), both are plausible. Since "Egg shell" is an option and is linked to fat necrosis (a common post-op/RT finding), it's a strong candidate. Dystrophic calcifications are often coarser and more irregular than classic eggshell.

The context points to a benign post-procedural change. Eggshell calcifications are a specific benign type associated with fat necrosis, a common result of surgery/radiation.

Question 80:
A women diagnosed with invasive ductal carcinoma, did mammogram after chemotherapy, revealed a round well-defined mass, what is the BIRADS:
a. 2
b. 3
c. 4
d. 5
e. 6

Answer: e

High-Yield Context from Slides (BI-RADS Classification - Slide 71):

- **BI-RADS 6: A case of a proven malignancy by a biopsy; here the image is taken as follow up for treatment or to look for a different focus of metastasis. After chemotherapy or radiotherapy; the patient remains a BI-RADS 6. However, after surgical removal of a lesion, the patient returns to BI-RADS 1.**

The patient has a known diagnosis of invasive ductal carcinoma (proven malignancy). The mammogram is being done *after* chemotherapy, which is treatment.
Even if the treated mass now appears "round and well-defined" (suggesting a good response to therapy), the BI-RADS category for imaging performed in the context of a known, treated malignancy (prior to surgical excision of any residual disease) remains BI-RADS 6. This category indicates that the malignancy is known and the imaging is for assessing treatment response or further management.

The appearance of the mass (round, well-defined) describes the *response* to treatment, but the BI-RADS category reflects the underlying known diagnosis in this context.

Therefore, BI-RADS 6 is the correct classification.

Question 81:
A 25 year old woman did a mammogram, which revealed a fatty breast, an oval well defined isodense mass, what is the ACR and BIRADS:
a. ACR 1 BIRADS 3
b. ACR 1 BIRADS 2
c. ACR 2 BIRADS 2
d. ACR 1 BIRADS 1
e. ACR 4 BIRADS 2

Answer: a

High-Yield Context from Slides:

- **ACR Breast Density Classification (Slide 64):**
  - **ACR 1: Fatty breast; usually in older females; <25% glandular tissue. Highly sensitive.**
  - ACR 2: Low amounts of fibroglandular tissue; 25-50% fibroglandular tissue.
  - ACR 3: Heterogeneous breast; 50-75% fibroglandular tissue.
  - ACR 4: Dense breast; >75% glandular tissue; sensitivity decreases to 60%.
- **BI-RADS Classification (Slide 71):**
  - BI-RADS 1: Negative.
  - BI-RADS 2: Benign finding (e.g., stable fibroadenoma, cyst).
  - **BI-RADS 3: Probably benign finding; <2% malignancy; follow up at 6,12,24 months. Ex. Fibroadenoma without a calcification.**
- **Mass Characteristics for Fibroadenoma (Benign/Probably Benign):**
  - Oval, well-defined mass (as per Q78).
  - Typically isodense or mildly hypodense compared to glandular tissue. If in a fatty breast, "isodense" might mean similar to the sparse glandular tissue present or just not markedly hyperdense.

The patient is 25 years old. The mammogram revealed a "fatty breast."

- "Fatty breast" corresponds to **ACR 1** (<25% glandular tissue).

The mass is "oval well defined isodense." These features (oval, well-defined) are suggestive of a benign or probably benign lesion, like a fibroadenoma. In a young patient, a new finding like this without prior imaging for comparison or specific benign features like popcorn calcification would typically be classified as:

- **BI-RADS 3 (Probably Benign)**, requiring short-term follow-up to ensure stability. If it were known to be stable or had classic benign calcifications, it could be BI-RADS 2. Without that information, BI-RADS 3 is appropriate for a new, apparently benign solid mass.

Combining these: ACR 1 and BI-RADS 3.
Therefore, "ACR 1 BIRADS 3" is the correct combination.

Question 82:
If you found 10 mm mass on mammogram, which of the following is a feature of malignancy:
a. Central lucency
b. Peripheral part of fat density
c. Clustered coarse calcifications
d. Irregular posterior border that appears well-defined on magnification view
e. Previous normal mammogram

Answer: c (This is tricky; "coarse" calcifications are usually benign. Perhaps it means "clustered *micro*calcifications" or "clustered *pleomorphic* calcifications." If taken literally, 'c' is benign. Let's review.)

High-Yield Context from Slides (Malignancy Features - Slide 64, 67, 68):

- **Malignant Mass Margins/Shape:** Ill-defined, speculated, irregular shape. Microlobulated can be suspicious.

- **Malignant Calcifications (Slide 68):**
  - **Pleomorphic:** multiple calcifications that are irregular; crushed stone appearance. Indicate high grade DCIS.
  - **Fine linear branching calcifications;** indicate high grade DCIS.
  - Amorphous calcifications are intermediate risk and need biopsy.
- **Benign Calcifications (Slide 67):**
  - Round, eggshell, vascular, plasma cell mastitis (large rod), dystrophic, suture.
  - **Popcorn calcifications: also called coarse calcifications;** ...diagnostic of an involutingfibroadenoma which is a benign lesion.
- **Fat in a Mass:**
  - A mass containing macroscopic fat (e.g., lipoma, galactocele, intramammary lymph node with fatty hilum, hamartoma) is generally benign. "Central lucency" or "peripheral part of fat density" would suggest fat content, favoring benignity.
- **Previous Normal Mammogram:** Does not rule out a new malignancy, but if a finding was present and stable on previous mammograms, that favors benignity. A *new* finding on a background of previously normal mammograms is assessed on its own merits.
- **Magnification Views:** Used to better characterize margins and calcifications. If a border appears irregular on standard views but well-defined on magnification, it might be less suspicious than if it remains ill-defined.

Analyzing the options:

- a. Central lucency: Suggests fat content (e.g., oil cyst, lipoma), which is benign.
- b. Peripheral part of fat density: Also suggests fat content, benign.
- c. Clustered coarse calcifications: "Coarse calcifications" are also called "popcorn calcifications" (Slide 67) and are benign (fibroadenoma). "Clustered" refers to distribution. If the calcifications themselves are morphologically benign (coarse), their clustering doesn't automatically make them malignant. However, *clusters of pleomorphic or fine linear branching MICROcalcifications* are suspicious. This option is problematic as written.
- d. Irregular posterior border that appears well-defined on magnification view: If magnification clarifies a border as well-defined when it initially looked irregular, this would *decrease* suspicion, not increase it.
- e. Previous normal mammogram: Not a feature *of the mass itself* for malignancy. A new malignant mass can arise after a normal mammogram.

Re-evaluating option 'c': "Clustered coarse calcifications."

- **Coarse calcifications (popcorn):** Benign (Slide 67).
- **Clustered distribution:** Calcifications close to each other (1-2 cm apart) (Slide 69). This distribution is often associated with malignancy *if the calcifications are morphologically suspicious (e.g., pleomorphic, fine linear)*.
  If the question
  meant "Clustered pleomorphic calcifications" or "Clustered microcalcifications of suspicious morphology," then it would be a feature of malignancy. As written, "clustered coarse calcifications" describes benign calcifications in a cluster.

Possible interpretation if 'c' is the answer: Perhaps the term "coarse" is being used loosely, and the emphasis is on "clustered," implying a focus of calcific activity that needs further assessment, even if individual flecks look "coarse." However, mammographic terminology is usually quite specific. "Coarse" or "popcorn" are benign types.

Let's assume there's an imprecision in the term "coarse" and the intended meaning leans towards suspicious clustering. Other options are more clearly benign or reduce suspicion:

- 'a' and 'b' point to benign fat.
- 'd' suggests improved characterization towards benign on magnification.
- 'e' is about history, not a mass feature.

If we have to pick the *most likely intended feature of malignancy* among poorly phrased options, and assuming "coarse" is a misnomer for something more suspicious that is "clustered," then 'c' might be the intended answer, despite its literal benign description.

Alternative consideration: Perhaps the question is flawed. If "clustered coarse calcifications" is taken literally as per Slide 67 (popcorn = coarse = benign), then it is NOT a feature of malignancy. In that case, none of the options are clearly malignant features, or option 'd' (irregular border) is the most suspicious element before magnification.

Given the high likelihood of imprecision in exam questions, if forced to choose and assuming "clustered" is the suspicious element overriding a misapplied "coarse," 'c' is the only option that involves calcification distribution often linked to malignancy (when morphology is also suspicious).

Question 83:
Calcified ring on mammogram:
a. a cyst
b. fat necrosis
c. fibroadenoma

Answer: a (or b, as eggshell calcification in fat necrosis is a ring)

High-Yield Context from Slides (Calcification Morphology):

- **Eggshell Calcifications (Slide 67):** "indicate fat necrosis." These are typically thin, curvilinear calcifications in the wall of an oil cyst (a result of fat necrosis), forming a ring or "eggshell."
- **Cysts:** Simple cysts are common and benign. They don't typically calcify unless there's been inflammation or hemorrhage within them, which can sometimes lead to rim calcification.
- **Fibroadenoma:** "Popcorn calcifications" (coarse) are typical of involuting fibroadenomas (Slide 67). Not typically a "ring."

Analyzing the options for a "calcified ring":

- a. a cyst: Possible, if it's an old, complicated cyst with rim calcification.
- b. fat necrosis: Very characteristic. Oil cysts (from fat necrosis) can develop classic "eggshell" (ring-like) calcification.
- c. fibroadenoma: Typically has popcorn/coarse calcifications, not a ring.

Both simple cysts (with wall calcification) and oil cysts (from fat necrosis, showing eggshell calcification) can present with a "calcified ring."
However, "eggshell calcification" is a very specific term for the ring-like calcification seen in the wall of an oil cyst due to **fat necrosis**.
If "calcified ring" is interpreted as "eggshell calcification," then fat necrosis is the direct answer from the slides.
If it's a more general "ring," a simple cyst could also fit.

The answer provided is 'a' (a cyst). This implies the question is referring to the rim calcification that can occur in the wall of a longstanding or complicated simple cyst.

It's worth noting that "Eggshell calcifications" (Slide 67) are linked to "fat necrosis." So if the question is strictly based on the slides, and "calcified ring" = "eggshell", then fat necrosis (b) would be a very strong contender. The choice of 'a' suggests a broader interpretation of "ring."

We have reached page 16. Let's continue to page 20.

Question 84 (from page 16):
26y/o lady presented with suspected breast mass the best imaging:
a. Mammogram
b. U/S

Answer: b

High-Yield Context from Slides (Imaging Young Women - Slide 63):

- "**Before the age of 40, we use ultrasound as a screening tool.** Before the age of 40, the breast is more dense (more fibroglandular tissue; therefore, mammograms will not show the pathology clearly)."
- Mammography screening: ">40: a mammogram is advised every 2 years."

The patient is 26 years old. In women under 40 (and especially under 30-35), breast tissue is typically dense, which reduces the sensitivity of mammography. Ultrasound is not limited by breast density in the same way and is excellent for

characterizing palpable masses, distinguishing cystic from solid lesions.
For a suspected breast mass in a 26-year-old, ultrasound is the preferred initial imaging modality.

Therefore, U/S (Ultrasound) is the best initial imaging.

Question 85 (from page 16):
All are asymmetrical breast tissue on mammogram except:
a. fibroma
b. lipoma
c. breast parenchyma

Answer: c

High-Yield Context from Slides & General Mammography:

- **Asymmetrical Breast Tissue / Asymmetry:** This refers to an area of fibroglandular tissue seen on one mammographic view or in one breast that has no corresponding similar density in the other breast or on other views. It can be normal (summation artifact, normal variation) or represent a true lesion.
- **Fibroma:** "Fibroma" is a general term for a benign tumor of fibrous connective tissue. In the breast context, it most likely refers to a **fibroadenoma** (which contains glandular and fibrous tissue). A fibroadenoma is a discrete mass and, if present only in one breast or one area, could contribute to an asymmetry.
- **Lipoma:** A benign tumor composed of fat. On a mammogram, a lipoma appears as a radiolucent (dark), well-circumscribed mass. If present as a discrete mass, it could be part of an asymmetry if compared to an area without a lipoma.
- **Breast Parenchyma:** This refers to the functional tissue of the breast, primarily composed of fibroglandular tissue. The *distribution* of breast parenchyma can be naturally asymmetrical between the two breasts or within different regions of the same breast. However, "breast parenchyma" itself is not a *cause* of asymmetry; rather, asymmetry is a *description of the appearance or distribution* of the parenchyma or a focal lesion within it.

The question asks what is *not* a cause of (or not an example of something that could create) asymmetrical breast tissue appearance.

- a. fibroma (fibroadenoma): A focal mass, can create asymmetry.
- b. lipoma: A focal fatty mass, can create asymmetry.
- c. breast parenchyma: Asymmetry is a *description* of how the parenchyma might appear. The parenchyma itself, in its normal variations, *is* what can be asymmetrical. The question might be interpreted as: which of these is not a *focal lesion* that causes asymmetry. In that sense, "breast parenchyma" refers to the background tissue itself, whose uneven distribution *is* the asymmetry.

This question is a bit awkwardly phrased.
If asymmetry means "a focal finding making one area different," then both fibromas and lipomas can do this.
If the question means "which of these is not a
pathological entity that creates asymmetry," then "breast parenchyma" (referring to normal variations in its distribution) would fit. Normal variations in parenchyma *are* a common cause of asymmetry.

Let's consider what "asymmetrical breast tissue" usually refers to in reporting: It often means an area of fibroglandular density that doesn't have a discrete mass correlate initially, and it's compared to the other side.

- A fibroadenoma would be a *mass*, which might present as an asymmetry before being fully characterized.
- A lipoma is also a *mass*.
- "Breast parenchyma" describes the tissue itself. Asymmetrical distribution of normal parenchyma is common.

If the answer 'c' is correct, the logic might be that fibroma and lipoma are discrete lesions that *cause* an asymmetry, whereas "breast parenchyma" is the tissue whose *distribution* might be asymmetrical. It's a subtle distinction.

Question 86 (from page 17):
All good modalities for detection of breast lesions except:
a. MRI
b. US
c. CT

Answer: c

High-Yield Context from Slides & General Breast Imaging:

- **Mammography (Slide 63):** "A mammogram is a breast X-ray used for screening and diagnosis of breast cancer."
- **Ultrasound (US) (Slide 63):** "Before the age of 40, we use ultrasound as a screening tool." Also used diagnostically to characterize masses seen on mammography (cystic vs. solid) and for guided biopsies.
- **MRI (Breast MRI):** While not detailed extensively in these specific slides for breast, breast MRI is a highly sensitive modality used for:
  - Screening high-risk women (e.g., BRCA gene mutations).
  - Evaluating extent of disease in newly diagnosed breast cancer.
  - Assessing response to neoadjuvant chemotherapy.
  - Investigating problematic mammographic or ultrasound findings.
  - Evaluating implant integrity.
- **CT (Computed Tomography):** CT scans are generally **not** used for primary detection or screening of breast lesions. The radiation dose is higher than mammography, and soft tissue contrast within the breast is inferior to mammography, US, and MRI for differentiating subtle breast lesions. CT is used for staging known breast cancer (e.g., looking for distant metastases in the chest, abdomen, bones) but not for initial detection of lesions *within the breast itself*.

Analyzing the options:

- a. MRI: A good modality for specific indications in breast lesion detection and characterization.
- b. US: A very good modality, especially in dense breasts, for characterizing masses, and as primary tool in young women.
- c. CT: Not a primary modality for *detection* of breast lesions within the breast. Used for staging.

Therefore, CT is the modality that is "except" in this context.

Question 87 (from page 17):
All are against malignancy except:
a. History of extramammary malignancy
b. fat containing
c. multiple
d. Total lucency
e. halo

Answer: a

High-Yield Context from Slides (Features of Malignancy/Benignity - Slide 64-68):

- **Features Suggesting Benignity:**
  - **Fat containing (Slide 65):** "Another type of fat containing mass is a lymph node a lymph nodes appears kidney shaped with a hyperdense cortex and hypodense medulla (Fat)." Masses containing macroscopic fat (lipomas, oil cysts, hamartomas, intramammary lymph nodes) are generally benign.
  - **Total lucency (Slide 65 implies fat-containing is lucent):** A purely lucent mass would be composed of fat (e.g., lipoma) and is benign.
  - **Halo sign:** A thin, radiolucent "halo" around a well-circumscribed mass is often a sign of a benign lesion (e.g., cyst, fibroadenoma). It represents compressed fat or the sharp interface between the mass and surrounding tissue. (This is general mammography knowledge, not explicitly detailed in these slides for "halo" itself, but well-circumscribed margins are on slide 64).
- **Features Suggesting Malignancy:**
  - Speculated margins, ill-defined margins, irregular shape (Slide 64).
  - Suspicious calcifications (pleomorphic, linear branching) (Slide 68).
  - Architectural distortion (Slide 64).

- **Multiple Lesions:** The presence of multiple, similar-appearing, well-circumscribed masses (e.g., multiple fibroadenomas or cysts) is often benign. However, multifocal or multicentric cancer can also occur, so "multiple" itself is not definitively benign or malignant without morphological assessment.
- **History of Extramammary Malignancy:** A history of cancer elsewhere increases the risk of metastatic disease to the breast (though rare) or a new primary breast cancer. It is a risk factor, not a feature against malignancy.

Analyzing the options in terms of being "against malignancy" (i.e., suggesting benignity):

- a. History of extramammary malignancy: This is a risk factor *for* potential malignancy (metastasis or new primary), not against it.
- b. fat containing: Strong sign against malignancy (favors benign).
- c. multiple: Often benign if masses are well-circumscribed and similar (e.g., multiple cysts/fibroadenomas). Less definitive than fat content but often leans benign.
- d. Total lucency: Implies a fatty lesion (lipoma), which is benign.
- e. halo: The halo sign around a mass is generally considered a benign feature.

The question asks "All are against malignancy **except**:" meaning we are looking for the option that does *not* suggest benignity (i.e., is neutral or suggests malignancy).
"History of extramammary malignancy" is a risk factor for having cancer, so it's not "against malignancy."

Therefore, 'a' is the correct answer.

Question 88 (from page 17):
Woman with history of trauma to breast, few weeks later she came to clinic, what you suspect on mammogram?

- Egg-shell appearance

  Answer: The statement itself presents "Egg-shell appearance" as the expected finding.

High-Yield Context from Slides (Post-Traumatic Changes, Calcifications - Slide 67):

- **Trauma to the Breast:** Can lead to hematoma formation and subsequent **fat necrosis**.
- **Fat Necrosis:**
  - An inflammatory process that occurs when fatty breast tissue is damaged.
  - Mammographically, acute fat necrosis may appear as an ill-defined mass or architectural distortion.
  - Over time, fat necrosis can resolve or evolve into an **oil cyst** (a collection of liquefied fat).
  - **Eggshell calcifications:** "indicate fat necrosis." (Slide 67). These are thin, curvilinear calcifications that form in the wall of an oil cyst.
  - Dystrophic calcifications (coarse, irregular) can also occur following trauma/surgery.

Given a history of trauma a few weeks prior, fat necrosis is a highly likely diagnosis if a new mammographic finding appears. The classic calcification pattern associated with evolving fat necrosis (specifically oil cysts) is eggshell calcification.

Therefore, "Egg-shell appearance" (referring to eggshell calcification) is a characteristic mammographic finding to suspect in a patient with a history of breast trauma leading to fat necrosis and oil cyst formation.

Question 89 (from page 17):
Well defined breast lesion, coarse calcification >> benign description. What is BIRAD score?

- BIRADS 2

  Answer: The statement provides the description and asks for the BI-RADS score, with "BIRADS 2" implied as correct.

High-Yield Context from Slides (Benign Findings, Calcifications, BI-RADS - Slide 67, 71):

- **Well-defined breast lesion:** Well-circumscribed margins are generally a feature of benign masses (Slide 64).
- **Coarse Calcifications:**
  - "Popcorn calcifications: also called **coarse calcifications**; the presence of a popcorn calcification inside an isodense/hypodense well circumscribed mass is diagnostic of an **involutingfibroadenoma which is a benign**

lesion." (Slide 67).

- **BI-RADS Classification (Slide 71):**
  - **BI-RADS 2: Benign finding; no need for short interval follow up; ex. Involutingfibroadenoma.**

A "well defined breast lesion" with "coarse calcifications" strongly points to a benign entity, most classically an involuting fibroadenoma. Such a finding is categorized as BI-RADS 2.

Therefore, BIRADS 2 is the correct score.

Question 90 (from page 17):
Malignant calcifications:

- Linear / branching

  Answer: The statement identifies "Linear / branching" as malignant calcifications.

High-Yield Context from Slides (Malignant Calcifications - Slide 68):

- **Malignant calcifications:**
  - **Pleomorphic:** multiple calcifications that are irregular; crushed stone appearance. Indicate high grade DCIS.
  - **Fine linear branching calcifications; indicate high grade DCIS.** (These often form along the ducts).
- **Intermediate risk (need biopsy):**
  - Amorphous calcifications: powder like; can indicate sclerosingadenosis (benign) or low grade DCIS (malignant).

The description "Linear / branching" directly matches "Fine linear branching calcifications" on Slide 68, which are indicative of high-grade Ductal Carcinoma in Situ (DCIS) and are considered malignant-type calcifications.

Therefore, the statement is correct.

Question 91 (from page 17):
In mammogram, needle shaped calcification that are thick and segmental pointing to the nipple, extensive, bilateral, indicates:

- Plasma cell mastitis

  Answer: The statement identifies "Plasma cell mastitis" as the indicated condition.

High-Yield Context from Slides (Benign Calcifications - Slide 67):

- **Benign Calcifications:**
  - **Plasma cell mastitis: large rod calcifications.**
    - These are typically benign calcifications that form within dilated ducts. They are often coarse, rod-like, or "cigar-shaped," and may be branching. They tend to point towards the nipple, following the ductal system. They can be bilateral and extensive. "Needle shaped" and "thick" can be consistent with "large rod." "Segmental pointing to the nipple" is very characteristic of ductal calcifications.

Other calcification types:

- Malignant calcifications are typically fine, pleomorphic, or fine linear/branching *micro*calcifications. "Thick" calcifications are usually benign.
- Vascular calcifications are linear "tram-track" calcifications.
- Secretory disease (which includes plasma cell mastitis) is a classic cause of large rod-like, ductal calcifications.

The description:

- "Needle shaped calcification that are thick": Consistent with large rod-like calcifications.
- "segmental pointing to the nipple": Very characteristic of ductal calcifications seen in plasma cell mastitis/secretory disease.
- "extensive, bilateral": Plasma cell mastitis can be bilateral and extensive.

This constellation of features (thick, rod-like/needle-shaped, ductal orientation, bilateral, extensive) is highly suggestive of benign ductal calcifications due to secretory disease/plasma cell mastitis.

Therefore, "Plasma cell mastitis" is a plausible diagnosis based on the description.

Question 92 (from page 17):
Not a cause of round lesion on mammogram:

- carcinoma

  Answer: The statement implies "carcinoma" is not a cause of a round lesion.

High-Yield Context from Slides (Mass Shapes - Slide 64):

- **Mass Shapes:**
  - **Round:** coin shaped lesion
  - Oval: egg shaped
  - Lobulated
  - Irregular
- **Carcinoma (Breast Cancer) Appearance:** While many carcinomas present with irregular shapes and spiculated or ill-defined margins (features highly suggestive of malignancy), some specific types of breast cancer *can* present as round or oval, well-circumscribed masses. Examples include:
  - Medullary carcinoma
  - Mucinous (colloid) carcinoma
  - Papillary carcinoma
  - Encapsulated papillary carcinoma
  - Invasive ductal carcinoma, NST (no special type) can occasionally be well-circumscribed.
  - Metastases to the breast also often appear as round, well-circumscribed masses.

The statement "Not a cause of round lesion on mammogram: - carcinoma" means that carcinoma *cannot* be a round lesion. This is false. While "round and well-defined" often suggests benignity, certain types of carcinoma *can* be round. The shape alone is not sufficient to rule out malignancy, and other features (margins, density, associated findings, clinical context) are crucial.

Therefore, the statement is incorrect; carcinoma *can* present as a round lesion on a mammogram. If the question means "which of these is *least likely* to be round if it is a typical infiltrating ductal/lobular cancer," then that's different. But as an absolute, some carcinomas are round.

If the test bank implies the answer to "Not a cause of round lesion on mammogram:" IS "carcinoma", then it's asserting that carcinoma is never round, which is wrong.
Perhaps the question in the test bank was "A feature with the most malignant potential in mammography:" and then "carcinoma" was not an option, but a feature was (like "notch and lobar edge" from the next item).

Let's assume the item means: "Which of the following is NOT typically a cause of a *benign-appearing* round lesion?" Even then, carcinoma can *mimic* a benign round lesion.

This question is problematic as stated. Carcinoma *can* be round.

Question 93 (from page 17):
A feature with the most malignant potential in mammography:

- notch and lobar edge

  Answer: The statement identifies "notch and lobar edge" as having high malignant potential.

High-Yield Context from Slides (Malignant Features - Slide 64):

- **Mass Margins:**
  - **Speculated: sun-ray appearance; it is one of the most important signs of malignancy. The presence of a single speculation is highly suggestive of a malignant mass.**
  - Ill-defined: the edges of the mass cannot be defined (suspicious).
  - Microlobulated (can be suspicious).

    - Obscured.
    - Well circumscribed (well defined) (usually benign).
- **Mass Shapes:**
    - Irregular (suspicious).
    - Round, Oval, Lobulated (can be benign or malignant depending on other features).

The slides do not specifically mention "notch" or "lobar edge" as distinct descriptors with assigned malignant potential.

- "Lobulated" is a shape descriptor (up to 3 lobes; if more, considered irregular). Multiple lobulations or "microlobulations" of the margin can be suspicious.
- A "notch" or indentation in the margin of a mass could contribute to an irregular shape or margin, which would be suspicious.

General Mammography Knowledge:

- **Spiculated margins** are the single most specific mammographic sign of malignancy.
- **Irregular shape** and **ill-defined margins** are also highly suspicious.
- Features like "notch" or a very angular/ "lobar edge" (if "lobar" here means sharp, angular projections rather than smooth lobulations) would contribute to an irregular shape or margin and thus increase suspicion.

If "lobar edge" refers to an irregular, angular, or very prominent lobulation, it would be more suspicious than a smoothly lobulated or round/oval mass. A "notch" would also make a margin irregular. These would be less specific than "spiculation" but more suspicious than "well-circumscribed."

The term "most malignant potential" is strong. Spiculated margins usually hold that title. However, among other subtle shape/margin descriptors, irregularities like notches or very angular lobulations ("lobar edge") would raise concern.

Question 94 (from page 17):
A round, well-defined, radiolucent mass with enlarged axillary lymph nodes with a fatty hila, BiRADS category:

- 4

  Answer: The statement suggests BI-RADS 4.

High-Yield Context from Slides (BI-RADS, Benign Features):

- **Radiolucent Mass:** A purely radiolucent mass is typically a **lipoma** (composed of fat) and is benign (BI-RADS 2).
- **Well-defined Margins:** Generally a benign feature.
- **Axillary Lymph Nodes:**
    - Normal axillary lymph nodes often have a **fatty hilum**, which appears radiolucent on mammography.
    - Enlarged lymph nodes can be reactive (benign) or metastatic (malignant).
    - **Signs of malignancy in a lymph node (Slide 67):** Thickening of the cortex (>1cm), Loss of fatty medulla (hilum), Increased in size (least important criterion).
- **BI-RADS Categories (Slide 71):**
    - BI-RADS 2: Benign.
    - BI-RADS 3: Probably benign (<2% risk).
    - **BI-RADS 4: Suspicious (2-95% risk), needs biopsy.**

The description has conflicting elements if interpreted for a single breast lesion:

1. **"A round, well-defined, radiolucent mass"**: This strongly suggests a benign lipoma (BI-RADS 2).
2. **"enlarged axillary lymph nodes with a fatty hila"**:
    - "Enlarged" can be suspicious.
    - "fatty hila" is a benign feature of a lymph node.
    - If the lymph nodes are merely enlarged but retain their fatty hila and have normal cortical thickness, they might still be considered reactive/benign. However, "enlarged" warrants attention.

Interpreting the Scenario:
If there's a clearly benign breast mass (like a lipoma) AND concurrently enlarged axillary lymph nodes (even if they have fatty hila), the lymph nodes themselves might drive the BI-RADS category up if their enlargement is unexplained or concerning.

- A BI-RADS 4 category means "suspicious finding; needs biopsy."
- If the breast mass is unequivocally a lipoma (BI-RADS 2), then the axillary nodes are the issue. "Enlarged" nodes, even with fatty hila, might prompt a BI-RADS 0 (needs further evaluation, e.g., ultrasound of axilla) or, if concerning enough on their own, a BI-RADS 3 or 4 depending on degree of enlargement and other features.

If the "round, well-defined, radiolucent mass" is the *primary finding of concern* despite its benign description, and the lymph nodes are an associated finding, it's unusual for such a mass to lead to BI-RADS 4.

Possible interpretation leading to BI-RADS 4:
Perhaps the "radiolucent mass" is not
purely fat but has some other component that, combined with enlarged nodes, raises suspicion. Or, the "enlarged" nature of the nodes, despite fatty hila, is deemed suspicious enough to warrant a BI-RADS 4 for the overall assessment, possibly to prompt investigation/biopsy of the nodes.

A classic lipoma with normal or reactive-appearing nodes (enlarged but fatty hila, normal cortex) would usually be BI-RADS 2 overall. If the nodes are significantly enlarged or show other subtle suspicious features despite a fatty hilum, that might elevate the category.

This is a somewhat contradictory set of findings if aiming for a single BI-RADS category for the *breast mass*. If the BI-RADS is for the *overall case assessment including the axilla*, then suspicious nodes could make it a 4.

Interventional radiology

Question 95 (from page 18):
Which one of the following is true?
a. Conventional venography is the modality of choice in imaging upper limb DVT
b. Digital subtraction angiography is used in interventional radiology for visualization of blood vessels, other radio-opaque structures such as bones are eliminated.
C. Hypo-vascular tumors benefit more from embolization due to low risk of bleeding
d. MRI has a major role in interventional radiology due to the lack of ionizing radiation
e. Percutaneous nephrostomy is contraindicated in cases of pyelonephritis

Answer: b

High-Yield Context from Slides (Interventional Radiology - Slide 93, 97, 101):

- **Conventional Venography for DVT:** Venography (injecting contrast into veins) *can* diagnose DVT. However, ultrasound (Duplex Doppler) is now the primary non-invasive modality of choice for DVT diagnosis in both upper and lower limbs due to its accuracy, lack of radiation, and non-invasiveness. Conventional venography is more invasive.
- **Digital Subtraction Angiography (DSA) (Slide 93):**
  - "The color of the contrast looks black; however, the computer ‘’subtracts’’ the bony structures. The bone, can sometimes be seen; however, you cannot see a clear cortex and medulla."
  - DSA is a technique where an initial "mask" image (without contrast) is taken, then images with contrast are acquired. The computer subtracts the mask image from the contrast images, effectively removing overlying structures like bones and soft tissues, leaving only the contrast-filled vessels visible with high clarity. This is extensively used in interventional radiology.
- **Embolization of Tumors (Slide 101, Slide 97):**
  - "Therapeutic embolization: Arteries are occluded by introducing a variety of materials through a catheter placed in a selected artery." Indications include "Tumors." (Slide 101).
  - "Tumors: to visualize the feeding arteries of a tumor; can be used to embolize the arteries feeding a tumor." (Slide 97).
  - Embolization is particularly useful for **hypervascular tumors** to reduce blood loss during surgery or as a palliative measure by cutting off their blood supply. Hypovascular tumors have less blood supply to target with embolization,

so they benefit less.

- **MRI in Interventional Radiology:** MRI is primarily a diagnostic imaging tool. While it can guide some specialized interventional procedures (MR-guided biopsy, focused ultrasound), its role in the broad spectrum of "interventional radiology" (which often involves real-time X-ray/fluoroscopy or ultrasound guidance for catheter-based work, embolizations, angioplasty, stenting) is less "major" than X-ray angiography or CT/US guidance. Its lack of ionizing radiation is an advantage, but equipment compatibility, procedure time, and real-time visualization challenges limit its general IR use.
- **Percutaneous Nephrostomy (PCN):** This is a procedure to place a drainage tube directly into the kidney's collecting system, usually to relieve obstruction.
  - **Pyelonephritis (kidney infection):** If pyelonephritis is complicated by obstruction (e.g., by a stone), a PCN is often *indicated* to drain infected urine and decompress the system, which is crucial for treatment. It is not contraindicated; in fact, it can be life-saving in obstructive pyelonephritis or pyonephrosis.

Analyzing the options:

- a. Conventional venography is the modality of choice in imaging upper limb DVT: False. Ultrasound is generally the modality of choice.
- b. Digital subtraction angiography is used in interventional radiology for visualization of blood vessels, other radio-opaque structures such as bones are eliminated: True. This accurately describes DSA (Slide 93).
- C. Hypo-vascular tumors benefit more from embolization due to low risk of bleeding: False. Hypervascular tumors benefit more from pre-operative embolization to *reduce* bleeding. Embolizing hypovascular tumors is less effective.
- d. MRI has a major role in interventional radiology due to the lack of ionizing radiation: False. While MR-guided interventions exist, its role is not as "major" across the board as fluoroscopy, DSA, US, or CT in guiding most IR procedures.
- e. Percutaneous nephrostomy is contraindicated in cases of pyelonephritis: False. It is often indicated in obstructive pyelonephritis.

Question 96 (from page 18):
The most sensitive sonographic/doppler sign to detect acute venous thrombosis is:
a. Presence of collaterals
b. Non-compressibility
C. Skin changes and cellulitis
d. Small caliber of the vein
e. Increased flow by doppler exam

Answer: b

High-Yield Context from Slides (DVT Diagnosis - Slide 27, 98):

- **Ultrasound/Doppler for DVT (Slide 27):**
  - "Veins are compressible, and collapse completely when pressed. In the case of DVT, the veins become incompressible."
  - "Diagnosis of DVT: Incompressible veins; Presence of a thrombus (not important for diagnosis [primary diagnostic criterion], but if present indicates DVT); Decreased blood flow through the vein."
- **Angiography for DVT (Appearance - Slide 98):**
  - Filling defect.
  - Non-visualization.
  - Differentiation of acute vs. chronic VTE based on collaterals and faint opacifications (collaterals suggest chronic).

Analyzing the sonographic/Doppler signs:

- a. Presence of collaterals: This is more a sign of *chronic* DVT, where alternative pathways have developed due to long-standing obstruction. Not the most sensitive sign for *acute* DVT.
- b. Non-compressibility: This is a primary and highly sensitive and specific sign of DVT on ultrasound. A normal vein compresses easily with gentle probe pressure; a thrombosed vein does not. Explicitly stated as diagnostic (Slide 27).

- C. Skin changes and cellulitis: These are clinical signs that can be associated with DVT (e.g., post-phlebitic syndrome, or cellulitis as a differential), but they are not direct sonographic signs *of the thrombus itself*.
- d. Small caliber of the vein: An acutely thrombosed vein may actually be distended (larger caliber) due to the thrombus and obstruction. A chronically thrombosed and recanalized vein might become smaller and scarred.
- e. Increased flow by doppler exam: In DVT, flow is typically decreased, absent, or non-phasic/continuous distal to the thrombus due to obstruction. Increased flow is not a sign of DVT.

Therefore, "Non-compressibility" is the most sensitive and key sonographic sign for acute DVT.

Question 97 (from page 18):
All are indications for IVC filter except:
a. all trauma patients prophylactically
b. Contraindication for anticoagulant
c. VTE while on anticoagulant
d. Bleeding while on anticoagulant

Answer: a

High-Yield Context from Slides (IVC Filters - Slide 101):

- **Function:** "Filters inserted into the inferior vena cava to prevent PE. The usual entry point is the femoral vein."
- **Indications:**
  - **Recurrent DVT** (implicitly, if anticoagulation is problematic or fails).
  - **Contraindication to coagulation.**
  - **Complications of anticoagulation** (this would include significant bleeding).
  - (The slide also mentions "VTE while on anticoagulant" as an indication in the test bank Q&A, which is a standard indication: failure of anticoagulation).

Analyzing the options:

- a. all trauma patients prophylactically: False. Prophylactic IVC filter placement in *all* trauma patients is not standard practice. Filters are reserved for high-risk trauma patients who have contraindications to anticoagulation or have failed/have complications from it, and have or are at very high risk of DVT/PE. Routine prophylactic use is controversial and generally not recommended due to filter-related complications.
- b. Contraindication for anticoagulant: True. This is a primary indication (Slide 101).
- c. VTE while on anticoagulant: True. This represents failure of anticoagulation therapy and is an indication.
- d. Bleeding while on anticoagulant: True. This is a complication of anticoagulation that necessitates stopping it, making an IVC filter a consideration if VTE risk is high.

Question 98 (from page 18):
Wrong about abdominal aneurysms:
a. AP diameter of more than >3cm in abdominal aorta is considered an aneurysm
b. Intimal flap is a sign of dissection
c. Wall irregularity is a sign of dissection
d. Most common site is infrarenal

Answer: c

High-Yield Context from Slides (Aneurysms - Slide 100):

- **Definition:** "Defined as a dilation of an artery."
- **Abdominal Aortic Aneurysm (AAA) Size:** "Aneurysms of the abdominal aorta are defined as dilation >3cm."
- **Dissection:**
  - "A dissecting aneurysm happens due to dissection of the intima or/and media layers."
  - "This leads to the formation of a false and a true lumen separated by an **intimal flap**. The intimal flap extends between the two arterial walls."
  - "The false lumen usually compresses the true lumen."

    - "Any leakage of contrast outside the vessel is indicative of dissection."
- **Common Site for AAA (General Knowledge):** The vast majority (around 90-95%) of AAAs are **infrarenal** (below the level of the renal arteries).

Analyzing the options:

- a. AP diameter of more than >3cm in abdominal aorta is considered an aneurysm: True (Slide 100). (Note: >3cm or an increase of >50% of normal diameter).
- b. Intimal flap is a sign of dissection: True (Slide 100). This is the hallmark of dissection.
- c. Wall irregularity is a sign of dissection: False. "Wall irregularity" is a non-specific term. It can be seen with atherosclerosis (plaque), mural thrombus within an aneurysm, or vasculitis. While a dissection involves the wall, the specific sign is the *intimal flap* separating true and false lumens. Simple "irregularity" is not specific for dissection itself.
- d. Most common site is infrarenal: True (general knowledge for AAA).

Question 99 (from page 19):
All are required in U/S guided liver biopsy except:
a. General anaesthesia
b. IV lines
c. Consent
d. Coagulation studies
e. Patient fasting

Answer: a

High-Yield Context from Slides (Common Interventional Procedures - Slide 93):

- "Percutaneous biopsies" are listed as a common procedure.
- The general advantages of interventional radiology include "Local anesthesia" (Slide 93).

General Knowledge (Ultrasound-Guided Liver Biopsy Procedure):

- **Anesthesia:** Typically performed under **local anesthesia** at the biopsy site. Sedation may be used if the patient is anxious, but general anesthesia is usually not required for routine percutaneous liver biopsy.
- **IV lines:** Important for access in case of medication needs (e.g., analgesia, sedation, or emergency drugs if a complication like bleeding occurs).
- **Consent:** Informed consent is mandatory for any invasive procedure.
- **Coagulation studies:** Essential pre-procedure to assess bleeding risk (e.g., PT/INR, PTT, platelet count). Abnormalities may need correction or be a contraindication.
- **Patient fasting:** Often required for several hours pre-procedure, partly to reduce the risk of aspiration if sedation is used or if an unexpected complication requires more emergent intervention, and also because some believe an empty stomach/gallbladder might provide better access or reduce certain risks (though this is less critical than for some other abdominal procedures).

Analyzing the options:

- a. General anaesthesia: False. Typically done under local anesthesia.
- b. IV lines: True. Important for access.
- c. Consent: True. Mandatory.
- d. Coagulation studies: True. Essential to check for bleeding risk.
- e. Patient fasting: True. Usually required.

Therefore, "General anaesthesia" is the one not typically required.

Question 100 (from page 19):
Which is false about angiogram:
a. Femoral aneurysm is a relative contraindication to cath
b. Left femoral artery is technically more accessible

c. Most frequently used to reach aorta is femoral artery
d. If pathology was on one side then access should be made through the other side

Answer: b

High-Yield Context from Slides (Angiography - Slide 94, 97):

- **Access Site (Seldinger Technique - Slide 97):** "We usually enter through the femoral artery."
  - "Why use the right femoral artery: Easily accessible and superficial. If bleeding happens after procedure, you can compress the artery easily. Large caliber vessel. Well defined landmarks. Most angiographers are right handed."
- **Contraindications (Slide 94):** No absolute contraindication listed, but "Relative contraindications include: poor renal reserve, Abnormal coagulation profile, Allergy, Metformin." Femoral artery aneurysm is not explicitly listed as a contraindication but would certainly make access more challenging and risky, so it could be considered a relative contraindication or a reason to choose an alternative access site.
- **Access Strategy (General Angiography Principles):**
  - The **right femoral artery** is often preferred due to reasons mentioned (especially for right-handed operators). There's no inherent technical advantage to the left femoral artery making it "more accessible."
  - If there's significant pathology (e.g., severe stenosis, occlusion, aneurysm) in one femoral artery, the contralateral femoral artery or an upper limb approach (e.g., brachial, radial) would be considered.
  - For treating a lesion in a limb, access is often gained from the contralateral side to allow easier catheter manipulation ("cross-over" technique). So if pathology is on one side (e.g., left leg ischemia), access might be from the right femoral.

Analyzing the options:

- a. Femoral aneurysm is a relative contraindication to cath: Plausible. Puncturing an aneurysmal artery is risky.
- b. Left femoral artery is technically more accessible: False. The right femoral is often preferred (Slide 97 reasons). There's no reason the left would be inherently "more accessible."
- c. Most frequently used to reach aorta is femoral artery: True. It's the standard access point for many aortic and peripheral procedures.
- d. If pathology was on one side then access should be made through the other side: True. This is a common strategy, e.g., for peripheral interventions, to approach from the contralateral side.

Question 101 (from page 19):
Wrong about femoral catheterization:
a. Femoral artery is medial to femur
b. Easily accessible
c. Low complication

Answer: a

High-Yield Context from Slides (Femoral Artery Access - Slide 97):

- **Why use the right femoral artery:**
  - "**Easily accessible and superficial.**"
  - "If bleeding happens after procedure, you can compress the artery easily."
  - "Large caliber vessel."
  - "Well defined landmarks."
- **Anatomical Location (General Knowledge):** The femoral artery passes roughly midway between the anterior superior iliac spine (ASIS) and the pubic symphysis, inferior to the inguinal ligament. It lies lateral to the femoral vein and medial to the femoral nerve (NAVEL - Nerve, Artery, Vein, Empty space, Lymphatics, from lateral to medial). The femur bone is deep and more lateral. The femoral artery is anterior to the hip joint and proximal femur, not directly "medial to femur" in a way that describes its access point. The common access point is over the femoral head for good compression against bone.
- **Complications of Angiography (Slide 94):** "very low complication rate; 0.16%." This implies femoral catheterization (as a common access) has a low complication rate overall. Puncture site complications are listed (groin hematoma, A-V

fistula, pseudoaneurysm).

Analyzing the options:

- a. Femoral artery is medial to femur: False. This anatomical relationship is incorrect for the typical puncture site. The artery is anterior to the femoral head/proximal femur. "Medial to the *femoral nerve*" is correct, but not "medial to femur" as a primary descriptor for access.
- b. Easily accessible: True (Slide 97).
- c. Low complication: True (Slide 94, overall angiography complication rate is low, and femoral is common access).

Question 102 (from page 19):
Endothelial repair which is wrong:
a. decreased hospital stay
b. Generalized Anesthesia in all patients

Answer: b

(Note: "Endothelial repair" is likely a typo for "Endovascular repair," e.g., of an aneurysm like EVAR - Endovascular Aneurysm Repair).

High-Yield Context from Slides (Interventional Radiology Advantages - Slide 93):

- **Advantages of Interventional Radiology (which includes endovascular procedures):**
  - "Minimally invasive: 8/10 procedures use skin incisions smaller than 5 mm."
  - "**Local anesthesia**."
  - "Early recovery."
  - "Most of the time, the procedures are outpatient procedures (short recovery time)."

Endovascular Repair (General Knowledge):

- Endovascular procedures (like EVAR for aortic aneurysms, or stenting for occlusive disease) are performed via catheter access, often through the femoral arteries.
- Compared to open surgical repair, they are less invasive, generally leading to:
  - Shorter hospital stays ("decreased hospital stay").
  - Faster recovery.
- **Anesthesia for Endovascular Procedures:** Many endovascular procedures can be performed under **local anesthesia with conscious sedation**, or regional anesthesia (e.g., epidural/spinal). General anesthesia *may* be used for complex or lengthy procedures, or based on patient factors, but it is **not required for all patients**. The trend is towards less invasive anesthetic techniques.

Analyzing the options (assuming "Endovascular repair"):

- a. decreased hospital stay: True. Compared to open surgery.
- b. Generalized Anesthesia in all patients: False. Many can be done with local/regional anesthesia and sedation.

Question 103 (from page 19):
Wrong about angioplasty prognosis:
a. Better in stenosis than occlusion
b. Better in distal vessels
c. Better in larger vessels

Answer: b

High-Yield Context from Slides:
The provided slides do not contain specific details about the prognostic factors for angioplasty success (e.g., comparing stenosis vs. occlusion, or vessel size/location). This question relies on general knowledge of interventional radiology outcomes.

General Knowledge (Angioplasty Prognosis/Outcomes):

- **Stenosis vs. Occlusion:** Angioplasty generally has better technical success rates and long-term patency for treating **stenoses** (narrowings) compared to complete **occlusions** (blockages). Recanalizing a chronic total occlusion (CTO) is technically more challenging and may have lower patency.
- **Vessel Size:** Angioplasty and stenting tend to have better long-term results in **larger vessels** (e.g., iliac arteries, superficial femoral artery) compared to smaller, more distal vessels (e.g., tibial or pedal arteries). Smaller vessels are more prone to restenosis or thrombosis after intervention.
- **Vessel Location/Type:**
  - **Larger, proximal vessels (e.g., aorta, iliacs):** Generally good outcomes.
  - **Femoropopliteal segment:** Outcomes are more variable.
  - **Infrapopliteal (tibial) vessels (distal vessels):** More challenging, higher rates of restenosis. These are "distal vessels."

Analyzing the options:

- a. Better in stenosis than occlusion: True.
- b. Better in distal vessels: False. Angioplasty outcomes are generally *worse* in small, distal vessels compared to larger, proximal ones.
- c. Better in larger vessels: True.

Question 104 (from page 19):
Wrong about IVC filter:
a. May lead to thrombosis

Answer: The statement itself is presented for evaluation. The question implies this statement is "wrong," but let's check.

High-Yield Context from Slides (IVC Filters - Slide 101):

- **Complications of IVC Filters:**
  - Migration of the filter
  - Failure of the filter
  - **Thrombosis** (This can mean thrombosis *of the filter itself* or DVT at the insertion site or even propagating up to the filter).
  - Groin complications (from insertion).

The statement is "Wrong about IVC filter: a. May lead to thrombosis."
This means the assertion "May lead to thrombosis" is supposedly wrong.
However, Slide 101 explicitly lists "
Thrombosis" as a complication of IVC filters. This refers to the risk of the filter itself thrombosing or causing caval thrombosis.

Therefore, the statement "May lead to thrombosis" is **TRUE** regarding IVC filters (it's a known complication). If the question asks "Wrong about IVC filter," and this statement is one of the options, and this statement *is* true, then the question setup is confusing or this specific item isn't the "wrong" one being sought in a list.

If the question means: "Which of the following statements *about problems* with IVC filters is wrong?" and option 'a' is "May lead to thrombosis," then this statement itself is true (it IS a problem).

Let's assume the format of the question in the test bank is:
"Wrong about IVC filter:
a. May lead to thrombosis
b. [Another statement]
c. [Another statement]"
And the answer key for the overall question is (for example) 'b'.
The item given "- May lead to thrombosis" would be a
true fact about IVC filters.

If the question implies the statement "May lead to thrombosis" is wrong about IVC filters, then that contradicts the slides. Given that "Thrombosis" is listed as a complication on Slide 101, the assertion "May lead to thrombosis" is correct.

There seems to be a misunderstanding in how this question is phrased or presented if "May lead to thrombosis" is supposed to be a *wrong statement* about IVC filters. It is a known complication.

Question 105 (from page 20):
b. Position is supra renal

(This is likely a continuation or part of a previous question that is not fully provided here. It's a statement, not a full question.)Without the full question context, it's impossible to provide specific slide-based analysis. "Position is supra renal" could refer to many things (e.g., an adrenal gland, a tumor, the origin of an artery).

If we assume it's related to the ***most common site of abdominal aortic aneurysms*** *(from Q98, which was infrarenal):*
* Q98 stated "Most common site is infrarenal" for AAA was TRUE.
* Therefore, if a statement said "Most common site for AAA is suprarenal," that would be FALSE.

If it's related to ***adrenal glands*** *(Slide 34):*
* "The right adrenal gland is superior to the right kidney."
* "The left adrenal gland lies anterosuperior to the upper pole of the left kidney."
* So, adrenal glands are in a "suprarenal" position.

We need the full question to analyze this.

Question 106 (from page 20):
All are true regarding arterial occlusive diseases except:
a. Thrombi have meniscal edge
b. 90 % due to atherosclerosis
c. Embolic mostly cardiac in origin
d. Embolism stick at bifurcation
e. thrombotic are less dangerous than embolic

Answer: a

High-Yield Context from Slides (Arterial Occlusive Disease - Slide 99):

- **Systemic manifestation of atherosclerosis.**
- Can be acute or chronic.
- **Classification (Acute):**
    - **Embolic:**
        - "Always acute."
        - "Most common cause of acute arterial occlusion."
        - "Six P's of ischemia."
        - "Most emboli originate from the femoral artery (46%)" - *This statement on the slide seems unusual; emboli to peripheral arteries typically originate from the heart or proximal aorta/aneurysms. Emboli lodging in the femoral artery is common, but originating there is less so unless from a femoral aneurysm.*
        - "Emboli can be of a cardiac origin: MI or atrial fibrillation."
    - **Thrombotic (Acute):**
        - "90% are caused by atherosclerosis."
        - "Clinical signs depend on the location and extent... generally less severe than acute embolic events." (This implies embolic events are *more* dangerous/severe).
- **On Angiograms (for Acute Occlusion):**
    - **Emboli:**
        - "**Meniscus sign**: the arterial supply seems to be cut off, and a concavity appears at the site of the embolus."
        - "Filling defect."
    - **Thrombi (Acute):**
        - "Sharp cut off or non-visualization; no collaterals."

Analyzing the options:

- a. Thrombi have meniscal edge: False. **Emboli** have a meniscus sign (concave edge). Acute thrombi typically show a sharp, abrupt cut-off (Slide 99).
- b. 90 % due to atherosclerosis: True for *acute thrombotic* arterial occlusive disease (Slide 99).
- c. Embolic mostly cardiac in origin: True (Slide 99, e.g., MI, atrial fibrillation).
- d. Embolism stick at bifurcation: True. Emboli tend to lodge at arterial bifurcations where the vessel narrows.
- e. thrombotic are less dangerous than embolic: True. Slide 99 states acute thrombotic events are "generally less severe than acute embolic events."

Question 107 (from page 20):
Best site to place for puncture in angiography for visualizing brain circulation:
a. Directly in carotid
b. Axillary artery
c. Femoral artery
d. Brachial artery
e. Radial artery

Answer: c

High-Yield Context from Slides (Angiography Access - Slide 97):

- "Technique (Seldinger technique): We usually enter through the **femoral artery** (choice of artery is discussed later)."
- "Why use the right femoral artery: Easily accessible and superficial... Large caliber vessel... Well defined landmarks..."

Cerebral Angiography (General Knowledge):

- For a comprehensive four-vessel cerebral angiogram (visualizing both carotid and vertebral systems), the **femoral artery** is the standard and most common access site. Catheters are advanced from the femoral artery up the aorta to selectively engage the origins of the brachiocephalic, carotid, subclavian, and vertebral arteries.
- **Direct carotid puncture:** Historically done, but carries higher risks (stroke, neck hematoma) and is generally avoided now that catheter techniques from remote access are well-established.
- **Axillary/Brachial/Radial artery access:** Can be used as alternative access sites for angiography if femoral access is contraindicated or difficult, or for specific interventions. Radial artery access is increasingly popular for cardiac and some neurointerventions due to lower access site complications, but femoral remains a workhorse.

Analyzing the options:

- a. Directly in carotid: Higher risk, not standard for diagnostic cerebral angiography.
- b. Axillary artery: Alternative access, not primary.
- c. Femoral artery: Standard and most common access site (Slide 97 general principle, and standard for cerebral angio).
- d. Brachial artery: Alternative access.
- e. Radial artery: Alternative access, gaining popularity but femoral is still very common.

Given the options and the general preference for femoral access for major angiographic procedures, 'c' is the best answer.

Question 108 (from page 20):
All are true about abdominal aortic aneurysm except:
a. 90% are suprarenal
b. 66% extend to common iliac
c. can be visualized by ultrasound with 98% size accuracy
d. >3 cm
e. can rupture retroperitoneally, especially to the left

Answer: a

High-Yield Context from Slides (Aneurysms - Slide 100) & General Knowledge:

- **Definition & Size (AAA):** "Aneurysms of the abdominal aorta are defined as dilation **>3cm**." (Slide 100).

- **Location (AAA):** The vast majority (around 90-95%) of Abdominal Aortic Aneurysms (AAAs) are **infrarenal** (occurring below the level of the renal arteries). Suprarenal AAAs are much less common.
- **Extension to Iliac Arteries:** AAAs frequently extend into one or both common iliac arteries. An extension rate of "66%" is a plausible statistic, though not explicitly in these slides.
- **Ultrasound for AAA:** Ultrasound is an excellent, non-invasive, and accurate screening and surveillance tool for AAAs. It can measure the anteroposterior and transverse diameters with high accuracy (98% size accuracy is a reasonable figure for US).
- **AAA Rupture:** Rupture is a life-threatening complication. AAAs typically rupture into the retroperitoneum. Rupture is more common on the left posterolateral aspect of the aorta.

Analyzing the options:

- a. 90% are suprarenal: False. Approximately 90-95% of AAAs are **infrarenal**.
- b. 66% extend to common iliac: Plausible. Iliac extension is common.
- c. can be visualized by ultrasound with 98% size accuracy: True. Ultrasound is very accurate for AAA sizing.
- d. >3 cm: True. This is the general definition for an AAA (Slide 100).
- e. can rupture retroperitoneally, especially to the left: True. This is the typical site and manner of rupture.

Question 109 (from page 20):
All are indications to do an arteriogram except:
a. VTE
b. blood vessel disease
c. arterial supply of tumor
d. define anatomy before surgery
e. detect source of GI bleeding

Answer: a

High-Yield Context from Slides (Arteriography Indications - Slide 97):

- **Indications for Arteriography:**
  - "Disorders of the blood vessels" (This would cover general "blood vessel disease" affecting arteries).
  - "Arterial anatomy before surgery."
  - "Investigation of bleeding from the GI tract."
  - "Tumors: to visualize the feeding arteries of a tumor; can be used to embolize the arteries feeding a tumor."
- **Venography Indications (Slide 97):**
  - "Indications: thrombi in veins (VTE)."

Analyzing the options:

- a. VTE (Venous Thromboembolism): This is an indication for **venography** (Slide 97), not arteriography. VTE refers to clots in veins (like DVT or PE).
- b. blood vessel disease: True. This is a broad indication for arteriography (Slide 97).
- c. arterial supply of tumor: True. Indicated for visualizing feeding arteries (Slide 97).
- d. define anatomy before surgery: True. Important for pre-surgical planning (Slide 97).
- e. detect source of GI bleeding: True. Arteriography can identify and potentially treat arterial sources of GI bleeding (Slide 97).

Question 110 (from page 20):
US-guided biopsy is not chosen over CT guidance in:

- lung biopsy

  Answer: The statement implies "lung biopsy" is where US is *not* chosen over CT.

High-Yield Context from Slides & General Interventional Radiology:

- **Ultrasound (US) Guidance:**
  - Advantages: Real-time visualization, no ionizing radiation, portable, often cheaper.
  - Excellent for guiding biopsies of superficial lesions or lesions clearly visible on US within solid organs (e.g., liver, kidney, thyroid, breast, some lymph nodes).
  - Limitations: Air and bone block ultrasound waves. Deep-seated lesions or those obscured by gas/bone are not suitable for US guidance.
- **CT Guidance:**
  - Advantages: Excellent anatomical detail, can visualize deep lesions, not limited by air/bone (except for beam hardening artifacts).
  - Used for biopsies of lesions in the chest (lung, mediastinum), abdomen (pancreas, retroperitoneum, deep pelvic lesions), and bone.
  - Disadvantage: Uses ionizing radiation.
- **Lung Biopsy:**
  - Most lung lesions (especially those not abutting the pleura) are surrounded by air, making them inaccessible or poorly visualized by ultrasound.
  - **CT guidance is the standard modality for percutaneous needle biopsy of most lung lesions.**
  - Ultrasound *can* be used for very peripheral lung lesions that are in contact with the pleura and visible sonographically, or for pleural-based lesions.

The statement "US-guided biopsy is not chosen over CT guidance in: - lung biopsy" means that for lung biopsies, CT guidance is generally preferred over US guidance. This is true for most intraparenchymal lung lesions.

Therefore, CT is generally the preferred guidance modality for lung biopsies over ultrasound, unless the lesion is very peripheral and clearly visible on US.

MSK

Question 111 (from page 21):
Wrong about interventional radiology:

- agitated patient is suitable for a digital subtraction angiography

  Answer: The statement implies that an agitated patient being suitable for DSA is "wrong."

High-Yield Context from Slides & General Interventional Radiology:

- **Digital Subtraction Angiography (DSA) (Slide 93):** Requires the subtraction of a mask image from subsequent contrast images. For this to work effectively, the patient must remain **very still** between the acquisition of the mask and the contrast run.
- **Patient Agitation:** An agitated patient will move, causing misregistration between the mask and the contrast images. This results in poor subtraction quality, significant motion artifacts, and non-diagnostic or sub-optimal images.
- **Cooperation:** Most interventional radiology procedures, especially those requiring precise catheter work and imaging like DSA, require patient cooperation or effective sedation/anesthesia to ensure stillness and safety.

The statement is "Wrong about interventional radiology: - agitated patient is suitable for a digital subtraction angiography." This means the assertion "agitated patient is suitable for a digital subtraction angiography" is wrong.
This is correct. An agitated patient is
not suitable for DSA because patient motion severely degrades image quality and can compromise the procedure. Sedation or general anesthesia might be required to perform DSA on an agitated patient if the procedure is essential.

Therefore, the statement (that an agitated patient is suitable) is indeed wrong.

Question 112 (from page 21):
A patient has reversible, large ischemia in the lateral wall of his heart on perfusion study, with normal treadmill ECG, next step:

- perform catheterization

  Answer: The statement implies "perform catheterization" is the next step.

High-Yield Context from Slides (Myocardial Perfusion Scanning - Slide 89):

- **When to use Myocardial Perfusion Scan:**
  - "In high risk patients, a myocardial perfusion scan is useless. These patients need to be admitted and catheterized in order to detect the abnormality."
  - "In low risk patients, catheterization would be too invasive. Therefore, we use a myocardial nuclear perfusion scan."
- **Interpreting Perfusion Scan Results (Slide 90):**
  - "If the area receives perfusion before stress, and perfusion stops after stress: **ischemia**." (This describes a reversible defect).
- A "reversible, large ischemia" on a perfusion study indicates significant coronary artery disease that is causing a large area of myocardium to be at risk during stress.
- A normal treadmill ECG does *not* rule out significant coronary artery disease, especially if the perfusion scan is abnormal. Perfusion scans are often more sensitive than routine ECG stress tests for detecting ischemia.

Clinical Decision Making (General Cardiology):
A finding of "large reversible ischemia" on a myocardial perfusion scan is a high-risk finding, irrespective of the ECG result during a standard treadmill test (which might have lower sensitivity). Such a finding typically warrants further investigation to define the coronary anatomy and consider revascularization (angioplasty/stenting or bypass surgery). The gold standard for defining coronary anatomy is
coronary catheterization (angiography).

Therefore, if a perfusion study shows large reversible ischemia, the next appropriate step is usually to proceed with coronary catheterization to visualize the coronary arteries and plan further management.

Question 113 (from page 21):
Regarding classical features of non-ossifying fibroma, one is false; Select one:
a. Split cortex sign
b. Well defined
C. Benign
d. Cortical destruction
e. Peripheral sclerosis

Answer: d

High-Yield Context from Slides (Non-ossifying fibroma (NOF) - Slide 111):

- **Benign Bone Lesions: Non-ossifying fibroma (NOF):**
  - "**Well defined border**"
  - "Narrow transition zone"
  - "Septated lesion"
  - "No periosteal reaction"
  - "No soft tissue extension"
  - "Usually asymptomatic"
- (The term "Split cortex sign" is not mentioned for NOF but is sometimes associated with fibrous cortical defects or NOFs if they cause some cortical expansion or thinning. "Peripheral sclerosis" implies a sclerotic rim, which is a benign feature often seen with NOFs).
- **Aggressive Bone Lesion Features (Slide 110):** "Cortical destruction" is a feature of aggressive lesions, whether malignant or aggressive non-malignant (like osteomyelitis). NOF is a benign, non-aggressive lesion.

Analyzing the options for NOF:

- a. Split cortex sign: Plausible. NOFs are often eccentric cortical lesions and can cause some cortical thinning or expansion, which might be described as splitting if it's thinned over the lesion.
- b. Well defined: True (Slide 111).
- C. Benign: True. NOF is a benign lesion.
- d. Cortical destruction: False. NOFs are benign and do not cause aggressive cortical destruction. They may cause cortical thinning or scalloping from within, but not destructive breakthrough typical of malignant or aggressive lesions.
- e. Peripheral sclerosis: True. NOFs often have a thin sclerotic rim, indicating their benign, slow-growing nature.

Therefore, "Cortical destruction" is false for a non-ossifying fibroma.

Question 114 (from page 21):
One of these lesions is intramedullary:
a. chondromyxoid fibroma
b. enchondroma
c. osteoid osteoma
d. GCT

Answer: b

High-Yield Context from Slides & General Bone Tumor Knowledge:

- **Intramedullary Lesion:** A lesion located within the medullary cavity (the marrow cavity) of a bone.
- **Lesion Locations/Types from Slides:**
  - **Osteoid Osteoma (Slide 111):** Described with "Background: **intercortical** radio-lucent nidus." This means it's typically located within the cortex of the bone, not intramedullary.
- **General Knowledge of Bone Tumors:**
  - **Chondromyxoid Fibroma:** A rare benign cartilaginous tumor. Typically eccentric, metaphyseal, and can be intracortical or extend into the medullary cavity, but often described as a cortical lesion.
  - **Enchondroma:** A benign cartilaginous tumor that arises **within the medullary cavity** of bones (hence "en"-chondroma). Very common in the small bones of hands and feet, but also long bones. This is a classic intramedullary lesion.
  - **Osteoid Osteoma:** Benign bone-forming tumor, typically located in the cortex of long bones or posterior elements of the spine.
  - **Giant Cell Tumor (GCT) of Bone:** Typically an eccentric, lytic lesion arising in the epiphysis of a long bone after physeal closure, extending to the subarticular bone. It involves the medullary bone but is classically epiphyseal and eccentric.

Analyzing the options:

- a. chondromyxoid fibroma: Often cortical/eccentric.
- b. enchondroma: Classic intramedullary cartilaginous lesion.
- c. osteoid osteoma: Typically intracortical (Slide 111).
- d. GCT: Epiphyseal, eccentric.

Therefore, "enchondroma" is the clearest example of an intramedullary lesion among the choices.

Question 115 (from page 21):
Wrong About seronegative arthritis imaging:
a. Trolley track sign is due to ossification of the posterior interspinous ligament
b. Sclerosis of the vertebral corner is an early sign

Answer: a

High-Yield Context from Slides (Seronegative Arthritis - Ankylosing Spondylitis - Slide 108-109):

- **Ankylosing Spondylitis (AS) - A type of seronegative spondyloarthropathy.**
- **Spine Signs (Lateral View):**

    - "Squaring of anterovertebral wall due to bridging syndesmophytes across the anterior longitudinal ligament."
    - "**Shiny corner sign** due to discovertebral junction sclerosis at corners of the vertebrae." (This is an early sign).
- **Spine Signs (AP View):**
    - "**Bamboo sign**: due to ossification of the outer layer of annulus fibrosis." (These are the syndesmophytes seen on AP view).
    - "**Dagger sign**: due to ossification of interspinous ligaments."
    - "**Trolley track sign**: due to facet joint fusion." (Specifically, ossification of the facet joint capsules and potentially associated ligaments).

Analyzing the options:

- a. Trolley track sign is due to ossification of the posterior interspinous ligament: False. The "Trolley track sign" is due to **facet joint fusion** (ossification of facet joint capsules). The "Dagger sign" is due to ossification of the interspinous (and supraspinous) ligaments.
- b. Sclerosis of the vertebral corner is an early sign: True. This is the "Shiny corner sign" (Romanus lesion), an early inflammatory change in AS.

Question 116 (from page 21):
All are radiological signs of malignant bone disease except:
a. Wide sclerotic rim
b. Endosteal cortical reaction
c. Soft tissue extension
d. Wide transition zone
e. Periosteal reaction

Answer: a

High-Yield Context from Slides (Describing Bone Lesions - Slide 110):

- **To describe a bone lesion, we comment on:**
    - **Borders:** Well defined (benign) vs. Ill defined (aggressive).
    - **Transition zone:** Narrow (benign) vs. **Wide (aggressive)**.
    - **Sclerotic rim:** Presence often indicates benign, slow-growing nature. Absence can be seen in aggressive lesions.
    - **Periosteal reaction (a sign of an aggressive lesion):**
        - Codman's triangle
        - Sun-burst appearance (hair-on-end sign)
        - Multi-lamellated layers; onion peel sign
        - Single peri-osteal layer reaction (can be benign or aggressive depending on other features, but aggressive forms exist).
    - **Soft tissue extension (a sign of an aggressive lesion).**
- **Aggressive Bone Lesions (Malignant - Slide 110):**
    - Osteosarcoma: Ill-defined border, **No sclerotic rim**, usually sclerotic background, periosteal reaction (Codman's, Sun burst), soft tissue extension.
    - Ewing's sarcoma: Ill-defined border, wide transition zone, **No sclerotic rim**, usually lytic background, periosteal reaction (onion peel), soft tissue extension.
- **Endosteal Cortical Reaction/Scalloping:** Endosteal scalloping (erosion of the inner cortical surface) can be seen with medullary lesions. If it's smooth and associated with a narrow transition zone, it can be benign. If it's aggressive and associated with cortical breakthrough, it's malignant. "Endosteal cortical reaction" as a standalone term is a bit vague, but aggressive tumors can certainly involve the endosteal surface and lead to cortical changes.

Analyzing the options as signs of *malignant* bone disease:

- a. Wide sclerotic rim: False. A sclerotic rim, especially a thick and well-defined one, is typically a feature of a **benign**, slow-growing lesion. Malignant lesions often lack a sclerotic rim or have an ill-defined one (Slide 110 examples for

osteosarcoma and Ewing's: "No sclerotic rim").

- b. Endosteal cortical reaction: Plausible. Aggressive malignant tumors growing in the medulla can erode or react with the endosteal surface of the cortex, leading to scalloping or destruction.
- c. Soft tissue extension: True. A sign of an aggressive lesion breaking out of the bone (Slide 110).
- d. Wide transition zone: True. A feature of aggressive lesions (Slide 110).
- e. Periosteal reaction: True. Many types (Codman's, sunburst, onion peel) are signs of aggressive lesions (Slide 110).

Therefore, "Wide sclerotic rim" is a sign against malignancy.

Question 117 (from page 22):
Inflammatory arthritis which is wrong:
a. erosions
b. weight bearing joints
c. uniform joint space narrowing

Answer: b

High-Yield Context from Slides (Inflammatory Arthritis - Slide 108):

- **General features of inflammatory arthritis:**
  - "**Uniform joint space loss** across the articulation surface."
  - "**Bone erosions**: discontinuation of the bony cortex."
  - "Osteopenia: loss of bone density."
  - "Soft tissue swelling."
- **Rheumatoid Arthritis (Seropositive - Slide 108):** A classic inflammatory arthritis. Typically affects small joints of hands and feet, wrists, elbows, shoulders, knees, ankles, cervical spine. While knees and ankles are weight-bearing, the hallmark is often the involvement of *non-weight-bearing* small joints of hands/feet initially.
- **Degenerative Arthritis (Osteoarthritis - Slide 109):**
  - "Affects **weight bearing joints mainly**. Most commonly involved joints are the knee (medial side) and hip joints."
  - Asymmetrical joint space loss, osteophytes, subchondral sclerosis, subchondral cysts.

Analyzing the options for *inflammatory* arthritis:

- a. erosions: True. Characteristic feature (Slide 108).
- b. weight bearing joints: This is more characteristic of **degenerative arthritis** (osteoarthritis) as the primary sites of involvement (Slide 109). While inflammatory arthritis *can* affect weight-bearing joints (e.g., RA in knees/hips, AS in hips/spine), it's not its defining characteristic site of predilection in the same way it is for osteoarthritis. Many inflammatory arthritides (like RA) preferentially affect small, non-weight-bearing joints.
- c. uniform joint space narrowing: True. Characteristic feature (Slide 108).

Therefore, "weight bearing joints" (as a primary or defining characteristic) is wrong for inflammatory arthritis when contrasted with degenerative arthritis.

Question 118 (from page 22):
Ewing sarcoma, which is wrong:
a. Lesion is permeative destructive
b. Periosteal reaction
c. Endocortical reaction
d. Easily differentiated from acute osteomyelitis by X-ray
e. diaphyseal

Answer: d

High-Yield Context from Slides (Ewing's Sarcoma - Slide 110):

- **Malignant Bone Lesion: Ewing's sarcoma:**
  - "Ill-defined border."

    - "Wide transition zone."
    - "No sclerotic rim."
    - "Usually has a lytic background." (Permeative or "moth-eaten" lytic destruction is classic).
    - "**Periosteal reaction** in the form of onion peel sign."
    - "Soft tissue extension can be seen."
    - "The patient can have fever and leukocytosis; therefore, it is hard to differentiate from osteomyelitis and imaging is not conclusive."
- **Location (General Knowledge):** Ewing's sarcoma commonly occurs in the **diaphysis** or metadiaphysis of long bones, as well as flat bones.
- **Endocortical Reaction:** The "lytic background" and aggressive nature can involve erosion or reaction of the endocortical surface.

Analyzing the options:

- a. Lesion is permeative destructive: True. Classic appearance.
- b. Periosteal reaction: True. Onion peel is characteristic (Slide 110).
- c. Endocortical reaction: Plausible. An aggressive intramedullary tumor like Ewing's will affect the endocortex.
- d. Easily differentiated from acute osteomyelitis by X-ray: False. Slide 110 explicitly states, "it is **hard to differentiate from osteomyelitis** and imaging is not conclusive" because Ewing's can present with systemic symptoms like fever and leukocytosis, mimicking infection.
- e. diaphyseal: True. Common location.

Question 119 (from page 22):
True about gout:
a. punched out erosions
b. early joint narrowing

Answer: a

High-Yield Context from Slides (Gout - Atypical Degenerative Arthritis - Slide 109):

- **Crystal deposition disease; gout:**
    - "**Punched out erosions** with sclerotic rim."
    - "**Preserved joint space**" (until very late stages).
    - "Soft tissue swelling."
    - "Formation of tophi: it is a sign of chronic disease caused by soft tissue swelling around the joint."

Analyzing the options:

- a. punched out erosions: True. Classic feature, often with overhanging edges and sclerotic rims (Slide 109).
- b. early joint narrowing: False. Gout is characterized by **preserved joint space** until late in the disease (Slide 109). Early joint space narrowing is more typical of inflammatory arthritis like RA or degenerative arthritis.

Question 120 (from page 22):
Acute osteomyelitis all true except:
a. expands bone
b. rarefaction
c. reactive bone thickening

Answer: c

High-Yield Context from Slides (Osteomyelitis - Slide 111):

- "Aggressive non-malignant bone lesions: Osteomyelitis:"
    - "An aggressive lesion."
    - "First signs on X-ray appear after 10 days of the disease. Before 10 days, the X-ray is completely normal."

- **Radiographic Signs of Osteomyelitis (General Knowledge, as slides are brief):**
  - **Early (after 10-14 days):** Soft tissue swelling, focal osteopenia/**rarefaction** (loss of bone density), periosteal reaction (can be single layer initially, then lamellated).
  - **Later:** Lytic (destructive) areas, sequestrum formation (dead bone), involucrum (new bone formation around sequestrum). Cortical destruction.
  - Bone expansion is not a primary feature of acute osteomyelitis; destruction and periosteal reaction are. Chronic osteomyelitis with involucrum can lead to bone thickening.
  - "Reactive bone thickening" (sclerosis) is more a feature of chronic osteomyelitis or healing, not typically the *acute* destructive phase. The acute phase shows lysis and rarefaction.

Analyzing the options for *acute* osteomyelitis:

- a. expands bone: Generally false for acute osteomyelitis. Aggressive destruction is more typical than primary expansion. Some tumors expand bone.
- b. rarefaction: True. Loss of bone density due to inflammation and hyperemia is an early sign.
- c. reactive bone thickening: False for *acute* osteomyelitis. Sclerosis and thickening are features of chronic osteomyelitis or healing.

If the question implies what happens *eventually* if untreated, then some thickening (involucrum) can occur. But for "acute," rarefaction and destruction are key.
The answer 'c' means "reactive bone thickening" is NOT true for acute osteomyelitis. This is correct; acute phase is lytic/rarefaction.

If 'a' (expands bone) is considered: Acute infection causes destruction, not typically expansion of the original bone contours.
Rarefaction (osteopenia) is a key early sign once visible.

The most clearly "not true" for *acute* osteomyelitis is "reactive bone thickening."

Question 121 (from page 22):
Super scan not in:
a. pulmonary osteodystrophy
b. Osteomalacia
c. Hyperparathyroidism

Answer: a

(This question refers to a "superscan" on a bone scintigraphy/bone scan. The slides do not explicitly describe a superscan.)

General Nuclear Medicine Knowledge (Bone Scan - Superscan):

- A "superscan" on a bone scan is characterized by:
  - Intense, diffuse, symmetrical uptake of the radiopharmaceutical throughout the axial and appendicular skeleton.
  - Markedly diminished or absent visualization of the kidneys and bladder (because most of the tracer has been taken up by the skeleton).
- **Causes of a Superscan:** Conditions with widespread, diffuse osteoblastic activity or increased bone turnover.
  - **Widespread metastatic disease** (most common, especially prostate cancer, breast cancer).
  - **Metabolic bone diseases:**
    - **Hyperparathyroidism** (especially severe primary or secondary).
    - **Osteomalacia** (can sometimes, though patchy uptake or focal abnormalities like Looser zones are also seen).
    - Paget's disease (if very extensive).
    - Renal osteodystrophy (a complex condition that includes features of hyperparathyroidism and osteomalacia).
    - Fibrous dysplasia (if extensive).
- **Pulmonary Osteodystrophy (Hypertrophic Pulmonary Osteoarthropathy - HPOA):**

- Characterized by clubbing of fingers/toes, periostitis of long bones (leading to pain and swelling), and arthralgia.
- Often associated with underlying lung disease (e.g., lung cancer, bronchiectasis, abscess) or other conditions.
- On a bone scan, HPOA typically shows **intense, linear, symmetrical periosteal uptake** along the diaphyses of long bones (especially tibia, fibula, radius, ulna) – often described as "tram-track" appearance. This is different from the diffuse skeletal uptake of a classic superscan.

Analyzing the options:

- a. pulmonary osteodystrophy: Causes linear periosteal uptake, not a classic diffuse superscan.
- b. Osteomalacia: Can be a cause of a superscan, or at least widespread increased uptake.
- c. Hyperparathyroidism: A classic cause of a superscan.

Therefore, a "superscan" is *not* typically seen in pulmonary osteodystrophy (HPOA).

Question 122 (from page 22):
All will cause opacities on skull x-ray except:
a. Histiocytosis
b. Irradiation
c. Multiple myeloma
d. Mets
e. Spherocytosis

Answer: c

High-Yield Context from Slides & General Skull Radiology:
An "opacity" on a skull X-ray means an area of increased density (whiter).

- **Histiocytosis (Langerhans Cell Histiocytosis - LCH):** Can affect bone, including the skull. Typically causes **lytic lesions** (radiolucent, darker areas), often well-defined with beveled edges ("hole-within-a-hole" appearance). Not opacities.
- **Irradiation:** Radiation therapy to the skull can cause various late effects. Radiation osteonecrosis can lead to mixed lytic and sclerotic (opaque) changes. Diffuse sclerosis can occur.
- **Multiple Myeloma:** Characterized by multiple, well-defined, "punched-out" **lytic lesions** in the skull and other bones. These are radiolucent, not opaque. Diffuse osteopenia can also occur.
- **Mets (Metastases):**
  - **Osteolytic metastases** (e.g., from lung, kidney, thyroid) cause lytic (radiolucent) lesions.
  - **Osteoblastic (sclerotic) metastases** (e.g., from prostate, breast sometimes) cause **opacities** (increased density).
  - Mixed lytic/blastic metastases can also occur.
- **Spherocytosis (Hereditary Spherocytosis):** A hemolytic anemia. Chronic hemolysis leads to marrow hyperplasia (expansion of the marrow spaces). In the skull, this can cause widening of the diploic space and a "hair-on-end" appearance (trabeculae perpendicular to the skull vault), which is a type of reactive bone change that can appear as increased overall thickness/density in certain projections or altered texture, not discrete opacities like blastic mets.

The question asks what will *not* cause opacities (i.e., will cause lucencies or no change).

- a. Histiocytosis: Causes lytic lesions (lucencies).
- b. Irradiation: Can cause sclerotic (opaque) changes.
- c. Multiple myeloma: Causes classic punched-out lytic lesions (lucencies).
- d. Mets: Can be osteoblastic (opaque) or osteolytic (lucent). So it *can* cause opacities.
- e. Spherocytosis: Causes marrow hyperplasia, "hair-on-end" which is not a discrete opacity but an altered bone texture/thickness.

The question is "All will cause opacities ... except". We need the one that *only* causes lucencies or doesn't cause opacities.

- Multiple Myeloma almost exclusively causes lytic lesions.
- Histiocytosis causes lytic lesions.
- Mets *can* cause opacities (blastic mets).

- Irradiation *can* cause opacities (sclerosis).
- Spherocytosis causes changes that aren't typically described as focal "opacities" in the same way as blastic mets.

If the answer is 'c' (Multiple Myeloma): This is correct, as myeloma causes lytic (lucent) lesions.
If we consider Histiocytosis ('a'), it also causes lytic lesions.

The term "opacities" usually refers to increased density. Multiple myeloma causes decreased density (lytic lesions).
Histiocytosis also causes lytic lesions.
If only one answer is allowed, and both 'a' and 'c' primarily cause lucencies:
Let's check if one
never causes opacities. Myeloma is classically lytic. Histiocytosis is classically lytic.
Perhaps the question implies "Which of these is
least likely to or *never* causes opacities?"

Multiple Myeloma is the most classic example of widespread "punched-out" lucencies.

Question 123 (from page 23):
Not in seronegative osteoarthritis:
a. Distal pattern
b. non Erosive
c. uniform joint space loss
d. osteopenia
e. proliferation

Answer: b

(Note: "Seronegative osteoarthritis" is an unusual term. Osteoarthritis (OA) is inherently seronegative (for rheumatoid factor, anti-CCP). Perhaps it's a typo for "seronegative inflammatory arthritis" like psoriatic arthritis or reactive arthritis, or it's trying to trick by combining terms. Assuming it refers to features of a seronegative inflammatory arthritis that are not typical of OA, or vice-versa. The options seem to mix features of inflammatory and degenerative arthritis.)

Let's analyze the options in the context of distinguishing inflammatory arthritis (often seronegative types) from osteoarthritis:

- **Features of Inflammatory Arthritis (e.g., Psoriatic, Reactive - which are seronegative for RF):**
  - **Distal pattern:** Psoriatic arthritis often affects Distal Interphalangeal (DIP) joints.
  - **Erosive:** Inflammatory arthritides are characterized by erosions (Slide 108).
  - **Uniform joint space loss:** Characteristic of inflammatory arthritis (Slide 108).
  - **Osteopenia:** Often seen in inflammatory arthritis (Slide 108).
  - **Proliferation:** Can refer to soft tissue swelling (synovitis) or new bone formation (enthesitis, periostitis) seen in some seronegative spondyloarthropathies.
- **Features of Osteoarthritis (OA):**
  - Non-uniform/asymmetrical joint space loss.
  - Osteophytes (bone proliferation/spurs).
  - Subchondral sclerosis, subchondral cysts.
  - Typically non-erosive in the classic sense (though erosive OA is a subtype, it's distinct).
  - No significant osteopenia (may have normal or increased bone density around joint).
  - Often affects weight-bearing joints and DIP/PIP joints of hands.

The question is "Not in seronegative osteoarthritis." This is very confusing.
Let's assume it means: "Which of these features is
not typically found in seronegative *inflammatory* arthropathies (like psoriatic arthritis)?" OR "Which of these is a feature *of osteoarthritis* that would distinguish it from a typical seronegative inflammatory process?"

If the answer is 'b' ("non Erosive"):

- Seronegative *inflammatory* arthropathies (like psoriatic arthritis, reactive arthritis, ankylosing spondylitis) ARE typically **erosive**.

- Osteoarthritis is *typically* **non-erosive** (though an "erosive osteoarthritis" subtype exists, it's not the standard form). So, if "seronegative osteoarthritis" is meant to describe a condition that has features of OA but is seronegative (which all OA is), then "non Erosive" would be a feature
  of it.

Let's try interpreting the question as: "Which of these is NOT a feature of seronegative *inflammatory* arthritis?"
a. Distal pattern: Yes (e.g., psoriatic).
b. non Erosive: No, they ARE erosive.
c. uniform joint space loss: Yes.
d. osteopenia: Yes.
e. proliferation (new bone/enthesitis): Yes (e.g., spondyloarthropathies).
In this interpretation, "non Erosive" would be the answer, meaning it's false for seronegative inflammatory arthritis.

The answer key being 'b' ("non Erosive") suggests the question is asking: "One of the following is NOT a characteristic of seronegative inflammatory arthropathies." In that case, "non Erosive" is indeed false because they *are* erosive.

The phrasing "Not in seronegative osteoarthritis" is problematic. If it means "a feature *absent* in seronegative inflammatory conditions that might be seen in OA," then "non-erosive" describes OA, but it's *not* absent in the sense of being opposite.

Let's go with the most straightforward interpretation based on the answer: The question is flawed, but if it's asking for a statement that is *false* about seronegative inflammatory arthritis, then "non Erosive" is false (as they are erosive).

Question 124 (from page 23):
Not found in ankylosing spondylitis:
a. Bamboo spine
b. Shiny corner sign
c. Rugger Jersey
d. Dagger sign
e. trolley track sign

Answer: c

High-Yield Context from Slides (Ankylosing Spondylitis - Slide 108-109):

- **Spine Signs (AS):**
  - Lateral View:
    - Squaring of anterovertebral wall.
    - **Shiny corner sign** (discovertebral junction sclerosis).
  - AP View:
    - **Bamboo sign** (ossification of annulus fibrosis/syndesmophytes).
    - **Dagger sign** (ossification of interspinous ligaments).
    - **Trolley track sign** (facet joint fusion).
- **Rugger Jersey Spine (Slide 112):**
  - Associated with **Hyperparathyroidism**.
  - "diffuse osteopenia of the vertebrae with subperiostealendovertebral plate sclerosis." (This means dense endplates with lucent vertebral body).

Analyzing the options:

- a. Bamboo spine: True, characteristic of AS.
- b. Shiny corner sign: True, early sign of AS.
- c. Rugger Jersey: False. This is a sign of hyperparathyroidism (Slide 112), not AS.
- d. Dagger sign: True, characteristic of AS.
- e. trolley track sign: True, characteristic of AS.

Question 125 (from page 23):
Not found in hyperparathyroidism:
a. bamboo spine

b. subperiosteal bone resorption
c. salt-pepper skull appearance
d. Rugger Jersey
e. calcification in soft tissue

Answer: a

High-Yield Context from Slides (Hyperparathyroidism - Slide 111-112):

- **Features of Hyperparathyroidism:**
  - "Diffuse osteopenia."
  - "**Bone resorption**:"
    - "**Sub-periosteal resorption** of the radial aspect of the middle phalanx of the 2nd, 3rd, and 4th fingers."
    - "Resorption of the terminal tuft of the distal phalanx."
    - "Brown tumors that appear as multiple lytic lesions."
    - "Focal bone resorption."
  - "**Skull sign: salt and pepper appearance**."
  - "**Rugger Jersey spine**: diffuse osteopenia of the vertebrae with subperiostealendovertebral plate sclerosis." (Slide 112).
- **Soft Tissue Calcification (General Knowledge):** Metastatic calcification (calcification in normal soft tissues) can occur in hyperparathyroidism due to high serum calcium and phosphate levels, particularly in chronic renal failure (secondary hyperparathyroidism).
- **Bamboo Spine (Slide 109):** Characteristic of Ankylosing Spondylitis.

Analyzing the options:

- a. bamboo spine: False. This is a sign of ankylosing spondylitis.
- b. subperiosteal bone resorption: True. Hallmark of hyperparathyroidism.
- c. salt-pepper skull appearance: True. Characteristic skull finding.
- d. Rugger Jersey: True. Characteristic spine finding (Slide 112).
- e. calcification in soft tissue: True. Metastatic calcification can occur.

Question 126 (from page 23):
Wrong about septic arthritis:

- symmetrical bilateral

Answer: The statement implies "symmetrical bilateral" is wrong for septic arthritis.

High-Yield Context from Slides (Septic Arthritis - Slide 108, 109):

- "Single joint inflammatory arthritis (septic arthritis): general features of inflammatory arthritis involving one joint only." (Slide 109).
- **General features of inflammatory arthritis (Slide 108):**
  - Uniform joint space loss.
  - Bone erosions.
  - Osteopenia.
  - Soft tissue swelling.

Septic Arthritis (General Knowledge):

- Septic arthritis is an infection of a joint.
- It is classically **monoarticular** (affecting a single joint). Polyarticular septic arthritis can occur but is less common (e.g., in disseminated gonococcal infection or certain immunocompromised states).

- It is typically **asymmetrical**. If multiple joints are involved (rare), it's usually not in a symmetrical pattern like rheumatoid arthritis.
- Large joints like the knee and hip are commonly affected.

The statement is "Wrong about septic arthritis: - symmetrical bilateral."
This means the assertion that septic arthritis is "symmetrical bilateral" is wrong.
This is correct. Septic arthritis is classically
monoarticular and asymmetrical. Symmetrical bilateral involvement would be highly atypical for common bacterial septic arthritis.

Therefore, the statement is correct in identifying "symmetrical bilateral" as wrong for septic arthritis.

Question 127 (from page 23):
Wrong about osteosarcoma:

- diaphyseal

  Answer: The statement implies "diaphyseal" is wrong for osteosarcoma.

High-Yield Context from Slides (Osteosarcoma - Slide 110):

- **Malignant Bone Lesion: Osteosarcoma:**
  - "Age: <20 (primary); in the elderly (metastasis)."
  - Ill-defined border, No sclerotic rim, Usually has a sclerotic background, Periosteal reaction (Codman's triangle or Sun burst), Soft tissue extension.
- **Location of Osteosarcoma (General Knowledge):**
  - Conventional osteosarcoma, the most common type, typically arises in the **metaphysis** of long bones, especially around the knee (distal femur, proximal tibia).
  - While it can occur in the diaphysis or epiphysis, the metaphysis is by far the most common location for primary osteosarcoma in adolescents and young adults.
  - Some subtypes (e.g., diaphyseal osteosarcoma) exist but are less common than metaphyseal.

The statement is "Wrong about osteosarcoma: - diaphyseal."
This means that "diaphyseal" is not the typical location for osteosarcoma.
This is largely true. The most common location for conventional osteosarcoma is
metaphyseal. While diaphyseal osteosarcomas do occur, they are less common. If the question is asking for the *typical* or *most common* site, then diaphyseal would be less accurate than metaphyseal.

Therefore, claiming "diaphyseal" as the primary location without qualification is generally considered less accurate than metaphyseal for classic osteosarcoma.

Question 128 (from page 23):
Wrong about non ossifying fibroma:

- majority need surgery

  Answer: The statement implies "majority need surgery" is wrong for NOF.

High-Yield Context from Slides (Non-ossifying fibroma (NOF) - Slide 111):

- **Benign Bone Lesions: Non-ossifying fibroma (NOF):**
  - Well defined border, Narrow transition zone, Septated lesion, No periosteal reaction, No soft tissue extension.
  - "**Usually asymptomatic**."

Non-Ossifying Fibroma (General Knowledge):

- NOFs are common, benign, developmental fibrous lesions of bone, typically seen in children and adolescents.
- They are often discovered incidentally on X-rays done for other reasons because they are **usually asymptomatic**.
- Most NOFs **resolve spontaneously** as the skeleton matures, often by "filling in" with bone.
- Surgical intervention (e.g., curettage and bone grafting) is generally reserved for:

    - Large lesions that are symptomatic (painful).
    - Lesions that cause or are at high risk of pathological fracture (e.g., if they occupy >50% of the bone diameter or cause significant cortical thinning).
    - Atypical appearance raising diagnostic uncertainty.
- The vast **majority do not require surgery** and can be managed with observation.

The statement is "Wrong about non ossifying fibroma: - majority need surgery."
This means the assertion "majority need surgery" is wrong.
This is correct. The majority of NOFs are asymptomatic and heal spontaneously, thus not requiring surgery.

Nuclear medicine

Question 129 (from page 24):
A male patient with non Hodgkin lymphoma in the mediastinum (6 cm), underwent chemotherapy, after that he did a PET scan that showed a 3 cm mass with no uptake, what’s the next step of management:
a. Give more chemotherapy
b. Biopsy
c. Follow up normally with no therapy
d. Repeat PET scan within 1 week

Answer: c

High-Yield Context from Slides (PET Scans in Lymphoma Treatment - Slide 91):

- **PET Scans (details):**
    - "The most important radiopharmaceutical used in a PET scan is fluorodeoxyglucose (FDG)."
    - "Used to assess lymphoma treatment: After two cycles of treatment, the lesions should disappear completely. If they don’t disappear, use a more aggressive treatment or opt for surgical treatment."
- **FDG-PET in Lymphoma:**
    - Malignant lymphoma cells are typically metabolically active and show increased FDG uptake (FDG-avid).
    - A negative PET scan (no significant FDG uptake) after treatment is indicative of a complete metabolic response, suggesting that any residual mass is likely non-viable scar tissue or necrosis rather than active tumor.
    - The Deauville score is often used to interpret post-treatment PET scans in lymphoma, where uptake less than or equal to liver uptake is generally considered a complete metabolic response.

The patient has a residual 3 cm mass after chemotherapy for Non-Hodgkin Lymphoma. A PET scan shows **no uptake** in this mass.

- No FDG uptake indicates that the residual mass is not metabolically active, meaning it's unlikely to be viable lymphoma. It's probably scar/fibrotic tissue or necrosis.
- A repeat PET scan within 1 week is too soon and unlikely to change management if the current scan is clearly negative.
- Giving more chemotherapy is not indicated if there's no evidence of active disease on PET.
- Biopsy of a PET-negative residual mass after chemotherapy is generally not the first step, as it's expected to be non-viable. Biopsy might be considered if there's later suspicion of relapse or if the initial PET was ambiguous.

Therefore, with a PET-negative residual mass, the most appropriate next step is typically observation/follow-up, as this indicates a good response to treatment.

"Follow up normally with no therapy" is the most consistent approach.

Question 130 (from page 24):
All are indications for myocardial scintigraphy except:
a. A patient with typical chest pain and a negative stress ECG
b. A patient with symptomatic CAD and diabetes
c. A patient showed 80% stenosis of LAD on cath angiography
d. Done to patient with CAD before surgery

Answer: c

High-Yield Context from Slides (Myocardial Perfusion Scanning - Slide 89):

- **When do we use a myocardial perfusion scan?**
  - "In **high risk patients, a myocardial perfusion scan is useless**. These patients need to be admitted and **catheterized in order to detect the abnormality**."
  - "In **low risk patients, catheterization would be too invasive**. Therefore, we use a myocardial nuclear perfusion scan."
- **Purpose:** Myocardial perfusion scans assess blood flow to the heart muscle at rest and under stress to detect ischemia (inadequate blood flow) or infarction (scar tissue from a previous heart attack).

Analyzing the options:

- a. A patient with typical chest pain and a negative stress ECG: True. This patient has symptoms suggestive of CAD (typical chest pain), but the initial stress ECG is negative. A myocardial perfusion scan is more sensitive than a stress ECG and can help clarify if ischemia is present. This is a common indication (intermediate risk, or discordant clinical/ECG findings).
- b. A patient with symptomatic CAD and diabetes: True. Diabetic patients often have atypical symptoms or silent ischemia. If they have symptomatic CAD, a perfusion scan can help assess the extent and severity of ischemia and guide management. This could be considered an intermediate to high-risk patient depending on "symptomatic CAD" specifics, where a perfusion scan could be useful before deciding on catheterization, or if catheterization is not immediately planned.
- c. A patient showed 80% stenosis of LAD on cath angiography: False. Coronary catheterization (angiography) is the gold standard for defining coronary anatomy. If a patient has already undergone catheterization and an 80% stenosis (a significant blockage) in the Left Anterior Descending artery (LAD) has been identified, the anatomical problem is known. The next step is usually to decide on revascularization (stenting or bypass surgery) or medical management based on the significance of this stenosis (often assessed by its physiological impact, which *could* have been done by FFR during cath, or if viability is in question for an already infarcted territory). A myocardial perfusion scan is generally done *before* catheterization to determine if there's ischemia that warrants invasive angiography. Once a significant anatomical lesion is found on cath, a perfusion scan *after* this finding to re-confirm ischemia from that specific lesion is usually not the primary next step, unless assessing viability in an associated territory or if the functional significance of an intermediate lesion seen on cath wasn't clear. The slide says "In high risk patients, a myocardial perfusion scan is useless. These patients need to be admitted and catheterized..." – this patient *has been* catheterized and found to be high risk.
- d. Done to patient with CAD before surgery (non-cardiac surgery): True. Pre-operative risk stratification with a myocardial perfusion scan is often done in patients with known or suspected CAD undergoing major non-cardiac surgery to assess their cardiac risk and guide perioperative management.

The most clear "except" is 'c'. Once a critical stenosis is identified on angiography, the focus shifts to treating that stenosis or assessing its physiological significance directly if needed (e.g. with FFR during the cath), not typically by doing a perfusion scan afterwards to re-diagnose ischemia.

Question 131 (from page 24):
A man with high T3, T4, low TSH, did uptake that showed <4% uptake, what's the next step of management:
a. Treat with radioactive iodine
b. Treat hyperthyroid symptoms and then follow up in the next 2-3 months
c. Give anti-thyroid meds and then after 2-3 months start him on thyroxine for life

Answer: b

High-Yield Context from Slides (Thyroid Scan & Pathologies - Slide 86-87):

- **Lab findings:** High T3, T4, and low TSH indicate **hyperthyroidism** (thyrotoxicosis).
- **Radioactive Iodine Uptake (RAIU):**
  - Normal uptake: 10-30% of administered iodine dose.
  - **Low Uptake (<4% in this case):** In the context of hyperthyroidism, a very low RAIU suggests that the thyroid gland is *not* actively trapping iodine to produce excess hormone. This occurs in conditions where pre-formed thyroid

hormone is being released from a damaged gland, or due to exogenous thyroid hormone intake, or iodine overload.

- **Causes of Thyrotoxicosis with Low RAIU:**
  - **Thyroiditis** (subacute, painless/silent, postpartum): Inflammation damages thyroid follicles, causing release of stored hormone. The gland itself is not overactive in producing new hormone, hence low uptake. This is often transient.
  - Exogenous thyroid hormone intake (factitious thyrotoxicosis).
  - Iodine-induced hyperthyroidism (Jod-Basedow effect, often in areas of iodine deficiency with pre-existing nodules - though uptake might not always be very low).
  - Struma ovarii (ectopic thyroid tissue in an ovarian teratoma producing hormone).
- **Management of Thyroiditis:**
  - "The uptake is decreased due to destruction of the thyroid."
  - "Treatment is supportive with beta blockers and NSAID’s." (Slide 87).
  - Subacute thyroiditis is typically self-limiting. The hyperthyroid phase is followed by a euthyroid or hypothyroid phase, and then usually recovery. Antithyroid drugs (which block new hormone synthesis) are not effective because the problem is hormone release, not overproduction. Radioactive iodine is contraindicated/ineffective due to low uptake.

The patient has thyrotoxicosis (high T3/T4, low TSH) with a very low RAIU (<4%). This pattern is classic for **thyroiditis**.

- a. Treat with radioactive iodine: Ineffective and contraindicated with such low uptake.
- b. Treat hyperthyroid symptoms and then follow up in the next 2-3 months: This is consistent with management of thyroiditis. Beta-blockers are used for symptomatic relief. The condition is often self-limiting, so follow-up is key to monitor for resolution or transition to hypothyroidism.
- c. Give anti-thyroid meds and then after 2-3 months start him on thyroxine for life: Anti-thyroid meds are not effective in thyroiditis. Thyroxine might be needed *if* a hypothyroid phase develops and is persistent, but not "for life" as an initial plan from this presentation.

Therefore, symptomatic treatment and follow-up is the most appropriate next step.

Question 132 (from page 25):
Increased iodine uptake:
a. Graves
b. Diffuse thyroiditis
c. Recent contrast

Answer: a

High-Yield Context from Slides (Thyroid Scan & Pathologies - Slide 86-87):

- **Normal Iodine Uptake:** 10-30% of administered dose. "Any increase or decrease is considered abnormal." (Slide 87).
- **Pathologies with Increased Uptake:**
  - **Grave’s disease:** "Diffuse increase in uptake because the thyroid is hyperactive." (Slide 87).
  - Toxic multinodular goiter or toxic adenoma (Hot nodules - Slide 87) would also show increased uptake, either diffusely or focally.
- **Pathologies/Conditions with Decreased Uptake:**
  - **Thyroiditis:** "The uptake is decreased due to destruction of the thyroid." (Slide 87). This includes Hashimoto's thyroiditis in its destructive phase ("Presents as decreased uptake due to autoimmune destruction of the thyroid" - Slide 87).
  - **Recent Contrast / Iodine Load:** Exposure to a large amount of iodine (e.g., from iodinated contrast media, amiodarone) will saturate the thyroid's iodine transport mechanism, leading to a *decreased* uptake of radioactive iodine tracer for several weeks or months.

Analyzing the options:

- a. Graves: Causes increased iodine uptake.

- b. Diffuse thyroiditis: Causes *decreased* iodine uptake due to gland destruction/inflammation.
- c. Recent contrast: Leads to *decreased* iodine uptake due to iodine overload.

Therefore, Graves' disease is the condition listed that causes increased iodine uptake.

Question 133 (from page 25):
Wrong about 99mTc:
a. A half-life of 6 hours
b. Cheap
c. m: maximum
d. energy 140 kev

Answer: c

High-Yield Context from Slides (Technetium-99m - Slide 84):

- **99Tc: Technetium 99 is the most commonly used radioactive substance because:**
  - "The only radiopharmaceutical that produces pure gamma rays (other substances produces other rays)."
  - "Has a suitable **energy level (140 kilo electron volt (kEV))**."
  - "Suitable **half life: 6 hours**."
  - "It is **available and cheap**."
- The "m" in 99mTc stands for **metastable**. This refers to an isomeric state of the Technetium-99 nucleus. It decays by isomeric transition (emitting a gamma ray) to 99Tc (ground state), which then undergoes beta decay with a very long half-life.

Analyzing the options:

- a. A half-life of 6 hours: True (Slide 84).
- b. Cheap: True (Slide 84, "available and cheap").
- c. m: maximum: False. The "m" stands for **metastable**.
- d. energy 140 kev: True (Slide 84).

Question 134 (from page 25):
Wrong about radionuclear:
a. Less than 10 rad usually no effect or asymptomatic effect
b. radionuclear use 0.46 rad
c. any small radiation can cause malignancies

Answer: c

(Note: "Radionuclear" likely refers to radiation from nuclear medicine procedures. The slide also notes "-According to slides, no true answer-" which means the provided answer 'c' may be debatable against the precise wording of the slides or one of the other options is also considered incorrect by the slide author.)

High-Yield Context from Slides (Radiation Exposure - Slide 91):

- "Radiation exposure:"
  - "**There are no clinical studies that associate cancers with diagnostic doses of radiation.** The only signification correlation is between radiation and thyroid cancer."

This statement on Slide 91 is crucial. It suggests that *diagnostic doses* of radiation (as used in nuclear medicine) are not clinically proven to cause cancer, with the exception of a correlation for thyroid cancer.

Let's analyze the options based on this and general radiation biology:

- a. Less than 10 rad usually no effect or asymptomatic effect: This refers to deterministic effects of radiation, which have a threshold dose. 10 rad (0.1 Gy) is generally below the threshold for most acute deterministic effects. Stochastic effects (like cancer induction) are theoretically considered to have no threshold (Linear No-Threshold model - LNT), but the risk at very low doses is small and hard to prove. This statement is plausible for *deterministic effects*.

- b. radionuclear use 0.46 rad: This is a specific dose value. Typical effective doses from common nuclear medicine procedures range from a few mSv to 20+ mSv (1 rad = 10 mGy = 10 mSv for gamma/beta). 0.46 rad = 4.6 mSv. This is a plausible dose for some nuclear medicine scans (e.g., a bone scan might be around 3-6 mSv, a thyroid scan less).
- c. any small radiation can cause malignancies: This reflects the LNT model for stochastic effects, which assumes that *any* dose of radiation, no matter how small, carries some risk of inducing cancer, and this risk is proportional to the dose. However, Slide 91 states "There are no clinical studies that associate cancers with diagnostic doses of radiation." This contradicts the LNT model's practical implications for *proven* cancer induction at low diagnostic doses.

If the answer is 'c' (meaning statement 'c' is wrong): This would align with Slide 91's assertion that diagnostic doses are not clinically linked to cancer (except thyroid). Thus, the idea that "any small radiation *can* cause malignancies" as a certainty or a clinically proven fact for diagnostic doses would be considered "wrong" according to that slide.

The test bank note "-According to slides, no true answer-" is problematic. If answer 'c' is given, then the slide directly supports 'c' being "wrong" in the sense that the LNT model's implication is not supported by clinical studies for diagnostic doses per the slide.

If we must choose what is "wrong about radionuclear" (i.e., an incorrect statement about it):
Statement 'c' ("any small radiation can cause malignancies") is a strong claim. While the LNT model exists, Slide 91 directly refutes its clinical demonstrability for most cancers at diagnostic doses. Therefore, according to the slides, statement 'c' would be considered "wrong" as a definitive statement of fact.

Question 135 (from page 25):
Coronary flow reserve following exercise:
a. 0.5
b. 4
c. 5
d. 2.5
e. 1.5

Answer: d (from test bank, though slide says exercise = 3 times, adenosine = 5 times)

High-Yield Context from Slides (Myocardial Perfusion Scanning - Normal Physiology - Slide 89):

- "Normal physiology:"
  - "In a normal heart, there is a large amount of cardiac reserve. Therefore, if you increase the heart’s activity, the heart can compensate using the reserve flow. Therefore, there will be no decrease in perfusion."
  - "Note: **exercises increases cardiac flow by 3 times; adenosine increases cardiac flow by 5 times.**"

Coronary Flow Reserve (CFR) is the maximum increase in coronary blood flow above its basal level that can be achieved for a given perfusion pressure.

- The slide states that exercise increases cardiac flow by **3 times**. This implies a CFR of 3 (or an increase *to* 3 times baseline, meaning an additional 2 times baseline flow).
- Adenosine (a pharmacological stressor) increases cardiac flow by **5 times**.

The question asks for "Coronary flow reserve following exercise."
Based on the slide, exercise increases flow by 3 times. The options are 0.5, 4, 5, 2.5, 1.5.
None of these directly match "3 times."

Let's analyze the answer 'd' (2.5).
If the baseline flow is 1 unit, and it increases
by 3 times, the new flow is 1 + 3 = 4 units. The reserve is 3 units.
If the baseline flow is 1 unit, and it increases
to 3 times, the new flow is 3 units. The reserve is 2 units.
The slide says "exercises increases cardiac flow by 3 times." This phrasing is a bit ambiguous. If it means the *increase* is 3x baseline, total flow is 4x. If it means total flow *becomes* 3x baseline, the increase is 2x.

Given the options, and the provided answer 'd' (2.5), there might be an understanding of CFR as the ratio of maximal to basal flow. If exercise increases flow *to* 3 times the basal level, then the CFR would be 3. If it increases flow *by* an additional 2 to 3 times the basal level, then total flow is 3 to 4 times basal.

The option 2.5 is closest to a modest increase. If "increases cardiac flow by 3 times" means the peak flow is 3 times the resting flow, then CFR is 3.

If the options are strict and 3 isn't available, 2.5 is the closest plausible value for an increase multiple.

However, the slide clearly states "exercise increases cardiac flow by 3 times". If the answer key is 'd' (2.5), then there is a discrepancy between the slide information and the expected answer, or the question/options are designed around a value not directly on the slide. Typically, normal CFR is considered to be in the range of 2.0 to 5.0. So 2.5 is a plausible, albeit low-normal, value for CFR achieved with exercise.

This question seems to have a mismatch with the explicit slide data if the answer is 2.5. The slide value is 3.

Question 136 (from page 25):
Cardiac perfusion scan which is wrong:
a. Higher sensitivity than ECG stress test
b. Decrease basal septum perfusion indicates infarction

Answer: b

High-Yield Context from Slides (Myocardial Perfusion Scanning - Ischemic Cascade, Interpretation - Slide 89-90):

- **Ischemic Cascade (Early to Late):**
    1. **Change in perfusion:** "the first apparent abnormality is a decrease in perfusion in response to stress testing. Therefore, a nuclear scan is the most sensitive test to detect cardiac disease."
    2. Altered contractility (systolic, then diastolic dysfunction).
    3. ST depression on stress testing (ECG).
    4. Angina pectoralis.
- This cascade implies that perfusion changes (detected by nuclear scan) occur earlier and are more sensitive indicators of ischemia than ECG changes.
- **How to interpret the result (Slide 90):**
    - Negative (normal perfusion at rest and stress): Normal.
    - Ischemia: Area receives perfusion before stress (at rest), and perfusion stops (or decreases) after stress. (This is a reversible defect).
    - Infarct: Area does not receive perfusion before stress (at rest) and still doesn’t receive perfusion after stress. (This is a fixed defect, indicating scar tissue).

Analyzing the options:

- a. Higher sensitivity than ECG stress test: True. Perfusion changes are earlier in the ischemic cascade than ECG changes, making perfusion scans generally more sensitive for detecting ischemia.
- b. Decrease basal septum perfusion indicates infarction:
    - A "decrease" in perfusion needs to be qualified (is it at rest, or only with stress?).
    - If there is **decreased perfusion at rest that persists with stress** (a fixed defect), this indicates **infarction** (scar).
    - If there is normal perfusion at rest but **decreased perfusion with stress** (a reversible defect), this indicates **ischemia**.
    - The statement "Decrease basal septum perfusion indicates infarction" is too vague. If this "decrease" is only seen with stress (reversible), it's ischemia. If it's seen at rest and stress (fixed), it's infarction.
    - However, a *fixed defect* (decreased perfusion at rest and stress) in the basal septum would indicate infarction in that region. The lack of specificity about "rest vs. stress" makes it ambiguous.

If "Decrease basal septum perfusion" implies a fixed defect (present at rest and stress), then it *would* indicate infarction. If it implies a defect that only appears or worsens with stress, it's ischemia.

Let's consider why 'b' might be "wrong."
Perhaps the issue is with "basal septum." While any region can infarct, "decrease... indicates infarction" needs the context of a
fixed defect.
If 'b' is wrong, it might be because a
reversible decrease indicates ischemia, not infarction. Or perhaps basal septal perfusion can be affected by other non-infarction conditions (e.g., attenuation artifact, LBBB-related perfusion patterns).

However, if we interpret "decrease basal septum perfusion" as a persistent, fixed defect seen on both rest and stress images, then it *does* indicate infarction.
If the question implies that
any decrease in basal septal perfusion automatically means infarction without further qualification, then it's wrong because a stress-induced decrease means ischemia.

Given 'b' is the answer, the most likely reason is that the statement is too general. A reversible decrease means ischemia, not infarction. Only a fixed decrease (at rest and stress) signifies infarction.

Question 137 (from page 25):
Bone scan wrong indication:
a. Lung
b. Brain
c. Breast
d. Multiple myeloma
e. Colorectal cancer

Answer: d (and arguably a, b, e if interpreted strictly as primary tumor detection)

High-Yield Context from Slides (Bone Scintigraphy - Bone Scan - Slide 90):

- **Mechanism:** Diphosphonates are used; material is injected IV and distributes to areas of increased blood flow and new bone formation (increased hydroxyapatite crystal activity).
- **Used for detection of:**
  - Trauma (stress fractures).
  - Infection.
  - **Tumors that produce a bony reaction.**
- **Limitation:** "**We don’t use it for the detection of osteolytic lesions.** Osteolytic lesions cannot be visualized using a bone scan. The most important example is **multiple myeloma**. In cases of multiple myeloma, we use a PET scan."

Analyzing the options as *indications for a bone scan* (usually for detecting bone metastases or primary bone tumors with osteoblastic activity):

- a. Lung (cancer): Lung cancer commonly metastasizes to bone, often causing osteolytic or mixed lesions. A bone scan is used to detect **bone metastases** from lung cancer.
- b. Brain (tumor): Primary brain tumors rarely metastasize to bone. Some systemic cancers can metastasize to both brain and bone. A bone scan would be for bone mets, not the primary brain tumor.
- c. Breast (cancer): Breast cancer very commonly metastasizes to bone (can be lytic, blastic, or mixed). Bone scan is a standard tool for detecting **bone metastases** from breast cancer.
- d. Multiple myeloma: Explicitly stated on Slide 90 as a condition where bone scans are *not* used for detection because its lesions are osteolytic. PET scan is preferred. This is a "wrong indication."
- e. Colorectal cancer: Colorectal cancer can metastasize to bone, though less commonly than breast or prostate. Lesions can be lytic or blastic. A bone scan can be used to look for **bone metastases**.

The question asks for a "wrong indication."

- Multiple myeloma is clearly a wrong indication according to the slides.
- For Lung, Breast, and Colorectal cancer, a bone scan *is* indicated to look for **bone metastases**, not to image the primary tumor itself. If the question implies "bone scan for diagnosing the primary tumor in the lung/brain/breast/colon," then those would also be wrong indications.
- However, in oncology, "bone scan for lung cancer" usually means "bone scan to stage lung cancer by looking for bone metastases."

Given the explicit statement about multiple myeloma on Slide 90, 'd' is the most direct "wrong indication" based on the provided material.

Question 138 (from page 26):
All are true about Tc Except:
a. multiple valent states and good chemistry

b. Half life of 6 hours
c. Adsorbed by aluminum
d. Decay by isomeric transition
e. originates from Mo

Answer: c

High-Yield Context from Slides (Technetium-99m - Slide 84):

- **99mTc:**
  - Most commonly used.
  - Produces pure gamma rays.
  - Energy: 140 kEV.
  - **Half-life: 6 hours.**
  - Available and cheap.
- **Origin:** "99Mo: 99 Molybendum is a radioactive substance that decays into 99Tc." (So 99mTc **originates from Mo**99 in a generator).
- **Chemistry (General Knowledge):** Technetium is a transition metal and can exist in multiple oxidation (valent) states (from -1 to +7). This versatility allows it to be chelated or bound to a wide variety of pharmaceuticals to target different organs or physiological processes. This is its "good chemistry."
- **Decay (General Knowledge):** 99mTc (metastable) decays to 99Tc (ground state) via **isomeric transition**, emitting a 140 keV gamma photon.
- **Adsorption by Aluminum (General Knowledge - relating to Tc-99m generators):** In a Mo-99/Tc-99m generator, the Mo-99 is typically adsorbed onto an alumina (aluminum oxide) column. The Tc-99m is then eluted (washed off) from the column with saline. If there is "aluminum breakthrough" from the generator, it means some aluminum ions have leached into the Tc-99m eluate. This aluminum can interfere with the labeling of certain Tc-99m kits (e.g., causing aggregation of Tc-99m sulfur colloid, affecting lung perfusion imaging if particles are too large, or affecting RBC labeling). So, while alumina is used in the generator, Tc-99m itself isn't "adsorbed by aluminum" in a way that's a fundamental property of Tc for its use; rather, aluminum contamination is a quality control issue.

Analyzing the options:

- a. multiple valent states and good chemistry: True. Its versatile chemistry is key to its wide use.
- b. Half life of 6 hours: True (Slide 84).
- c. Adsorbed by aluminum: False. Mo-99 is adsorbed on alumina. Tc-99m is eluted from it. Aluminum contamination in the Tc-99m eluate is a problem, not a desired property or fundamental characteristic of Tc itself.
- d. Decay by isomeric transition: True. 99mTc decays to 99Tc this way.
- e. originates from Mo: True. From a Mo-99/Tc-99m generator (Slide 84).

Question 139 (from page 26):
Myocardial perfusion studies:

- Coronary flow reserve

Answer: The statement implies "Coronary flow reserve" is assessed by or related to myocardial perfusion studies.

High-Yield Context from Slides (Myocardial Perfusion Scanning - Slide 89):

- "Normal physiology: In a normal heart, there is a large amount of cardiac **reserve**. Therefore, if you increase the heart's activity, the heart can compensate using the **reserve flow**."
- "Note: exercises increases cardiac flow by 3 times; adenosine increases cardiac flow by 5 times."
- Myocardial perfusion studies are performed at rest and under stress (exercise or pharmacological) to assess the heart's ability to increase blood flow in response to increased demand. This ability is a reflection of the coronary flow reserve.
- If coronary flow reserve is impaired (e.g., due to stenosis), stress will induce a relative perfusion defect (ischemia) compared to rest or compared to normally perfused regions.

The concept of **Coronary Flow Reserve** is central to understanding and interpreting myocardial perfusion studies. These studies essentially test the coronary flow reserve.

Therefore, the statement is correct; myocardial perfusion studies are fundamentally about assessing coronary flow reserve.

Question 140 (from page 26):
Not a trace in myocardial perfusion scan:

- Tn99 HMPAO

  Answer: The statement implies Tc-99m HMPAO is not a tracer for myocardial perfusion.

High-Yield Context from Slides (Myocardial Perfusion Scan Materials - Slide 90):

- "Materials used: **Tc99 tetrofosmin, sestamibi, and thalium** (analogue of potassium)."

Other Radiopharmaceuticals (General Nuclear Medicine Knowledge):

- **Tc-99m HMPAO (Exametazime):** A lipophilic agent that crosses the blood-brain barrier. It is primarily used for **cerebral perfusion imaging** (brain SPECT) and also for labeling white blood cells for infection/inflammation imaging. It is **not** a standard tracer for myocardial perfusion.

The listed tracers for myocardial perfusion on Slide 90 are Tetrofosmin, Sestamibi (both Tc-99m labeled), and Thallium-201.
Tc-99m HMPAO is used for brain perfusion.

Therefore, the statement is correct; Tc-99m HMPAO is not a tracer used in myocardial perfusion scans.

Question 141 (from page 26):
True about PET scan:

- important for oncologic practice

  Answer: The statement implies PET scan is important for oncologic practice.

High-Yield Context from Slides (PET Scans - Slide 85, 91):

- **PET Scan Basics (Slide 85):**
  - Uses positron-emitting substances (e.g., radioactive fluorine).
  - Radioactive glucose (FDG - fluorodeoxyglucose) is a common compound.
  - "Any cell with increased glucose uptake, will emit more radiation. So, a PET scan using radioactive glucose can show any small increase in metabolism inside a certain cell. This is ideal for **detecting small tumor cells**."
- **PET Scan Uses (Slide 91):**
  - "The most important radiopharmaceutical used in a PET scan is fluorodeoxyglucose (FDG)."
  - "Used to assess **lymphoma treatment**."
  - (Also mentions cholecystitis, myocardial viability/activity, seizure focus, Parkinson's research).

Oncology (the study and treatment of tumors) heavily relies on PET scans (primarily FDG-PET) for:

- Initial staging of many cancers.
- Detecting recurrent disease.
- Monitoring response to therapy (as mentioned for lymphoma).
- Guiding biopsies.

The ability of FDG-PET to detect metabolically active tumor cells (even small ones) makes it extremely important in oncologic practice.

Therefore, the statement "True about PET scan: - important for oncologic practice" is correct.

Question 142 (from page 26):
Most commonly used PET tracer:

- 18F-FDG

  Answer: The statement implies 18F-FDG is the most commonly used PET tracer.

High-Yield Context from Slides (PET Scans - Slide 85, 91):

- "The PET scan uses positron emitting substances. These substances include **radioactive fluorine (most important)**..." (Slide 85).
- "The most commonly used radionucleotide is fluorine." (Slide 85).
- "The mostly commonly used radioactive compound is **radioactive glucose**." (Slide 85).
- "Radioactive glucose (**fluorodeoxyglucose**)" (Slide 85). (18F is the fluorine isotope used).
- "The most important radiopharmaceutical used in a PET scan is **fluorodeoxyglucose (FDG)**." (Slide 91).

The slides repeatedly emphasize fluorine (specifically 18F) and fluorodeoxyglucose (FDG) as the most important and commonly used components for PET scanning in the context described (especially oncologic).

Therefore, the statement "Most commonly used PET tracer: - 18F-FDG" is correct.

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018 EXAM

Question 143:
True about arteriograms:
a. Intimal flap is a radiological sign of a dissection aneurysm
b. Collaterals can be seen in acute VTE
c. Thrombus appears as meniscus sign

Answer: A

High-Yield Context (from previous slides & general knowledge):

- **Dissection Aneurysm (Slide 100):**
  - "A dissecting aneurysm happens due to dissection of the intima or/and media layers."
  - "This leads to the formation of a false and a true lumen separated by an **intimal flap**."
- **Venous Thromboembolism (VTE) (Slide 98 - Angiography of DVT):**
  - "To differentiate acute VTE’s from chronic ones, we look at the presence of **collaterals** and the presence of faint opacifications."
  - "In cases of a chronic VTE, due to the presence of collaterals, some blood flow might return."
  - This implies collaterals are a sign of **chronic** VTE, not acute.
- **Meniscus Sign (Slide 99 - Arterial Occlusive Disease, Emboli):**
  - For **Emboli** on angiograms: "**Meniscus sign**: the arterial supply seems to be cut off, and a concavity appears at the site of the embolus."
  - For acute **Thrombi** on angiograms: "Sharp cut off or non-visualization; no collaterals."

Analysis:

- a. Intimal flap is a radiological sign of a dissection aneurysm: **True**. This is the hallmark sign (Slide 100).
- b. Collaterals can be seen in acute VTE: **False**. Collaterals are a sign of chronic VTE (Slide 98).
- c. Thrombus appears as meniscus sign: **False**. An embolus appears with a meniscus sign. An acute thrombus shows a sharp cut-off (Slide 99).

Question 144:
Patient presented with traumatic head injury, which is true:
a. Do MRI
b. Do CT
c. wait and observe

Answer: B

High-Yield Context (from previous slides & general knowledge):

- **CT in Emergency/Trauma (Slide 73, 75):**
  - "Not used in cases of emergency. MRI takes time (the average time is 15 minutes); therefore, in an emergency setting, we use a CT scan." (Slide 73, referring to MRI).
  - "In cases of a suspected stroke, the first study to be done is a non-contrasted CT. A non-contrasted CT can reveal the site of a hemorrhagic infarct." (Slide 75). This principle extends to trauma to quickly identify hemorrhage, fractures, and significant mass effect.
- **CT for Brain Lesions (Slide 3):** CT is used to assess for midline shift, hydrocephalus, and focal brain lesions. Acute hemorrhage is hyperdense on CT (Slide 5).
- **MRI:** While excellent for detailed brain anatomy and certain pathologies, MRI is slower and less suitable for acute, unstable trauma patients where rapid assessment for life-threatening conditions (like hemorrhage needing surgery) is paramount.

Analysis:
In an acute traumatic head injury, the primary goal is rapid assessment for intracranial hemorrhage, fractures, herniation, or other emergent conditions.

- a. Do MRI: **False**. MRI is too slow for the initial acute assessment of head trauma.
- b. Do CT: **True**. Non-contrast CT of the head is the imaging modality of choice for acute head trauma due to its speed and excellent ability to detect acute blood and fractures.
- c. wait and observe: **False**. Potentially life-threatening injuries need to be ruled out or identified promptly.

Question 145:
Best modality to detect acute brain ischemia?
a. CT without contrast
b. T2
c. T* (likely referring to T2* or SWI)
d. DWI/ADC

Answer: D

High-Yield Context (from previous slides & general knowledge):

- **CT for Acute Ischemia (Slide 10, 75):**
  - Non-contrast CT is often the first scan to rule out hemorrhage.
  - "A CT scan can be normal up to 72 hours after an infarct." (Slide 10).
  - "A CT scan gives limited information about edema." (Slide 75).
- **MRI for Acute Ischemia (Slide 75):**
  - "To diagnose an ischemic infarct, we use an MRI scan."
  - **DWI (Diffusion-Weighted Imaging) and ADC (Apparent Diffusion Coefficient):** "The golden standard for the diagnosis is a DWI and ADC sequences."
    - DWI: Ischemic area looks **hyperintense** (bright).
    - ADC: Ischemic area looks **hypointense** (dark). This combination is characteristic of acute cytotoxic edema.
  - T2-weighted: "On a T2 scan the infarcted area looks hyperintense and well demarcated." (Slide 75). This appears slightly later than DWI changes.
  - T2* (T2-star) or SWI (Susceptibility Weighted Imaging): These sequences are very sensitive to blood products (hemorrhage, hemosiderin). While useful for detecting hemorrhagic transformation of an infarct or chronic microbleeds, they are not the primary sequences for detecting *acute ischemia* itself. SWI (Slide 78) is mentioned for detecting hemorrhage with a hypointense rim.

Analysis:

- a. CT without contrast: Good for ruling out hemorrhage, but not sensitive for early acute ischemia.
- b. T2: Shows ischemia as hyperintense, but changes appear somewhat later than DWI.
- c. T*: Best for blood products, not primary for acute ischemia detection.
- d. DWI/ADC: **True**. This combination is the gold standard for detecting acute ischemia within minutes to hours of onset due to its sensitivity to restricted water diffusion in cytotoxic edema.

Question 146:
A 44 years old female pt regularly does a mammography every X years. Her recent mammography showed a mass that didn’t change since her last mammogram (which was in 2020). Which of the following is true?
a. Repeat mammogram with the same screening interval
b. Consult a doctor urgently
c. Repeat the mammogram every 6 months
d. Do surgery

Answer: A

High-Yield Context (from previous slides & general knowledge - BI-RADS, stability):

- **Screening Mammography Interval (Slide 63):** ">40: a mammogram is advised every 2 years." (This is a general guideline; "every X years" in the question is vague).
- **Stability of a Finding:** A mass that is unchanged over a significant period (e.g., 2 years or more, as implied by "since 2020" if the current year is 2022+) is a strong indicator of benignity.
- **BI-RADS 2 (Benign Finding) (Slide 71):** "no need for short interval follow up." This category is used for demonstrably benign findings, including stable masses.
- **BI-RADS 3 (Probably Benign Finding) (Slide 71):** "follow up at 6,12,24 months (Initial short-interval follow up)." This is for findings that appear benign but are new or not proven stable.

Analysis:
The patient is 44 (in the screening age group). The key information is that the mass "didn’t change since her last mammogram (which was in 2020)." If the current mammogram is, for example, in 2022 or later, this demonstrates stability over at least 2 years. A stable mass is highly likely benign.

- If the mass is considered benign due to stability (and assuming benign morphological features not detailed in the question), it would likely be classified as BI-RADS 2.
- For a BI-RADS 2 finding, the patient would return to her regular screening interval.
- a. Repeat mammogram with the same screening interval: **True**. If the mass is stable and considered benign (BI-RADS 2), routine screening is appropriate.
- b. Consult a doctor urgently: **False**. Stability suggests benignity; no urgency.
- c. Repeat the mammogram every 6 months: **False**. This is short-interval follow-up for BI-RADS 3 (probably benign, stability not yet established). This mass *is* stable.
- d. Do surgery: **False**. Surgery is not indicated for a stable, benign-appearing mass.

Question 147:
If you found 10 mm mass on mammogram, which of the following is a feature of malignancy:
a. Hyper density
b. Peripheral part of fat density
c. Coarse calcification
d. Irregular posterior border that appears well-defined on magnification view
e. Previous normal mammogram

Answer: A*(This is similar to Q82 from the previous batch, but with a different answer choice highlighted. Let's re-evaluate with 'A' as the target.)*

High-Yield Context (from previous slides & general knowledge - Mass features):

- **Density of a Mass (Slide 64):** "the density of a mass is described in reference to the most hyperdense area in the breast." Options are Hypodense, Isodense, Hyperdense.

    - Benign masses (e.g., cysts, fibroadenomas) are often isodense or hypodense relative to fibroglandular tissue.
    - **Malignant masses are often hyperdense** compared to surrounding breast tissue because they are cellular and have less fat.
- **Fat content ("Peripheral part of fat density"):** Suggests benignity (Slide 65).
- **Coarse calcification:** Benign (e.g., popcorn calcifications in fibroadenomas - Slide 67).
- **Irregular posterior border that appears well-defined on magnification:** If magnification clarifies a border as well-defined, it *decreases* suspicion.
- **Previous normal mammogram:** Historical information, not a feature *of the mass*.

Analysis:

- a. Hyper density: **True**. Malignant masses are often hyperdense relative to the surrounding fibroglandular tissue due to their high cellularity. This is a feature that can raise suspicion for malignancy.
- b. Peripheral part of fat density: Suggests benignity.
- c. Coarse calcification: Suggests benignity.
- d. Irregular posterior border that appears well-defined on magnification view: This change towards "well-defined" *reduces* suspicion.
- e. Previous normal mammogram: Historical, not a mass feature.

Compared to other options, "Hyper density" is a feature that can be associated with malignancy.

Question 148:
Patient suffered a traumatic breast injury, mammography will most likely show:
a. Rod calcifications
b. Fine linear branching calcifications
c. Eggshell calcifications
d. Dystrophic

Answer: C*(This is very similar to Q79, but "Dystrophic" is now an option. Let's compare C and D.)*

High-Yield Context (from previous slides & general knowledge - Post-traumatic changes):

- **Trauma → Fat Necrosis (Slide 67):**
    - **Eggshell calcifications:** "indicate fat necrosis." Thin, curvilinear calcifications in the wall of an oil cyst.
    - **Dystrophic calcifications:** "ill defined calcifications usually following a surgery or a biopsy." Also common after trauma. These are typically coarse, irregular, and can be quite dense.
- **Rod calcifications:** Plasma cell mastitis (Slide 67).
- **Fine linear branching calcifications:** Malignant (DCIS) (Slide 68).

Analysis:
Both eggshell calcifications (from oil cysts due to fat necrosis) and dystrophic calcifications are common sequelae of breast trauma.

- "Eggshell calcifications" are a specific, recognizable pattern directly linked to fat necrosis on the slides.
- "Dystrophic" is a broader term for calcification in damaged tissue; post-traumatic dystrophic calcifications are common and benign.

If both are options, which is "most likely" or more specific to the evolution of fat necrosis?
Oil cysts with eggshell calcification are a very characteristic outcome of fat necrosis. Dystrophic calcification is also correct but perhaps less specific in its
morphology than "eggshell."

The answer key selects 'C' (Eggshell calcifications). This is a very classic and specific benign calcification pattern seen after trauma due to fat necrosis evolving into oil cysts.

Question 149:
The probability of cold nodule to be benign is:
a. 70%

b. 85%
c. 25%
d. 15%

Answer: B

High-Yield Context (from previous slides - Thyroid Nodules - Slide 87):

- **Thyroid Nodules on Uptake Scan:**
  - **Hot nodules:** Take up more radioactive iodine than surrounding thyroid tissue.
    - "Single: here, we do not take a biopsy, because a single nodule is benign. A single nodule can never cause hyperthyroidism." (This statement about never causing hyperthyroidism is generally incorrect for an autonomously functioning "hot" nodule, which *can* cause hyperthyroidism. However, the point about it being benign and not needing biopsy is often true for solitary hot nodules).
  - **Cold nodules:** Take up less radioactive iodine than surrounding tissue.
    - "**Require a biopsy as they might be malignant.**"
    - "Treatment is usually surgical."
- The slides do not give specific percentages for malignancy risk in cold nodules, only that they "might be malignant."

General Endocrinology/Nuclear Medicine Knowledge (Cold Thyroid Nodules):

- The majority of thyroid nodules are benign.
- "Cold" nodules on a thyroid scan have a higher risk of malignancy compared to "hot" nodules.
- The risk of malignancy in a cold nodule is often quoted in the range of 5-15% (or historically up to 20%).
- This means the probability of a cold nodule being **benign** is conversely high, around 80-95%.

Analysis:
The question asks for the probability of a cold nodule to be
benign.
If the malignancy risk is 5-15%, then the benign probability is 85-95%.

- a. 70% (malignancy risk 30%)
- b. 85% (malignancy risk 15%)
- c. 25% (malignancy risk 75%) - This would mean most are malignant, which is false.
- d. 15% (malignancy risk 85%) - This would mean most are malignant, which is false.

Option 'b' (85% benign) corresponds to a 15% malignancy risk, which is within the generally accepted range for cold nodules.

Question 150:
CT guided biopsy is used in:
a. Lung abscess
b. Para-aortic L.N
c. Both a and b

Answer: C

High-Yield Context (from previous slides & general knowledge - CT-guided biopsy):

- **CT Guidance (from Q110 context):** Excellent for deep lesions, not limited by air/bone. Used for biopsies in chest (lung, mediastinum), abdomen (pancreas, retroperitoneum, deep pelvic lesions), bone.
- **Lung Abscess:** A lung abscess is a pus-filled cavity in the lung. Biopsy or drainage might be needed if diagnosis is uncertain or for therapeutic drainage if not responding to antibiotics. CT is the ideal guidance for accessing a lesion within the lung parenchyma.
- **Para-aortic Lymph Nodes (L.N):** These are deep retroperitoneal lymph nodes. CT guidance is commonly used for biopsying retroperitoneal and deep abdominal/pelvic lymph nodes.

Analysis:

- a. Lung abscess: **True**. CT is suitable for guiding biopsy or drainage of a lung abscess if needed.
- b. Para-aortic L.N: **True**. CT is suitable for guiding biopsy of these deep lymph nodes.
- c. Both a and b: **True**, since both 'a' and 'b' are correct.

Question 151:
All of the following is used in myocardial perfusion scanning except:
a. MAG3
b. Tetrofosmin
c. Sestamibi
d. Thalium

Answer: A

High-Yield Context (from previous slides - Myocardial Perfusion Tracers - Slide 90):

- "Materials used [for myocardial perfusion scan]: **Tc99 tetrofosmin, sestamibi, and thalium** (analogue of potassium)."
- **MAG3 (Mercaptoacetyltriglycine) (Slide 91 context for renal scans):** Used for dynamic **renal scans** to assess tubular secretion and renal function.

Analysis:

- a. MAG3: **False** (not used for myocardial perfusion; used for renal scans).
- b. Tetrofosmin: **True** (listed on Slide 90).
- c. Sestamibi: **True** (listed on Slide 90).
- d. Thalium: **True** (listed on Slide 90).

Therefore, MAG3 is the one not used for myocardial perfusion scanning.

Question 152:
A chest x-ray showed an opacity silhouetting the left heart border, diaphragm is clearly seen. Which lobe is affected?
a. Middle right lobe
b. Lower left lobe
c. Whole left lung
d. Upper left lobe

Answer: D

High-Yield Context (from previous slides - Silhouette Sign - Slide 104):

- "Silhouette sign: a silhouette appears when the lung parenchyma covers an adjacent structure. It helps in locating the anatomical position of the lesion."
- **Silhouettes of the left lung:**
  - "**Left heart border: lingular pathology**; if the opacity extends superiorly, the whole upper lobe is affected."
  - "Left heart border + diaphragm: lower lobe pathology."
- The **lingula** is part of the **left upper lobe**.
- If the diaphragm is "clearly seen," it means the lobe adjacent to that part of the diaphragm is aerated (not opacified).

Analysis:
The opacity is silhouetting (obscuring) the
left heart border. This indicates pathology in the structure anatomically adjacent to the left heart border, which is the **lingula of the left upper lobe**.
The diaphragm being "clearly seen" means the left lower lobe (which is adjacent to the posterior left hemidiaphragm) is likely clear, at least in the portion forming the silhouette with the diaphragm.

- a. Middle right lobe: Would silhouette the right heart border.
- b. Lower left lobe: Would silhouette the left hemidiaphragm and/or descending aorta.
- c. Whole left lung: Would cause complete opacification of the left hemithorax, obscuring both the left heart border and the left hemidiaphragm.

- d. Upper left lobe: **True**. Specifically, the lingular segment of the left upper lobe is in contact with the left heart border.

Question 153:
Which of the following is would be classified as BIRAD4:
a. Eggshell calcifications
b. Cluster pleomorphic calcifications
c. Dystrophic calcification

Answer: B

High-Yield Context (from previous slides - BI-RADS & Calcifications - Slide 67, 68, 71):

- **BI-RADS 2 (Benign Finding) (Slide 71):**
  - **Eggshell calcifications** (indicate fat necrosis - Slide 67) are benign.
  - **Dystrophic calcifications** (usually following surgery/biopsy - Slide 67) are benign.
- **BI-RADS 4 (Suspicious Finding) (Slide 71):** "needs biopsy; 2-95% malignancy."
  - "Amorphous calcification" is given as an example on Slide 71 for BI-RADS 4.
  - **Malignant Calcifications (Slide 68):**
    - "**Pleomorphic:** multiple calcifications that are irregular; crushed stone appearance. Indicate high grade DCIS."
    - "Fine linear branching calcifications; indicate high grade DCIS."
  - **Distribution of Calcifications (Slide 69):** "**Clustered**: the calcifications are close to each other (1-2 cm apart)." "Segmental and **cluster calcifications are usually malignant**." (This assumes the *morphology* of the clustered calcifications is suspicious).

Analysis:

- a. Eggshell calcifications: Benign (BI-RADS 2).
- b. Cluster pleomorphic calcifications:
  - **Pleomorphic calcifications** are a malignant type (Slide 68).
  - **Clustered** distribution of suspicious calcifications is usually malignant (Slide 69).
  - Therefore, this combination is highly suspicious and would be BI-RADS 4 (or even 5 depending on extent and other features).
- c. Dystrophic calcification: Benign (BI-RADS 2).

Question 154:
Least indicated to do a myocardial perfusion scan:
a. Patient with cath showing 75% stenosis
b. Abnormal stress test in low risk patient
c. Other choices were all low risk pts Indicated

Answer: A*(This is very similar to Q130 from the previous batch).*

High-Yield Context (from previous slides - Myocardial Perfusion Scanning - Slide 89):

- "When do we use a myocardial perfusion scan?"
  - "In **high risk patients, a myocardial perfusion scan is useless.** These patients need to be admitted and **catheterized in order to detect the abnormality.**"
  - "In **low risk patients, catheterization would be too invasive.** Therefore, we use a myocardial nuclear perfusion scan."

Analysis:

- a. Patient with cath showing 75% stenosis: **Least indicated**. This patient has already undergone catheterization (the gold standard for anatomy), and a significant (75%) stenosis has been identified. A perfusion scan *after* this finding is generally not the primary next step to "detect the abnormality" as the abnormality is already known. Management would focus on the significance of this stenosis (e.g., FFR if not done, revascularization). The slide suggests high-risk

patients (which this patient now is, with known significant CAD) get catheterized, not perfusion scanned as the next step for primary diagnosis of ischemia.

- b. Abnormal stress test in low risk patient: **Indicated**. A low-risk patient with an abnormal non-invasive stress test (like ECG stress test) would be a good candidate for a myocardial perfusion scan to further clarify the presence and extent of ischemia before considering invasive catheterization.
- c. Other choices were all low risk pts Indicated: This supports that low-risk patients with some indication (e.g., symptoms, equivocal prior test) are suitable for perfusion scanning.

Question 155:
Wrong about rickets:

Answer: Well defined margin of ossification nucleus

High-Yield Context (from previous slides - Rickets - Slide 111):

- **Rickets (Metabolic bone disease):**
  - "Diffuse osteopenia"
  - "**Cupping of metaphysis**"
  - "**Fraying and irregularity of the metaphysis**"
  - "**Widening of the growth plate**"
  - "Bowing of the limbs"
  - "Ricketic rosary: ossification of the chostocondral junction" (Should be *enlargement/expansion* of the costochondral junction; ossification is normal).
  - "**Delayed appearance of carpal ossification centers**; usually 2 are present at birth"
- **Ossification Centers in Rickets:** Due to deficient mineralization, the ossification centers (epiphyseal nuclei) appear **late**, and their margins are often **indistinct, frayed, and poorly defined**, not well-defined. The metaphysis itself is frayed and irregular.

Analysis:
The key features of rickets at the growth plate and metaphysis are irregularity, fraying, and cupping due to impaired mineralization. The ossification centers, when they appear, also suffer from this poor mineralization.
Therefore, a "Well defined margin of ossification nucleus" is
wrong for rickets. The margins are typically ill-defined and irregular.

Question 156:
Frontal mass with calcifications, most likely?

Answer: Oligodendroglioma

High-Yield Context (from previous slides & general neuro-oncology):

- The slides mention calcification in the brain (Slide 3, 5, 9), but don't specifically link frontal mass calcification types to specific tumors in detail, other than meningiomas having extra-axial calcifications (Slide 9).
- **T1 Hyperintense Structures (Slide 74):** Include calcifications.
- **Tumor Calcification (General Neuro-oncology Knowledge):**
  - **Oligodendroglioma:** These are glial tumors that are well-known for having a high incidence of calcification (present in up to 70-90% of cases). Calcification is often a key diagnostic clue. They commonly occur in the frontal lobes.
  - **Other tumors that can calcify:**
    - Astrocytoma (less common than oligodendroglioma, especially low-grade ones).
    - Craniopharyngioma (suprasellar, often cystic and calcified).
    - Meningioma (often calcified, but typically extra-axial).
    - Ependymoma.
    - Choroid plexus papilloma.

- Some metastases (e.g., from osteosarcoma, chondrosarcoma, mucinous adenocarcinomas).

Analysis:
For an
intra-axial frontal lobe mass with calcifications, **oligodendroglioma** is a classic consideration due to its high propensity for calcification.

Question 157:
Which of the following is wrong?

Answer: Epidural hematoma treated with burr hole

High-Yield Context (from previous slides - EDH and SDH Treatment):

- **Epidural Hematoma (EDH) Treatment (Slide 6):**
  - "Treatment: **craniotomy**"
  - "In the case of an epidural hemorrhage, the treatment is craniotomy. **Burr holes are not used.**"
  - "Due to the absence of CSF, epidural hemorrhages clot. If burr holes are used, the clots cannot escape, and this might complicate the case. However, if a craniotomy is performed we allow the clot to escape."
- **Subdural Hematoma (SDH) Treatment (Slide 7):**
  - "Treatment: **Burr hole**"
  - "Here, we can use a burr hole instead of a craniotomy because blood does not clot (due to trabeculae rupture and CSF leak)."

Analysis:
The statement "Epidural hematoma treated with burr hole" is
wrong. The slides explicitly state that EDH is treated with craniotomy and burr holes are not used because the clot in an EDH needs to be evacuated more completely than a burr hole allows.

Question 158:
Which of the following is wrong?

Answer: non-uniformed joint space loss in septic arthritis (other choices were obvious)

High-Yield Context (from previous slides - Septic Arthritis, Inflammatory Arthritis):

- **Septic Arthritis (Slide 109):** "Single joint inflammatory arthritis (septic arthritis): **general features of inflammatory arthritis** involving one joint only."
- **General features of inflammatory arthritis (Slide 108):**
  - "**Uniform joint space loss** across the articulation surface."
  - Bone erosions, osteopenia, soft tissue swelling.
- **Degenerative Arthritis (OA) (Slide 109):** Characterized by "Asymmetrical joint space loss" (i.e., non-uniform).

Analysis:
Septic arthritis is an acute inflammatory process. Like other inflammatory arthritides, it typically causes rapid,
uniform joint space loss due to enzymatic destruction of cartilage across the entire joint surface.
"Non-uniform joint space loss" is characteristic of osteoarthritis, where a specific compartment (e.g., medial knee) wears down more than others.

Therefore, the statement "non-uniformed joint space loss in septic arthritis" is **wrong**. Septic arthritis causes uniform joint space loss.

Question 159:
Which of the following is wrong?

Answer: spondylodiscitis>> loss of vertical height excludes the disease

High-Yield Context (from previous slides & general MSK radiology):

- The slides do not specifically cover spondylodiscitis in detail.

- **Spondylodiscitis (Discitis and Vertebral Osteomyelitis):** Infection involving the intervertebral disc and adjacent vertebral bodies.
    - **Radiographic Features:**
        - **Early:** May be normal, or subtle disc space narrowing.
        - **Later:**
            - **Disc space narrowing** is a key feature due to destruction of the disc.
            - Erosion and destruction of the vertebral endplates adjacent to the disc.
            - Lytic changes or sclerosis in the affected vertebral bodies.
            - Paravertebral soft tissue swelling or abscess formation.
            - In advanced cases, vertebral body collapse and **loss of vertebral height** can occur due to bone destruction. Kyphotic deformity may result.
- "Loss of vertical height excludes the disease": This implies that if there is loss of vertebral body height, it cannot be spondylodiscitis.

Analysis:
Spondylodiscitis leads to destruction of the disc and adjacent vertebral bodies. This destructive process can, and often does, lead to
loss of vertebral body height and potentially vertebral collapse, especially if untreated or severe.
Therefore, the statement "loss of vertical height excludes the disease" is
wrong. Loss of vertebral height is a potential complication or finding in spondylodiscitis.

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019 EXAM

Question 160:
Digital subtraction angiogram question from past

(This is a placeholder, not a full question. Assuming it's asking about a characteristic or use of DSA).

High-Yield Context (from previous slides - DSA - Slide 93):

- **Digital Subtraction Angiography (DSA):**
    - Technique: An initial "mask" image (without contrast) is taken. Contrast is injected, and subsequent images are acquired. The computer subtracts the mask image from the contrast images.
    - Purpose: This subtraction process effectively **removes overlying radio-opaque structures like bones and soft tissues**, leaving only the contrast-filled vessels visible with high clarity.
    - Appearance: Contrast typically appears black (or white depending on display settings, but the subtraction is key). Bones are "subtracted" out.
    - Use: Extensively used in interventional radiology for visualizing blood vessels during procedures like angioplasty, stenting, embolization, and diagnostic angiography.

Possible Question & Answer (based on common DSA knowledge):

- **Q: Which of the following best describes Digital Subtraction Angiography (DSA)?**
    - **A: A technique where bony structures are digitally removed to enhance visualization of contrast-filled vessels.**

Question 162:
DMSA scan for pyelonephritis

(This is a statement, likely implying a question about the utility or findings of DMSA in pyelonephritis).

High-Yield Context (from previous slides - DMSA Scan - Slide 91):

- **DMSA (Dimercaptosuccinic acid):**
    - "In static images we use a DMSA scan. **DMSA goes to the cortex.**"
    - It binds to renal cortical tubules.

    - Used for assessing **renal cortical morphology, scars, and differential renal function** (relative uptake by each kidney).
- **Pyelonephritis (Kidney Infection):**
    - Acute pyelonephritis is an infection of the renal parenchyma and collecting system. It can cause inflammation and damage to the renal cortex.
    - **DMSA Scan in Acute Pyelonephritis:** Can show focal or diffuse areas of **decreased DMSA uptake** in the affected cortical regions. These represent areas of inflammation/infection and dysfunction.
    - **DMSA Scan for Renal Scarring:** DMSA is very sensitive for detecting **renal cortical scars**, which can be a sequela of previous pyelonephritis (especially in children with vesicoureteral reflux). Scars appear as persistent photopenic (cold) defects.

Possible Question & Answer:

- **Q: What is the primary role of a DMSA scan in a patient with suspected or known pyelonephritis?**
    - **A: To detect areas of acute cortical inflammation/infection (as photopenic defects) and to identify long-term renal cortical scarring.**

Question 163:
leptomeningeal expansion - growing fracture

(This is a statement pairing "leptomeningeal expansion" with "growing fracture." This likely refers to a specific type of skull fracture complication).

High-Yield Context (General Pediatric Neuroradiology/Neurosurgery):

- **Growing Skull Fracture (GSF) / Leptomeningeal Cyst:**
    - This is a rare but serious complication of skull fractures in infants and young children (typically under 3 years of age), when the dura mater is still relatively thin and closely applied to the skull, and the brain is rapidly growing.
    - It occurs when there is a linear skull fracture associated with an underlying **dural tear**.
    - The pulsating cerebrospinal fluid (CSF) and/or herniating brain tissue/leptomeninges (pia and arachnoid mater) through the dural tear can prevent the bone edges from healing and cause progressive erosion and **expansion of the fracture line** over weeks to months.
    - A **leptomeningeal cyst** (an outpouching of the arachnoid containing CSF) can form and protrude through the skull defect. This is the "leptomeningeal expansion."
    - Clinically, it may present as a growing, pulsatile scalp swelling over the fracture site. Neurological deficits can occur.
    - Imaging (CT/MRI) shows the widened fracture, possible bone erosion, and often the associated cyst or herniated brain tissue.

Possible Question & Answer:

- **Q: A "growing fracture" of the skull in an infant, characterized by progressive widening of the fracture line and a pulsatile scalp swelling, is typically associated with what underlying pathology?**
    - **A: A dural tear with herniation of leptomeninges and/or brain tissue (often forming a leptomeningeal cyst).**

Question 164:
Not abuse - supracondylar

(This is a statement implying that a supracondylar fracture is generally NOT considered indicative of child abuse, or at least not a classic high-specificity fracture for abuse).

High-Yield Context (General Pediatric Orthopedics & Child Abuse):

- **Fractures Highly Specific for Child Abuse (Non-Accidental Injury - NAI):**
    - Metaphyseal corner fractures (classic metaphyseal lesions - CMLs).
    - Posterior rib fractures (especially multiple, in different stages of healing).
    - Scapular fractures.

    - Sternal fractures.
    - Spinous process fractures.
    - Complex skull fractures (though simple linear ones can be accidental).
    - Multiple fractures in different stages of healing.
- **Supracondylar Fracture of the Humerus:**
    - This is a very **common fracture in children**, typically occurring between ages 5-7 years.
    - The usual mechanism is a **fall onto an outstretched hand (FOOSH)** with the elbow hyperextended.
    - While any fracture *can* be inflicted, isolated supracondylar fractures with a plausible accidental mechanism (like a FOOSH) are generally **not considered high-specificity indicators of abuse** on their own. The history and overall clinical picture are crucial. If the history is inconsistent with the injury, or other suspicious injuries are present, then abuse would be considered.

Possible Question & Answer:

- **Q: Which of the following fractures in a child is generally LEAST specific for non-accidental injury (child abuse) when an appropriate accidental mechanism is described?**
    - (Options might include: Metaphyseal corner fracture, Posterior rib fracture, **Supracondylar humerus fracture**, Sternal fracture)
    - **A: Supracondylar humerus fracture.**

Question 165:
Wrong: uncinate in front of mesenteric vessels VS pancreas location is inferiorly oblique from right to left (not sure..)

(This is evaluating two anatomical statements, one of which is asserted as "Wrong").

High-Yield Context (from previous slides - Pancreas, Superior Mesenteric Vessels - Slide 37, 38):

- **Pancreas Anatomy & Location (Slide 37):**
    - "The pancreas is divided into four parts: Uncinnate process (related to the third part of duodenum), Head (related to the second part of duodenum), Body (we find the splenic vein posterior to the body), Tail (lies between the spleen and the kidney)."
    - "The pancreas crosses the midline. From an anatomical point of view, the tail is at a level superior to the head. This means that the **pancreas has an oblique direction inside the abdominal cavity.**" (It extends obliquely from the C-loop of the duodenum (right) superolaterally towards the splenic hilum (left), so the tail is more superior and posterior than the head).
- **Superior Mesenteric Vessels (SMV/SMA) & Uncinate Process (Slide 38):**
    - "Importance of superior mesenteric vessels:"
    - "Behind the superior mesenteric vessels, we can find the following structures (anterior to posterior): **Uncinnate process of the pancreas**, 3rd part of the duodenum, Left renal vein."
    - This means the uncinate process of the pancreas lies **posterior** to the superior mesenteric vessels (SMV and SMA). The SMV is typically to the right of the SMA.

Analysis of the Statements:

1. **"uncinate in front of mesenteric vessels"**:
    - According to Slide 38, the uncinate process is **BEHIND** (posterior to) the superior mesenteric vessels.
    - Therefore, this statement is **WRONG**.
2. **"pancreas location is inferiorly oblique from right to left"**:
    - Slide 37 states, "the tail is at a level superior to the head. This means that the pancreas has an oblique direction." The head is on the right, in the duodenal C-loop. The tail is to the left, towards the spleen, and is more superior.
    - So, the pancreas runs obliquely from inferomedial on the right (head) to superolateral on the left (tail).
    - The statement "inferiorly oblique from right to left" would mean it goes downwards as it goes to the left. This is the opposite. It goes *superiorly* oblique from right to left.

- Therefore, this statement is also **WRONG**.

The question states "Wrong: uncinate in front of mesenteric vessels VS pancreas location is inferiorly oblique from right to left". Both parts of this comparison seem to be incorrect statements based on the slides. If the "VS" implies choosing which one is wrong, they both are. If "Wrong:" applies to the first part, that's correct.

If "Wrong:" applies to the statement "uncinate in front of mesenteric vessels", then this is correct, as the uncinate is posterior.
The second statement, "pancreas location is inferiorly oblique from right to left," is also incorrect; it is superiorly oblique.

The question is poorly phrased if only one is meant to be wrong, as both appear incorrect based on the slides. However, the first statement (uncinate in front of SMV) is a very direct contradiction to Slide 38.

Question 166:
Mircrolobulated: BIRAD 4

(This implies a microlobulated margin for a breast mass is classified as BI-RADS 4).

High-Yield Context (from previous slides - Mass Margins, BI-RADS - Slide 64, 71):

- **Mass Margins (Slide 64):**
  - Well circumscribed (well defined)
  - Obscured
  - **Microlobulated**
  - Ill-defined
  - Speculated (sun-ray appearance; one of the most important signs of malignancy).
- **BI-RADS Classification (Slide 71):**
  - BI-RADS 2: Benign.
  - BI-RADS 3: Probably benign (<2% malignancy).
  - **BI-RADS 4: Suspicious finding** (amorphous calcification); needs biopsy; 2-95% malignancy.
  - BI-RADS 5: Highly suggestive of malignancy (>95% chance).

Microlobulated Margins (General Mammography):

- A microlobulated margin is one with small, short-cycle undulations.
- While some benign lesions can have lobulated or even microlobulated margins, a microlobulated margin is generally considered a **suspicious feature**, raising concern for malignancy more than a well-circumscribed or smoothly lobulated margin.
- Findings with microlobulated margins are often placed in **BI-RADS 4** (Suspicious), prompting recommendation for biopsy. The likelihood of malignancy for a microlobulated mass is in the BI-RADS 4 range (from low suspicion 4A to moderate 4B).

Analysis:
The statement "Mircrolobulated: BIRAD 4" aligns with standard mammographic interpretation, where microlobulated margins are a suspicious feature warranting a BI-RADS 4 classification.

Question 167:
BIRAD 2 RADIOLUCENT AND OVAL LESION

(This implies a radiolucent and oval lesion is classified as BI-RADS 2).

High-Yield Context (from previous slides - BI-RADS, Radiolucent Lesions - Slide 65, 71):

- **Radiolucent Breast Lesions:** These are lesions that are darker than surrounding glandular tissue on mammography, indicating they contain fat.
  - Examples: Lipoma (purely fat), galactocele (can have fat-fluid levels), oil cyst (liquefied fat, often post-traumatic), hamartoma (contains fat and glandular tissue).
  - Purely fatty lesions like lipomas are characteristically radiolucent.
- **Oval Shape (Slide 64):** An oval (egg-shaped) lesion is one of the described shapes.

- **BI-RADS 2 (Benign Finding) (Slide 71):** "no need for short interval follow up." This category is for demonstrably benign findings.
    - A classic lipoma (radiolucent, well-circumscribed, oval or round) is a BI-RADS 2 finding.
    - An oil cyst (often round/oval, radiolucent, may have eggshell calcification) is BI-RADS 2.

Analysis:
A lesion that is
radiolucent (suggesting fat content) and **oval** (a generally non-aggressive shape), especially if well-defined (implied if not stated otherwise for BI-RADS 2), is characteristic of a benign entity like a lipoma or an oil cyst. Such findings are appropriately classified as **BI-RADS 2**.

Question 168:
Finding in judicial hanging: a. CERVICAL fracture b. cerebral anemia mostly the answer is A

High-Yield Context (General Forensic Pathology / Biomechanics of Hanging):

- **Judicial Hanging (Long Drop):** Designed to cause rapid death, typically by cervical spine fracture-dislocation (classically a "hangman's fracture" involving the C2 pedicles/pars interarticularis) leading to transection or severe injury to the spinal cord high in the cervical region. This causes immediate respiratory arrest and neurological incapacitation.
- **Suicidal/Homicidal Hanging (Short Drop/Suspension):** Death is more often due to:
    - **Cerebral hypoxia/anoxia:** Caused by compression of the carotid arteries (occluding blood flow to the brain) and/or jugular veins (preventing venous return from the brain, leading to congestion and hypoxia).
    - Airway obstruction (compression of the trachea) can also contribute but is often not complete.
    - Vagal reflex (cardiac arrest due to pressure on carotid sinus/vagus nerve).
    - Cervical spine fractures are less common in short-drop/suspension hangings than in judicial long-drop hangings, though other neck injuries can occur.
- "Cerebral anemia" is not a standard term. If it means lack of blood flow to the brain (ischemia/anoxia), then that *is* a mechanism of death in many hangings.

Analysis (based on the common understanding of judicial hanging injuries):

- a. CERVICAL fracture: **True**. Specifically, a high cervical fracture-dislocation (like a hangman's fracture) is the intended primary injury in judicial long-drop hanging to cause swift death.
- b. cerebral anemia (ischemia/anoxia): **True** as a mechanism of death in many types of hangings (especially short drop/suspension where vascular occlusion is key), but in a judicial hanging, the spinal cord injury from fracture is often the primary lethal event, which would then lead to cessation of breathing and subsequent global anoxia.

The question likely refers to the *primary intended mechanism* or *most characteristic injury* in a classic judicial hanging.
If the answer is 'A', it emphasizes the cervical fracture as the defining injury of judicial hanging. Both are potential consequences or mechanisms, but the high cervical fracture causing spinal cord transection is the specific aim of a "long-drop" judicial hanging.

Question 169:
Wrong anout Non ossifying fibroma - central lesion

(This implies that "central lesion" is a wrong descriptor for a Non-Ossifying Fibroma - NOF).

High-Yield Context (from previous slides - NOF - Slide 111 & General Knowledge):

- **Non-ossifying fibroma (NOF):**
    - Benign, developmental fibrous lesion.
    - Typically occurs in the **metaphysis** of long bones in children and adolescents.
    - Classically described as an **eccentric, cortically-based lesion**. It arises in or immediately adjacent to the cortex and often causes some thinning or scalloping of the overlying cortex. It does not usually extend deeply into the medullary cavity to be considered "central" in the diaphysis or metaphysis.
    - Slide 111 describes it as having a "well defined border," "narrow transition zone," "septated lesion." These are consistent with an eccentric cortical lesion.

Analysis:

- A "central lesion" would imply it's located in the center of the medullary cavity of the bone.
- NOFs are characteristically **eccentric** and **cortical** (or immediately subcortical) in location.

Therefore, describing a Non-Ossifying Fibroma as a "central lesion" is **wrong**.

Question 170:
Ewing vs osteosarcoma - ewing is diaphesial

(This statement compares the typical locations of Ewing sarcoma and osteosarcoma, asserting Ewing is diaphyseal).

High-Yield Context (from previous slides - Ewing/Osteosarcoma locations - Q127 context & General Knowledge):

- **Osteosarcoma (Conventional):**
  - Most commonly arises in the **metaphysis** of long bones, especially around the knee.
- **Ewing Sarcoma:**
  - Commonly occurs in the **diaphysis** or metadiaphysis of long bones (femur, tibia, humerus are common sites).
  - Can also occur in flat bones (pelvis, ribs, scapula).
  - Slide 110 mentions Ewing sarcoma but doesn't specify location other than it can cause fever/leukocytosis.

Analysis:
The statement "ewing is diaphesial" is
true as a common and characteristic location for Ewing sarcoma. Osteosarcoma is classically metaphyseal. This statement highlights a key differentiating feature in their typical presentations.

Question 171:
Wrong extramedullary intradural lesion cause cord expansion

(This statement claims it's wrong for an extramedullary intradural lesion to cause cord expansion).

High-Yield Context (General Spinal Cord Tumor Classification & Effects):

- **Spinal Cord Lesion Locations:**
  - **Intramedullary:** Originating *within* the spinal cord substance itself (e.g., astrocytoma, ependymoma). These lesions typically cause **expansion of the spinal cord**.
  - **Extramedullary:** Originating *outside* the spinal cord substance. These are further divided:
    - **Intradural-Extramedullary (IDEM):** Located within the dural sac but outside the spinal cord (e.g., meningioma, schwannoma/neurofibroma). These lesions typically **compress and displace the spinal cord**, but do not cause intrinsic expansion of the cord itself. The cord may be thinned or flattened.
    - **Extradural:** Located outside the dural sac (e.g., metastatic disease to vertebrae, disc herniation, epidural abscess). These lesions compress the dural sac and the spinal cord within it.
- **Cord Expansion:** Refers to an increase in the diameter or bulk of the spinal cord itself. This is characteristic of intramedullary lesions.

Analysis:
The statement is "Wrong extramedullary intradural lesion cause cord expansion." This means it's asserting that the idea "extramedullary intradural lesion cause cord expansion" is wrong.
This is
true. Extramedullary intradural lesions (like meningiomas or schwannomas) grow outside the cord but within the dura. They **compress and displace** the spinal cord; they do **not** cause the cord itself to expand. Cord expansion is a hallmark of intramedullary lesions.

Therefore, the statement correctly identifies that it's wrong for an extramedullary intradural lesion to cause cord expansion.

Question 172:
Aorta supply GI with 3 single main branches

(This refers to the major unpaired visceral branches of the abdominal aorta supplying the GI tract).

High-Yield Context (General GI Vascular Anatomy):
The abdominal aorta gives rise to three major
unpaired (single) branches that supply the bulk of the gastrointestinal tract:

1. **Celiac Trunk (Celiac Artery):** Arises anteriorly from the aorta just below the diaphragm. It supplies the foregut derivatives: distal esophagus, stomach, proximal duodenum, liver, gallbladder, pancreas, and spleen.
2. **Superior Mesenteric Artery (SMA):** Arises anteriorly from the aorta, inferior to the celiac trunk (typically around L1). It supplies the midgut derivatives: distal duodenum, jejunum, ileum, cecum, appendix, ascending colon, and proximal two-thirds of the transverse colon.
3. **Inferior Mesenteric Artery (IMA):** Arises anteriorly from the aorta, inferior to the SMA (typically around L3). It supplies the hindgut derivatives: distal one-third of the transverse colon, descending colon, sigmoid colon, and rectum.

Analysis:
The statement "Aorta supply GI with 3 single main branches" is
true. These are the celiac trunk, SMA, and IMA.

Question 173:
Technique used in interventional radiology - seldinger

(This implies the Seldinger technique is used in interventional radiology).

High-Yield Context (from previous slides - Angiography Technique - Slide 97):

- "Technique (**Seldinger technique**)"
  - "We usually enter through the femoral artery..."
  - "Insertion of a needle and a guidewire; the needle penetrate the artery..."
  - "The needle is slowly withdrawn until we see backflow"
  - "Take the needle out and insert a catheter over the guidewire"
  - "Take the guidewire out."
- Interventional radiology encompasses a wide range of minimally invasive, image-guided procedures, many of which involve percutaneous vascular access.

Analysis:
The
Seldinger technique is a fundamental method for obtaining safe percutaneous access to blood vessels (and other hollow structures). It is a cornerstone of angiography and many interventional radiology procedures.
The statement "Technique used in interventional radiology - seldinger" is
true.

Question 174:
stroke in MRI? Hyperintense in DWI, Hypointense in ADC

(This describes the characteristic MRI appearance of an acute ischemic stroke).

High-Yield Context (from previous slides - MRI in Stroke - Slide 75):

- "To diagnose an ischemic infarct, we use an MRI scan."
- "The golden standard for the diagnosis is a DWI and ADC sequences:"
  - "**DWI: diffusion weighted image; ... the area of ischemia will look hyperintense and well demarcated.** On a DWI sequence, the CSF looks hypointense."
  - "**ADC: apparent diffusion coefficient. The area of a stroke will look hypointense** (the hyperintense area on DWI will look hypointense on ADC). On an ADC sequence, the CSF looks hyperintense."
  - "The DWI sequence and the ADC sequence need to be viewed side by side. To make a diagnosis of a stroke, you need to have a well demarcated wedge shaped lesion that respects the arterial territory. It must look hyperintense on DWI and hypointense on ADC."

Analysis:
The statement "stroke in MRI? Hyperintense in DWI, Hypointense in ADC" accurately describes the classic pattern of acute

ischemic stroke on these MRI sequences, known as "restricted diffusion." This combination is highly specific for acute ischemia.
The statement is
true.

Question 175:
Biconvex lesion on CT - Extradural hematoma

(This links a biconvex lesion shape on CT to an extradural hematoma).

High-Yield Context (from previous slides - Extradural/Epidural Hematoma - Slide 6):

- "Epidural hemorrhage:"
  - "The typical hemorrhage (90-95%) looks like a **biconvex (lens-shaped) hyperdense lesion** that is unilateral and supratentorial."

Analysis:
A "biconvex lesion on CT" is the characteristic shape of an
extradural (epidural) hematoma.
The statement is
true.

Question 176:
Wrong about tension pneumothorax - Contralateral widening of intercostal spaces

(This implies that "Contralateral widening of intercostal spaces" is a wrong sign for tension pneumothorax).

High-Yield Context (from previous slides - Tension Pneumothorax - Slide 106):

- **Tension Pneumothorax (Minor criteria):**
  - "Flattening of the **ipsilateral** diaphragm."
  - "Widening and flattening of the intercostal spaces on the **ipsilateral** side."
  - "Congestion (increased vascular markings) of the hila."
- **Major criteria:** Mediastinal shift to the **contralateral** side.

Analysis:
In a tension pneumothorax, the increased pressure builds up on the
ipsilateral (same) side as the pneumothorax. This pressure causes:

- The **ipsilateral** lung to collapse.
- The **ipsilateral** hemidiaphragm to be pushed down and flattened.
- The **ipsilateral** intercostal spaces to widen.
- The mediastinum to shift to the **contralateral** (opposite) side.

The statement "Contralateral widening of intercostal spaces" is **wrong**. The widening of intercostal spaces occurs on the **ipsilateral** side due to the high intrapleural pressure on that side. The contralateral side might even appear compressed due to the mediastinal shift.

Question 177:
Which is true about stochastic effect? has a linear proportion with radiation dose

(This asks about a characteristic of stochastic effects of radiation).

High-Yield Context (from previous slides - Radiation Effects - Q134 context & General Radiation Biology):

- The slides (Slide 91) touch on radiation effects: "There are no clinical studies that associate cancers with diagnostic doses of radiation." This implicitly refers to stochastic effects (like cancer).
- **Types of Radiation Effects:**
  - **Deterministic Effects (Non-Stochastic):**
    - Have a **threshold dose** below which the effect does not occur.

- The **severity** of the effect increases with dose above the threshold.
- Examples: Skin erythema, cataracts, sterility, radiation sickness, organ damage.

- **Stochastic Effects (Probabilistic):**
  - Have **no dose threshold** (according to the Linear No-Threshold model - LNT). Any dose, however small, is assumed to carry some risk.
  - The **probability (or risk)** of the effect occurring increases with dose.
  - The **severity** of the effect, if it occurs, is independent of the dose (e.g., a radiation-induced cancer is just as severe whether caused by a low or high dose, but the chance of it happening is higher with a higher dose).
  - Examples: Cancer induction, heritable genetic effects.
  - The LNT model assumes a **linear relationship between dose and the probability of the effect**.

Analysis:
The statement "Which is true about stochastic effect? has a linear proportion with radiation dose" is referring to the relationship between dose and the
probability of the stochastic effect occurring.
According to the Linear No-Threshold (LNT) model, which is widely used for radiation protection purposes, the risk (probability) of stochastic effects like cancer is directly proportional to the radiation dose, even at low doses. There is no threshold.

Therefore, the statement "has a linear proportion with radiation dose" (referring to the probability of occurrence) is **true** for stochastic effects under the LNT model.
