問題 1：請選擇「不」正確的描述。

1. 設備管理的基本概念是確保病患在例行臨床實務中的電子上與機械上安全。
2. 設備管理必須將暴露劑量(Exposure dose)納入考量。
3. 若醫療機構本身無法執行維護工作，可以尋求委外服務。
4. 顯影劑(contrast media)自動注射器，是需要維護的『』項目之一。

問題 2：請選擇與醫療品質最無關的項目。

1. 有效性
2. 效率
3. 可近性
4. 科學性與技術性的品質

問題 3：請選擇「無」直接關聯的一個或一個以上的配對。

a. 在 X 光高電壓產生器(X-ray high-voltage generator)內的計時器(Measurement of timer)測量誤差－X 光管(X-ray tube)的電壓與電流計
b. 接地確認(Confirmation of grounding)－漏電電流計(leak current meter)
c. 移動保留裝置(retaining device)所需的力量測量－推拉力測試儀器(push-pull gauge)

1. 只有 a
2. 只有 b
3. 只有 c
4. a 到 c 全部

問題 4：請選擇改善醫療品質之 4 個步驟順序的正確答案。

① 辨識問題　② 分析問題　③ 形成假設　④ 確認與行動

1. ① → ② → ③ → ④
2. ① → ② → ④ → ③
3. ① → ③ → ② → ④
4. ① → ③ → ④ → ②

問題 5：下列何者「不」正確。

1. 使用者有責任在製造商面前檢查新購買的設備。
2. 維護包括日常維護和定期維護。
3. 在每天開始工作前的檢查，主要為目視檢查。
4. 醫療機構是負責維護醫療設備的主要機構。

問題 6：請選擇逐步手法(stepwise approach)的正確名稱，包括目標設定、計畫訂定與執行，以及效能評估與管理，以便有效達成目標，此方法發展於 1930 年代且迄今仍被廣泛使用。

1. CPDA
2. DAPC
3. PDCA
4. ACPD

問題 7：請選擇維修記錄「不」需要的項目。

1. 醫療設備的名稱
2. 產品型式、型號與購買年份
3. 購買數量
4. 維修記錄(日期、維修要點、維修人員)

問題 8：請選擇何者「不是」醫學影像與放射學系統管理員角色的的正確描述。

1. 維持效能並確保放射線相關設備的安全性，以提供適當與高品質的醫療服務。
2. 指派工作人員，以確保放射線相關設備的順暢操作。
3. 準備各放射線相關設備需要的管理計畫(management plans)。
4. 依需要提供設備管理的教育與訓練。

問題 9：請選擇可用以追蹤 mAs 與 mR/mAs 值之變異量、測得之 kVp 值與自動曝光一段時間後之密度的圖形。

1. 推移圖(Run chart)
2. 管制圖(Control chart)
3. 查檢表(Check sheet)
4. 柏拉圖(Pareto chart)

問題 10：請選擇何者「不是」焦點的正確描述。

1. 即使負載狀態(load conditions)已改變，焦點的大小仍保持不變。
2. 實際的焦點區域(actual focus area)比有效焦點區域(effective focus area)大。
3. 標的角度(target angle)愈小，可允許的負載愈大。
4. X 光強度在陰極側(cathode side)較高，在陽極側(anode side)較低。

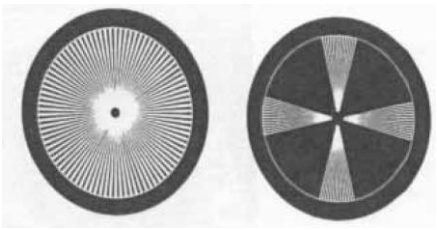
問題 11：請選擇「無法」以非連接型(non-connection) X 光分析器進行測量的項目。

1. mGy　　2. mAs
3. 半值層(HVL)　　4. 輻射率(Radiation rate)

問題 12：請選擇何者「不是」影像倍增管(image intensifier)的正確描述。

1. 周邊的影像失真(Image distortion)大於中央。
2. 入射平面(the plane of incidence)的視野領域愈大，影像的失真愈小。
3. 入射平面的視野領域愈大，影像的失真愈多。
4. 影像失真包括線軸失真(spool distortion)與地磁失真(geomagnetic distortion)。

問題 13：請選擇可使用星型攝影機法(star-pattern camera method)進行測量的項目。



1. mA 線性(mA Linearity)　　2. 焦點測試(Focal spot test)
3. kVp 準確度(kVp accuracy)　　4. mAs 互換性(mAs reciprocity)

問題 14：請選擇最大額定管電壓為 150 Kv(tube voltage of 150 kV)以下之 X 光設備的正確完全過濾範圍。

1. **1.5** mmAl 以上　　2. **2.0** mmAl 以上　　3. **2.5** mmAl 以上　　4. **3.0** mmAl 以上

問題 15：請選擇一個專有名詞，是用以描述藉由控制曝光時間或其他因素，無論病患體型大小，皆可以固定密度(constant density)提供影像資料的方法。

1. 產生器(Generator)　　2. 自動曝光控制(Automatic exposure control (AEC))
3. 半值層(Half value layer (HVL))　　4. 計時器(Timer)

問題 16：請選擇 X 光場(X-ray field)與光場(the light field)之差異的正確描述。

1. 0.5%的射源影像距離(source image distance (SID))
2. 1.0%的射源影像距離
3. 2.0%的射源影像距離
4. 3.0%的射源影像距離

問題 17：選擇具 AEC (自動曝光控制)能力之設備的最大入射線量率(incident dose rate)。

1. 2.58 x 10^{-1} C/kg/min
2. 2.58 x 10^{-2} C/kg/min
3. 2.58 x 10^{-3} C/kg/min
4. 2.58 x 10^{-4} C/kg/min

問題 18：請選擇與執行自動曝光控制(automatic exposure control)「無」關的性質。

1. 回應時間
2. 管電壓(Tube voltage)
3. 物體厚度
4. 管電流

問題 19：請選擇測量 X 光螢光攝影(X-ray fluoroscope)之入射線量率(incident dose rate)的正確射源影像距離(SID)。

1. 8 吋
2. 10 吋
3. 12 吋
4. 14 吋

問題 20：請選擇與散射線可移除式濾光板(a scattered ray removal grid)「無」關的項目。

1. 選擇性
2. 解析度(Resolution)
3. 對比改善因子(Contrast improvement factor)
4. 曝光因子(Exposure factor)

問題 21：請選擇可使用 Burger-Rose phantom 假體測量的項目。

1. 低對比　　2. 銳度　　3. 調製傳遞函數(MTF)　　4. 方均根(RMS)

問題 22：請選擇何者「不是」平板探測器(flat panel detector)的正確描述。

1. 有直接與間接轉換法。
2. CsI 適用於間接變換法的 X 光入射平面(plane of X-ray incidence)。
3. 無覆光(veiling glare)。
4. 探測器會受地磁(geomagnetism)影響。

問題 23：請選擇何者「不是」使用個人熱發光劑量計(TLD)的適當方法。

1. 熱發光劑量計(TLD)應放置於防護衣內側。
2. 當使用熱發光劑量(TLD)計作為額外的測量時，將它放置於防護衣的頸部外側。
3. 熱發光劑量計(TLD)對光線敏感。
4. 每一個熱發光劑量計(TLD)應至少每 3 個月進行一次放射量測定(dosimetry)。

問題 24：請選擇何者「不是」X 光螢光攝影系統(X-ray fluorographic system)的組成項目。

1. X 光濾光板(X-ray grid)
2. X 光影像倍增管(X-ray image intensifier)
3. X 光電視照相機(X-ray television camera)
4. 電視監視器(TV monitor)

問題 25：請選擇影響乳房影像品質的正確項目組合。

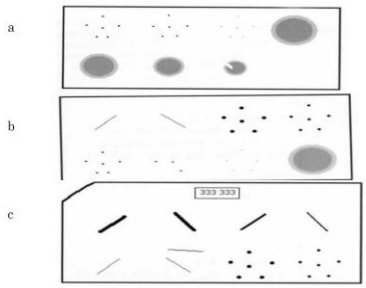
a. 乳房吸收量的差異　　b. 焦距的大小　　c. 曝光場　　d. 過濾

1. 只有 a
2. a 與 b
3. a、b 與 c
4. a 到 d 全部

問題 26：請選擇何者「不是」影像倍增管(image intensifier)的性能測試工具。

1. 測量變換因子的亮度計(Luminance meter)
2. 測量對比的密度計(Densitometer)
3. 測量失真的方格圖(Grid chart)
4. 測量解析度的 X 光解析度測試圖

問題 27：請選擇乳房假體攝影影像(mammographic phantom images)中評估模擬病變的正確評分。



1. 腫塊(Mass)=4、斑點(Speck)=3.5、纖維(Fiber)=5
2. 腫塊(Mass)=3.5，斑點(Speck)=4，纖維(Fiber)=4.5
3. 腫塊(Mass)=4，斑點(Speck)=5，纖維(Fiber)=5.5
4. 腫塊(Mass)=3.5，斑點(Speck)=3.5，纖維(Fiber)=6

問題 28：請選擇何者「不是」增加旋轉陽極 X 光管(rotating anode X-ray tube)短期可負載量的正確方法。

1. 增加焦點區域。
2. 增加陽極轉速(anode rotation speed)。
3. 增加標的角度。
4. 增加焦點軌跡(focus trajectory)的直徑。

問題 29：請選擇一次乳房攝影曝光量的適當平均乳房劑量。

1. 1.5 mGy 以下
2. 2.0 mGy 以下
3. 2.5 mGy 以下
4. 3.0 mGy 以下

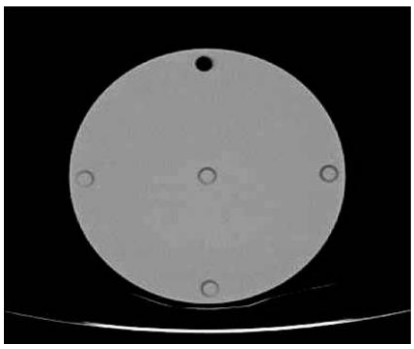
問題 30：請選擇乳房攝影設備之自動曝光控制(AEC)檢查「不」必要的項目。

1. 可以表現 2、4、6 與 8 公分線條的平板(plate)。
2. 游離室(Ionization chamber)
3. 鉛標記板(Lead marker plate)
4. 密度計(Densitometer)

問題 31：請選擇何種組合「不」適用於 X 光電腦斷層系統。

1. X 光管－旋轉陽極(Rotating anode)
2. X 光探測器－半導體
3. DAS (直接附加儲存)－數位類比轉換器(D/A converter)
4. 電腦－磁碟

問題 32：請選擇可使用下圖假體進行測量的項目。



1. 空間解析度(Spatial resolution)
2. 對比解析度
3. 一致性
4. 電腦斷層劑量指標(Computed tomography dose index (CTDI))

問題 33：請選擇與 X 光電腦斷層攝影產生之假影(artifacts)有關的項目。

1. 多次反射
2. 邊溢波(Side lobe)
3. 部分容積效應(volume effect)
4. 記錄失真(Misregistration)

問題 34：請選擇何者「不是」電腦斷層攝影數值測量的合適假體組成材料。

1. 聚乙烯(Polyethylene)
2. 聚苯乙烯(Polystyrene)
3. 樹脂玻璃(Plexiglas)
4. 鋁

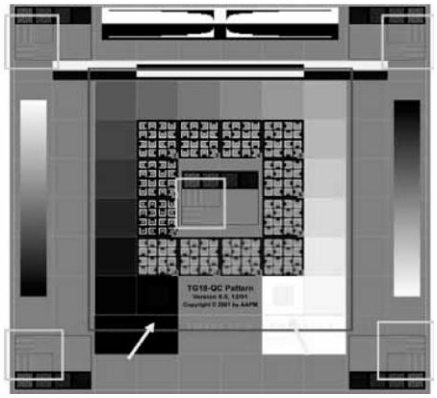
問題 35：請選擇電腦斷層劑量指標(computed tomography dose index (CTDI))的正確特性。

1. 與切片厚度成比例
2. 與管電流成比例
3. 與管電壓成比例
4. 與影像雜訊成比例

問題 36：請選擇何者「不是」多層次電腦斷層攝影的正確描述。

1. 部分容積效應會減低
2. 可取得準確的各向同性(isotropic)影像。
3 環狀假影會增加
4. 最終切片的厚度與準直儀(collimator)無關

問題 37：請選擇何者「不是」下方影像的正確描述。



1. 亮度與對比的改變
2. 空間解析度
3. 幾何失真
4. 亮度一致性

問題 38：請選擇與多層次電腦斷層攝影系統有關的項目組合。

a. 射頻線圈(RF coil)
b. 無線電屏蔽(Radio shield)
c. 錐形射束(Cone beam)
d. 資料擷取系統 DAS (Data acquisition system)
e. 靈敏度時間控制 STC (Sensitivity time control)

1. a與b　　2. a與e　　3. b與c　　4. c與d

問題 39：請選擇「不會」在電腦斷層攝影中引起假影的項目。

1. 射束(Beam)硬化
2. 機器誤差
3. 探測器缺陷
4. 重建運算法(algorithm)的選擇

問題 40：請選擇與電腦斷層攝影軸方向解析度有關的正確項目組合。

a. 顯示器像素(Display pixel)大小　b. 探測器的敏感度
c. 切片厚度　d. 螺旋節距(Helical pitch)

1. a與b　2. a與e　3. b與c　4. c與d

問題 41：請選擇何者「不是」多層面電腦斷層攝影的正確描述。

1. 在軸方向也有探測器陣列。
2. 同時可獲得多層切面影像。
3. 可取得各向同性(isotropic)影像。
4. 切片的厚度取決於準直儀(collimator)。

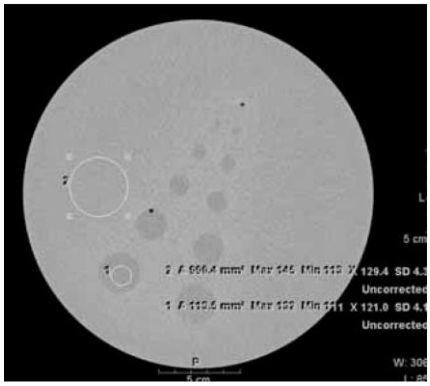
問題 42：請選擇何者「不是」電腦斷層系統之電腦斷層劑量指標(CTDI)的正確描述。

1. 使用懸垂式離子室(pensile-type ion chamber)。
2. 使用直徑 16 與 32 公分的假體。
3. 整合多層次掃瞄的 Z 側劑量(Z-side dose)剖面。
4. 提供手術期間的病患暴露量資料。

問題 43：請選擇螺旋電腦斷層攝影於切片厚度為 5 毫米，與旋轉臂每轉一次工作台移動 10 毫米間的正確間距。

1. **0.2**　2. **0.5**　3. **2**　4. **5**

問題 44：請選擇下圖顯示之影像的適當描述。



1. 空間解析度測量
2. 對比解析度
3. 電腦斷層攝影值測量
4. 放射劑量測定

問題 45：請選擇關於電腦斷層攝影系統之空間解析度的正確測量。

1. 維納頻譜 Winer spectrum (SD)
2. 公分$^{-1}$/電腦斷層攝影值
3. 電腦斷層攝影值
4. 調控轉換函數(MTF) (Lp/cm)

問題 46：請選擇必須在超導核磁共振攝影(MRI)系統的組成中，使用液體螺旋進行冷卻的項目。

1. 斜向磁場線圈(magnetic field coil)
2. 體線圈(Body coil)
3. 靜態磁場線圈
4. 表面線圈

問題 47：請選擇何者「不是」核磁共振攝影(MRI)的合適假體組成材料。

1. 硫酸銅 CuSO4 (Cupric sulfate)
2. 水
3. 氯化鎳 $NiCl_2$ (Nickel chloride)
4. 凝膠(Gel)

問題 48：請選擇「不會」在核磁共振攝影(MRI)中引起假影的項目。

1. 呼吸的動作
2. 腸道氣體
3. 心臟運動
4. 衣服的鈕釦

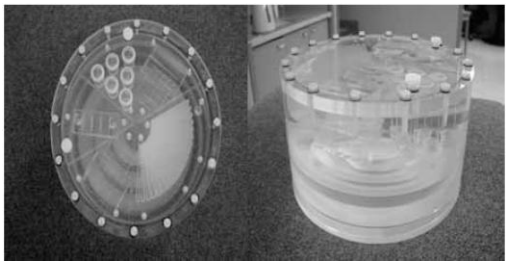
問題 49：請選擇何種項目「不」適用於核磁共振攝影(MRI)系統的一日性檢查。

1. 氦液位計(helium level measurement)的控制
2. 恆溫溼器(thermo-hygrostat)的控制
3. 低溫冰箱(cryogenic refrigerator)的控制
4. 手術室的溫度控制

問題 50：請選擇不應攜入核磁共振檢查室的項目。

1. 氧氣瓶(Oxygen cylinder)
2. 陶瓷剪刀(Ceramic scissors)
3. 以非磁性材質製作的輪椅
4. 蝴蝶針

問題 51：請選擇「不能」使用下圖核磁共振效能評估專用假體進行測量的項目。



1. 切片厚度
2. 影像一致性
3. 空間解析度
4. 假影

問題 52：請選擇改善核磁共振攝影訊號/雜訊比(S/N ratio)的適當方法。

1. 增加矩陣(matrix)。
2. 減低視野大小。
3. 增加加成(additions)
4. 減低切片厚度。

問題 53：請選擇植入心律調節器的人進入核磁共振攝影檢查室，建議的最大磁通密度(magnetic flux density)限制。

1. 50 gauss (高斯)
2. 10 gauss (高斯)
3. 5 gauss (高斯)
4. 0.5 gauss (高斯)

問題 54：請選擇何者「不是」核磁共振攝影系統效能評估的必須項目。

1. 影像一致性
2. 影像失真
3. 切片厚度
4. 液氦液位(Liquid helium level)

問題 55：請選擇在使用 1.5T 核磁共振系統進行臨床檢查，突然發生電力中斷，且預期在短時間內並不會恢復電力時，需採取的正確行動。

1. 手動拉出檢查台，讓病患離開檢查台，並等待電力復原。
2. 將手電筒拿至檢查室安慰病患，並等待電力復原。
3. 冷卻幫浦(cooling pump)停止後，可能會立即發生淬滅(quenching)。為了避免發生危險，需立即將病患拉離檢查台，並讓病人離開檢查室。
4. 電力中斷時磁場會消失。將照明設備與凳子帶至檢查室，並協助病患安全離開檢查台。

問題 56：請選擇核磁共振系統全球通用的最大雜訊。

1. 95 dB (分貝)　　2. 100 dB (分貝)　　3. 70 dB (分貝)　　4. 140 dB (分貝)

問題 57：請選擇何者「不是」核磁共振系統每日例行檢查的必須項目。

a. 使用檢查用假體測量訊號/雜訊比
b. 確認緊急呼叫的能力
c. 確認斷開鈕(quench button)的操作

1. 只有 a
2. 只有 b
3. 只有 c
4. a 到 c 全部

問題 58：請選擇在含有氦的情況下進行淬滅(quench)的「不」當行動。

1. 打開檢查室的門。
2. 在臨床檢查中發生淬滅時，請讓病患立即離開檢查室。
3. 通知院內準備進行心肺復甦術。
4. 立即確認病患的生命徵象。

問題 59：請選擇「不」需避免核磁共振檢查的病患。

1. 剛手術後，在腦神經系統裝有夾子(clip)的病患。
2. 植入心律調節器的病患。
3. 精神病患
4. 植入強磁性耳蝸(ferromagnetic cochlear)的病患。

問題 60：請選擇美國食品與藥物管理局對全身暴露於核磁共振攝影系統之無線射頻波，建議的最大電磁波能量比吸收率(specific absorption rate (SAR))。

1. **4.0 W/kg**
2. **0.4 W/kg**
3. **0.8 W/kg**
4. **8 W/kg**

問題 61：請選擇何者「不是」處理超音波診斷儀雜訊的正確方法。

1. 如果雜訊源自於電源線，請將設備重新使用另一條電源線連接至插座。
2. 考量減低雜訊與電器安全，請避免使用 3P 轉接頭連接電源線與插座。
3. 如果雜訊源自於電源線，請使用雜訊濾波器或雜訊遮斷變壓器。
4. 使用該設備時，需避免同時使用電刀或其他可能會引起大量雜訊的工具。

問題 62：請選擇何者「不是」在使用後檢查超音波診斷儀的適當方法。

1. 檢查探頭鏡
2. 檢查探頭纜線的包覆情形。
3. 探頭上留有未拭去的凝膠
4. 整理探頭纜線。

問題 63：請選擇何者是管理超音波診斷儀探頭的正確方法。

a. 在使用前檢查聲波透鏡(acoustic lens)與探頭盒(probe)是否出現裂痕。
b. 定期檢查連接探頭與設備主體之連接頭是否出現鬆脫。
c. 在對探頭進行滅菌前，洗淨探頭、盒子、纜線上的凝膠、血液與其他黏附物。

1. 只有 a
2. 只有 b
3. 只有 c
4. a 到 c 全部

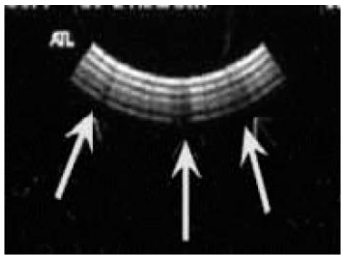
問題 64 請選擇何者「不是」使用超音波診斷儀的正確方法。

1. 使用後將設備的顯示器固定。
2. 在設備使用完畢後，將探頭的纜線收好。
3. 中斷檢查探頭(處於作用位置)的連結。
4. 在設備使用完畢後，拭淨探頭上的凝膠。

問題 65：請選擇使用超音波診斷儀的正確方法。

1. 探頭掉落地面，但未經檢查就使用於下一位病患且。
2. 如果兩次檢查間的時間充裕，則不一定需要將影像固定。
3. 如果探頭表面受損，影像會受影響但電器安全則無疑慮。
4. 將不常使用的探頭儲存在盒子中，並在需要時進行連結。

問題 66：請選擇下圖轉送器的正確檢查項目。



1. 回波現象(Main bang phenomenon)
2. 晶體缺陷(Crystal defects)
3. 纜線
4. 橡膠浮動

問題 67：請選擇規律使用超音波診斷儀的正確方法。

a. 打開電源後等候一段時間，然後再使用該設備。
b. 必須在使用前檢查探頭。
c. 在調整影像品質後，也需調整顯示器螢幕與單色印表機。
d. 使用設備後，將探頭保存在托架上避免掉落。

1. a 與 b
2. b 與 c
3. c 與 d
4. a 到 d 全部

問題 68：請選擇測量標準超音波假體時，「不」合適的注意事項。

1. 將假體放在乾淨、平坦的位置。
2. 在掃描表面上使用適量的低黏度凝膠或水。
3. 調整增益，使假體表面呈現黑色。
4. 將時間增益控制(TGC)調整至正常肝臟的設定值，並記錄該設定。

問題 69：請選擇規律使用超音波診斷儀的「錯誤」方法。

1. 確認插座的電量。
2. 並不需要配有接地線的 3P 插座。
3. 在移動時，需避免拔掉設備的插座。
4. 在確認影像傳送與其他步驟皆完成後，關閉電源。

問題 70：請選擇控制收到之超音波訊號的亮度與整體強度的項目。

1. 時間增益控制(TGC)
2. 增益
3. 動態範圍
4. 輸出電源

問題 71：請選擇何者「不是」γ 相機之效能測試的正確描述。

1. 整體評估是依據將準值儀(gamma camera)連接至相機。
2. 能量解析度是以 keV 表示。
3. 相機的內在空間解析度與準值儀的解析度無關。
4. 使用 ^{99m}Tc 輻射原。

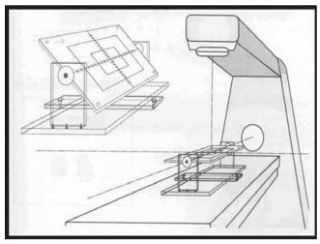
問題 72：請選擇正子攝影系統的正確描述。

1. 環的直徑愈大，空間解析度愈佳。
2. 距視野中心的距離愈遠，空間解析度愈佳。
3. 符合計數的時間視窗愈短，計數效率愈佳。
4. LSO 的相對光輸出比 BGO 小。

問題 73：請選擇何者「不是」直線加速器的正確描述。

1. 速調管(klystron)是一種微波振子管(microwave oscillator tube)。
2. 離子幫浦會抑制放電。
3. 偏轉磁鐵可從電子射線中分離出 X 射線。
4. 螢幕放射量測定器也與射束平坦性的監測有關。

問題 74：請選擇使用下圖工具「無法」在治療設備中測量的項目。



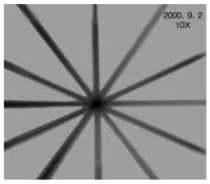
1. 光/輻射照野一致性
2. 雷射定位精確性
3. 照野指示器(Light/radiation field coincidence)精確性
4. 檢查台頂端下垂

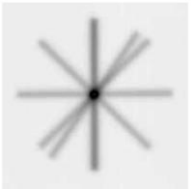
問題 75：請選擇與體外放射法之劑量分佈「無關」的項目。

1. 劑量率
2. 輻射能量
3. 輻射照野面積
4. 射源標的間距

問題 76：請選擇下述(A)圖與(B)圖的正確描述。

(A) (B)





1. (A)旋轉臂旋轉等軸中心檢查；(B)準值儀旋轉等軸中心檢查
2. (A)準值儀旋轉等軸中心檢查；(B)旋轉臂旋轉等軸中心檢查
3. (A)治療床旋轉等軸中心檢查；(B)準值儀旋轉等軸中心檢查
4. (A)準值儀旋轉等軸中心檢查；(B)治療床旋轉等軸中心檢查

問題 77：請選擇與離子室讀數吸收劑量計算「無關」的項目。

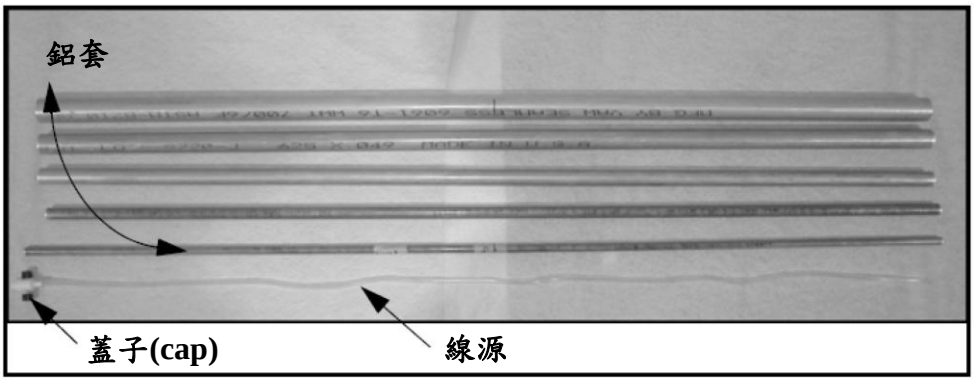
1. 吸收劑量轉換因子
2. 質量衰減係數
3. 大氣修正因子
4. 離子重組修正因子

問題 78：請選擇用以校準居里－公尺(curie- meter)的來源。

1. ^{57}Co
2. ^{60}Co
3. ^{99m}Tc
4. ^{137}Cs

問題 79：請選擇在美國電機製造業協會(NEMA)測試中，使用輔助工具進行測量的項目(下圖)。

圖5.1：線源與鋁套



1. 空間解析度
2. 敏感度
3. 散射分率
4. 影像品質

問題 80：請選擇與下方描述有關的項目。「在平靜使用輻射過程的淨效益觀點下的輻射暴露量，應盡量與個體可使用之劑量限制範圍一樣低。」

1. ALARA
2. ICRP
3. NEMA
4. IAEA

1.用（Bragg-Gray）空腔計算腔壁物質所接受的吸收劑量時，會用到下列那一種物理量(digital Value)？ (B)

A曝路率（exposure rate constant）

B平均阻擋本領比值（average stopping power ratio）

C質量衰減係數（mass attenuation coefficient）

D射質因素(quality factor）

2.在電子射束的深度劑量曲線中，沒有布拉格峰（Bragg peak）的主要原因是? (A)

A電子的散射긊

B制動輻射的產生

C原子核的吸收긚

D互毀（annihilation radiation）

3.若一已曝露的膠片在洗片(develop)後對光的穿透率（transmittance）為 0.01，則其光密度（OD）值為?

(C)

A 0.01 긊

B 1 긛

C 2 긚

D 3

4. X光的射束品質可用下列那些指標代表之？ (D)

A管電壓

B管電流

C半值層

D能譜形狀

5.已知經N＝N0e-μx 計算後N＝4000，但經偵檢器度量結果發現實際N＝7000，則增建因子（buildup factor）為多少？ (C)

A 0.57 긊

B 1.5 긛

C 1.75 긚

D 3.75

6.二次電子在空氣中產生一離子(Ion Pair)對平均需多少能量?

(D)

A 3.4 eV 긊

B 33.85 J 긛

C 33.85 keV 긚

D 33.85 eV

7. 若一光子射線能量為 1 MeV，則其康普吞邊緣（Compton edge）的能量為多少MeV？ (C)

A 0.204 긊

B 0.661 긛

C 0.796 긚

D 0.408

8.放射性核種 94 241 Pu 衰變到 83 209 Bi，共經過α衰變和β衰變各多少次？ (A)
A 8 , 5
B 8 , 4
C 7 , 5
D 7 , 4

9. 6 MeV 電子與物質的作用主要透過下列何種反應？ (C)
A康普吞效應
B成對發生
C游離與激發
D光電效應

10.99Mo 的半衰期為 67 小時， 99mTc 的半衰期為 6 小時，當 10 mg 的 99Mo 與 99mTc 平衡時，有多少的 99mTc 產生？ (B)
A 10.8 mg
B 0.9 mg
C 1.2 mg
D 0.9 μg

11. 原子內軌道電子躍遷而產生的光子，與外層軌道電子作用而射出的電子稱為? (D)
A 束縛電子（binding electron）
B 自由電子（free electron）
C 轉換電子（conversion electron）
D 鄂惹電子（auger electron）

12. 已知 20 MeV 的光子在水中的質量衰減係數為 0.0182 cm2/g，請問其平均自由路徑（mean free path）為多少公分？ (C)
A 37
B 46
C 55
D 64

13. 光電倍增管中，將閃爍光轉化為電子的元件為? (C)
A NaI（T1）
B 陽極（anode）
C 光陰極（photocathode）
D 次陽極（dynode）

14. 輻射度量能譜圖上有一主尖峰能量為 1. 17 MeV，其半高全寬度（FWHM）為 80 keV，則能量分解度為? (B)
A 3. 4%
B 6. 8%
C 10. 0 %
D 13. 6 %

15. 置P-32 核種的屏蔽罐，其內、外層分別採用何種設計可將制動輻射減至最少？ (D)
A高原子序材質、低原子序材質
B高原子序材質、高原子序材質

C低原子序材質、低原子序材質
D低原子序材質、高原子序材質

16.以混凝土為中子屏蔽時，最好選擇下列何種元素含量較低者，以避免產生多量的高能γ射線？ (D)
A 1H
B 12C
C 16O
D 23Na

17. 游離腔正負極收集到的電流量與何者成正比？ (B)
A累積劑量
B劑量率
C照射時間
D射源與游離腔的距離

18. NaI（Tl）偵檢器的絕對效率，與下列何者無關？ (D)
A 偵檢器晶體的大小
B游離輻射的能量
C偵檢器的材質
D游離輻射的強弱

19.「th」表示threshold energy，請問 9Be(γ, n)8Be，Eth=1.67 MeV，這是什麼反應？ (C)

A. annihilation
B. pair production
C. photodisintegration
D. transmutation

20.若發生β decay，則母核與子核一定屬於？ (C)

A. isotopes
B. isotones
C. isobars
D. isomers

1. Which digital value is used in calculating an absorbed dose received by a material of the cavity wall in a Bragg-Gray cavity? (B)
   A exposure rate constant
   B average stopping power ratio
   C mass attenuation coefficient
   D quality factor

2. What is the primary reason for absence of a Bragg peak in a depth dosage curve for an electron beam? (A)
   A scattering of electrons
   B occurrence of bremsstrahlung
   C absorption by atomic nucleus
   D annihilation radiation

3. Given that an exposed film has transmittance of 0.01 after development, what is the optical density (OD) of the film? (C)
   A 0.01
   B 1
   C 2
   D 3

4. Which of the following is a beam quality indicator in X-ray imaging? (C)
   A tubal voltage
   B tubal current
   C half-value layer
   D profile of energy spectrum

5. Given that $N=N_0e^{-\mu x}$, and calculation result shows that N=4000, but measurement by a detector reveals that actually N=7000. How much is the buildup factor? (C)
   A 0.57
   B 1.5
   C 1.75
   D 3.75

6. What is the mean energy required for secondary electrons to generate an ion pair in air? (D)
   A 3.4 eV
   B 33.85 J
   C 33.85 keV
   D 33.85 eV

7. Given that a photon beam has energy of 1 MeV, how much is the energy (MeV) of its Compton edge? (C)
   A 0.204
   B 0.661
   C 0.796
   D 0.408

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7. Given that a photon beam has energy of 1 MeV, how much is the energy (MeV) of its Compton edge? (C)
A 0.204
B 0.661
C 0.796
D 0.408

8. How many times does radioactive nuclide $^{241}_{94}Pu$ undergo α-decay and β-decay respectively to become 83 209 Bi? (A)
   A 8 , 5
   B 8 , 4
   C 7 , 5
   D 7 , 4

9. Though which of the following reaction can the interaction between 6 MeV electron and matter undergo? (C)
   A Compton effect
   B pair production
   C ionization and excitation
   D photoelectric effect

10. 99Mo has a half life of 67 hours, and 99mTc has a half life of 6 hours. How much 99mTc is produced when 10 mg of 99Mo and 99mTc are in equilibrium? (B)
   A 10.8 mg
   B 0.9 mg
   C 1.2 mg
   D 0.9 μg

11. What is the electron emitted as a result of the interaction between the photons produced by electron transition in inner orbits of an atom and an electron from outer orbits of an atom? (D)
   A binding electron
   B free electron
   C conversion electron
   D auger electron

12. Given that a photon with energy of 20 MeV has a mass attenuation coefficient of 0.0182 cm2/g in water, how long is its mean free path (in cm)? (C)
   A 37
   B 46
   C 55
   D 64

13. In a photomultiplier tube, what is the component for converting a flash of light into electrons? (C)
   A NaI (T1)
   B anode
   C photocathode
   D dynode

14. In a radiation energy spectrum, a primary peak has energy of 1.17 MeV, and its full width at half maximum (FWHM) is 80 keV, what is the percentage of energy resolution? (B)
   A 3.4%

B 6.8%
C 10.0 %
D 13.6 %

15. A shielding tank contains P-32 nuclei, how can its inner and outer layers minimize bremsstrahlung? (D)
A material of a high atomic number, material of a low atomic number
B material of a high atomic number, material of a high atomic number
C material of a low atomic number, material of a low atomic number
D material of a low atomic number, material of a high atomic number

16. Where a neutron shield is made of concrete, which of the following elements should be minimized so as to prevent generation of excessive high-energy γ beams? (D)
A $_{1}H$
B $_{12}C$
C $_{16}O$
D $_{23}Na$

17. Which of the following is proportional to the magnitude of current collected at the anode and the cathode of an ionizing cavity? (B)
A accumulated dose
B dose rate
C radiation duration
D distance between the radiation source and the ionizing cavity

18. Which of the following does not correlate with the absolute efficiency of a NaI (T1) detector? (D)
A size of detector crystal
B energy of ionizing radiation
C the material of which the detector is made
D magnitude of ionizing radiation

19. Threshold energy is denoted with "th". What is the reaction denoted by 9Be(γ, n)8Be, where Eth=1.67 MeV? (C)
A. annihilation
B. pair production
C. photodisintegration
D. transmutation

20. In the event of β-decay, what must the parent nucleus and the daughter nucleus be? (C)
A. isotopes
B. isotones
C. isobars
D. isomers

1.用（Bragg-Gray）空腔計算腔壁物質所接受的吸收劑量時，會用到下列那一種物理量(digital Value)？ (B)

A曝路率（exposure rate constant）

B平均阻擋本領比值（average stopping power ratio）

C質量衰減係數（mass attenuation coefficient）

D射質因素(quality factor）

2.在電子射束的深度劑量曲線中，沒有布拉格峰（Bragg peak）的主要原因是? (A)

A電子的散射

B制動輻射的產生

C原子核的吸收

D互毀（annihilation radiation）

3.若一已曝露的膠片在洗片(develop)後對光的穿透率（transmittance）為 0.01，則其光密度（OD）值為?

(C)

A 0.01

B 1

C 2

D 3

4. X光的射束品質可用下列那些指標代表之？ (D)

A管電壓

B管電流

C半值層

D能譜形狀

5.已知經N＝N0e-μx 計算後N＝4000，但經偵檢器度量結果發現實際N＝7000，則增建因子（buildup factor）為多少？ (C)

A 0.57

B 1.5

C 1.75

D 3.75

6.二次電子在空氣中產生一離子(Ion Pair)對平均需多少能量?

(D)

A 3.4 eV

B 33.85 J

C 33.85 keV

D 33.85 eV

7. 若一光子射線能量為 1 MeV，則其康普吞邊緣（Compton edge）的能量為多少MeV？ (C)

A 0.204

B 0.661

C 0.796

D 0.408

8.放射性核種 94 241 Pu 衰變到 83 209 Bi，共經過α衰變和β衰變各多少次？ (A)

A 8 , 5

B 8 , 4
C 7 , 5
D 7 , 4

9. 6 MeV 電子與物質的作用主要透過下列何種反應？ (C)
A康普吞效應
B成對發生
C游離與激發
D光電效應

10.99Mo 的半衰期為 67 小時， 99mTc 的半衰期為 6 小時，當 10 mg 的 99Mo 與 99mTc 平衡時，有多少的 99mTc 產生？ (B)
A 10.8 mg
B 0.9 mg
C 1.2 mg
D 0.9 μg

11. 原子內軌道電子躍遷而產生的光子，與外層軌道電子作用而射出的電子稱為? (D)
A 束縛電子（binding electron）
B 自由電子（free electron）
C 轉換電子（conversion electron）
D 鄂惹電子（auger electron）

12. 已知 20 MeV 的光子在水中的質量衰減係數為 0.0182 cm2/g，請問其平均自由路徑（mean free path）為多少公分？ (C)
A 37
B 46
C 55
D 64

13. 光電倍增管中，將閃爍光轉化為電子的元件為? (C)
A NaI（T1）
B 陽極（anode）
C 光陰極（photocathode）
D 次陽極（dynode）

14. 輻射度量能譜圖上有一主尖峰能量為 1. 17 MeV，其半高全寬度（FWHM）為 80 keV，則能量分解度為? (B)
A 3. 4%
B 6. 8%
C 10. 0 %
D 13. 6 %

15. 置P-32 核種的屏蔽罐，其內、外層分別採用何種設計可將制動輻射減至最少？ (D)
A高原子序材質、低原子序材質
B高原子序材質、高原子序材質
C低原子序材質、低原子序材質
D低原子序材質、高原子序材質

16. 以混凝土為中子屏蔽時，最好選擇下列何種元素含量較低者，以避免產生多量的高能γ射線？ (D)

A 1H
B 12C
C 16O
D 23Na

17. 游離腔正負極收集到的電流量與何者成正比？ (B)

A累積劑量
B劑量率
C照射時間
D射源與游離腔的距離

18. NaI（Tl）偵檢器的絕對效率，與下列何者無關？ (D)

A 偵檢器晶體的大小
B游離輻射的能量
C偵檢器的材質
D游離輻射的強弱

19.「th」表示threshold energy，請問 9Be(γ, n)8Be，Eth=1.67 MeV，這是什麼反應？ (C)

A. annihilation
B. pair production
C. photodisintegration
D. transmutation

20. 若發生β decay，則母核與子核一定屬於？ (C)

A. isotopes
B. isotones
C. isobars
D. isomers

MRSM

1. Parallel processing:
(A) Involves running several tasks simultaneously
(B) Requires an array processor
(C) Cannot be performed in machine code
(D) Requires the sharing of peripheral devices

2. Which of the following definitions regarding digital computers is *false*?
(A) A byte consists of 8 bits.
(B) Files is a collection of data treated as a unit
(C) Microprocessor is a single integrated circuit.
(D) Modem maintains the power supply to computers.

3. Which of the following x-ray detector material emits light?
(A) Xenon
(B) CsI
(C) Selenium
(D) PbI

4. Which of the following does *not* involve image processing?
(A) Histogram equalization
(B) Low-pass filtering
(C) Background subtraction
(D) K-edge filtering

5. For comparable image mottle, which has the highest patient dose?
(A) Screen/film
(B) Photostimulable phosphor
(C) Direct flat-panel detector
(D) Indirect flat-panel detector

6. Digital photospot imaging does not generally require:
(A) Exposure time less than 0.1 s
(B) Tube current above 100 mA
(C) Voltage over 120 kV
(D) 1,000 line TV camera

7. The most important component affecting spatial resolution in DSA is the:
(A) Focal spot size
(B) Image intensifier input phosphor thickness
(C) Image intensifier output phosphor thickness
(D) Digitization matrix

8. The low voltage used in screen/film mammography reduces:
(A) Subject contrast
(B) Dose
(C) Microcalcification visibility
(D) Scatter

9. Modern mammography equipment does not use:
(A) 100 kW generators
(B) Small focal spots (0.1 to 0.3 mm)
(C) Automatic exposure control
(D) Built-in compression paddle

10. In mammography, a fiber interspaced grid is preferred over aluminum because it:
(A) Reduces the dose
(B) Improves resolution
(C) Removes more scatter
(D) Reduces image mottle

11. The optimal film density in mammography will *not*:
(A) Be between 1.5 and 2.0
(B) Need a developer temperature of 55°C
(C) Require a viewbox luminance greater than 3,000 cd/m^2
(D) Maximize image contrast

12. Breast compression in mammography
(A) Improves image contrast
(B) Eliminates the need for a grid
(C) Requires the use of a wide-latitude film
(D) Increases radiation dose

13. Geometric unsharpness in mammography is:

(A) Unimportant
(B) Minimized with a large focal Spot
(C) Reduce by a small SID
(D) Increased with magnification

14. Benefits of stereotaxic localization for core biopsies include all the following *except*:
(A) Short procedure time (30minutes)
(B) Absence of ionizing radiation
(C) Minimal local anesthetic
(D) Reduce risk

15. Breast dose in mammography are most likely to be reduced by *increasing* the:
(A) X-ray tube voltage
(B) X-ray tube current
(C) Focal spot size
(D) Grid ratio

16. The AGD per film in screening mammography with a grid is likely to be
(A) Below 1 mGy (less than 100 mrad)
(B) 1 mGy (100 mrad)
(C) 2 mGy (200 mrad)
(D) 3 mGy (300 mrad)
17. The use of thermography to detect breast cancer:
(A) Involved ionizing radiation
(B) Uses thermoluminescent dosimeters
(C) Is most effective near the chest wall
(D) Is deemed by the ACR to be ineffective

18. Which of the following has a Hounsfield unit value of approximately – 90?
(A) Fat
(B) Gray matter
(C) Walter
(D) Bone

19. Which image reconstruction algorithm is used in current commercial CT scanners?
(A) Two-dimensional Fourier transform

(B) Three-dimensional Fourier transform
(C) Back projection
(D) Filtered back projection

20. The CT image display contrast:
(A) Must be selected prior to the x-ray exposures
(B) May be altered after the CT scan
(C) Does not modify the appearance of the CT image
(D) Can be used to change the Hounsfield unit values of image data

21. Which of the following *cannot* be used to process CT images?
(A) window/level adjustment
(B) Multiplanar reformatting
(C) Phase encoding
(D) Volume rendering

22. CT collimators are
(A) Variable for different section thicknesses
(B) Not necessary for helical scans
(C) Usually made out of Plexiglas
(D) Bowtie shaped

23. CT number depends on all the following *except*:
(A) Beam hardening
(B) Tissue heteroheneity
(C) mAs
(D) x-ray attenuation

24. The main advantage of helical CT over conventional (axial) CT is improved:
(A) Spatial resolution
(B) Low contrast detection
(C) Data acquisition rate
(D) Patient dose

25. CT fluoroscopy minimizes radiation doses by using lower:
(A) Filtration
(B) Voltage
(C) Current

(D) Collimator thickness

26. The theoretically best possible CT resolution for a 512^2 matrix and 25 cm FOV is:
(A) 0.5 lp/mm
(B) 1.0 lp/mm
(C) 2.0 lp/mm
(D) 5.0 lp/mm

27. Visibility of large low-contrast CT lesions may improve with increasing:
(A) Filtration
(B) mAs
(C) Matrix size
(D) Display window width

28. Partial volume artifacts in CT are generally reduced by reducing the:
(A) Section thickness
(B) Scanning time
(C) Image matrix size
(D) Focal spot size

29. Ring artifacts in a third-generation CT scanner are caused by
(A) Kilovolt peak drift
(B) Tube arcing
(C) Faculty detector elements
(D) Patient motion

30. Which of the following is not a source of CT artifacts?
(A) Patient motion
(B) Metal implants
(C) Beam hardening
(D) Low tube current

31. If a CT with FOV 20 cm, matrix size 512 × 512, slice thickness 5 mm, what is its voxel size (mm) ?
(A) 0.4
(B) 0.8
(C) 1.4
(D) 1.8

32. The dose to the fetus during an abdominal CT scan would *not* increase with increasing:

(A) Patient size

(B) Tube voltage

(C) Tube current

(D) Scan time

33. The scattered radiation dose 1 meter from a patient undergoing a head CT scan is:

(A) Less than 0.04 mGy (below 4 mrad)

(B) About 0.04 mGy (4 mrad)

(C) About 0.4 mGy (40 mrad)

(D) About 4 mGy (400 mrad)

34. A 2 MHz transducer has an approximate wavelength of:

(A) 0.01 mm

(B) 0.1 mm

(C) 1.0 mm

(D) 10 mm

35. Which of the following has the highest acoustic impedance?

(A) Bone

(B) Fat

(C) Air

(D) Water

36. If an ultrasound beam is attenuated by 99%, the attenuation is:

(A) 1 db

(B) 3 db

(C) 10 db

(D) 20 db

37. Ultrasound shadowing artifacts are unlikely behind:

(A) Strong attenuators

(B) Bone

(C) Air

(D) Fluid-filled cysts

38. What is the imaging depth or penetration in soft tissue with a ultrasound probe of 5 MHz?

(A) 1

(B) 4

(C) 12

(D) 30

39. An ultrasound beam traveling through tissue *cannot* be:

(A) Absorbed

(B) Amplified

(C) Scattered

(D) Reflected

40. The Q factor of a transducer refer to:

(A) Coupling efficiency

(B) Minimum intensity

(C) Maximum intensity

(D) Purity of the frequency

41. An echo received 65 microseconds after the signal is sent is from what depth?

(A) 2 cm

(B) 5cm

(C) 7cm

(D) 10 cm

42. Ultrasound signals are converted from digital data to a video monitor display using a:

(A) Log amplifier

(B) Photomultiplier tube

(C) Photocathode

(D) Scan converter

43. Lateral resolution in ultrasound imaging would most likely be improved by:

(A) Increasing transducer focusing

(B) Imaging in the Fraunhofer zone

(C) Using fewer scan line

(D) Increasing the frequency

44. The Doppler shift from a moving object depends on all of the following except?
(A) Speed of ultrasound beam
(B) Frequency
(C) Angel between beam and object
(D) Object depth

45. Which of the following angle will general the largest Doppler shift?
(A) 90°
(B) 60°
(C) 30°
(D) 0°

46. The Larmor frequency is the frequency of:
(A) Pulse repetition
(B) Nuclear precession
(C) Phase encoding
(D) Spatial encoding

47. The resonance frequency for ^{1}H in a 1.5 T magnetic field is:
(A) 63 H_3
(B) 63kH_3
(C) 63MH_3
(D) 63GH_3

48. The maximum MR signal is obtained by using a:
(A) 90 degree FR tip, short TE, and short TR
(B) 45 degree FR tip, short TE, and short TR
(C) 90 degree FR tip, short TE, and long TR
(D) 90 degree FR tip, long TE, and short TR

49. The small amount of bound water produces no detected MR signal because:
(A) T1 is too short
(B) T2 is too short
(C) T2*is very long
(D) T2 is longer than T1

50. MR "shimming" is used to:
(A) Minimize noise in RF coils

(B) Correct for magnetic-field inhomogeneities
(C) Reduce the noise level in MR system
(D) Minimize the possibility of quenches

51. Gradient field in MR are used most commonly to:
(A) Increase T2
(B) Shorten T1 values
(C) Localize MR signal source
(D) Increase signal in large patients

52. Which line is an exclusion zone for persons with pacemakers:
(A) 0.5G
(B) 5G
(C) 50G
(D) 500G

53. The FDA limit power deposition in patients undergoing MR does *not* include:
(A) 3.2 W/kg averaged over the head
(B) 8 W/kg peak value
(C) 0.4 w/kg averaged over body
(D) A less than 3°C temperature rise in the heart

54. In spin-echo imaging, the echo signal normally is measured:
(A) Immediately ($t = 0$)
(B) After time TE
(C) After time 4 × T1
(D) After T2

55. MR SNR cannot be improved by increasing the:
(A) Matrix size
(B) Number of acquisitions
(C) Static magnetic-field strength
(D) Section thickness

56. In MR, motion results in ghost images that appear in which direction?
(A) Read encode
(B) Phase encode
(C) Slice selection axis

(D) PA

57. Contrast in MR can be due to all the following differences *except*:
(A) Presence of flow
(B) Proton density
(C) T1
(D) Atomic number

58. Common MR angiography techniques are based on:
(A) Phase contrast
(B) Phase encoding
(C) T1 contrast
(D) Time to inversion

59. MR spectroscopy is used to detect all the following except:
(A) ^{31}P
(B) ^{32}P
(C) Inorganic phosphate
(D) Phosphocreatinine

60. Functional imaging using magnetic resonance dose *not* show:
(A) Brain activation sites
(B) Increased venous oxygenation
(C) Increased spin density sites
(D) Superior temporal resolution to positron emission tomography (PET)

Q1. Choose the description that is not correct.

(1.) The basic idea of equipment management is to ensure electrical and mechanical safety for patients in routine clinical practice.
(2.) Exposure dose must be taken into account in equipment management.
(3.) Maintenance work can be outsourced if a medical institution cannot perform it by itself.
(4.) An automatic injector of contrast media is an item to be maintained.

Q2. Choose the item that is least relevant to medical quality.

(1.) Effectiveness
(2.) Efficiency
(3.) Accessibility
(4.) Scientific and technical quality

Q3. Choose the answer that correctly indicates the pair or pairs that are not directly related.

a. Measurement of timer error in an X-ray high-voltage generator --- an X-ray tube voltage and current meter

b. Confirmation of grounding --- leak current meter

c. Measurement of force required to move a retaining device --- Push-pull gauge

(1.) Only a
(2.) Only b
(3.) Only c
(4.) All of a to c

Q4. Choose the answer that correctly indicates the four sequential steps to improve medical quality.

① Identification of a problem

② Analysis of a problem

③ Formulation of a hypothesis

④ Verification and action

(1.) ① → ② → ③ → ④
(2.) ① → ② → ④ → ③
(3.) ① → ③ → ② → ④
(4.) ① → ③ → ④ → ②

Q5. Choose the answer that is not correct.

(1.) Receiving an inspection is a test of newly purchased equipment conducted under the responsibility of the user in the presence of the manufacturer.
(2.) Maintenance consists of daily and periodic maintenance.
(3.) Checks before the commencement of each day's work consist mainly of visual inspection.
(4.) Medical institutions are the main organizations responsible for the maintenance of medical equipment.

Q6. Choose the correct name of the stepwise approach consisting of setting an objective, making and executing a plan, and evaluating and managing the performance, so as to achieve the objective effectively; this method was developed in the 1930s and is still being used widely.

(1.) CPDA (2.) DAPC (3.) PDCA (4.) ACPD

Q7. Choose the item that is not required as a record of maintenance.

(1.) Name of the medical equipment
(2.) Product type, model number, and year of purchase
(3.) Purchase amount
(4.) Record of repair (date, outline of repair, person who did the repair)

Q8. Choose the answer that does not correctly describe the role of a Medical Imaging and Radiological Systems Manager.

(1.) To maintain the performance and ensure the safety of radiation-related equipment, so as to offer appropriate and high-quality medical services.
(2.) To allocate workers to ensure smooth operation of radiation-related equipment.
(3.) To prepare management plans required for each unit of radiation-related equipment.
(4.) To provide, as required, education and training on equipment management.

Q9. Choose the diagram that may be used for tracking variations in mAs and mR/mAs values, measured kVp values, and density in automatic exposure over a certain period of time.

(1.) Run chart (2.) Control chart
(3.) Check sheet (4.) Pareto chart

Q10. Choose the answer that does not correctly describe the focus.

(1.) The size of the focus remains unchanged even when load conditions are changed.
(2.) The actual focus area is greater than the effective focus area.
(3.) The smaller the target angle, the greater the allowable load.
(4.) X-ray intensity is higher on the cathode side and lower on the anode side.

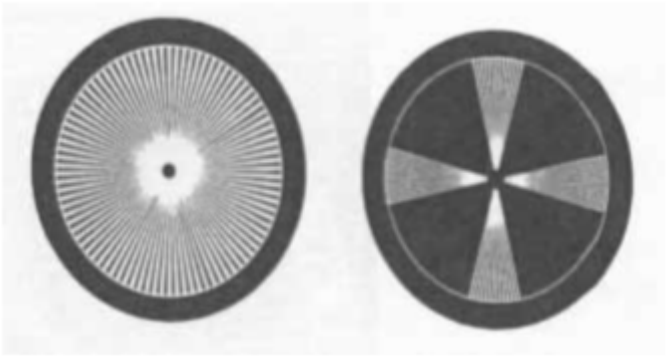
Q11. Choose the item that can not be measured with a non-connection X-ray analyzer.

(1.) mGy
(2.) mAs
(3.) HVL
(4.) Radiation rate

Q12. Choose the answer that does not correctly describe an image intensifier.

(1.) Image distortion is greater in the periphery than at the center.
(2.) The greater the size of the field of view on the plane of incidence, the smaller the image distortion.
(3.) The greater the size of the field of view on the plane of incidence, the greater the image distortion.
(4.) Image distortion consists of a spool distortion and a geomagnetic distortion.

Q13. Choose the item that can be measured by using test charts of the star-pattern camera method.



(1.) mA Linearity
(2.) Focal spot test
(3.) kVp accuracy
(4.) mAs reciprocity

Q14. Choose the correct range of total filtration for X-ray equipment with a nominal maximum tube voltage of 150 kV or less.

(1.) 1.5 mmAl or more
(2.) 2.0 mmAl or more
(3.) 2.5 mmAl or more
(4.) 3.0 mmAl or more

Q15. Choose the term that describes a way to provide image data at constant density regardless of the body shape of the patient by controlling exposure time and other factors.

(1.) Generator
(2.) Automatic exposure control (AEC)
(3.) Half value layer (HVL)
(4.) Timer

Q16. Choose the answer that correctly describes the discrepancy between the X-ray field and the light field.

(1.) 0.5% of the source image distance (SID)
(2.) 1.0% of the SID
(3.) 2.0% of the SID
(4.) 3.0% of the SID

Q17. Choose the maximum incident dose rate for equipment having AEC capability.

(1.) 2.58×10-1 C/kg/min
(2.) 2.58×10-2 C/kg/min
(3.) 2.58×10-3 C/kg/min
(4.) 2.58×10-4 C/kg/min

Q18. Choose the property that is not relevant to the performance of automatic exposure control.

(1.) Response time
(2.) Tube voltage
(3.) Subject thickness
(4.) Tube current

Q19. Choose the correct SID for measuring incident dose rate in an X-ray fluoroscope.

(1.) 8 inches
(2.) 10 inches
(3.) 12 inches
(4.) 14 inches

Q20. Choose the item that is not related to the performance of a scattered ray removal grid.

(1.) Selectivity
(2.) Resolution
(3.) Contrast improvement factor
(4.) Exposure factor

Q21. Choose the item that can be measured by using a Burger-Rose phantom.

(1.) Low contrast
(2.) Sharpness
(3.) MTF
(4.) RMS

Q22. Choose the answer that does not correctly describe a flat panel detector.

(1.) There are direct and indirect conversion methods.
(2.) CsI is used on the plane of X-ray incidence in the indirect conversion method.
(3.) There is no veiling glare.
(4.) The detector is influenced by geomagnetism.

Q23. Choose the answer that does not describe an appropriate way to use a personal TLD.

(1.) The TLD should be put inside protective clothing.
(2.) When using a TLD as an additional measure, put it on the neck outside the protective clothing.
(3.) The TLD is sensitive to light.
(4.) Each TLD should be used for dosimetry at least once every three months.

Q24. Choose the item that dose not constitute an X-ray fluorographic system.

(1.) X-ray grid
(2.) X-ray image intensifier
(3.) X-ray television camera
(4.) TV monitor

Q25. Choose the correct combination of items that affect the quality of mammographic images.

a. Absorption difference in the breast

b. Size of focus

c. Exposure field

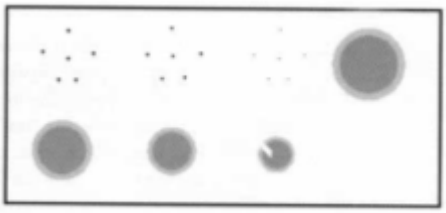
d. Filtration

(1.) Only a
(2.) a and b
(3.) a, b and c
(4.) All of a to d

Q26. Choose the item that is not a correct tool for testing the performance of an image intensifier.

(1.) Luminance meter for measuring the conversion factor
(2.) Densitometer for measuring contrast
(3.) Grid chart for measuring distortion
(4.) X-ray resolution test chart for measuring resolution

Q27. Choose the correct scoring for evaluating the simulated lesions in the mammographic phantom images.

a. 

b. 

c. 

(1.) Mass=4, Speck=3.5, Fiber=5
(2.) Mass=3.5, Speck=4, Fiber=4.5
(3.) Mass=4, Speck=5, Fiber=5.5
(4.) Mass=3.5, Speck=3.5, Fiber=6

Q28. Choose the answer that is not a correct way to increase the short-term allowable load of a rotating anode X-ray tube.

(1.) Increase the focus area.
(2.) Increase the anode rotation speed.
(3.) Increase the target angle.
(4.) Increase the diameter of the focus trajectory.

Q29. Choose the appropriate average breast dose in a one-time mammographic exposure.

(1.) 1.5 mGy or less
(2.) 2.0 mGy or less
(3.) 2.5 mGy or less
(4.) 3.0 mGy or less

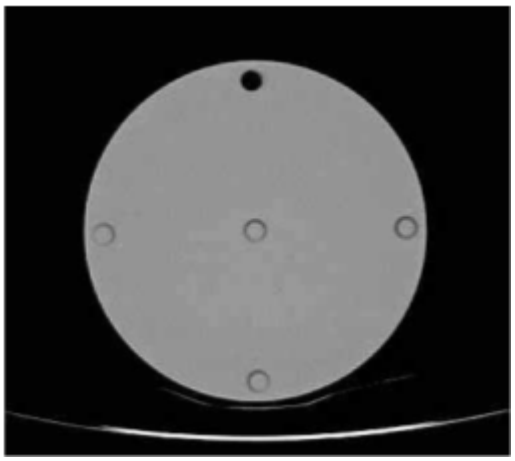
Q30. Choose the item that is not necessary for the inspection of the automatic exposure control (AEC) of mammographic equipment.

(1.) A plate that can express lines of 2, 4, 6, and 8 cm.
(2.) Ionization chamber
(3.) Lead marker plate
(4.) Densitometer

Q31. Choose the combination that is not appropriate for an X-ray CT system.

(1.) X-ray tube --- Rotating anode
(2.) X-ray detector --- Semiconductor
(3.) DAS --- D/A converter
(4.) Computer --- Magnetic disc

Q32. Choose the item that can be measured by using the phantom shown below.



(1.) Spatial resolution
(2.) Contrast resolution
(3.) Uniformity
(4.) Computed tomography dose index (CTDI)

Q33. Choose the item that is relevant to artifacts generated in X-ray CT.

(1.) Multiple reflections
(2.) Side lobe
(3.) Partial volume effect
(4.) Misregistration

Q34. Choose the material that is not an appropriate constituent of a phantom for CT number measurement.

(1.) Polyethylene
(2.) Polystyrene
(3.) Plexiglas
(4.) Aluminum

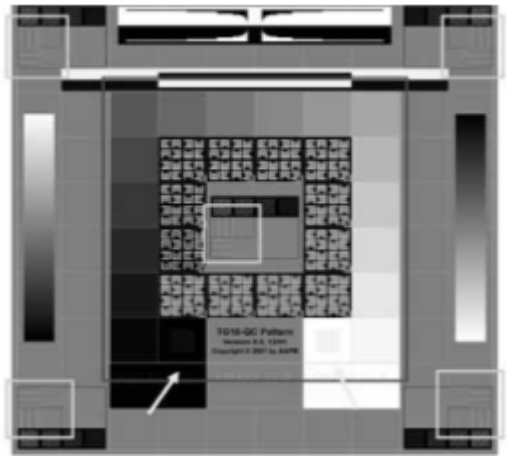
Q35. Choose the correct characteristic of the computed tomography dose index (CTDI).

(1.) Proportional to slice thickness
(2.) Proportional to tube current
(3.) Proportional to tube voltage
(4.) Proportional to image noise

Q36. Choose the answer that does not correctly describe a multi-slice CT.

(1.) Partial volume effect is reduced.
(2.) Precise isotropic images can be obtained.
(3.) Ring artifacts are increased.
(4.) The final slice thickness does not depend on the collimator.

Q37. Choose the item that does not correctly describe the image shown below.



(1.) Changes in brightness and contrast
(2.) Spatial resolution
(3.) Geometric distortion
(4.) Luminance uniformity

Q38. Choose the correct combination of items that are relevant to a multi-slice CT system.

a. RF coil
b. Radio shield
c. Cone beam
d. Data acquisition system (DAS)
e. Sensitivity time control (STC)

(1.) a and b
(2.) a and e
(3.) b and c
(4.) c and d

Q39. Choose the item that does not cause artifacts in CT.

(1.) Beam hardening
(2.) Machine errors
(3.) Detector defects
(4.) Selection of a reconstruction algorithm

Q40. Choose the correct combination of items that are relevant to the resolution of a CT in the axial direction.

a. Display pixel size
b. Detector sensitivity
c. Slice thickness
d. Helical pitch

(1.) a and b (2.) a and e (3.) b and c (4.) c and d

Q41. Choose the answer that does not correctly describe a multi-slice CT.

(1.) There is also a detector array in the axial direction.
(2.) Multiple slice images can be obtained simultaneously.
(3.) Isotropic images can be obtained.
(4.) Slice thickness depends on the collimator.

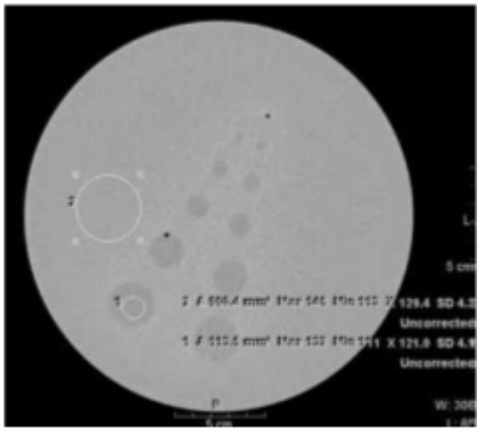
Q42. Choose the answer that does not correctly describe the computed tomography dose index (CTDI) of a CT system.

(1.) A pensile-type ion chamber is used.
(2.) Phantoms of 16 and 32 cm in diameter are used.
(3.) The Z-side dose profile of multi-slice scan is integrated.
(4.) Data on patient exposure during the operation is provided.

Q43. Choose the correct pitch of a helical CT at a slice thickness of 5 mm and a table movement of 10 mm per gantry rotation.

(1.) 0.2 (2.) 0.5 (3.) 2 (4.) 5

Q44. Choose the description appropriate for the image shown below.



(1.) Spatial resolution measurement
(2.) Contrast resolution
(3.) CT number measurement
(4.) Dosimetry

Q45. Choose the correct measure of the spatial resolution for a CT system.

(1.) Winer spectrum (SD)
(2.) cm-1/CT number
(3.) CT number
(4.) MTF (Lp/cm)

Q46. Choose the item that must be cooled with liquid helium among the constituents of a superconductive MRI system.

(1.) Inclined magnetic field coil
(2.) Body coil
(3.) Static magnetic field coil
(4.) Surface coil

Q47. Choose the material that is not an appropriate constituent of a phantom for MRI.

(1.) Cupric sulfate ($CuSO_4$)
(2.) Water
(3.) Nickel chloride ($NiCl_2$)
(4.) Gel

Q48. Choose the item that does not cause artifacts in the MRI.

(1.) Breathing motion
(2.) Intestinal gas
(3.) Cardiac motion
(4.) Buttons on clothes

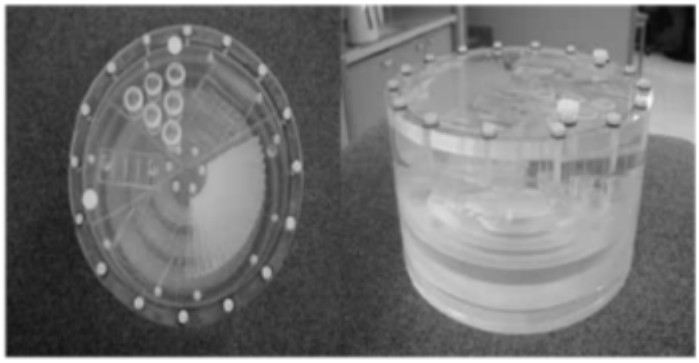
Q49. Choose the item that is not appropriate for the one-day inspection of an MRI system.

(1.) Control of the helium level measurement
(2.) Control of the thermo-hygrostat
(3.) Control of the cryogenic refrigerator
(4.) Control of the operation hall room temperature

Q50. Choose the item that should not be brought into an MR examination room.

(1.) Oxygen cylinder
(2.) Ceramic scissors
(3.) Wheelchair made of non-magnetic substances
(4.) Butterfly needle

Q51. Choose the item that can not be measured by using the phantom for MR performance evaluation shown below.



(1.) Slice thickness
(2.) Image uniformity
(3.) Spatial resolution
(4.) Artifacts

Q52. Choose the appropriate way to improve the S/N ratio in MRI.

(1.) Increase the matrix.
(2.) Reduce the size of the field of view.
(3.) Increase the number of additions
(4.) Reduce the slice thickness.

Q53. Choose the recommended maximum magnetic flux density above which the entrance of a pacemaker-implanted person to an MRI inspection room is restricted.

(1.) 50 gauss (2.) 10 gauss (3.) 5 gauss (4.) 0.5 gauss

Q54. Choose the item that is not necessary for evaluating the performance of an MR system.

(1.) Image uniformity
(2.) Image distortion
(3.) Slice thickness
(4.) Liquid helium level

Q55. Choose the correct action to be taken when a sudden power failure occurs while using a 1.5T MR system for clinical inspection and power recovery is not expected for a while.

(1.) Pull out the table manually, let the patient get off from the table, and wait for power recovery.
(2.) Bring a flashlight into the inspection room to sooth the patient, and wait for power recovery.
(3.) Quenching may occur immediately after the stop of the cooling pump. For protection against this danger, pull the patient off from the table immediately, and lead the patient out of the inspection room.
(4.) Magnetic fields disappear when power failure occurs. Bring a lamp and a stool into the inspection room, and help the patient get off from the table safely.

Q56. Choose the internationally allowed maximum noise for an MR system.

(1.) 95 dB (2.) 100 dB (3.) 70 dB (4.) 140 dB

Q57. Choose the item or items that are not required in the daily inspection of MR systems.

a. Measurement of the S/N ratio by using a phantom for inspection

b. Confirmation of the emergency-call capability

c. Confirmation of the operation of the quench button

(1.) Only a (2.) Only b (3.) Only c (4.) All of a to c

Q58. Choose the action that is not appropriate in the case of quenching involving helium.

(1.) Open the door of the inspection room.
(2.) When quenching occurs during clinical inspection, lead the patient out of the inspection room immediately.
(3.) A CPR announcement within the hospital.
(4.) Confirm the vital signs of the patient immediately.

Q59. Choose the patient who does not have to avoid an MR inspection.

(1.) Patient who has a clip in the cranial nerve system right after surgery.
(2.) Patient with a pacemaker implanted.
(3.) Psychiatric patient
(4.) Patient with a ferromagnetic cochlear implanted

Q60. Choose the maximum allowable specific absorption rate (SAR) recommended by the U.S. Food and Drug Administration for the whole body exposed to a radio frequency wave from an MRI system.

(1.) 4.0 W/kg (2.) 0.4 W/kg (3.) 0.8 W/kg (4.) 8 W/kg

Q61. Choose the answer that is not a correct way to address the noise of ultrasonic diagnostic equipment.

(1.) When there is noise that is derived from the power supply line, reconnect the equipment to a receptacle of another power line.
(2.) In consideration of noise reduction and electrical safety, avoid using 3P plugs for power cables and receptacles.
(3.) When there is noise that is derived from the power supply line, use a noise filter or noise cut transformer.
(4.) When using the equipment, avoid the simultaneous use of an electric knife or other tools that may cause substantial noise.

Q62. Choose the answer that is not an appropriate way to inspect ultrasonic diagnostic equipment after use.

(1.) Check the probe lens.
(2.) Check the probe cable covering.
(3.) Leave the gel on the probe without wiping it off.
(4.) Organize the probe cables.

Q63. Choose the item or items that are correct ways to manage the probe of ultrasonic diagnostic equipment.

a. Check for any cracks or damage in the acoustic lens and the case of the probe before its use.

b. Periodically check for any looseness in the connector that connects the probe and the main body of the equipment.

c. Before sterilizing the probe, wash out the gel, blood, and other adherents on the surfaces of the probe, case, and cable.

(1.) Only a (2.) Only b (3.) Only c (4.) All of a to c

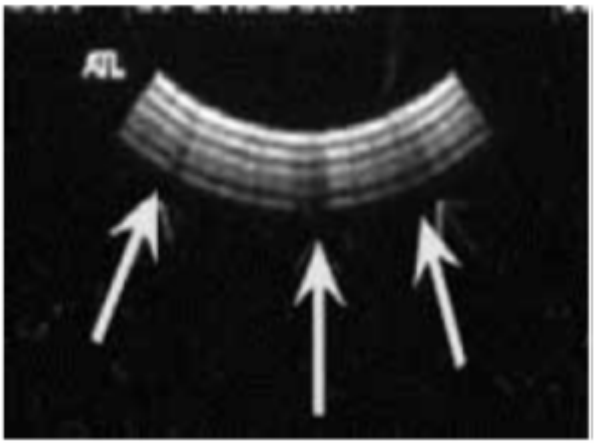
Q64. Choose the answer that is not a correct way to use ultrasonic diagnostic equipment.

(1.) Freeze the display of the equipment after use.
(2.) Put the probe cables away after using the equipment.
(3.) Disconnect the probe of the acting position being inspected
(4.) Wipe the gel off the probe after using the equipment.

Q65. Choose the correct way to use ultrasonic diagnostic equipment.

(1.) The probe fell down on the floor, but it was used for the next patient without inspection.
(2.) Image freezing is not necessary when there is some time between the previous and next inspections.
(3.) When the probe surface is damaged, images are affected but electric safety is assured.
(4.) A seldomly used probe is stored in a case and is connected when necessary.

Q66. Choose the correct item to be inspected for the transducer shown below.



(1.) Main bang phenomenon
(2.) Crystal defects
(3.) Cables
(4.) Floating of rubber

Q67. Choose the items that describe correct ways to use ultrasonic diagnostic equipment on a regular basis.

a. Wait for some time after turning on the power, and then use the equipment.

b. Inspection of the probe is necessary before its use.

c. After adjusting image quality, also adjust the display monitor and the monochrome printer.

d. After using the equipment, keep the probe in a holder to prevent falling.

(1.) a and b (2.) b and c (3.) c and d (4.) All of a to d

Q68. Choose the precaution that is not appropriate for measuring a standard ultrasonic phantom.

(1.) Place the phantom on a clean and flat place.
(2.) Apply an appropriate amount of low-viscosity gel or water on the scan surface.
(3.) Adjust the gain so that the phantom surface appears black.
(4.) Adjust the TGC setting to the value of the normal liver, and record the setting.

Q69. Choose the description that is not a correct way to use ultrasonic diagnostic equipment on a regular basis.

(1.) Confirm the power capacity of the receptacle.
(2.) A 3P receptacle having a grounding conductor is not required.
(3.) Avoid unplugging the equipment when moving it.
(4.) Turn off the power after confirming that image transfer and other processing are completed.

Q70. Choose the item that controls the brightness and overall intensity of the received ultrasonic signals.

(1.) Time gain control (TGC)
(2.) Gain
(3.) Dynamic range
(4.) Output power

Q71. Choose the answer that does not correctly describe the performance test of a gamma camera.

(1.) The overall evaluation is based on attaching a collimator to the camera.
(2.) The energy resolution is expressed in keV.
(3.) The intrinsic spatial resolution of the camera does not depend on the resolution of the collimator.
(4.) A 99mTc radiation source is used.

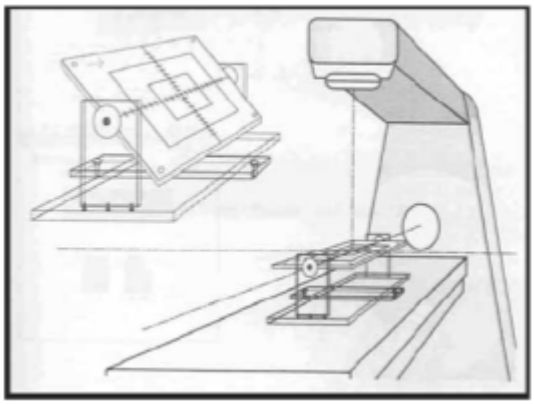
Q72. Choose the answer that correctly describes the performance of a PET system.

(1.) The greater the ring diameter, the better the spatial resolution.
(2.) The greater the distance from the center of the field of view, the better the spatial resolution.
(3.) The shorter the coincidence counting time window, the better the counting efficiency.
(4.) Relative light output is smaller in LSO than BGO.

Q73. Choose the answer that does not correctly describe a linear accelerator.

(1.) A klystron is a microwave oscillator tube.
(2.) An ion pump suppresses electric discharge.
(3.) A deflection magnet separates X-rays from electron rays.
(4.) A monitor dosimeter is also relevant to the monitoring of beam flatness.

Q74. Choose the item that can not be measured in therapy equipment by using the tool depicted below.



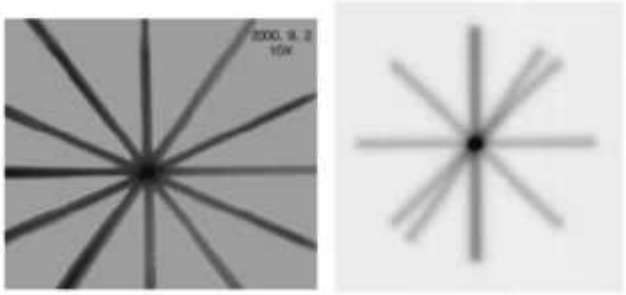
(1.) Light/radiation field coincidence
(2.) Precision of laser localization
(3.) Precision of field size indicator
(4.) Table top sag

Q75. Choose the item that is not related to dose distribution in the external irradiation method.

(1.) Dose rate
(2.) Radiation energy
(3.) Size of irradiation field
(4.) Source-target distance

Q76. Choose the correct descriptions for Figures (A) and (B) below.

(A) (B)



(1.) (A) Gantry rotation isocenter check; (B) Collimator rotation isocenter check
(2.) (A) Collimator rotation isocenter check; (B) Gantry rotation isocenter check
(3.) (A) Couch rotation isocenter check; (B) Collimator rotation isocenter check
(4.) (A) Collimator rotation isocenter check; (B) Couch rotation isocenter check

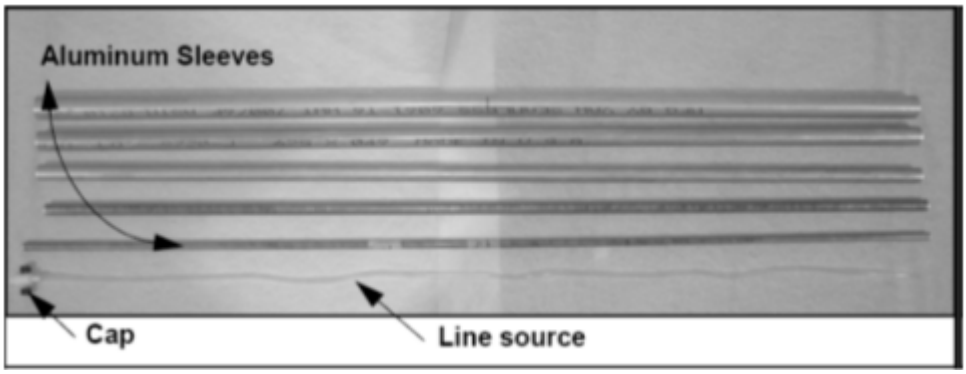
Q77. Choose the item that is not related to the calculation of the absorbed dose from ionization chamber readouts.

(1.) Absorbed dose conversion factor
(2.) Mass attenuation coefficient
(3.) Atmospheric correction factor
(4.) Ion recombination correction factor

Q78. Choose the source used for calibrating a curie-meter.

(1.) 57Co (2.) 60Co (3.) 99mTc (4.) 137Cs

Q79. Choose the item that is measured by using the auxiliary tools shown below in the test of National Electrical Manufacturer's Association (NEMA).



(1.) Spatial resolution (2.) Sensitivity
(3.) Scatter fraction (4.) Image quality

Q80. Choose the term that is related to the description below.

"Exposure to radiation that is justified in view of net benefit in the process of a peaceful use of radiation should be kept as low as reasonably achievable within individual dose limits."

(1.) ALARA (2.) ICRP (3.) NEMA (4.) IAEA

Q81. Which of the following added filters is <u>not used</u> with diagnostic X-ray tubes?

(1.) Molybdenum (2.) Tungsten (3.) Copper (4.) Aluminum

Q82. Which of the following statements about flat panel detectors is <u>incorrect</u>?

(1.) They are devices that detect X-rays as electrical signals.
(2.) There are direct and indirect types.
(3.) Their dynamic range is inferior to screen/film systems.
(4.) They can be used for moving pictures.

Q83. Which of the following x-ray detector material emits light?

(1.) Xenon (2.) CsI (3.) Selenium (4.) PbI

Q84. Which of the following statements about DSA is incorrect?

(1.) Images can be viewed in real time.
(2.) The recursive filter reduces noise.
(3.) It offers superior contrast resolution.
(4.) The smaller the I.I. input field, the lower the dose.

Q85. Which of the following is not relevant to computed radiography (CR)?

(1.) Imaging plate
(2.) Screen cassette
(3.) Laser tube
(4.) A/D converter

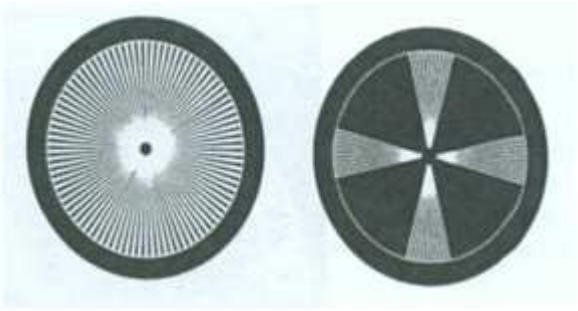
Q86. Which of the following is not relevant to the performance of anti-scatter grids?

(1.) Exposure factor
(2.) Selectivity
(3.) Resolution
(4.) Contrast improvement factor

Q87. Which of the following is not the measurement item for Tube and Collimator?

(1.) Focal spot size
(2.) Beam perpendicularity
(3.) Grid alignment test
(4.) Light field/Beam alignment test

Q88. Choose the correct item for the suggested measurement equipment?



(1.) mA Linearity
(2.) Focal spot test
(3.) Kvp accuracy
(4.) mAs reciprocity

Q89. Which of the following is measured using the Burger-Rose phantom?

(1.) Low contrast
(2.) Sharpness
(3.) MTF
(4.) RMS

Q90. Which of the following is not included in the image intensifier?

(1.) Input screen
(2.) Photocathode
(3.) Electron gun
(4.) Output screen

Q91. Which of the following is an incorrect statement on reducing the artifacts?

(1.) Clean the darkroom every day.
(2.) Be careful not to leaving fingerprints and nail marks when treat films.
(3.) Take the X-ray picture immediately after insert the film into the cassette.
(4.) Be careful not to include the partial body of patient, cloth or hair.

Q92. Which of the following is the IAEA standard for the level of radiation at the low dose, two direction mammography?

(1.) 0.3 mGy (2.) 3 mGy (3.) 30 mGy (4.) 3 Gy

Q93. The low voltage used in screen/film mammography reduces:

(1.) Subject contrast
(2.) Dose
(3.) Micro calcification visibility
(4.) Scatter

Q94. In mammography, a fiber interspaced grid is preferred over aluminum because it:

(1.) Reduces the dose
(2.) Improves resolution
(3.) Removes more scatter
(4.) Reduces image mottle

Q95. Breast compression in mammography

(1.) Improves image contrast
(2.) Eliminates the need for a grid
(3.) Requires the use of a wide-latitude film
(4.) Increases radiation dose

Q96. Breast dose in mammography are most likely to be reduced by increasing the:

(1.) X-ray tube voltage
(2.) X-ray tube current
(3.) Focal spot size
(4.) Grid ratio

Q97. Which of the following cannot be used to process CT images?

(1.) window/level adjustment
(2.) Multiplanar reformatting
(3.) Phase encoding
(4.) Volume rendering

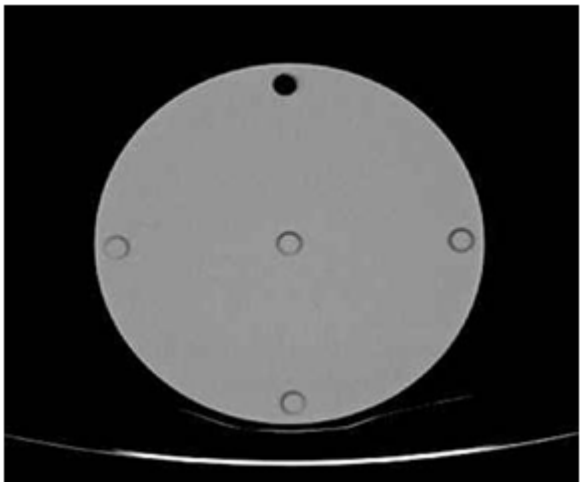
Q98. The main advantage of helical CT over conventional (axial) CT is improved:

(1.) Spatial resolution
(2.) Low contrast detection
(3.) Data acquisition rate
(4.) Patient dose

Q99. Partial volume artifacts in CT are generally reduced by reducing the:

(1.) Section thickness
(2.) Scanning time
(3.) Image matrix size
(4.) Focal spot size

Q100. Below is a CT performance evaluation image. Which of the following does it measure?



(1.) spatial resolution
(2.) contrast resolution
(3.) Uniformity
(4.) CTDI

Q101. What is the reference value in patient table movement distance accuracy test in CT?

(1.) under ± 1mm
(2.) under ± 2mm
(3.) under ± 3mm
(4.) under ± 5mm

Q102. Which of the following statements concerning the characteristics of helical CT is correct?

(1.) Inversion motion of the X-ray tube and movement of the bed are performed alternately.
(2.) 360° interpolation reconstruction uses data from two sequential rotations.
(3.) The ratio between slice thickness and the amount of bed movement (mm/1 rotation) cannot be changed.
(4.) A slip ring is used to control movement of the bed.

Q103. Which of the following statements concerning X-ray CT dose measurement is <u>incorrect</u>?

(1.) A pencil-shaped ionization chamber dosimeter is used.
(2.) The effective energy of the X-ray CT scanner is found with measurement of the half -value layer.
(3.) CTDI is used for evaluation of the tissue dose.
(4.) Dose measurement is taken on the surface of an acrylic cylindrical phantom.

Q104. Which of the following combinations is <u>incorrect</u> for X-ray CT?

(1.) Image reconstruction – Convolution integral method
(2.) Beam hardening – Ring artifacts
(3.) Number of matrices – Spatial resolution
(4.) Image noise – Low contrast resolution

Q105. Which of the following statements concerning X-ray CT number is correct?

(1.) Fat is higher than water.
(2.) 2. It is found using the coefficient of reflection of the X-ray beam.
(3.) 3. It changes depending on the atomic number of the substance.
(4.) 4. It is a relative value taking water as zero.

Q106. Which of the following statements about multislice CT is incorrect?

(1.) It also has detector arrays along the body axis.
(2.) Multiple slice images can be obtained simultaneously.
(3.) A cone beam X-ray is used.
(4.) The image slice thickness is determined with a collimator.

Q107. Which of the following statements concerning X-ray CT number is irrelevant?

(1.) Ring artifact
(2.) Beam hardening artifact
(3.) Motion artifact
(4.) Chemical shift artifact

Q108. Which of the following statements concerning the characteristics of superconducting magnet MRI systems is correct?

(1.) To maintain the superconducting state, the magnetostatic coil is cooled with liquid nitrogen.
(2.) The gradient magnetic coil must also be kept in a superconducting state.
(3.) The static magnetic field remains even when the power supply of the MRI system is turned off.
(4.) MRI systems with a static magnetic field strength greater than 3.0 t have yet to be developed, even for research purposes.

Q109. For maintenance work on the power supply system, power to the whole MRI examination room is stopped. Which of the following procedures is incorrect?

(1.) With a resistive magnet MRI, turn off the power to the magnetostatic coil to shut down the static magnetic field.
(2.) With a permanent magnet MRI, take measures to prevent sudden changes in temperature in the examination room.
(3.) With superconducting magnet MRI systems, since quenching occurs if the chiller is turned off, contact the manufacturer and shut down the magnetic field systematically.
(4.) Turn off the power supply to the whole MRI system according to the correct procedure and shut off the main breaker.

Q110. Which of the following combinations is incorrect?

(1.) RF unevenness – Drop in image uniformity
(2.) Magnetostatic field unevenness – Increased image distortion
(3.) RF shield defect – Occurrence of artifacts
(4.) Multi-channel transmission coil – Increased SAR

Q111. Which of the following combinations is largely irrelevant as a safety factor in MRI systems?

(1.) Magnetostatic field – Dynamic action (missile effect)
(2.) Gradient magnetic field – Heat generation
(3.) RF – Heat generation, burns
(4.) Noise – Transient hearing loss

Q112. Which of the following is largely irrelevant as a factor causing quenching in superconducting magnet MRI systems?

(1.) When the amount of remaining liquid helium falls below the minimum level.
(2.) When conducting an examination of a patient with non-magnetic metal in their body (titanium alloy joint prosthesis).
(3.) When a ferromagnetic material is accidentally attracted.
(4.) When there is a strong vibration in an earthquake.

Q113. Which of the following statements concerning SAR is correct?

(1.) Called "specific absorption rate", it indicates the heat generated in the human body by RF.
(2.) It does not change due to static magnetic field strength.
(3.) The larger the subject, the smaller the value.
(4.) The shorter the repetition time, the smaller the value.

Q114. Which of the following statements comparing the characteristics of 3.0 t MRI systems with 1.5 t systems is incorrect?

(1.) There is no difference in SAR.
(2.) SNR is double.
(3.) Since chemical shift increases, MRS spectral resolution is improved.
(4.) There is little difference in T2.

Q115. Which of the following is not included in the daily routine for maintaining the quality control of the equipments?

(1.) helium level management
(2.) thermo-hygrostat management
(3.) ultra low refrigerator management
(4.) operating room temperature management

Q116. Which of the following is an incorrect phantom in MRI?

(1.) ACR phantom
(2.) Water phantom
(3.) AAPM phantom
(4.) Multi purpose phantom

Q117. Which of the following is the recommendation of field strength that does not permit the pacemaker transplantation patients to enter the keep off region in the MRI scanning room?

(1.) 50gauss (2.) 10gauss (3.) 5gauss (4.) 0.5gauss

Q118. Which of the following is an incorrect OH&S when quenching occurs?

(1.) Open the examination door widely.
(2.) Evacuate the patient immediately.
(3.) Call CPR team.
(4.) Check the vital sign of evacuated patient.

Q119. Which of the following is an incorrect precaution of the ultrasound standard phantom?

(1.) Place the phantom on the flat and clean area.
(2.) Proper amount low viscosity gel or water place on the scan surface.
(3.) Adjust the gain value which the bottom of phantom shows black.
(4.) The values of Sono CT, TGC, and Output are adjusted as the same as the values of normal liver and recorded.

Q120. The resonance frequency for ^{1}H in a 1.5 T magnetic field is:

(1.) 63 H_3 (2.) 63kH_3 (3.) 63MH_3 (4.) 63GH_3

Q121. MR "shimming" is used to:

(1.) Minimize noise in RF coils
(2.) Correct for magnetic-field inhomogeneities
(3.) Reduce the noise level in MR system
(4.) Minimize the possibility of quenches

Q122. MR SNR cannot be improved by increasing the:

(1.) Matrix size
(2.) Number of acquisitions
(3.) Static magnetic-field strength
(4.) Section thickness

Q123. Which of the following has the highest acoustic impedance?

(1.) Bone (2.) Fat (3.) Air (4.) Water

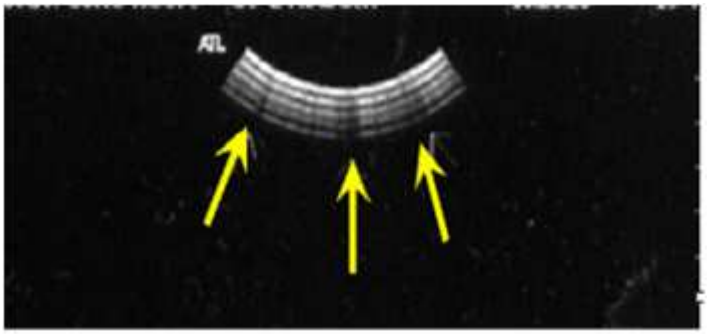
Q124. Ultrasound shadowing artifacts are unlikely behind:

(1.) Strong attenuators
(2.) Bone
(3.) Air
(4.) Fluid-filled cysts

Q125. Ultrasound signals are converted from digital data to a video monitor display using a:

(1.) Log amplifier
(2.) Photomultiplier tube
(3.) Photocathode
(4.) Scan converter

Q126. Which of the following is related to the transducer check up image below?



(1.) Mian bang phenomenon
(2.) Crystal defect check up
(3.) Cables check up
(4.) Rubber check up

Q127. Which of the following statements concerning acceptance of new equipment is <u>incorrect</u>?

(1.) When using a system for the first time, read the operation manual before operating the equipment.
(2.) Although the image quality of each probe is adjusted at shipment, perform a recheck and readjustment.
(3.) Several ultrasound devices were plugged into the same outlet without the power capacity being checked.
(4.) Check that there is no equipment that generates high frequencies in the vicinity of installation.

Q128. Which of the following statements concerning daily use is correct?

(1.) Before carrying out an examination, check the acoustic lens and case of the probe for cracks and other damage.
(2.) Although image quality was adjusted, the viewing monitor and black and white printer were not adjusted.
(3.) There is no need to check the operation of the probe before the examination.
(4.) Although the earth cable of the equipment was not connected, there was no problem with the image so it was left disconnected.

Q129. Which of the following statements concerning care of the probe is correct?

(1.) Although the probe surface was hotter than usual, since there was no problem with the image, the examination was continued.
(2.) When the probe surface is damaged, although there is a problem with the image, electrically the probe is safe.
(3.) Although the probe was dropped on the floor, it was used on the next patient without it being checked after an examination.
(4.) Unused probes are kept in a case and are plugged in when they are needed.

Q130. Which of the following statements about routine inspection is <u>incorrect</u>?

(1.) It is desirable to take control data in order to check deterioration of the probe and other parts.
(2.) Routine inspection largely involves items that are beyond the skill of the user.
(3.) Patient leakage current is a current that flows between the part of the diagnostic device in contact with the patient's body and the earth via the patient.
(4.) Examination items include axial resolution and lateral resolution.

Q131. Choose the correct name.

(1.) Thyroid tissues sample
(2.) Neck phantom
(3.) Thyroid phantom
(4.) Kidney phantom

Q132. Which of the following phantoms is unsuitable for measurement in radiation therapy?

(1.) Water phantom
(2.) Crystal glass
(3.) Mix DP
(4.) Solid water

Q133. Which of the following is not relevant to electron irradiation from linac equipment?

(1.) Electron gun
(2.) Scattering foil
(3.) Monitor-dosimeter
(4.) Flatness filter

Q134. Which of the following statements concerning radiation therapy quality assurance is incorrect?

(1.) The reference dosimeter is calibrated once every three years.
(2.) The accuracy of the laser light that indicates the isocenter is checked every morning.
(3.) The monitor unit (MU value) set for each plan is calculated independently.
(4.) The correspondence between the light field and radiation field is checked using film.

Q135. Which of the following combinations concerning linac equipment is correct?

(1.) Accelerating tube – Traveling wave and standing wave
(2.) Microwave oscillator – Thyratron
(3.) Electron acceleration – Rotary motion due to the microwave electric field
(4.) Output dose – Pulse number

Q136. Which of the following is not relevant to dose distribution algorithms?

(1.) STD method
(2.) Power law TAR method
(3.) Monte Carlo method
(4.) Pencil beam method

Q137. Which of the following yields a significant difference in dose distribution according to different algorithms?

(1.) Lung (2.) Bone (3.) Fat (4.) Liver

Q138. Which of the following statements about linac equipment is incorrect?

(1.) Electrons are emitted by the electron gun.
(2.) Electrons are accelerated by a high frequency electric field.
(3.) A multileaf collimator is used.
(4.) Bending magnets separate the X-rays and electron beam.

Q139. Which of the following abbreviations concerning radiation therapy is incorrect?

(1.) Tissue maximum ratio: TMR
(2.) Tissue air ratio: TAR
(3.) Scatter air ratio: TNM
(4.) Percentage depth dose: PDD

Q140. Which of the following is not relevant to calculating dose distribution for radiation therapy?

(1.) Wedge filter
(2.) Atmospheric correction factor
(3.) Inhomogeneity
(4.) Off center axis ratio

Q141. Which of the following statements concerning gamma camera quality control is correct?

(1.) A collimator is attached for measurement of intrinsic resolution.
(2.) Maximum deviation (%) is used for evaluation of overall resolution.
(3.) A copper plate is used for testing image linearity.
(4.) A sinogram is used for evaluating the SPECT center of rotation.

Q142. Which of the following statements concerning gamma camera scintillators is correct?

(1.) NaI(TI) is most commonly used.
(2.) Resolution improves as thickness increases.
(3.) Scintillators with the same material as the scintillators of specialized PET devices are common.
(4.) They are highly resistant to temperature change.

Q143. Which of the following statements concerning low energy, high-resolution collimators is correct?

(1.) They have better image resolution than high-sensitivity types.
(2.) The vanes are thicker than those for high energy types.
(3.) They have higher count efficiency than general-purpose types.
(4.) They are used for double indium peak acquisition.

Q144. Which of the following statements concerning energy resolution tests is correct?

(1.) Resolution is the same for all nuclides.
(2.) The full width at half maximum of the photoelectric peak is used as an index.
(3.) The larger the full width at half maximum value, the better the image quality.
(4.) 67Ga is used as a marker.

Q145. Which of the following is the SPECT image reconstruction method?

(1.) TEW (triple energy window)
(2.) Patlak Plot
(3.) Successive approximation
(4.) Mean transit time method

Q146. Which of the following causes ring artifacts in SPECT images?

(1.) Excessive radius of gyration
(2.) Reduced spatial resolution
(3.) 180° data acquisition
(4.) Displacement of the center of rotation

Q147. Which of the following does <u>not</u> affect the intrinsic resolution of gamma cameras?

(1.) Multiple scattering of the gamma ray inside the scintillator
(2.) Fluctuation of the output current from the photomultiplier
(3.) Deterioration through secular change of the scintillator
(4.) The shape of the collimator used

Q148. Which of the following statements about gamma camera collimators is <u>incorrect</u>?

(1.) They affect overall resolution.
(2.) They are matched to the energy of the nuclide used.
(3.) A high resolution type is used when the counting rate is low.
(4.) Lead is used in the material of the vanes.

Q149. In order to maintain the quality in the medical setting, a strategic approach is applied.

This approach consists of planning, practicing and analyzing. Choose the correct strategic approach method from the following.

(1.) CPDA (2.) DAPC (3.) PDCA (4.) ACPD

Q150. Which of the following is an <u>incorrect</u> statement describing the importance of the equipment management?

(1.) It needs to keep up with the recommendation item of ICRP etc.
(2.) It is no meaning that bring many expense and endeavor.
(3.) It is very important to educate the members and members' try.
(4.) We have to have a mind that it'll be important key to make a good result.

Q151. Choose the wrong statement.

(1). There are daily maintenance and periodic maintenance to maintain equipment performance.
(2). An acceptance test should be conducted when a monitor approved by the Pharmaceutical Affairs Law is repaired or replaced.
(3). Invariance tests to verify that the performance of equipment satisfies the installation criteria and any early detection of performance changes shall be conducted by the user of the equipment.
(4). An acceptance test to verify, after installation, that equipment satisfies the contract specifications shall be conducted by the user of the equipment.

Q152. Choose the wrong statement about the role of a Medical Imaging and Radiologic Systems Manager.

(1). Trains workers on safe handling of equipment.
(2). Consults patients about radiation exposure.
(3). Prepares equipment management plans.
(4). Makes efforts to improve medical services.

Q153. Choose the wrong statement about the performance testing of an image intensifier.

(1). Image distortion is measured.
(2). Response speed is measured.
(3). Image contrast is measured.
(4). The entrance field size is measured.

Q154. Choose the correct statement about daily maintenance.

(1). Start-of-day checking, based mainly on visual inspection, is a safety check conducted without taking much time before performing examinations.
(2). End-of-day checking takes sufficient time to focus on the items that can not be covered by start-of-day checking.
(3). Periodic maintenance can be omitted if daily maintenance is performed properly.
(4). Predetermined items are checked by spending sufficient time to maintain quality and performance.

Q155. Choose the wrong statement about the role of a Medical Imaging and Radiologic Systems Manager.

(1). Does not have to deal with equipment covered by a maintenance contract.
(2). Conducts the cost-benefit analysis of equipment.
(3). Prepares inspection plans for each piece of equipment.
(4). Grasps the state of equipment operation and addresses problems.

Q156. Choose the wrong combination of items regarding measuring instruments.

(1). Tube voltage, tube current --- Tube voltage meter, tube current meter
(2). Duration of imaging --- Stopwatch
(3). Time-integrated tube current --- mAs-value meter
(4). X-ray output --- Transmission type dosimeter

Q157. Choose the wrong statement about the verification of electric safety.

(1). The allowable limit of the earth leakage current of a permanently installed high-voltage X-ray system is 10.0 mA.
(2). The allowable limit of the external leakage current of a permanently installed high-voltage X-ray system is 0.1 mA.
(3). The allowable limit of the installed leakage current of a movable high-voltage X-ray system is 5.0 mA.
(4). The allowable limit of the external leakage current of a movable high-voltage X-ray system is 0.1 mA.

Q158. Choose the wrong statement about equipment maintenance.

(1). It addresses mechanical safety, electric safety, and radiation safety.
(2). It includes periodic part replacement for preventive maintenance.
(3). All medical equipment is subject to maintenance.
(4). Care must be taken to prevent infection as a safety measure.

Q159. Choose the wrong statement about a focus size test.

(1). It is conducted using the pinhole camera method or the slit camera method.
(2). It is conducted using the pinhole camera method or the parallel pattern camera method.
(3). The parallel pattern camera method can be used when the nominal focus size is 0.3 or less.
(4). The star pattern camera method uses a star pattern test chart for measurement.

Q160. Choose the action not needed in equipment management documentation.

(1). Manage imaging or examination manuals simultaneously.
(2). Record acceptance test data.
(3). Record the progress of equipment repair and maintenance.
(4). Manage manuals and attached documents simultaneously.

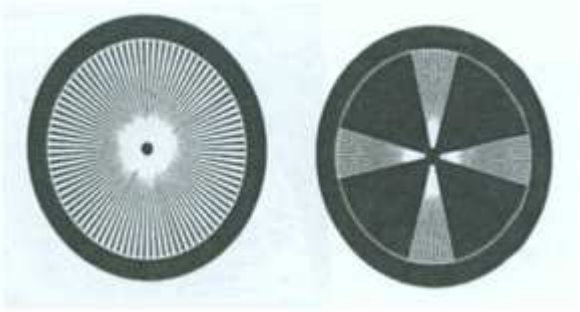
Q161. Choose the correct statement about a diagnostic X-ray tube.

(1). The intensity of X-rays emitted from the target is higher on the anode side than the cathode side.
(2). The smaller the target angle, the greater the short-term allowable load.
(3). The size of focus remains unchanged when load conditions are changed.
(4). The actual focus area is smaller than the effective focus area.

Q162. Choose the material not used for an additional filter of a diagnostic X-ray tube.

(1). Gold
(2). Copper
(3). Molybdenum
(4). Aluminum

Q163. Choose the test item appropriately measured by using the chart below.



(1). Focus size
(2). Half-value thickness
(3). Energy dependence of kVp-value
(4). Reciprocity of mAs-value

Q164. The minimum HVL for x-ray units operating at 80 kVp is ____mm of aluminum.

(1). 3.0
(2). 2.3.
(3). 1.6
(4). 0.9.

Q165. The ability of an imaging system to create separate images of closely spaced high-contrast objects is known as

(1). Spatial resolution
(2). Contrast resolution
(3). Quantum mottle
(4). Screen speed

Q166. Which type of test tool may be used to demonstrate pincushion distortion?

(1). Dosimeter
(2). Wire mesh tool
(3). Ion chamber
(4). Homogenous phantom

Q167. The MTF is one method to measure the:

(1). Low-contrast resolution
(2). High-contrast spatial resolution
(3). Attenuation
(4). Section Thickness..

Q168. Which of the following is not true regarding the focus?

(1). Focus size is unchanged irrespective of the load condition
(2). Actual focus area is larger than actual effective focus area
(3). The smaller target angle, the higher permitted load
(4). 4. In the X-ray intensity distribution, the cathode side is strong, the anode side is weak

Q169. Which of the following is not related with the performance of automatic exposure control device?

(1). The characteristic of response time
(2). The characteristic of kvp
(3). The characteristic of subject thickness
(4). The characteristic of mAs

Q170. Which of the following is not related with the performance test for image intensifier tube?

(1). Convert coefficient – brightness tester
(2). Contrast-density tester
(3). Distortion—grid shape chart
(4). Resolution—resolution test chart

Q171. Choose the wrong statement about a flat panel detector.

(1). It detects X-rays as electric signals
(2). There are direct and indirect methods.
(3). Its dynamic range is narrower than that of an intensifying screen-film system.
(4). It can cope with dynamic images.

Q172. Choose the correct statement about an over-tube-type fluoroscopic system.

(1.) It is easy to conduct magnified imaging.
(2.) It is possible to perform close spot imaging.
(3.) It is often used as a near-field operated fluoroscopic system.
(4.) Much headroom can be provided over the couch.

Q173. Choose the correct statement about a mammographic X-ray system.

(1). The heel effect of the X-ray tube is utilized.
(2). Aluminum is used at the radiation aperture.
(3). Molybdenum is used for an additional filter.
(4). A focus size with a nominal large focus of 2.0 mm is used.

Q174. Which of the following is true regarding the affected factor to mammography imaging quality?

a. The absorbent difference of breast	b. The size of focus
c. Collimation	d. Filteration

(1). a (2). a, b (3). a, b, c (4). a, b, c, d

Q175. The light field/x-ray field alignment for mammographic units must be accurate to within ±_____% of the SID.

(1). 2 (2). 3 (3). 4 (4). 5

Q176. How often at least for Mammographic quality standards, phantom images with ACR accreditation phantom or equivalent phantom should be obtain?

(1). Daily. (2). Weekly. (3). Monthly. (4). Yearly.

Q177. Choose the wrong statement about an X-ray TV system.

(1). The greater the number of scanning lines, the higher the vertical resolution.
(2). The ratio of horizontal to vertical dimensions of a screen is called the aspect ratio.
(3). Electromagnetic deflection is used in the deflection circuit.
(4). The wider the video frequency band, the lower the horizontal resolution.

Q178. Choose the wrong statement about DSA.

(1). It allows real-time image observation.
(2). A recursive filter reduces noise.
(3). It excels in contrast resolution.
(4). The smaller the input field of view of the image intensifier, the smaller the exposure dose.

Q179. Choose the item not related to computed radiography (CR).

(1). Cassette with intensifying screen (2). Imaging plate
(3). Laser tube (4). A/D converter

Q180. Choose the wrong statement about an inverter-type X-ray system

(1). The rated output of the system is affected by the source impedance.
(2). With a single-phase power source, an X-ray output comparable to that obtained with a three-phase power source can be obtained.
(3). There are rectangular wave-type and resonant-type inverters.
(4). The size of the high voltage transformer is irrelevant to the inverter frequency.

Q181. Choose the item not related to a CT system.

(1). Single slice (2). Multi-slice
(3). Quenching (4). Helical scan

Q182. Choose the correct statement about an X-ray CT value.

(1). Fat has a higher CT value than water.
(2). It is determined from the reflectance of an X-ray beam.
(3). It depends on the atomic number of the subject material.
(4). It is a relative value, with a zero value for water.

Q183. Choose the item relevant to a multi-slice CT system.

(1). RF coil
(2). Radio wave shield
(3). Narrow beam
(4). DAS (data acquisition system)

Q184. Choose the item relevant to CT resolution in the axial direction.

(1.) Display pixel size
(2.) Detector sensitivity
(3.) Helical pitch
(4.) Scan time

Q185. Choose the item not relevant to the performance evaluation of a CT system.

(1). Spatial resolution
(2). Scintillator
(3). Contrast resolution
(4). Slice thickness

Q186. Choose the item not relevant to the start-of-day checking of a CT system.

(1). Gantry operation and safety
(2). Couch operation and safety
(3). X-ray output dose measurement
(4). Safety mechanism operation

Q187. Choose the item not relevant to the image reconstruction of a CT system.

(1). Successive approximation method
(2). Back projection method
(3). Radon's theorem
(4). Clarkson method

Q188. Choose the item not relevant to the image noise of a CT system.

(1). Structural noise
(2). Acoustic noise
(3). Electric noise
(4). Quantization noise

Q189. Choose the item not relevant to the dosimetry of a CT system.

(1). Low contrast resolution
(2). DLP
(3). MSAD
(4). CTDI

Q190. Choose the item relevant to artifacts in X-ray CT.

(1). Multi-reflection
(2). Side lobe
(3). Beam hardening
(4). Misregistration

Q191. Which of the following is related with CT artifact?.

a. Reverberation
b. Side lobe
c. Partial volume effect
d. Beam hardening phenomenon
e. Register error

(1). a, b (2). a, e (3). b, c (4). c, d

Q192. Which of the following is related with multislice CT?

a. RF coil
b. Electric wave shield
c. cone beam
d. DAS (data acquisition system)
e. STC (sensitivity time control)

(1). a, b (2). a, e (3). b, c (4). c, d

Q193. CT imaging has excellent _____ because of the narrow beam collimation.

(1). spatial frequency
(2). noise reduction
(3). contrast resolution
(4). spatial resolution

Q194. Filtered back projection in CT refers to _____.

(1). spatial resolution
(2). pre-patient collimation
(3). beam filtration
(4). image reconstruction

Q195. The pixel size is reduced when the _____ size is increased and the _____ size is fixed

(1). field of view, matrix
(2). matrix, field of view
(3). Hounsfield unit, field of view
(4). field of view, Hounsfield unit

Q196. Choose the wrong statement about a linac therapy system.

(1). Electrons are generated by an electron gun.
(2). Electrons are accelerated by a high frequency electric field.
(3). A multi-leaf collimator is used.
(4). X-rays and electron beams are separated by a bending magnet.

Q197. Choose the item that needs to be checked at least once a week for the quality control of a linac therapy system.

(1). Measurement of output factor
(2). Calibration of monitoring dosimeter
(3). Measurement of percentage depth dose
(4). Measurement of wedge factor

Q198. Choose the wrong statement about the quality control of radiotherapy.

(1). Draw up a therapy plan assuming that the patient will not move.
(2). Verify the precision of the laser light isocenter every morning.
(3). Conduct independent calculation of the monitor unit number (MU value) set for each plan.
(4). Use films to verify the matching of the light field and irradiation field.

Q199. Choose the wrong statement about a superconducting magnet MRI system.

(1). The static magnetic field coil is cooled by liquid helium to maintain a superconducting state.
(2). The gradient magnetic field coil must also be maintained in a superconducting state.
(3). A static magnetic field remains even when power to the MRI system is shut off.
(4). There is an MRI system with a static magnetic field exceeding 5.0 T.

Q200. Choose the wrong action to be taken in advance of a power system maintenance outage in an area including an MRI examination room.

(1). In the case of a resistive magnet MRI system, shut down power to the static magnetic field coil to eliminate the magnetic field.
(2). In the case of a permanent magnet MRI system, take measures to avoid sudden changes in temperature in the examination room.
(3). In the case of a superconducting magnet MRI system, because helium consumption increases when the refrigerator stops, add a sufficient amount of helium to avoid the occurrence of quenching.
(4). In all types of MRI systems, because the static magnetic field disappears during an outage, there is not need to prohibit access to the MRI examination room.

Q201. Choose the wrong combination of items.

(1). Incomplete shimming --- Lowered MRS frequency resolution
(2). Multi-channeled reception coil --- Capability of parallel imaging
(3). Multi-channeled transmission coil --- Improved image homogeneity
(4). Improper RF shield --- Increased SAR

Q202. Choose the wrong statement about SNR measurement in the NEMA method.

(1). Imaging is conducted twice with a phantom in place, and the differential image is used as noise data in analysis.
(2). Imaging is conducted twice in duplicate taking care not to change gain and other conditions.
(3). The ROI area should cover at least 90% of the phantom cross section.
(4). In a parallel imaging sequence, adjustment is required because the noise level varies with location in the FOV.

Q203. Choose the item not required by the JIS standards for daily maintenance of an MRI system.

(1). Spatial resolution measurement
(2). SAR measurement
(3). Geometric distortion measurement
(4). Slice thickness measurement

Q204. Choose the combination of unrelated items in terms of MRI system safety.

(1). Static magnetic field --- Mechanical action (missile effect)
(2). Gradient magnetic field --- Peripheral nerve irritation
(3). RF waves --- Fever, burn
(4). Noise --- Vertigo

Q205. Choose the item that does not cause quenching in a superconducting magnet MRI system.

(1). Contamination of a room-temperature gas occurred when refilling liquid helium
(2). An emergency demagnetization button was pressed.
(3). A nonmagnetic metal was put in the magnet bore.
(4). A long-term power outage occurred.

Q206. Choose the wrong statement about SAR.

(1). It stands for specific absorption rate, which means heat generated by RF waves in a human body.
(2). It increases in proportion to the square of the static magnetic field intensity.
(3). The smaller the subject, the greater the SAR.
(4). The larger the flip angle, the greater the SAR.

Q207. Choose the wrong statement about the effect of multi-transmission in a 3.0-T MRI system.

(1). Local SAR does not change.
(2). Image homogeneity is improved.
(3). Contrast is improved because protons are excited more homogeneously.
(4). It is effective for abdominal and mammary examinations.

Q208. Choose the wrong action to take when quenching has occurred in a superconducting magnet MRI system.

(1). Stop the examination, and let the subject evacuate the examination room.
(2). To minimize the leak of helium gas to the surrounding area, close the door to the examination room and the windows around the room.
(3). Prohibit access to the examination room because it may get filled with helium.
(4). Keep away from the helium gas discharged from the quench pipe outlet because it is cryogenic and dangerous.

Q209. What is the recommended and prohibited gauss line for those patients who are transplanted a pace maker at MRI room?

(1). 50 (2). 10 (3). 5 (4). 0.5

Q210. Which item is unnecessary for MRI QC test?

(1). Imaging uniformity
(2). Imaging distortion
(3). Slice thickness
(4). The residual liquid helium

Q211. Choose the correct statement about a gamma camera scintillator.

(1). It is often the same in material as a scintillator for a dedicated PET system.
(2). The thicker its thickness, the higher the resolution.
(3). NaI(Tl) is most widely used.
(4). It is resistant to temperature changes.

Q212. Choose the wrong statement about the performance testing of a gamma camera.

(1). A lead slit phantom is used to test image linearity
(2). The intrinsic resolution is better than the overall resolution.
(3). Energy resolution is obtained from half-value thickness.
(4). A planar source is used to test the overall homogeneity.

Q213. Choose the item that does not affect the resolution of a SPECT system.

(1). Image reconstruction method
(2). Absorption correction
(3). Scattering correction
(4). Radioactive decay correction

Q214. Choose the wrong action to take when accepting equipment.

(1). If the equipment is used for the first time, read the operational manual before operating it.
(2). Although the image quality of each probe is factory-adjusted, conduct verification and adjustment once again.
(3). Because a 100-V ordinary power socket can be used for the equipment, two equipment units can be connected to the same socket.
(4). When installing the equipment, the collection of control data and other actions should be taken in the presence of the manufacturer's personnel.

Q215. Choose the correct action regarding the daily use of equipment.

(1). Although there is a crack in the probe lens surface and the probe's interior is exposed, the probe is used in this state because no change in image quality is observed.
(2). The observation monitor and monochrome printer are also adjusted when adjusting image quality.
(3). If no problem occurred during examination on a given day, it is not necessary to verify the operation of the probe before examination on the next day.
(4). Although the earth cable of the equipment is disconnected, the equipment is used in this state because no change in image quality is observed.

Q216. Choose the wrong statement.

(1). Avoid using the equipment immediately after turning it on.
(2). Wipe the jelly off the probe surface soon after finishing examination.
(3). After using the equipment, keep the probe in a holder to prevent falling.
(4). The equipment can be turned off immediately after finishing examination.

Q217. Choose the wrong statement.

(1). Image freezing is not necessary when there is some time between the last and next inspections.
(2). Avoid using the equipment near a strong electromagnetic field.
(3). After confirming the completion of image transfer, the equipment was unplugged for moving.
(4). Do not fold the probe cable forcibly.

Q218. Choose the wrong statement about probe disinfection.

(1). Even in the case of an ultrasonic probe that can be disinfected, do not expose the connector part of the probe to water or chemicals.
(2). Disinfect or sterilize the probe according to the procedure recommended by the manufacturer.
(3). The probe is never degraded regardless of how many times it is disinfected.
(4). If there is a crack in the probe lens surface and the probe's interior is exposed, do not disinfect or sterilize the probe.

Q219. Choose the correct statement about periodic maintenance.

(1). Maintenance contracts for ultrasonic systems are more costly than those for CT and MRI systems.
(2). It includes verification of distance and directional resolution.
(3). There is no item of periodic maintenance that can be done by the user.
(4). Degradation of the image quality of an ultrasonic system is clearly recognized in daily use.

Q220. Choose the wrong statement about reducing noise in equipment.

(1). If noise comes from the power line, reconnect the power plug to a receptacle of another power line.
(2). Avoid as much as possible using the equipment simultaneously with an electric knife or other devices that generate significant noise.
(3). Always use 3P-type receptacles for noise control and electric safety.
(4). Noise filters and noise-cut transformers are seldom used.

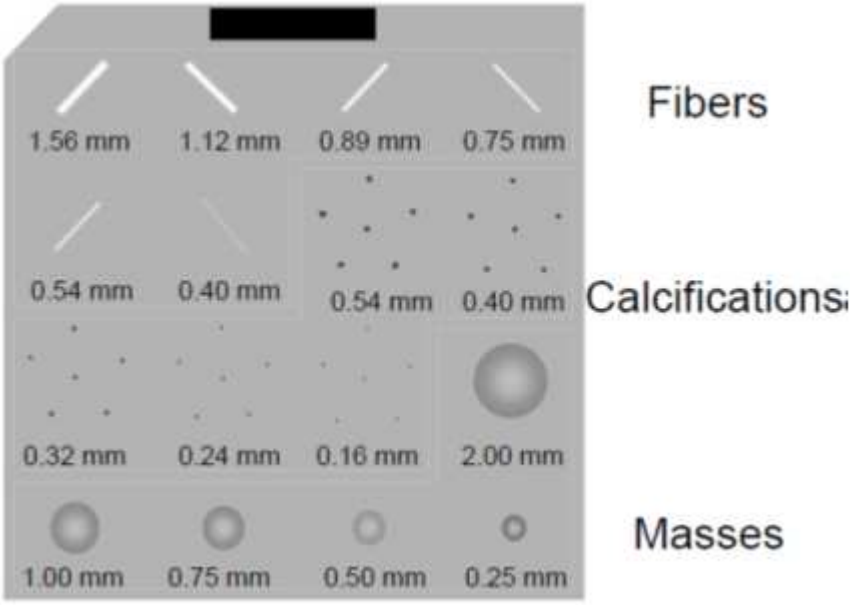
Q221. Which QC tools is not used to measure focal spot size?

(1). pinhole camera.
(2). star pattern.
(3). slit camera.
(4). Eight-Peny Test

Q222. Any repeat rate exceeding_____ should be seriously examined.

(1). 2% to 4%.
(2). (B) 4% to 6%.
(3). (C) 6% to 8%.
(4). (D) 8% to 10%.

Q223. The figure below is Mammography Accreditation Phantom. What is MQSA quality standard must be clearly visible at least?



(1). 4 fibers, 3 calcification groups and 3 masses
(2). 4 fibers, 4 calcification groups and 4 masses
(3). 3 fibers, 3 calcification groups and 4 masses
(4). 3 fibers, 4 calcification groups and 3 masses

Q224. Which of the following factors can affect the accuracy of a density (HU) measurement in CT image ?

(1). Window level.
(2). Monitor brightness
(3). Display FOV
(4). System calibration.

Q225. Which of the following tests does not need to be performed routinely as part of an ultrasound quality assurance program ?

(1). Uniformity.
(2). Distance accuracy.
(3). Axial Resolution
(4). Maximum death of visulization.

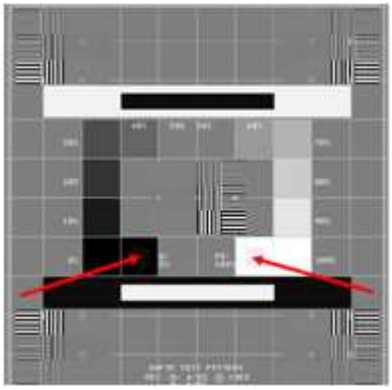
Q226. A string phantom is useful for measuring the:

(1). The Maximum depth of Doppler signal detection
(2). Velocity accuracy on a spectral Doppler display.
(3). Axial resolution in B-mode .
(4). Vertical distance measurement accuracy

Q227. Doppler flow phantoms are useful for determining the:

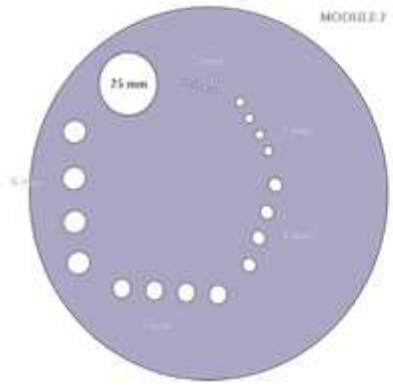
(1). The vertical distance measurement accuracy.
(2). The acoustic output during color flow imaging
(3). The horizontal distance measurement accuracy.
(4). The maximum depth of Doppler signal detection

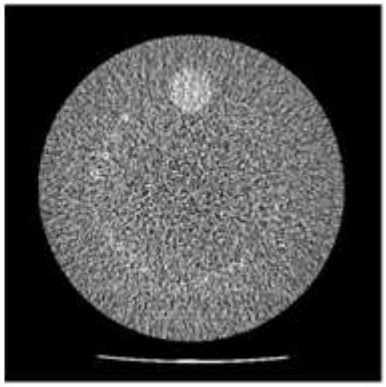
Q228. The red arrows of this figure (SMPTE pattern) are used to measure the __ of screen.



(1). Spatial Resolution
(2). Homogeneity
(3). Brightness and Contrast
(4). None of above all.

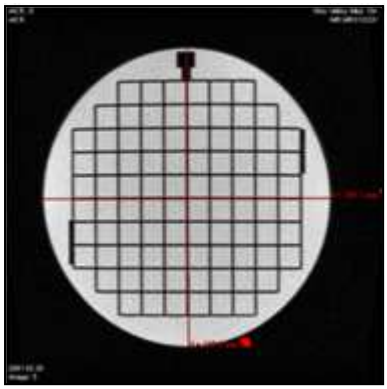
Q229. Which of CT quality control is measured in this figure?





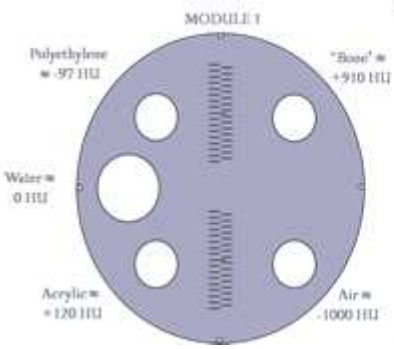
(1). Low Contrast
(2). Spatial Resolution
(3). Slice Thickness
(4). CT number

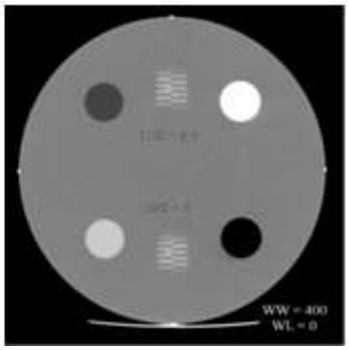
Q230. Which of MR quality control is measured in this figure?



(1). Center frequency
(2). Geometric accuracy
(3). High contrast resolution
(4). Low contrast detectability

Q231. Which of CT quality control is measured in the figure?





(1). Noise and Uniformity
(2). Spatial Resolution
(3). Slice Thickness
(4). Patient Dose

Q232. Which of the followings are the causes of MR slice position accuracy?

(A)Operator error.(B)Table positioning shift (C)High B_o in -homogeneities. (D) Slice thinkness

(1). (A) and (B)
(2). (B) and (C)
(3). (A)、(B)and(C)
(4). above of all

Q233. Which of the following is false regarding geometric unsharpness?

(1). Inversely proportional to focal spot size.
(2). Directly proportional to object-film distance.
(3). Inversely proportional to focal spot-object distance.
(4). Characterized by penumbra width.

Q234. In some situations, e.g., it is important to see radiographic anatomy in both high- and low density regions of a chest exam. To aid in this, one could choose a film with____.

(1). High gradient
(2). High gamma
(3). Slow speed
(4). Long latitude

Q235. The purpose of a screen is to:

1. Convert x-rays to light photons.

2. Reduce scatter reaching the film.

3. Reduce patient's exposure.

4. Increase radiographic resolution.

(1). 1,2,3,4 (2). 2 only (3). 2,4 (4). 1,3

Q236. What is the milliamperage used during fluoroscopy?

(1). 100 mA (2). 50 mA (3). 5 mA (4). 1 mA

Q237. The image intensifier improved fluoroscopy by increasing image _____.

(1). brightness
(2). resolution
(3). magnification
(4). contrast

Q238. Focal spot size is measured with a _____

(1). pinhole camera
(2). star pattern
(3). slit camera
(4). all of the above

Q239. A cassette that is improperly positioned can cause a _____ artifact

(1). blur
(2). grid cut-off
(3). fog
(4). double exposure

Q240. What is the most common cause of tube failure?

(1). cracked anode
(2). loose bearings
(3). pitted anode
(4). tungsten vaporization

Q241. The effective focal spot size is ____ the actual focal spot size.

(1). equal to
(2). larger than
(3). equal to or larger than
(4). smaller than

Q242. Localized pitting or cracking on the anode can occur from _____.

(1). filament vaporization
(2). a single excessive exposure
(3). long exposure times
(4). high kVp and low mA

Q243. The size and construction of the _____ determines the anode heat capacity

(1). tube housing (2). cathode wire

(3). bearing assembly (4). anode disk

Q244. Image noise in CT scanning depends on _____

(1). pixel size (2). detector efficiency

(3). slice thickness (4). all of the above

Q245. A high variation in pixel values in a homogenous phantom is a measure of _____.

(1). spatial resolution (2). image noise

(3). contrast resolution (4). motion artifact

Q246. The degree of spatial resolution in any CT imaging system is limited to the size of the _____

(1). voxel (2). FOV (3). matrix (4). pixel

Q247. Each pixel of information in the CT image contains numerical information in _____ units.

(1). voxel (2). reconstruction

(3). Hounsfield (4). pixel

Q248. The patient dose in CT is determined by the _____ collimator.

(1). predetector (2). prepatient (3). postpatient (4). both A and B

Q249. The computed radiography image has _____.

(1). narrow exposure latitude (2). wide exposure latitude

(3). improved contrast resolution (4). both B and C

Q250. Spatial resolution is determined by the ratio of _____ to _____.

(1). matrix size, field of view (2). field of view, matrix size

(3). bit depth, field of view (4). field of view, dynamic range

Q251. What is the primary reason for absence of a Bragg peak in a depth dosage curve for an electron beam?

(1). scattering of electrons (2). occurrence of bremsstrahlung

(3). absorption by atomic nucleus (4). annihilation radiation

Q252. Given that an exposed film has transmittance of 0.01 after development, what is the optical density (OD) of the film?

(1). 0.01 (2). 1 (3). 2 (4). 3

Q253. Which of the following is a beam quality indicator in X-ray imaging?

(1). tubal voltage (2). tubal current

(3). half-value layer (4). profile of energy spectrum

Q254. Given that $N = N_0 e^{-\mu x}$, and calculation result shows that $N = 4000$, but measurement by a detector reveals that actually $N = 7000$. How much is the buildup factor?

(1). 0.57 (2). 1.5 (3). 1.75 (4). 3.75

Q255. What is the mean energy required for secondary electrons to generate an ion pair in air?

(1). 3.4 eV (2). 33.85 J (3). 33.85 keV (4). 33.85 eV

Q256. What is the electron emitted as a result of the interaction between the photons produced by electron transition in inner orbits of an atom and an electron from outer orbits of an atom?

(1). binding electron
(2). free electron
(3). conversion electron
(4). auger electron

Q257. In a photomultiplier tube, what is the component for converting a flash of light into electrons?

(1). NaI (T1) (2). anode (3). photocathode (4). dynode

Q258. In a radiation energy spectrum, a primary peak has energy of 1.17 MeV, and its full width at half maximum (FWHM) is 80 keV, what is the percentage of energy resolution?

(1). 3.4% (2). 6.8% (3). 10.0 % (4). 13.6 %

Q259. A shielding tank contains P-32 nuclei, how can its inner and outer layers minimize bremsstrahlung?

(1). material of a high atomic number, material of a low atomic number
(2). material of a high atomic number, material of a high atomic number
(3). material of a low atomic number, material of a low atomic number
(4). material of a low atomic number, material of a high atomic number

Q260. Which of the following is proportional to the magnitude of current collected at the anode and the cathode of an ionizing cavity?

(1). accumulated dose
(2). dose rate
(3). radiation duration
(4). distance between the radiation source and the ionizing cavity

Q261. Which of the following does not correlate with the absolute efficiency of a NaI (Tl) detector?

(1). size of detector crystal
(2). energy of ionizing radiation
(3). the material of which the detector is made
(4). magnitude of ionizing radiation

Q262. In the event of β-decay, what must the parent nucleus and the daughter nucleus be?

(1). isotopes (2). isotones (3). isobars (4). isomers

Q263. Which of the following does *not* involve image processing?

(1). Histogram equalization (2). Low-pass filtering

(3). Background subtraction (4). K-edge filtering

Q264. The most important component affecting spatial resolution in DSA is the:

(1). Focal spot size

(2). Image intensifier input phosphor thickness

(3). Image intensifier output phosphor thickness

(4). Digitization matrix

Q265. Geometric unsharpness in mammography is:

(1). Unimportant (2). Minimized with a large focal Spot

(3). Reduce by a small SID (4). Increased with magnification

Q266. Which of the following has a Hounsfield unit value of approximately – 90?

(1). Fat (2). Gray matter (3). Walter (4). Bone

Q267. Which image reconstruction algorithm is used in current commercial CT scanners?

(1). Two-dimensional Fourier transform (2). Three-dimensional Fourier transform

(3). Back projection (4). Filtered back projection

Q268. CT collimators are

(1). Variable for different section thicknesses (2). Not necessary for helical scans

(3). Usually made out of Plexiglas (4). Bowtie shaped

Q269. CT fluoroscopy minimizes radiation doses by using lower:

(1). Filtration (2). Voltage

(3). Current (4). Collimator thickness

Q270. The theoretically best possible CT resolution for a 512^2 matrix and 25 cm FOV is:

(1). 0.5 lp/mm (2). 1.0 lp/mm (3). 2.0 lp/mm (4). 5.0 lp/mm

Q271. Visibility of large low-contrast CT lesions may improve with increasing:

(1). Filtration (2). mAs

(3). Matrix size (4). Display window width

Q272. Ring artifacts in a third-generation CT scanner are caused by

(1). Kilovolt peak drift (2). Tube arcing

(3). Faculty detector elements (4). Patient motion

Q273. If a CT with FOV 20 cm, matrix size 512 × 512, slice thickness 5 mm, what is its voxel size (mm)?

(1). 0.4 (2). 0.8 (3). 1.4 (4). 1.8

Q274. A 2 MHz transducer has an approximate wavelength of:

(1). 0.01 mm (2). 0.1 mm (3). 1.0 mm (4). 10 mm

Q275. What is the imaging depth or penetration in soft tissue with a ultrasound probe of 5 MHz?

(1). 1 (2). 4 (3). 12 (4). 30

Q276. An ultrasound beam traveling through tissue *cannot* be:

(1). Absorbed (2). Amplified (3). Scattered (4). Reflected

Q277. An echo received 65 microseconds after the signal is sent is from what depth?

(1). 2 cm (2). 5cm (3). 7cm (4). 10 cm

Q278. Lateral resolution in ultrasound imaging would most likely be improved by:

(1). Increasing transducer focusing (2). Imaging in the Fraunhofer zone

(3). Using fewer scan line (4). Increasing the frequency

Q279. The Doppler shift from a moving object depends on all of the following except?

(1). Speed of ultrasound beam (2). Frequency

(3). Angel between beam and object (4). Object depth

Q280. Which of the following angle will general the largest Doppler shift?

(1). 90° (2). 60° (3). 30° (4). 0°

Q281. The maximum MR signal is obtained by using a:

(1). 90 degree FR tip, short TE, and short TR (2). 45 degree FR tip, short TE, and short TR

(3). 90 degree FR tip, short TE, and long TR (4). 90 degree FR tip, long TE, and short TR

Q282. The small amount of bound water produces no detected MR signal because:

(1). T1 is too short (2). T2 is too short

(3). T2 is very long (4). T2 is longer than T1

Q283. Gradient field in MR are used most commonly to:

(1). Increase T2 (2). Shorten T1 values

(3). Localize MR signal source (4). Increase signal in large patients

Q284. The FDA limit power deposition in patients undergoing MR does *not* include:

(1). 3.2 W/kg averaged over the head

(2). 8 W/kg peak value

(3). 0.4 w/kg averaged over body

(4). A less than 3˚C temperature rise in the heart

Q285. In spin-echo imaging, the echo signal normally is measured:

(1). Immediately ($t = 0$) (2). After time TE

(3). After time $4 \times T1$ (4). After T2

Q286. In MR, motion results in ghost images that appear in which direction?

(1). Read encode
(2). Phase encode
(3). Slice selection axis
(4). PA

Q287. Common MR angiography techniques are based on:

(1). Phase contrast
(2). Phase encoding
(3). T1 contrast
(4). Time to inversion

Q288. MR spectroscopy is used to detect all the following except:

(1.) ^{31}P
(2.) ^{32}P
(3.) Inorganic phosphate
(4.) Phosphocreatinine

Q289. Functional imaging using magnetic resonance dose *not* show:

(1). Brain activation sites
(2). Increased venous oxygenation
(3). Increased spin density sites
(4). Superior temporal resolution to positron emission tomography (PET)

MRSM

1.다음은 X-선 조사야 시험의 설명으로 올바르지 **않는** 것은?

가) 실내조도가 10 이하 인 상태에서 실시한다
나) SID 100 cm에서 평균조도가 100 Lux이상이어야 한다
다) 엑스선조사야의 중심과 광조사야 중심의 차이 및 각 주변의 차이는 이용선의 중심이 수직으로 입사하였을 때 SID의 ±2% 이내이어야 한다
라) 엑스선 조사방향이 일정할 경우에는 엑스선조사야의 중심과 광조사야 중심의 차이 및 각 주변의 차이는 이용선의 중심이 수직으로 입사하였을 때 SID의 ±1% 이내이어야 한다

１．X-線照射野テストの説明として正しくないことは？
１）室内の照度（しょうど、illuminance）が１０以下の状態で実施する。
２）SID 100 cmで平均 照度が100 Lux以上でなければならない。
３）X-線照射野と 光照射野の中心の差および各周辺の差は利用線の中心を垂直で入射した時 SIDの ±2% 以内でなければならない
４）X-線の照射方向が一定であれば X-線照射野と 光照射野の中心の差および各周辺の差は利用線の中心を垂直で入射した時 SIDの ±１% 以内でなければならない

2 진단용 엑스선장치, 진단용엑스선발생기의 반가층(mm Al)은 최고 관전압이 70kV 이하인 장치의 경우 기준점 60kVp 에서 (ⓐ) 이상이어야 하고, 최고 관전압이 70kV를 초과하는 장치의 경우 기준점 80kVp 에서 (ⓑ) 이상이어야 한다. ⓐ, ⓑ의 조합으로 알맞은 것은?

가) ⓐ 1.0, ⓑ 2.0
나) ⓐ 1.3, ⓑ 2.3
다) ⓐ 1.7, ⓑ 2.7
라) ⓐ 2.0, ⓑ 2.7

２．診断用X-線装置、 診断用X-線発生器の 頒価層(mm Al)は最高管電圧が 70kV 以下の装置の場合、基準店 60kVp で（ a。 ）以上でなければならないし，最高管電圧が 70kVを超過する装置の場合、基準店 80kVp で（b。 ）以上でなければならない． a。，b。の組合として適当なことは?
１）ⓐ 1.0, ⓑ 2.0
２）ⓐ 1.3, ⓑ 2.3
３）ⓐ 1.7, ⓑ 2.7
４）ⓐ 2.0, ⓑ 2.7

3. 촬영실의 방사선방어시설에서 방어벽의 외측에서 측정한 방사선 누설선량 및 산란선량의 합계는 주당 얼마 이하이어야 하는가? (단위 mR)

가) 10
나) 50
다) 100
라) 200

３．撮影室の放射線防護施設で防御壁の外側で測定した放射線漏洩線量及び散乱線量の合計は一週当りいくら以下でなければならないか? (単位 mR)
１）10
２）50
３）100

4) 200

4. 진료용엑스선방어칸막이의 크기는 가로 (ⓐ) m × 세로 (ⓑ) m 이상이어야 한다. ⓐ, ⓑ의 조합으로 알맞은 것은?

가) ⓐ 0.7 ⓑ 2.0
나) ⓐ 1.0 ⓑ 1.8
다) ⓐ 0.8 ⓑ 2.0
라) ⓐ 0.8 ⓑ 1.8

4． 診断用X線防護間仕切りの大きさは横 (a。) m × 縦 (b。) m 以上でなければならない. a。, b。の組合として適当なことは?
1) ⓐ 0.7 ⓑ 2.0
2) ⓐ 1.0 ⓑ 1.8
3) ⓐ 0.8 ⓑ 2.0
4) ⓐ 0.8 ⓑ 1.8

5. 다음은 기기관리를 하기 위한 의료기관의 노력을 설명한 것이다. 설명이 옳지 **<u>않은</u>** 것은

가) 전체 구성원들의 공감대 형성이 중요하다
나) 구체적이고, 체계적인 계획으로 진행을 하여야 한다
다) 여러 사람이 작업을 하면 신뢰도가 떨어질 수 있기 때문에 특정인이 전체 관리를 하는 것이 필요하다
라) 전체적이고, 전반적인 관리를 통하여 기기관리를 총체적으로 관리할 필요가 있다

5．次は器機管理をするための医療機関の努力を説明したことだ. 説明が正しくないことは?
1) 全構成員たちの共感台を形成することが重要だ
2) 具体的で, 体系的な計画で進行しなければならない
3) 多数の人が作業をすると信頼度が下がることができるから特定人が全体の管理をすることが必要だ
4) 全体的で, 全般的な管理を通じて器機管理を総合的に管理する必要がある

6. 특정 기간에 걸친 mAs, mR/mAs 의 변동 상항을 추적하거나 kVp 측정의 변동 상항, 자동현상기의 농도변화 등을 알기 쉽게 하기 위하여 사용되는 도표는?

가) Run Charts (추이 도표)
나) Control Charts (관리도)
다) Check Sheets (점검지)
라) Pareto Charts

6．特定期間にわたる mAs, mR/mAs の変動状況を追跡するとか kVp 測定の変動状況, 自動現像機の濃度変化などが分かりやすくするために使われる図表は?
1) Run Charts (推移図表)
2) Control Charts (管理図)
3) Check Sheets (点検紙)
4) Pareto Charts

7. 다음 중 진단용방사선발생장치의 검사기준 중 관전류 시험에 대한 설명으로 맞는 것은?

가) 백분율평균오차는 지시치에 대하여 ±5%이내 이내이어야 한다.
나) 백분율평균오차는 지시치에 대하여 ±7%이내 이내이어야 한다
다) 백분율평균오차는 지시치에 대하여 ±10%이내 이내이어야 한다
라) 백분율평균오차는 지시치에 대하여 ±15%이내 이내이어야 한다

7．次の中で 診断用X線発生装置の検査基準の中で管電流試験に対する説明として正しいことは?
1） 表示値に対する測定値の百分率平均誤差は ±5%以内でなければならない
2） 表示値に対する測定値の百分率平均誤差は ±7%以内でなければならない
3） 表示値に対する測定値の百分率平均誤差は ±10以内でなければならない
4） 表示値に対する測定値の百分率平均誤差は ±15以内でなければならない

8. 넓은 범위의 관전압과 환자의 두께에 관계없이 동일농도의 영상정보를 제공할뿐 아니라 mA및 Kvp의 조사유지, 조사야의 재현성 및 조사야의 변화에 따른 노출을 조절하고 최고의 노출시간등을 조절하여 주는 것은 무엇인가?

가) Generator
나) AEC(Automatic Exposure Control)
다) HVL(Half Value Layer)
라) Timer

8．広い範囲の管電圧と患者の厚さに関わらず同一濃度の画像情報を提供するだけでなく mA及び Kvpの調査維持, 照射野の再現性及照射野の変化による露出を調節して最高の露出時間等を調節してくれることは何か?
1）Generator
2）AEC(Automatic Exposure Control)
3）HVL(Half Value Layer)
4）Timer

9. 다음이 설명하는 것은?

❑ x-ray 빔의 강도를 50%로 줄이는데 필요한 물질(보통 알루미늄)의 두께.
❑ X-ray빔의 투과력에 대한 정보를 제공❑ NCRP #99 보고서에 따르면 **80kVp에서의 최소 이것은 2.3㎜의 알루미늄**
❑ **또한 80kVp의 2.3에서 3㎜Al의 이것 보다 증가** 될 경우 환자에게 **노출되는 선량은 25%**까지 줄어들 것이다.

가) Generator
나) AEC(Automatic Exposure Control)
다) HVL(Half Value Layer)
라) Timer

9. 次は何に対する説明ですか。

- ❑ 照射線量を半分にするのに要する吸収板の厚さ.
- ❑ 照射線量の透過力に対する情報を提供
- ❑ NCRP #99 報告書によると 80kVp での最小のこれは 2.3mm のアルミニウム
- ❑ また 80kVp の 2.3 から 3mmAl のこれより増加になる場合、患者に露出される善良は 25%まで減る

1) Generator
2) AEC(Automatic Exposure Control)
3) HVL(Half Value Layer)
4) Timer

10. 다음은 진단용 X선 발생장치의 성능 관리 측정 중 어떠한 측정을 위한 도구인가?

가) Grid alignment test
나) AEC(Automatic Exposure Control) 재현성 test
다) HVL(Half Value Layer) test
라) Timer 정확성 test

10. 次は診断用X-線発生装置の性能管理測定の中でどんな測定のためのものか?

1) Grid alignment test
2) AEC(Automatic Exposure Control)の再現性 test
3) HVL(Half Value Layer) test
4) Timerの正確性 test

11. 영상의 선예도를 평가하는 항목은?

가) RMS
나) MTF
다) Contrast
라) DQE

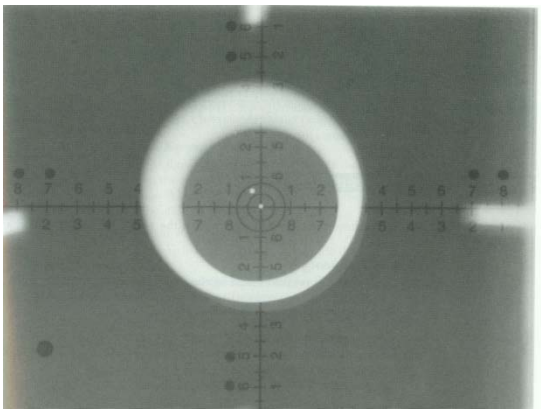
11. 画像の鮮鋭度を評価する項目は?
1) RMS
2) MTF
3) Contrast
4) DQE

12. 진단용방사선 발생장치의 안전관리에 관한 규칙에서 재현성 측정의 기준은?

가) 5%(3회 측정)
나) 5%(6회 측정)
다) 10%(3회 측정)
라) 10%(6회 측정)

12. 診断用X-線発生装置 の安全管理に関する規則で再現性測定の基準は?
1) 5%(3回測定)
2) 5%(6回測定)
3) 10%(3回測定)
4) 10%(6回測定)

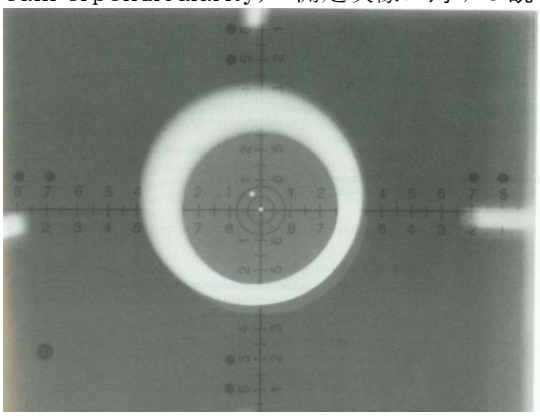
13. NCRP 보고#99 권고에 따른 중심 선속 수직검사 (Beam erpendicularity) 의 측정 영상에 대한 설명으로 옳은 것은?



가) 조준선 일치는 5mm 이상으로 허용범위를 초과하였다.

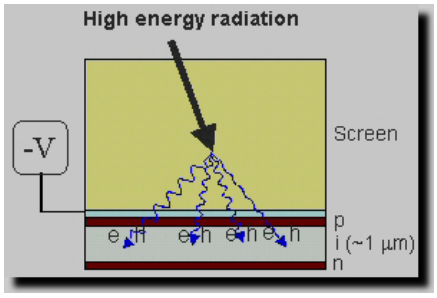
나) 조준선 일치는 5mm 이하임으로 허용 범위 내에 있다.
다) 중심선속은 수직으로부터 약 2.0° 벗어난 것이다.
라) 중심선속은 수직으로부터 약 3.0° 벗어난 것이다.

13. NCRP 報告#99 勧告による中心船速垂直検事(Beam erpendicularity)の測定映像に対する説明で正しいことは?



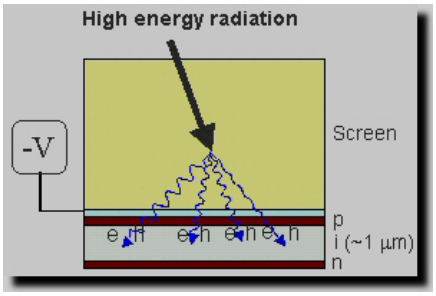
1) 照準線一致は 5mm 以上で許容範囲を超過した.
2) 照準線一致は 5mm 以下で許容範囲の以内にある.
3) 中心船速は垂直から約 2.0° 外れたのだ.
4) 中心船速は垂直から約 3.0° 外れたのだ

14. 그림과 같은 방식으로 영상획득이 이루어지는 장비의 특성으로 **<u>틀린</u>** 것은?



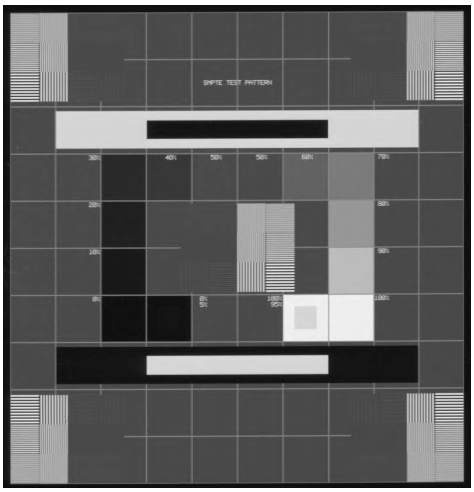
가) 입사 X-선을 먼저 섬광체나 형광체를 이용하여 가시광선으로 변환시킨다.
나) 형광체 물질로는 a-Se을 주로 사용한다.
다) 이 가시광선을 PIN구조의 비정질 실리콘 어레이가 포착한다.
라) X-선 신호를 빛으로 먼저 변환 한 다음 전기적인 신호로 변환하기 때문에 화질은 직접방식 보다 떨어진다.

14. 次の絵のような方式で映像獲得が行われる装備の特性で間違ったことは?



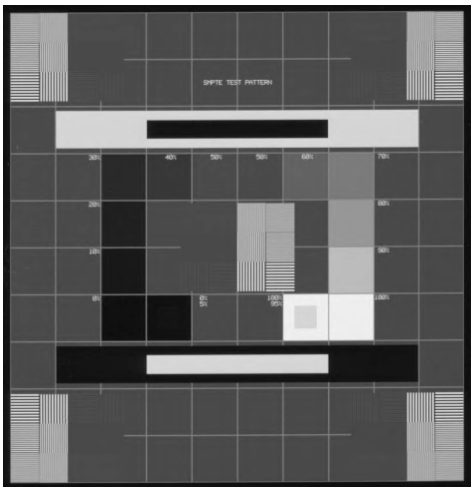
1）入射X-線をまず蛍光体を利用して可視光線で変換させる
2）蛍光体物質では a-Seを主に使う.
3）この可視光線を PIN構造の非晶質シリコーンアレイが捕捉する.
4）X-線信号を光で先に変換した後電気的な信号で変換するから画質は直接方式よりおちる.

15. 아래 그림과 관련이 **없는** 것은?



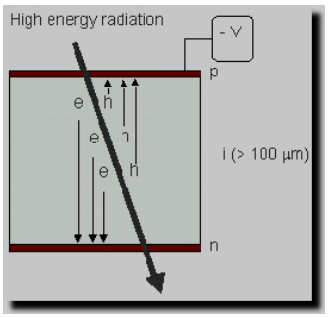
가) 모니터
나) 계획된 Chart에 의한 정기적인 점검이 중요
다) Grid
라) SMPTE Test Pattern

15. 下の絵と関連がないことは?



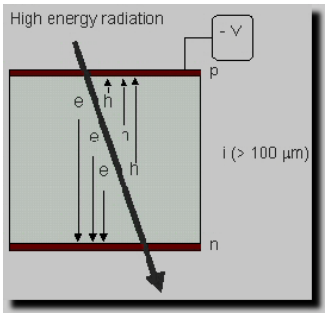
1) モニター
2) 計画された Chartによる定期的な点検が重要
3) Grid
4) SMPTE Test Pattern

16. 다음 그림과 같이 X-ray를 직접 전기신호로 변환하여 영상을 획득하는 시스템은?



가) S/F (Screen/Film)
나) CR (Computed Radiography)
다) DF (Digital Fluorography)
라) DDR (Direct Digital Radiography)

16. 次の絵のように X-rayを直接電気信号で変換して画像を獲得するシステムは?



1) S/F (Screen/Film)
2) CR (Computed Radiography)
3) DF (Digital Fluorography)
4) DDR (Direct Digital Radiography)

17. X-선관의 방사구, 관용기의 방사창 및 X-선관 내의 조립 필터 및 절연유 등에서 방사선을 흡수하는 여과는? [최고관전압에 대한 최소 알루미늄(mm)당량으로 나타낸다]

1) 부가여과
2) 이중여과
3) 고유여과
4) 부하여과

17. X-線管の放射口, 寛容機の放射窓及び X-線管内の組み立てフィルター及び絶縁油などで放射線を吸収する濾過は? [最高官電圧に対する最小アルミニウム(mm)当量で現わす]

1) 付加濾過
2) 二重濾過
3) 固有濾過
4) 負荷濾過

18. 다음 중 영상증배관(image intensifier)을 구성하는 구성요소가 **아닌** 것은?

1)입력형광면(input screen)
2)광음극(photocathode)
3)전자총(electron gun)
4)출력형광면(output screen)

18. 次の中で映像増配官(image intensifier)を構成する構成要素でないことは?

1) 入力蛍光面 (input screen)
2) 光陰極 (photocathode)
3) 電子銃 (electron gun)
4) 出力蛍光面 (output screen)

19. TV 카메라에서 촬상관의 구성이 **아닌** 것은?

가) 전자총
나) 광전막
다) 조절격자

라) Iris 필터

19. TV 카메라で撮像管の構成でないことは?

가) 電子銃
나) 光電幕
다) 調節格子
라) Iris フィルター

20. X선 TV시스템의 공간분해능(spatial resolution) 측정에서 line-pair pattern의 방향을 모니터 주사선 방향에 45°로 위치하여 측정하는 이유는?

가) 수평분해능 측정　　나) 수직분해능 측정
다) 대조도 분해능측정　　라) 수직, 수평분해능 측정

20. X線TVシステムの空間分解能(spatial resolution) 測定で line-pair patternの方向をモニター走査線方向に 45°に位して測定する理由は?
1）水平分解能測定　2）垂直分解能測定
3）対照度分解能測定　4）垂直, 水平分解能測定

21. 입사선량율 측정에서 환자테이블과 영상증배관의 거리는?

가) 8인치
나) 10인치
다) 12인치
라) 14인치

21. 入射線量率測定で患者テーブルと映像増配官の距離は?
1) 8 inch
2) 10 inch
3) 12 inch
4) 14 inch

22. 유방촬영용장치의 다음 검사항목 주기는 검사는?

재촬영 분석
판독용 모니터 관리
임상영상평가

1) 매주
2) 3 개월
3) 6 개월
4) 1 년

22. マンモグラフィ 装置の次の検査項目週期は?

再撮影分析
読影用モニター管理
臨床画像評価

1) 毎週
2) 3 ヶ月
3) 6 ヶ月
4) 1 年

23. Burger-Rose phantom을 사용하여 측정하는 것은?

가) low contrast
나) Sharpness
다) MTF
라) RMS

23. Burger-Rose phantomを使って測定することは?

1) low contrast
2) Sharpness
3) MTF
4) RMS

24. 유방촬영에서 Low kVp를 사용하는 이유는?

가) reduces contrast and reduces patient dose
나) increases contrast but increases patient dose
다) reduces contrast but increases patient dose
라) increases contrast and reduces patient dose

24. マンモグラフィで Low kVpを使う理由は?

1) reduces contrast and reduces patient dose
2) increases contrast but increases patient dose
3) reduces contrast but increases patient dose
4) increases contrast and reduces patient dose

25. 유방영상의 화질에 미치는 영향으로 옳은 조합은?

ㄱ. 유방의 흡수차	ㄴ. 선질	ㄷ. 초점의 크기
ㄹ. 조사시간	ㅁ. 조사야	ㅂ. 여과

가) ㄱ,ㄴ,ㄷ,ㄹ,
나) ㄱ,ㄴ,ㄷ,ㅁ
다) ㄷ,ㄹ,ㅁ,ㅂ
라) 모두

25. マンモグラフィの 画質に及ぶ影響で正しい組合は?

ㄱ. 乳房の吸収差	ㄴ. 線質	ㄷ. 焦点の大きさ
ㄹ. 照射時間	ㅁ. 照射野	ㅂ. 濾過

1) ㄱ,ㄴ,ㄷ,ㄹ,
2) ㄱ,ㄴ,ㄷ,ㅁ
3) ㄷ,ㄹ,ㅁ,ㅂ
4) 全部

26 유방영상 임상평가의 MLO view의 평가 기준으로 옳지 않은 것은?

가) 대흉근의 하단이 유두 위까지 내려 온 상태로 보인다.
나) 흉벽의 다른 부위가 유방과 겹치지 않는다.
다) 유방 하 주름이 열려 있어야 한다.
라) 유방의 아래 부위가 처진 상태로 보이지 않는다.

26 マンモグラフィ臨床評価の MLO viewの評価基準で正しくないことは?
1) 大胸根の下端が乳頭の上まで下った状態に見える.
2) 胸壁の他の部位が乳房と重ならない
3) 乳房下しわが開かれていなければならない.
4) 乳房の下の部位が下がった状態に見えない.

27. 유방촬영시 사용되는 방사선량은 저용량으로 두방향의 유방촬영술을 시행했때 국제원자력기관(IAEA)이 정하는 기준은 얼마인가?

가) 0.3 mGy
나) 3 mGy
다) 30 mGy
라) 3 Gy

27. マンモグラフィの被ばく線量は 低用量で両方向の検査をした時国際原子力機関(IAEA)が決まった基準はいくらか?

1) 0.3 mGy
2) 3 mGy
3) 30 mGy
4) 3 Gy

28. 유방 팬톰은 50%의 지방, 50%의( ), 압박두께( )cm 로 구성되었다.
팬톰은 섬유소6, speck 5group , mass5개의 총16개의 모의 병소가 있다.
병소의 검출능은 섬유소( ), speck group ( ), mass( )의 총( )개 이상의 검출능을 보여야 한다.

가) 유방실질, 4.2cm , 3개, 3개, 4개, 10
나) 유방실질, 4.5cm , 3개, 4개, 3개, 10
다) 유방실질, 4.2cm , 4개, 3개, 3개, 10
라) 유방실질, 4.5cm, 4개, 3개, 3개, 10

28. 乳房 ファントム は 50%の地方, 50%の( ), 圧迫厚さ( )cm に構成された.
ファントム は 繊維素6, speck 5group , mass5個の総16個の謀議病巣がある.

病巣の検出能は繊維素(　　), speck group (　　), mass(　　)の 総(　　) 個以上の 検出能を見せなければならない.

1) 乳房実質, 4.2cm , 3個, 3個, 4個, 10
2) 乳房実質, 4.5cm , 3個, 4個, 3個, 10
3) 乳房実質, 4.2cm , 4個, 3個, 3個, 10
4) 乳房実質, 4.5cm, 4個, 3個, 3個, 10

29. 현상기 정도관리에 필요한 내용으로 올바른 것은?
1. Sensitometer 2. Densitometer 3. Graph 용지
4. 디지털 온도계(최소 0.5℃ 이내로 정확한 온도계) 5. 새로운 film 한 상자

가) 1, 2
나) 1, 2, 3
다) 1, 2, 3, 4
라) 1, 2, 3, 4, 5

29. 現像機精度管理に必要な内容で正しいことは?
1. Sensitometer 2. Densitometer 3. Graph 用紙
4. デジタル温度計(最小 0.5℃ 以内で正確な温度計) 5. 新しい film 一箱

1) 1, 2
2) 1, 2, 3
3) 1, 2, 3, 4
4) 1, 2, 3, 4, 5

30. NCRP(national councilon radiation protection)의 규정에따라 몰리브덴(Mo)타겟 X 선관을 사용하는 필름/증감지 system 에 의한 유방영상을 위하여 추천되는 최소의 반가층(HVL)으로 올바른 것은?

가) 0.3 mmAl 나) 0.9 mmAl
다) 1.5 mmAl 라) 2.3 mmAl

30. NCRP(national councilon radiation protection)の規定によってモリブデン(Mo)ターゲット X 線管を使うフィルム/増減紙 system によるマンモグラフィに推薦される最小の半価層(HVL)で正しいことは?
1) 0.3 mmAl 2) 0.9 mmAl
3) 1.5 mmAl 4) 2.3 mmAl

31. CT검사 시 발생되는 Partial volume artifact에 영향을 주는 것으로 **옳은** 것은?

가) Scan time 나) Slice thickness
다) Matrix size 라) Focal spot size

31. CT検事時発生される Partial volume artifactに影響を与えることで正しいことは?

1) Scan time　　2) Slice thickness
3) Matrix size　　4) Focal spot size

32. Multi detector CT에 대한 설명으로 옳지 **않은** 것은?

가) Cone beam X-ray이용
나) slice thickness는 collimator에 의해 결정
다) Multiple slice images 획득
라) Pencil type ionization chamber dosimeter

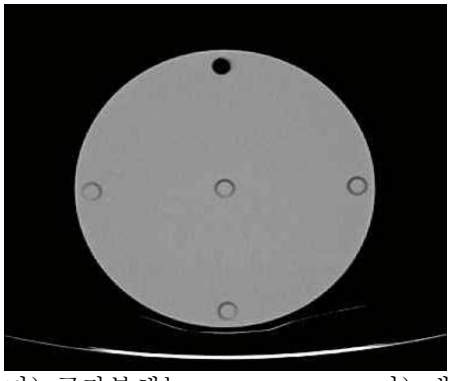
32. Multi detector CTに対する説明で正しくないことは?
1) Cone beam X-rayを使う
2) slice thicknessは collimatorによって決まれる
3) Multiple slice images 獲得
4) Pencil type ionization chamber dosimeter

33. CT의 정도 관리에서 관전류가 250mAs일 때 기준치로 **옳은** 것은?

가) ± 10 %　　나) ± 15 %
다) ± 20 %　　라) ± 25 %

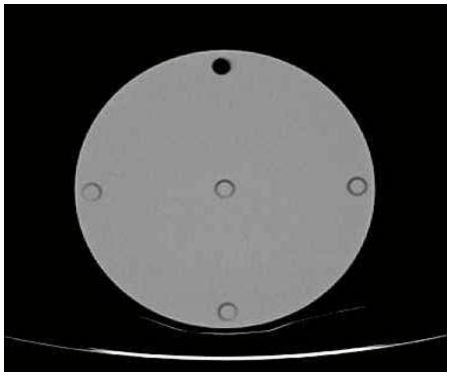
33. CTの精度管理で管電流が 250mAsである時の基準値で正しいことは?
1) ± 10 %　　2) ± 15 %
3) ± 20 %　　4) ± 25 %

34. 다음 CT 영상은 무엇을 측정하기 위한 영상인가?



가) 공간분해능　　나) 대조도분해능
다) 균일도　　라) 선량지표(CTDI)

34. 次のCT画像は何を測定するためのものですか?



가) 空間分解能　　나) 対照度分解能
다) 均一度　　라) 線量指標 (CTDI)

35. 전산화단층촬영장치의 선량측정을 위해 120kVp, 340mAs, 10mm thickness, Single slice scan시 모니터에 10 mR이 측정되었다면 CTDI는 얼마인가?

가) 78 mGy　　나) 7.8 mGy
다) 10 mGy　　라) 20 mGy

35. CT線量測定のために 120kVp, 340mAs, 10mm thickness, Single slice scanを使った時モニターに 10 mRが測定されたら CTDIはいくらか?
1) 78 mGy　　2) 7.8 mGy
3) 10 mGy　　4) 20 mGy

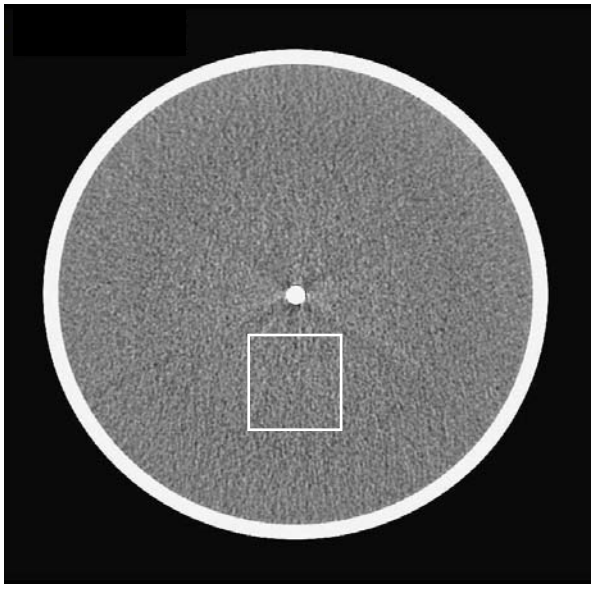
36. 다음 중 전산화단층촬영 장치의 선량측정에 사용되는 기구로 옳은 것는?

가) PMX-III multimeter　　나) AAPM phantom
다) Dynalyzer　　라) ion-chamber system

36. 次の中でCTの線量測定に使われる器具で正しいことは?

1) PMX-III multimeter　　2) AAPM phantom
3) Dynalyzer　　라4) ion-chamber system

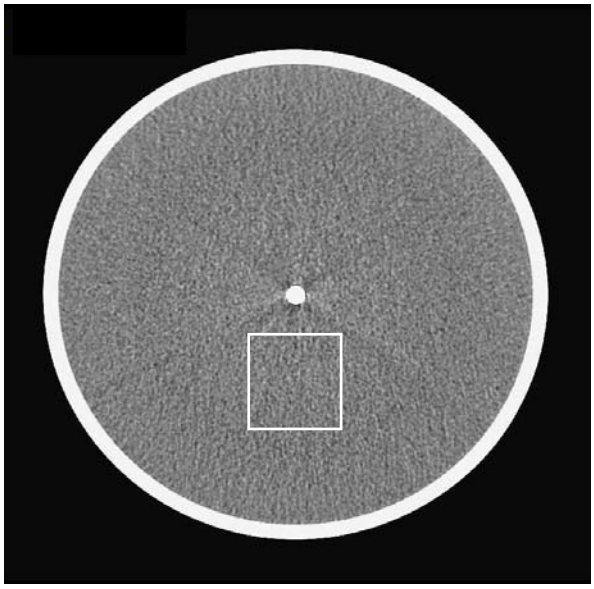
37. 다음 **CT영상에 대한 설명으로 옳지 않은 것은** ?



4cm x 4cm

가) CT number　　나) Noise
다) Uniformity　　라) Artifact

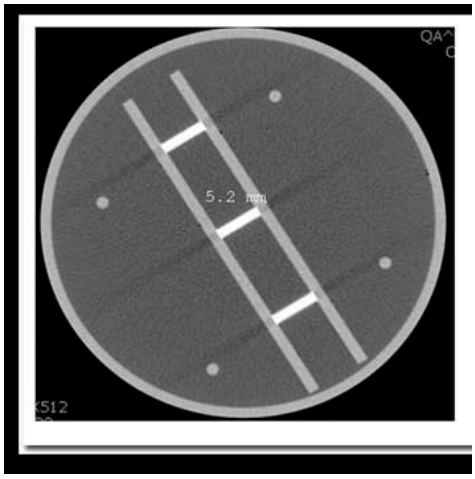
37. 次のCT画像に対する説明として正しくないのは?



4cm x 4cm

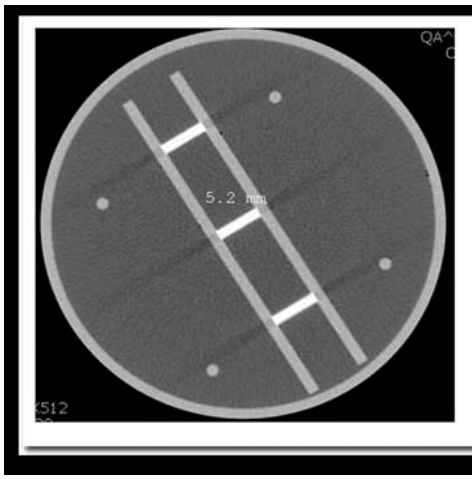
1) CT number　　2) Noise
3) Uniformity　　4) Artifact

38. 다음 CT영상에 대한 설명으로 옳은 것은 ?



가) 노이즈 나) 아티팩트
다) 슬라이스 두께 라) 균일도

38. 次のCT画像に対する説明として正しいのは?



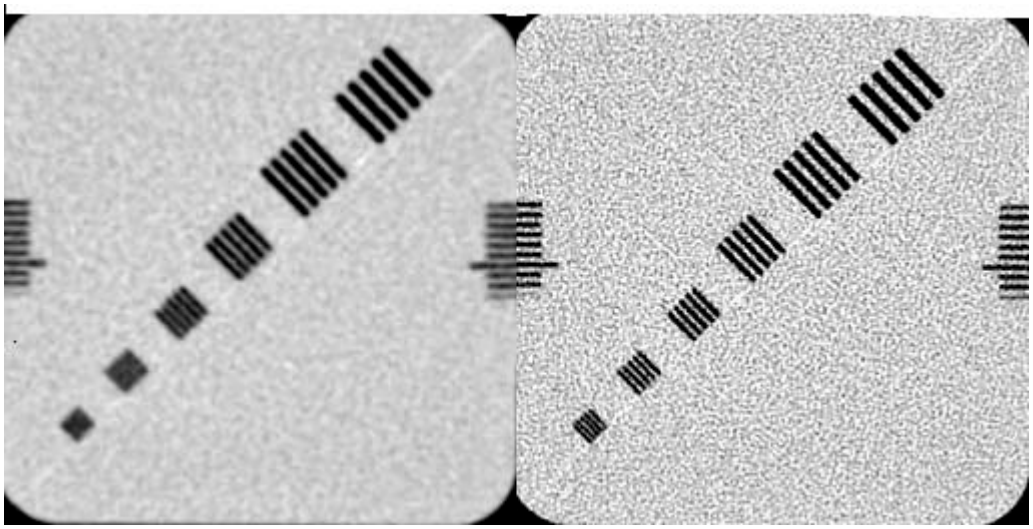
1) noise 2) artifact
3) スライスの厚さ 4) 均一度

39. 전산화단층촬영장치의 인공물의 원인으로 옳지 않은 것은 ?

가) 선속경화현상
나) 기계적인 오류
다) Detector의 결함
라) 적절한 재구성 알고리즘의 선택

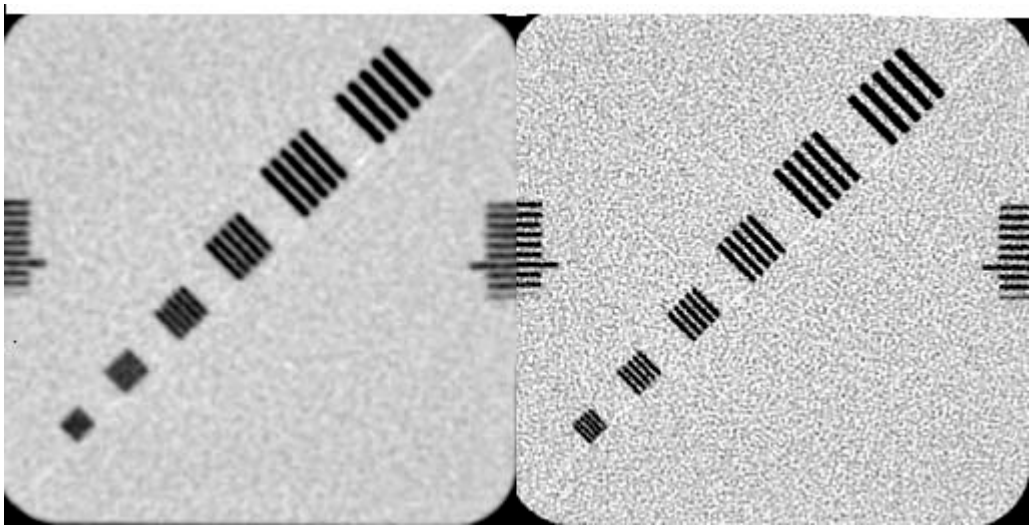
39. CT artifactの原因で正しくないことは ?
가) 船速硬化現象
나) 機械的な間違い
다) Detectorの欠陥
라) 適切な再構成アルゴリズムの選択

40. 다음 CT영상은 무엇을 측정하기 위한 것인가?



가) 단면 두께
나) 재구성 알고리즘
다) CT Number
라) 균일도

40. 次のCT画像は何を測定するためのことですか?



가) 断面の厚さ
나) 再構成アルゴリズム
다) CT Number
라) 均一度

41. CT에서 Scout localization view의 정확성 측정에 있어 교정을 요하는 범위는?

가) 1 mm 이상 나) 2 mm 이상
다) 3 mm 이상 라) 3 mm 이내

41. CTで Scout localization viewの正確性測定において校正を要する範囲は?

1) 1 mm 以上 2) 2 mm 以上
3) 3 mm 以上 4) 3 mm 以内

42. 전산화단층촬영장치의 X-선 고유의 특성에 의한 피사체내의 CT number의 불균일성을 나타내는것은?

1) Beam hardening effect 2) Cupping effect
3) Partial volume effect 4) Photon effect

42. CTのX-線固有の特性による被写体内の CT numberの不均一性を現わすことは?

가) Beam hardening effect 나) Cupping effect
다) Partial volume effect 라) Photon effect

43. 전산화단층촬영장치의 환자피폭선량의 지준치의 표시는?

가) mR/100mAs 나) mSv/100mAs
다) mGy/100mAs 라) Kv*mAs

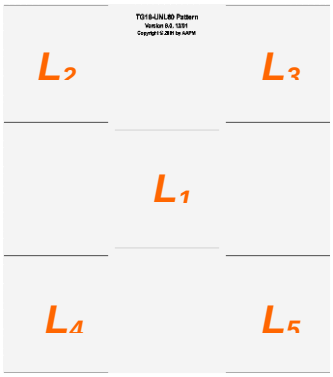
43. CTの患者被ばく線量の基準値の 表示は?

1) mR/100mAs 2) mSv/100mAs
3) mGy/100mAs 4) Kv*mAs

44. 다음 영상에 대한 설명으로 옳지 않은 것은?

가) 백색 휘도,
나) 흑색 휘도
다) 휘도 균일도
라) 기하학적 왜곡도

44. 次の映像に対する説明で正しくないことは?



가) 白色輝度,
나) 黒色輝度
다) 輝度均一度
라) 幾何学的歪曲度

45. 다음 중 MRI 정도 관리에 있어서 국제표준 시스템과 그 성격이 다른 것은?

가) AAPM standards
나) ACR
다) NEMA standards
라) MDD evaluation Report

45. 次の中で MRI 精度管理において国際標準システムとその性格が違ったものは?

1) AAPM standards
2) ACR
3) NEMA standards
4) MDD evaluation Report

46. 다음 영상은 MRI장비가 원활하게 가동하기 위하여 컴퓨터실에 설치된 항온 항습기의 영상으로 반드시 유지되어야 할 습도는?

가) 50~60%
나) 30~40%
다) 70~80%
라) 80~90%

46. 次の絵はMRI装備が円満に稼動するためにコンピューター室に設置された恒温恒湿気だ。必ず維持されなければならない湿度は?

1) 50~60%　　2) 30~40%
3) 70~80%　　4) 80~90%

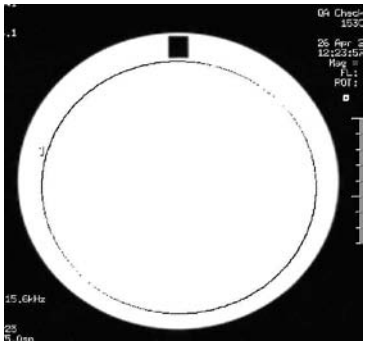
47. 다음 영상은 절편위치의 정확도를 측정한 영상으로 만약 불합격이 된다면 그 이유로 적절하지 않는 것은?

가) 촬영자가 절편 위치 설정을 잘못한 경우
나) table 이동에 오류가 생기면
다) Gradient calibration이 불량하거나 주자장 균일도가 엉망일 경우
라) Eddy current 교정이 나쁠 경우

47. 次は切片位置の正確度を測定した映像でもし不合格になったらその理由で適切ではないことは?

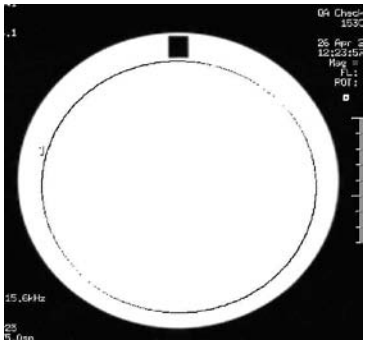
1) 検査する人が切片位置設定が間違った場合
2) tableの移動に間違いが生じれば
3) Gradient calibrationが不良とか修主磁場均一度が台無しの場合
4) Eddy current 校正が悪い場合

48. 다음 영상은 영상강도의 균일성을 측정**으로** 영상 상부에 검은 사각형을 포함하지 않고 그려야 할 ROI의 범위는?



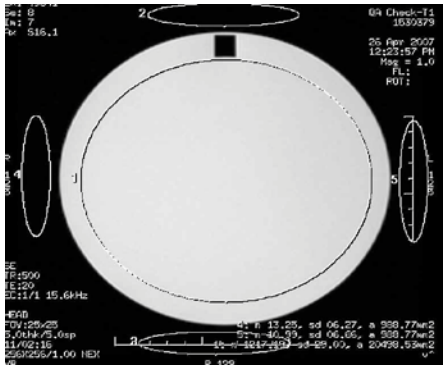
가) 185~190cm²
나) 195~205cm²
다) 210~220cm²
라) 205~215cm²

48. 次は映像 強度の均一性測定で映像上部に黒い四角形を含まないで描かなければならない ROIの範囲は?



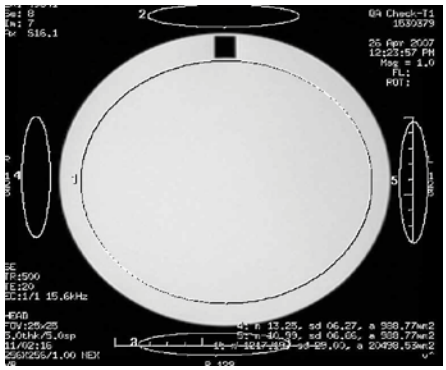
1) 185~190cm²
2) 195~205cm²
3) 210~220cm²
4) 205~215cm²

49. 다음 영상은 영상에서 고스트 인공물 생성 정도를 평가한 것**으로** 합격기준이 되는 고스트의 비율 범위는?



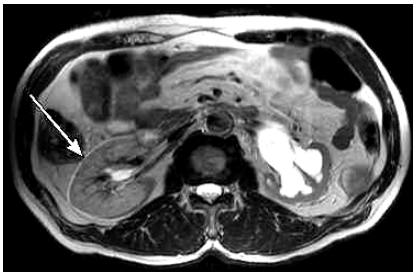
가) 2.5~2.8% 이상
나) 2.5% 이하
다) 2.5% 이상
라) 3.0% 이상

49. 次は画像でゴースト人工物生成程度を評価したことで合格基準になるゴーストの割合範囲は?



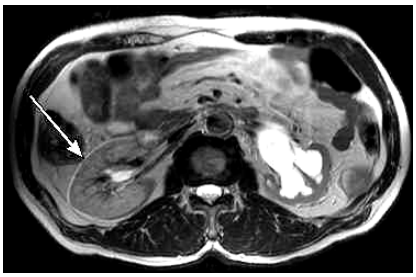
1) 2.5~2.8% 以上
2) 2.5% 以下
3) 2.5% 以上
4) 3.0% 以上

50. 다음 영상은 MRI Chemical shift artifact **옳은 것은?**



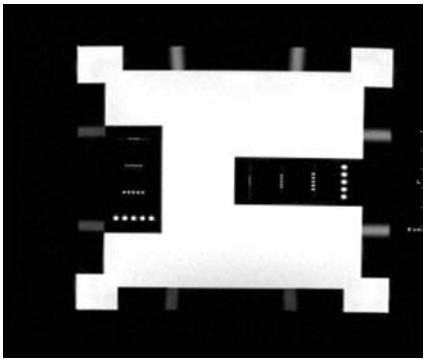
가) Chemical shift artifact는 frequency encoding 방향으로 발생한다
나) 수신대역폭을 넓게 하여 chemical shift artifact를 줄일 수 있다.
다) Chemical shift artifact는 공기와 조직의 경계면에서 발생 한다.
라) 지방 소거법을 사용하여 chemical shift artifact를 줄일 수 있다.

50. 次の MRI Chemical shift artifact で正しいことは?



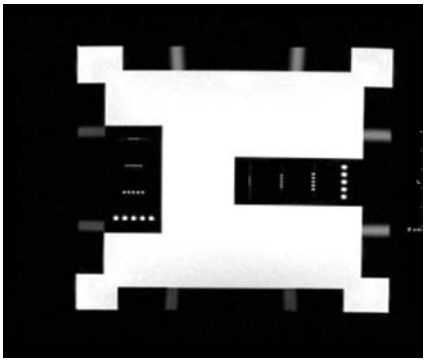
1) Chemical shift artifactは frequency encoding 方向に発生する
2) 受信帯域幅を広くして chemical shift artifactを減らすことができる.
3) Chemical shift artifactは空気と組職の境界面で発生する.
4) 脂肪消去法を使って chemical shift artifactを減らすことができる

51. 다음 영상은 무엇을 측정한 것인가?



가) 공간분해능
나) 직선성
다) 균일도
라) 단층두께 촬영

51. 次は何を測定したことですか?



1) 空間分解能
2) 直線性
3) 均一度
4) 断層厚さの撮影

52. 헬륨소거 (Quenching)가 발생했을 시 적절한 조치가 아닌 것은?

가) 검사실 문을 완전히 열어 놓는다.
나) 검사 중 발생 시 즉시 환자를 바깥으로 피난시킨다.
다) 병원의 응급 콜(CPR)방송을 한다.
라) 피난 된 환자의 활력징후 (Vital sign check)를 즉시 확인 한다.

52. ヘリウム消去 (Quenching)が発生した時適切な措置ではないことは?
1) 検事室の門を完全に開いておく
2) 検事の中で発生時直ちに患者を外で避難させる.
3) 病院の応急コール(CPR)放送をする.
4) 避難された患者のVital sign checkを直ちに確認する.

53. MRI검사를 안전하게 하기 위해서는 많은 제한이 따른다. 다음 중 MRI와 MRS검사에서의 상대적으로 금기해야 할 환자로 옳은 것은?

가) 지혈클립(뇌신경계)을 한 환자
나) 전자적 심박 조율기를 이식한 환자
다) 폐쇄 공포증 환자
라) 강자성 인공와우 이식

53. MRI検事を安全にするためには多くの制限がある. 次の中で MRIと MRS検事で 相対的に禁忌しなければならない患者で正しいことは?
1) 血止めクリップ(雷神境界)を一患者
2) 電子的心拍調律期を移植した患者
3) 閉鎖恐怖症患者
4) 強磁性人工蝸牛移植

54. 미국 FDA에서 권고하는 RF에 노출되는 특수흡수율(SAR)의 제한 범위는?

가) 4.0W/kg 나) 0.4W/kg
다) 0.8W/kg 라) 8W/kg

54. アメリカ FDAで勧告する RFに露出する特殊吸収率(SAR)の制限範囲は?
1) 4.0W/kg 2) 0.4W/kg
3) 0.8W/kg 4) 8W/kg

55. 자장세기(Gauss line)에 근거한 제한조건으로 MR장치로부터 영향을 받을 수 있는 것들로 연결이 옳지 않은 것은?

가) 1 Gauss line- CT 장치
나) 5 Gauss line- 인공 심박동기
다) 5 Gauss line- Magnet Card

라) 10 Gauss line- 공조장치

55. 磁場(Gauss line)に根拠した制限条件で MR装置から影響を受けることができるものなどで連結が正しくないことは?

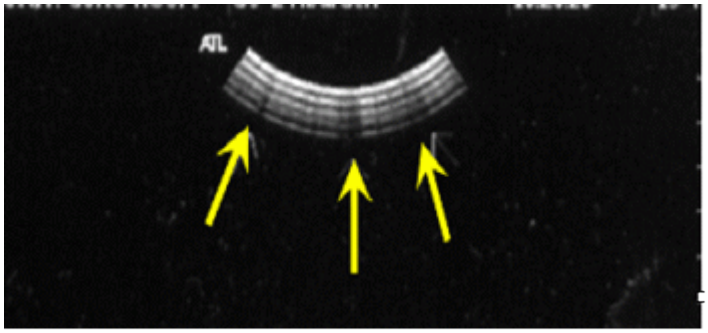
1) 1 Gauss line- CT 装置

2) 5 Gauss line- 人工心搏動期

3) 5 Gauss line- Magnet Card

4) 10 Gauss line- 空調装置

56. 다음 영상은 초음파 transducer 점검에 관한 것으로 옳지 않은 것은?



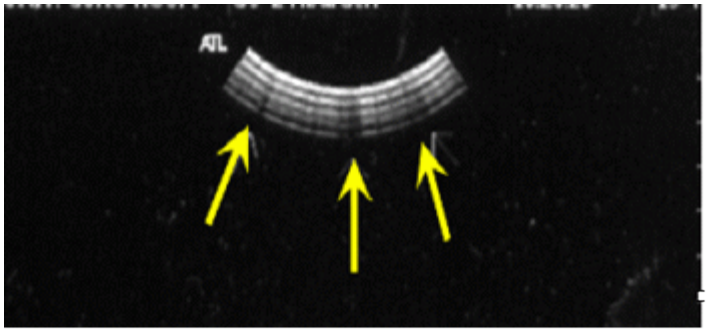
가) Rubber 가 뜨지 않았는지 확인한다.

나) crystal defect 가 있는지 확인한다.

다) 검사 후 Freeze 한다.

라) Probe를 소독하기 위해 열소독 한다.

56. 次の超音波 transducer 点検に関することで正しくないことは?



1) Rubber が浮かばなかったのか確認する.

2) crystal defect があるのか確認する.

3) 検査後 Freeze する

4) Probeを消毒するために熱消毒する

57. 표준 팬텀(ATS-539)의 특징이 아닌 것은?

가) 초음파 영상장치의 정확성과 수행능력을 평가한다.
나) Human tissue 와 동일 음향특성이다.
다) Rubber-based tissue-mimicking material 음속: 1450m/s±1.0 at 23˚
라) Attenuation Coefficient는 0.7dB/cm/MHz±5%

57. 標準ファントム(ATS-539)の特徴ではないことは?
1) 超音波映像装置の正確性と遂行能力を評価する.
2) Human tissue と同一音響特性だ.
3) Rubber-based tissue-mimicking material 音速: 1450m/s±1.0 at 23˚
4) Attenuation Coefficient는 0.7dB/cm/MHz±5%

58. 초음파 영상진단장치의 영상종류가 다양하므로 의료 동영상 처리장치를 통하여 영상을 획득하는데 이때 이용되는 의료동영상처리장치는 무엇인가?
가) PACS 나) Gateway 다) Petamotion 라) DICOM

58. 超音波映像診断装置の映像種類が多様なので医療動画処理処置を通じて映像を獲得する。この時利用される医療動画処理処置は何か?
1) PACS 2) Gateway 3) Petamotion 4) DICOM

59. 다음 설명에 해당하는 것으로 옳은 것은?
이것은 매질내의 실제 거리가 sound beam에 축을 따라 정확하게 표현되는지 측정하는 것으로 정확한 진단의 critical factor이며 구조물의 크기, 깊이, 부피를 표시한다. 이것은 무엇인가?
가) Horizontal measurement 나) Vertical measurement
다) Penetration 라) Axial&Lateral Resolution

59. 次の説明にあたることで正しいことは?
これは媒質内の実際距離が sound beam に軸に付いて正確に表現されるのか測定することで正確な診断の critical factor で構造物の大きさ, 深み, 体積を表示する. これは何か?
1) Horizontal measurement 2) Vertical measurement
3) Penetration 4) Axial&Lateral Resolution

60. 수신된 초음파 신호의 강약을 전체적으로 조절하여 밝기 정도를 조절하는 것은 무엇인가?

가) T.G.C(Time Gain Control) 나) Gain
다) Dynamic range 라) Output power

60. 受信された超音波信号の強弱を全体的に調節して明るさ位を調節することは何か?
1) T.G.C(Time Gain Control) 2) Gain
3) Dynamic range 4) Output power

61. 다음 중 초음파 표준 팬텀의 측정 시 주의사항 중 옳지 않는 것은?

가) Phantom 을 깨끗하고 평평한 곳에 놓는다.
나) 적당한 양의 Low viscosity Gel 또는 물을 scan surface 에 둔다.
다) Phantom 바닥이 Black 으로 보이도록 Gain 값을 조절한다.
라) Sono CT, TGC, Output등의 Settings을 Normal Liver와 같은 값으로 조절, 기록한다.

61. 次の中で超音波標準ファントムの測定時注意事項中正しくないことは?
1) Phantom をきれいで平たい所におく.
2) 適当な量の Low viscosity Gel または水を scan surface に置く.
3) Phantom 底が Black と見えるように Gain 値段を調節する.
4) Sono CT, TGC, Outputなどの Settingsを Normal Liverと同じ数値で調節, 記録する.

62. 초음파 출력에 관한 설명으로 틀린 것은?

가) 정성적인 방법으로는 제조회사에 따라 %, dB, Low, medium, High 으로 표시한다.
나) 정량적인 방법으로는 실시간 레벨로 표시하고 ALARA 원칙을 적용한다.
다) 정량적인 방법은 TI(Thermal index), MI(Mechanical index)로 표시한다.
라) Output 최대 출력은 프로브마다 동일하다

62. 超音波出力に関する説明で違ったことは?
1) 定性的な方法では製造会社によって %, dB, Low, medium, High で表示する.
2) 定量的な方法ではリアルタイムレベルで表示して ALARA 原則を適用する.
3) 定量的な方法は TI(Thermal index), MI(Mechanical index)で表示する.
4) Output 最大出力はプロブごとに等しい

63. 방사선 종양학과의 QA 대상 기기에 포함되지 않는 것은?

가) 선형 가속기 (Linac)
나) Co-60 원격치료장치
다) 모의 치료장치 (Simulator)
라) CT (전산화 단층 촬영장치)

63. 放射線腫瘍学科の QA 対象機器に含まれないことは?

1) 線型加速器 (Linac)
2) Co-60 遠隔治療装置
3) 謀議治療装置 (Simulator)
4) CT

64. 선형가속기(Linac)의 acceptance test 중 Radiation survey에 해당되지 않는 것은? 2

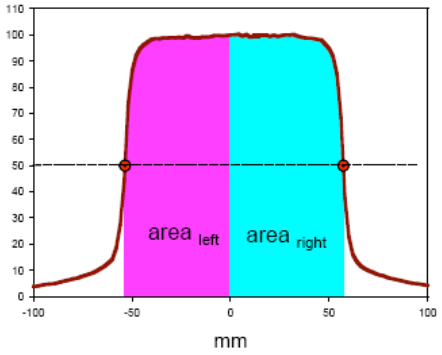
가) 치료실 문 밖　　나) 치료실 안 쪽 (치료실 내)
다) 치료실 바깥 쪽 벽면　　라) Head leakage

64. 線型加速器 (Linac)の acceptance test の中で Radiation surveyに当たらないことは?

1) 治療室の門の外　　2) 治療室の中

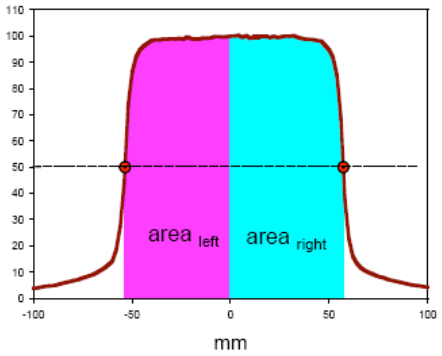
3) 治療室の外の壁面　　4) Head leakage

65. Photon beam의 점검 항목 중 다음 그림이 나타내는 측정내용과 그 허용치는? 3



가) Flatness – 2%　　나) Flatness – 3%
다) Symmetry – 2%　　라) Symmetry – 5%

65. Photon beamの点検項目の中で次の絵が現わす測定内容とその許容値は?3



1) Flatness – 2%　　2) Flatness – 3%
3) Symmetry – 2%　　4) Symmetry – 5%

66. 모의치료장치 (Simulator)의 기하학적 및 공간적 정확도 점검의 기준이 되는 장치는? 4

가) 근접치료장치 (Brachytherapy unit)
나) 전산화 단층 촬영장치 (CT)
다) 컴퓨터 선량 계산장치 (RTP)
라) 선형 가속장치 (Linac)

66. 謀議治療装置 (Simulator)の幾何学的及び空間的正確度点検の基準になる装置は? 4

가) 近接治療装置 (Brachytherapy unit)
나) CT
다) コンピューター線量計算装置 (RTP)
라) 線型加速器 (Linac)

67. 다음 중 괄호 안에 알맞은 것은?

방사선치료에서 QA &QC는 매우 중요하다. 국제 방사선 단위 측정위원회(ICRU)에서는 환자에 대한 투여선량의 정밀도는 ±(　　)%, 전 치료과정에서 불확정도는 ±(　　)% 이하로 할 필요가 있음을 권고하고 있다.

가) 2.0, 3.0
나) 3.0, 3.0
다) 3.0, 5.0
라) 2.0, 5.0

67. 次の中で(　　)の中に適当なことは?

放射線治療で QA &QCは非常に重要だ. 国際放射線単位測定委員会(ICRU)では患者に対する投与善良の精密度は ±(　　)%, 私は治療過程で不確定島は ±(　　)% 以下にする必要があることを勧告している.

1）2.0, 3.0
2）3.0, 3.0
3）3.0, 5.0
4）2.0, 5.0

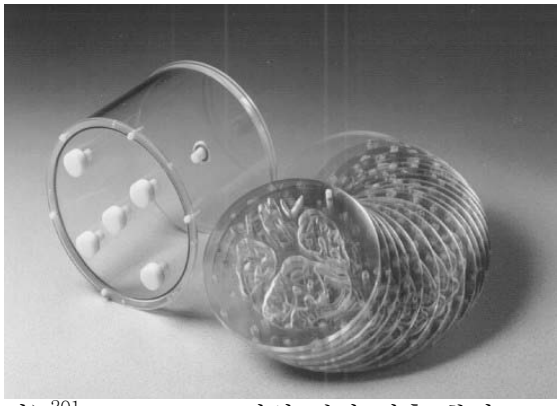
68. 다음은 핵의학 분야에 사용되는 선량 측정기로 측정기 교정 시 사용되는 선원으로 옳은 것은?

가) ^{57}Co　　나) ^{60}Co　　다) ^{99m}Tc　　라) ^{137}Cs

68. 次は核医学分野に使われる線量測定器で測定器校正時使われるsourceで正しいことは?

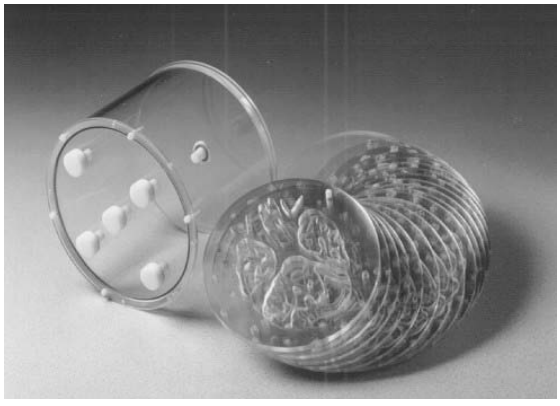
1) ^{57}Co 2) ^{60}Co 3) ^{99m}Tc 4) ^{137}Cs

69. 다음 **핵의학 팬텀 영상**에 대한 설명 중 **옳은** 것은?



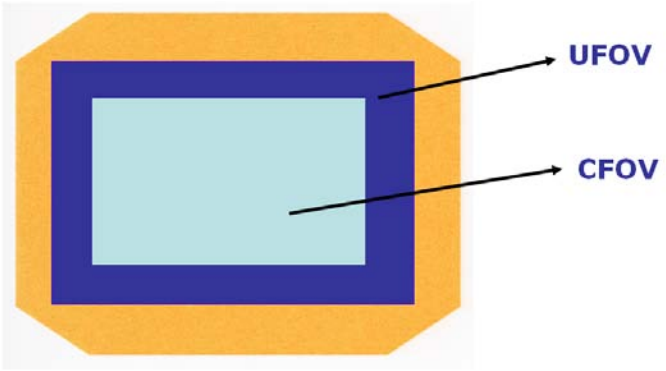
가) ^{201}Tl-chloride 단일 광자 단층 촬영
나) ^{18}F-FDG 양전자 단층 촬영
다) 호프만 뇌 팬텀
라) 단층 팬텀 (Jaszczak phantom)

69. 다음 **핵의학 팬텀 영상**에 대한 설명 중 **옳은** 것은?



가) ^{201}Tl-chloride 단일 광자 단층 촬영
나) ^{18}F-FDG 양전자 단층 촬영
다) 호프만 뇌 팬텀
라) 단층 팬텀 (Jaszczak phantom)

70 次の核医学映像に対する説明の中で正しくないことは?



1) UFOVは実際のDetectorの大きさの 95%だ.
2) UFOVは 4.5%以下である時、密集度が均一だ.
3) CFOVは実際のDetectorの大きさの 75%だ.
4) CFOVは 4.5%以下である時、密集度が均一だ.

71. 다음 중 **핵의학에서** 해상력 측정**에 대한 설명으로 옳지 않은** 것은?

가) 2선원 분해거리 측정 (PSF)
나) 반치폭의 측정 (FWHM)
다) 분해능 팬텀의 이용
라) 면선원 측정 (Flood phantom)

71. 次の中で核医学で解像力測定に対する説明で正しくないことは?

1) 2 線源分解距離測定 (PSF)
2) 半値幅の測定 (FWHM)
3) 分解能ファントムの利用
4) 面線源測定 (Flood phantom)

MRSM

1.다음은 X-선 조사야 시험의 설명으로 올바르지 **않는** 것은?

가) 실내조도가 10 이하 인 상태에서 실시한다
나) SID 100 cm에서 평균조도가 100 Lux이상이어야 한다
다) 엑스선조사야의 중심과 광조사야 중심의 차이 및 각 주변의 차이는 이용선의 중심이 수직으로 입사하였을 때 SID의 ±2% 이내이어야 한다
라) 엑스선 조사방향이 일정할 경우에는 엑스선조사야의 중심과 광조사야 중심의 차이 및 각 주변의 차이는 이용선의 중심이 수직으로 입사하였을 때 SID의 ±1% 이내이어야 한다

１．X-線照射野テストの説明として正しくないことは？
１）室内の照度（しょうど、illuminance）が１０以下の状態で実施する。
２）SID 100 cmで平均 照度が100 Lux以上でなければならない。
３）X-線照射野と 光照射野の中心の差および各周辺の差は利用線の中心を垂直で入射した時 SIDの ±2% 以内でなければならない
４）X-線の照射方向が一定であれば X-線照射野と 光照射野の中心の差および各周辺の差は利用線の中心を垂直で入射した時 SIDの ±１% 以内でなければならない

2 진단용 엑스선장치, 진단용엑스선발생기의 반가층(mm Al)은 최고 관전압이 70kV 이하인 장치의 경우 기준점 60kVp 에서 (ⓐ) 이상이어야 하고, 최고 관전압이 70kV를 초과하는 장치의 경우 기준점 80kVp 에서 (ⓑ) 이상이어야 한다. ⓐ, ⓑ의 조합으로 알맞은 것은?

가) ⓐ 1.0, ⓑ 2.0
나) ⓐ 1.3, ⓑ 2.3
다) ⓐ 1.7, ⓑ 2.7
라) ⓐ 2.0, ⓑ 2.7

２．診断用X-線装置、 診断用X-線発生器の 頒価層(mm Al)は最高管電圧が 70kV 以下の装置の場合、基準店 60kVp で（ a。 ）以上でなければならないし，最高管電圧が 70kVを超過する装置の場合、基準店 80kVp で（b。 ）以上でなければならない． a。，b。の組合として適当なことは?
１）ⓐ 1.0, ⓑ 2.0
２）ⓐ 1.3, ⓑ 2.3
３）ⓐ 1.7, ⓑ 2.7
４）ⓐ 2.0, ⓑ 2.7

3. 촬영실의 방사선방어시설에서 방어벽의 외측에서 측정한 방사선 누설선량 및 산란선량의 합계는 주당 얼마 이하이어야 하는가? (단위 mR)

가) 10
나) 50
다) 100
라) 200

３．撮影室の放射線防護施設で防御壁の外側で測定した放射線漏洩線量及び散乱線量の合計は一週当りいくら以下でなければならないか? (単位 mR)
１）10
２）50
３）100

4) 200

4. 진료용엑스선방어칸막이의 크기는 가로 (ⓐ) m × 세로 (ⓑ) m 이상이어야 한다. ⓐ, ⓑ의 조합으로 알맞은 것은?

가) ⓐ 0.7 ⓑ 2.0
나) ⓐ 1.0 ⓑ 1.8
다) ⓐ 0.8 ⓑ 2.0
라) ⓐ 0.8 ⓑ 1.8

4． 診断用X線防護間仕切りの大きさは横 (a。) m × 縦 (b。) m 以上でなければならない. a。, b。の組合として適当なことは?
1) ⓐ 0.7 ⓑ 2.0
2) ⓐ 1.0 ⓑ 1.8
3) ⓐ 0.8 ⓑ 2.0
4) ⓐ 0.8 ⓑ 1.8

5. 다음은 기기관리를 하기 위한 의료기관의 노력을 설명한 것이다. 설명이 옳지 **<u>않은</u>** 것은

가) 전체 구성원들의 공감대 형성이 중요하다
나) 구체적이고, 체계적인 계획으로 진행을 하여야 한다
다) 여러 사람이 작업을 하면 신뢰도가 떨어질 수 있기 때문에 특정인이 전체 관리를 하는 것이 필요하다
라) 전체적이고, 전반적인 관리를 통하여 기기관리를 총체적으로 관리할 필요가 있다

5．次は器機管理をするための医療機関の努力を説明したことだ. 説明が正しくないことは?
1) 全構成員たちの共感台を形成することが重要だ
2) 具体的で, 体系的な計画で進行しなければならない
3) 多数の人が作業をすると信頼度が下がることができるから特定人が全体の管理をすることが必要だ
4) 全体的で, 全般的な管理を通じて器機管理を総合的に管理する必要がある

6. 특정 기간에 걸친 mAs, mR/mAs 의 변동 상항을 추적하거나 kVp 측정의 변동 상항, 자동현상기의 농도변화 등을 알기 쉽게 하기 위하여 사용되는 도표는?

가) Run Charts (추이 도표)
나) Control Charts (관리도)
다) Check Sheets (점검지)
라) Pareto Charts

6．特定期間にわたる mAs, mR/mAs の変動状況を追跡するとか kVp 測定の変動状況, 自動現像機の濃度変化などが分かりやすくするために使われる図表は?
1) Run Charts (推移図表)
2) Control Charts (管理図)
3) Check Sheets (点検紙)
4) Pareto Charts

7. 다음 중 진단용방사선발생장치의 검사기준 중 관전류 시험에 대한 설명으로 맞는 것은?

가) 백분율평균오차는 지시치에 대하여 ±5%이내 이내이어야 한다.
나) 백분율평균오차는 지시치에 대하여 ±7%이내 이내이어야 한다
다) 백분율평균오차는 지시치에 대하여 ±10%이내 이내이어야 한다
라) 백분율평균오차는 지시치에 대하여 ±15%이내 이내이어야 한다

7．次の中で 診断用X線発生装置の検査基準の中で管電流試験に対する説明として正しいことは?
1） 表示値に対する測定値の百分率平均誤差は ±5%以内でなければならない
2） 表示値に対する測定値の百分率平均誤差は ±7%以内でなければならない
3） 表示値に対する測定値の百分率平均誤差は ±10以内でなければならない
4） 表示値に対する測定値の百分率平均誤差は ±15以内でなければならない

8. 넓은 범위의 관전압과 환자의 두께에 관계없이 동일농도의 영상정보를 제공할뿐 아니라 mA및 Kvp의 조사유지, 조사야의 재현성 및 조사야의 변화에 따른 노출을 조절하고 최고의 노출시간등을 조절하여 주는 것은 무엇인가?

가) Generator
나) AEC(Automatic Exposure Control)
다) HVL(Half Value Layer)
라) Timer

8．広い範囲の管電圧と患者の厚さに関わらず同一濃度の画像情報を提供するだけでなく mA及び Kvpの調査維持, 照射野の再現性及照射野の変化による露出を調節して最高の露出時間等を調節してくれることは何か?
1）Generator
2）AEC(Automatic Exposure Control)
3）HVL(Half Value Layer)
4）Timer

9. 다음이 설명하는 것은?

❑ x-ray 빔의 강도를 50%로 줄이는데 필요한 물질(보통 알루미늄)의 두께.
❑ X-ray빔의 투과력에 대한 정보를 제공❑ NCRP #99 보고서에 따르면 **80kVp에서의 최소 이것은 2.3㎜의 알루미늄**
❑ **또한 80kVp의 2.3에서 3㎜Al의 이것 보다 증가** 될 경우 환자에게 **노출되는 선량은 25%**까지 줄어들 것이다.

가) Generator
나) AEC(Automatic Exposure Control)
다) HVL(Half Value Layer)
라) Timer

9. 次は何に対する説明ですか。

- ❑ 照射線量を半分にするのに要する吸収板の厚さ.
- ❑ 照射線量の透過力に対する情報を提供
- ❑ NCRP #99 報告書によると 80kVp での最小のこれは 2.3mm のアルミニウム
- ❑ また 80kVp の 2.3 から 3mmAl のこれより増加になる場合、患者に露出される善良は 25%まで減る

1) Generator
2) AEC(Automatic Exposure Control)
3) HVL(Half Value Layer)
4) Timer

10. 다음은 진단용 X선 발생장치의 성능 관리 측정 중 어떠한 측정을 위한 도구인가?

가) Grid alignment test
나) AEC(Automatic Exposure Control) 재현성 test
다) HVL(Half Value Layer) test
라) Timer 정확성 test

10. 次は診断用X-線発生装置の性能管理測定の中でどんな測定のためのものか?

1) Grid alignment test
2) AEC(Automatic Exposure Control)の再現性 test
3) HVL(Half Value Layer) test
4) Timerの正確性 test

11. 영상의 선예도를 평가하는 항목은?

가) RMS
나) MTF
다) Contrast
라) DQE

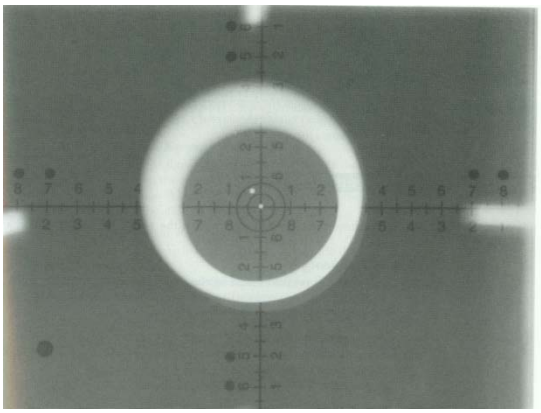
11. 画像の鮮鋭度を評価する項目は?
1) RMS
2) MTF
3) Contrast
4) DQE

12. 진단용방사선 발생장치의 안전관리에 관한 규칙에서 재현성 측정의 기준은?

가) 5%(3회 측정)
나) 5%(6회 측정)
다) 10%(3회 측정)
라) 10%(6회 측정)

12. 診断用X-線発生装置 の安全管理に関する規則で再現性測定の基準は?
1) 5%(3回測定)
2) 5%(6回測定)
3) 10%(3回測定)
4) 10%(6回測定)

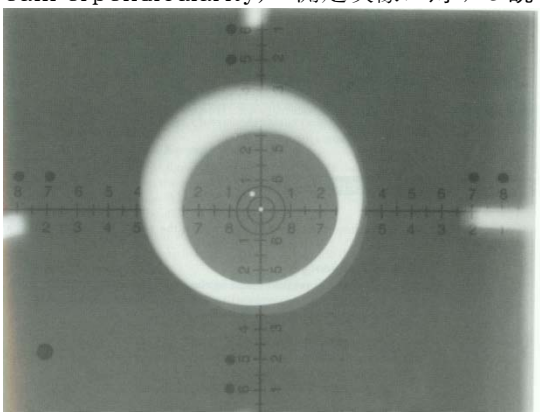
13. NCRP 보고#99 권고에 따른 중심 선속 수직검사 (Beam erpendicularity) 의 측정 영상에 대한 설명으로 옳은 것은?



가) 조준선 일치는 5mm 이상으로 허용범위를 초과하였다.

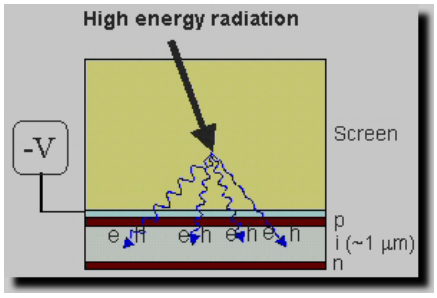
나) 조준선 일치는 5mm 이하임으로 허용 범위 내에 있다.
다) 중심선속은 수직으로부터 약 2.0° 벗어난 것이다.
라) 중심선속은 수직으로부터 약 3.0° 벗어난 것이다.

13. NCRP 報告#99 勧告による中心船速垂直検事(Beam erpendicularity)の測定映像に対する説明で正しいことは?



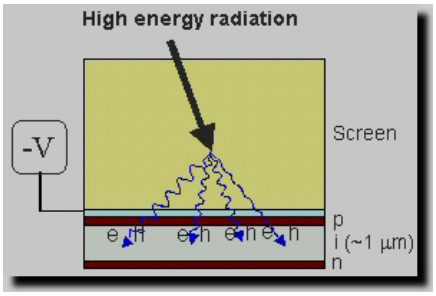
1) 照準線一致は 5mm 以上で許容範囲を超過した.
2) 照準線一致は 5mm 以下で許容範囲の以内にある.
3) 中心船速は垂直から約 2.0° 外れたのだ.
4) 中心船速は垂直から約 3.0° 外れたのだ

14. 그림과 같은 방식으로 영상획득이 이루어지는 장비의 특성으로 **<u>틀린</u>** 것은?



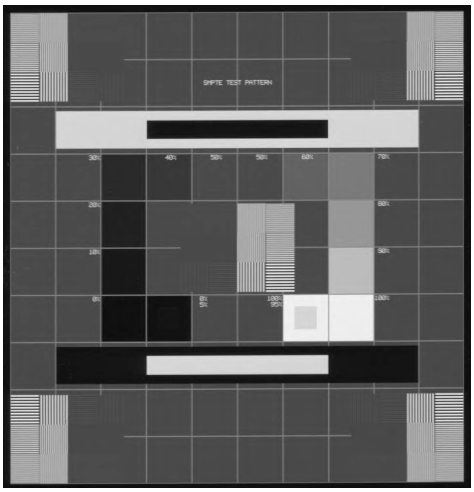
가) 입사 X-선을 먼저 섬광체나 형광체를 이용하여 가시광선으로 변환시킨다.
나) 형광체 물질로는 a-Se을 주로 사용한다.
다) 이 가시광선을 PIN구조의 비정질 실리콘 어레이가 포착한다.
라) X-선 신호를 빛으로 먼저 변환 한 다음 전기적인 신호로 변환하기 때문에 화질은 직접방식 보다 떨어진다.

14. 次の絵のような方式で映像獲得が行われる装備の特性で間違ったことは?



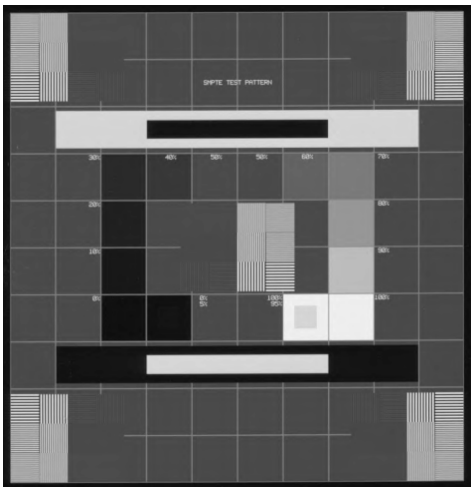
1）入射X-線をまず蛍光体を利用して可視光線で変換させる
2）蛍光体物質では a-Seを主に使う.
3）この可視光線を PIN構造の非晶質シリコーンアレイが捕捉する.
4）X-線信号を光で先に変換した後電気的な信号で変換するから画質は直接方式よりおちる.

15. 아래 그림과 관련이 **없는** 것은?



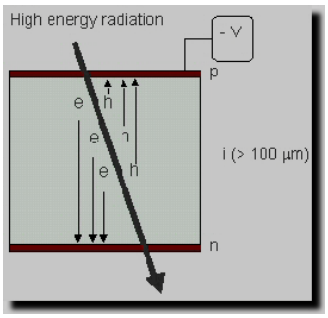
가) 모니터
나) 계획된 Chart에 의한 정기적인 점검이 중요
다) Grid
라) SMPTE Test Pattern

15. 下の絵と関連がないことは?



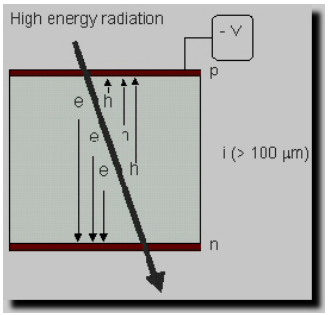
1) モニター
2) 計画された Chartによる定期的な点検が重要
3) Grid
4) SMPTE Test Pattern

16. 다음 그림과 같이 X-ray를 직접 전기신호로 변환하여 영상을 획득하는 시스템은?



가) S/F (Screen/Film)
나) CR (Computed Radiography)
다) DF (Digital Fluorography)
라) DDR (Direct Digital Radiography)

16. 次の絵のように X-rayを直接電気信号で変換して画像を獲得するシステムは?



1) S/F (Screen/Film)
2) CR (Computed Radiography)
3) DF (Digital Fluorography)
4) DDR (Direct Digital Radiography)

17. X-선관의 방사구, 관용기의 방사창 및 X-선관 내의 조립 필터 및 절연유 등에서 방사선을 흡수하는 여과는? [최고관전압에 대한 최소 알루미늄(mm)당량으로 나타낸다]

1) 부가여과
2) 이중여과
3) 고유여과
4) 부하여과

17. X-線管の放射口, 寛容機の放射窓及び X-線管内の組み立てフィルター及び絶縁油などで放射線を吸収する濾過は? [最高官電圧に対する最小アルミニウム(mm)当量で現わす]

1) 付加濾過
2) 二重濾過
3) 固有濾過
4) 負荷濾過

18. 다음 중 영상증배관(image intensifier)을 구성하는 구성요소가 **아닌** 것은?

1)입력형광면(input screen)
2)광음극(photocathode)
3)전자총(electron gun)
4)출력형광면(output screen)

18. 次の中で映像増配官(image intensifier)を構成する構成要素でないことは?

1) 入力蛍光面 (input screen)
2) 光陰極 (photocathode)
3) 電子銃 (electron gun)
4) 出力蛍光面 (output screen)

19. TV 카메라에서 촬상관의 구성이 **아닌** 것은?

가) 전자총
나) 광전막
다) 조절격자

라) Iris 필터

19. TV 카메라で撮像管の構成でないことは?

가) 電子銃
나) 光電幕
다) 調節格子
라) Iris フィルター

20. X선 TV시스템의 공간분해능(spatial resolution) 측정에서 line-pair pattern의 방향을 모니터 주사선 방향에 45°로 위치하여 측정하는 이유는?

가) 수평분해능 측정　　나) 수직분해능 측정
다) 대조도 분해능측정　　라) 수직, 수평분해능 측정

20. X線TVシステムの空間分解能(spatial resolution) 測定で line-pair patternの方向をモニター走査線方向に 45°に位して測定する理由は?
1）水平分解能測定　2）垂直分解能測定
3）対照度分解能測定　4）垂直, 水平分解能測定

21. 입사선량율 측정에서 환자테이블과 영상증배관의 거리는?

가) 8인치
나) 10인치
다) 12인치
라) 14인치

21. 入射線量率測定で患者テーブルと映像増配官の距離は?
1) 8 inch
2) 10 inch
3) 12 inch
4) 14 inch

22. 유방촬영용장치의 다음 검사항목 주기는 검사는?

재촬영 분석
판독용 모니터 관리
임상영상평가

1) 매주
2) 3 개월
3) 6 개월
4) 1 년

22. マンモグラフィ 装置の次の検査項目週期は?

再撮影分析
読影用モニター管理
臨床画像評価

1) 毎週
2) 3 ヶ月
3) 6 ヶ月
4) 1 年

23. Burger-Rose phantom을 사용하여 측정하는 것은?

가) low contrast
나) Sharpness
다) MTF
라) RMS

23. Burger-Rose phantomを使って測定することは?

1) low contrast
2) Sharpness
3) MTF
4) RMS

24. 유방촬영에서 Low kVp를 사용하는 이유는?

가) reduces contrast and reduces patient dose
나) increases contrast but increases patient dose
다) reduces contrast but increases patient dose
라) increases contrast and reduces patient dose

24. マンモグラフィで Low kVpを使う理由は?

1) reduces contrast and reduces patient dose
2) increases contrast but increases patient dose
3) reduces contrast but increases patient dose
4) increases contrast and reduces patient dose

25. 유방영상의 화질에 미치는 영향으로 옳은 조합은?

ㄱ. 유방의 흡수차	ㄴ. 선질	ㄷ. 초점의 크기
ㄹ. 조사시간	ㅁ. 조사야	ㅂ. 여과

가) ㄱ,ㄴ,ㄷ,ㄹ,
나) ㄱ,ㄴ,ㄷ,ㅁ
다) ㄷ,ㄹ,ㅁ,ㅂ
라) 모두

25. マンモグラフィの 画質に及ぶ影響で正しい組合は?

ㄱ. 乳房の吸収差	ㄴ. 線質	ㄷ. 焦点の大きさ
ㄹ. 照射時間	ㅁ. 照射野	ㅂ. 濾過

1) ㄱ,ㄴ,ㄷ,ㄹ,
2) ㄱ,ㄴ,ㄷ,ㅁ
3) ㄷ,ㄹ,ㅁ,ㅂ
4) 全部

26 유방영상 임상평가의 MLO view의 평가 기준으로 옳지 않은 것은?

가) 대흉근의 하단이 유두 위까지 내려 온 상태로 보인다.
나) 흉벽의 다른 부위가 유방과 겹치지 않는다.
다) 유방 하 주름이 열려 있어야 한다.
라) 유방의 아래 부위가 처진 상태로 보이지 않는다.

26 マンモグラフィ臨床評価の MLO viewの評価基準で正しくないことは?
1) 大胸根の下端が乳頭の上まで下った状態に見える.
2) 胸壁の他の部位が乳房と重ならない
3) 乳房下しわが開かれていなければならない.
4) 乳房の下の部位が下がった状態に見えない.

27. 유방촬영시 사용되는 방사선량은 저용량으로 두방향의 유방촬영술을 시행했때 국제원자력기관(IAEA)이 정하는 기준은 얼마인가?

가) 0.3 mGy
나) 3 mGy
다) 30 mGy
라) 3 Gy

27. マンモグラフィの被ばく線量は 低用量で両方向の検査をした時国際原子力機関(IAEA)が決まった基準はいくらか?

1) 0.3 mGy
2) 3 mGy
3) 30 mGy
4) 3 Gy

28. 유방 팬톰은 50%의 지방, 50%의( ), 압박두께( )cm 로 구성되었다.
팬톰은 섬유소6, speck 5group , mass5개의 총16개의 모의 병소가 있다.
병소의 검출능은 섬유소( ), speck group ( ), mass( )의 총( )개 이상의 검출능을 보여야 한다.

가) 유방실질, 4.2cm , 3개, 3개, 4개, 10
나) 유방실질, 4.5cm , 3개, 4개, 3개, 10
다) 유방실질, 4.2cm , 4개, 3개, 3개, 10
라) 유방실질, 4.5cm, 4개, 3개, 3개, 10

28. 乳房 ファントム は 50%の地方, 50%の( ), 圧迫厚さ( )cm に構成された.
ファントム は 繊維素6, speck 5group , mass5個の総16個の謀議病巣がある.

病巣の検出能は繊維素(　　), speck group (　　), mass(　　)の 総(　　) 個以上の 検出能を見せなければならない.

1) 乳房実質, 4.2cm , 3個, 3個, 4個, 10
2) 乳房実質, 4.5cm , 3個, 4個, 3個, 10
3) 乳房実質, 4.2cm , 4個, 3個, 3個, 10
4) 乳房実質, 4.5cm, 4個, 3個, 3個, 10

29. 현상기 정도관리에 필요한 내용으로 올바른 것은?
1. Sensitometer 2. Densitometer 3. Graph 용지
4. 디지털 온도계(최소 0.5℃ 이내로 정확한 온도계) 5. 새로운 film 한 상자

가) 1, 2
나) 1, 2, 3
다) 1, 2, 3, 4
라) 1, 2, 3, 4, 5

29. 現像機精度管理に必要な内容で正しいことは?
1. Sensitometer 2. Densitometer 3. Graph 用紙
4. デジタル温度計(最小 0.5℃ 以内で正確な温度計) 5. 新しい film 一箱

1) 1, 2
2) 1, 2, 3
3) 1, 2, 3, 4
4) 1, 2, 3, 4, 5

30. NCRP(national councilon radiation protection)의 규정에따라 몰리브덴(Mo)타겟 X 선관을 사용하는 필름/증감지 system 에 의한 유방영상을 위하여 추천되는 최소의 반가층(HVL)으로 올바른 것은?

가) 0.3 mmAl 나) 0.9 mmAl
다) 1.5 mmAl 라) 2.3 mmAl

30. NCRP(national councilon radiation protection)の規定によってモリブデン(Mo)ターゲット X 線管を使うフィルム/増減紙 system によるマンモグラフィに推薦される最小の半価層(HVL)で正しいことは?
1) 0.3 mmAl 2) 0.9 mmAl
3) 1.5 mmAl 4) 2.3 mmAl

31. CT검사 시 발생되는 Partial volume artifact에 영향을 주는 것으로 **옳은** 것은?

가) Scan time 나) Slice thickness
다) Matrix size 라) Focal spot size

31. CT検事時発生される Partial volume artifactに影響を与えることで正しいことは?

1) Scan time　　2) Slice thickness
3) Matrix size　　4) Focal spot size

32. Multi detector CT에 대한 설명으로 옳지 **않은** 것은?

가) Cone beam X-ray이용
나) slice thickness는 collimator에 의해 결정
다) Multiple slice images 획득
라) Pencil type ionization chamber dosimeter

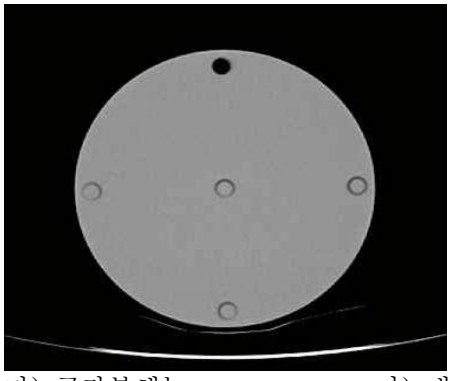
32. Multi detector CTに対する説明で正しくないことは?
1) Cone beam X-rayを使う
2) slice thicknessは collimatorによって決まれる
3) Multiple slice images 獲得
4) Pencil type ionization chamber dosimeter

33. CT의 정도 관리에서 관전류가 250mAs일 때 기준치로 **옳은** 것은?

가) ± 10 %　　나) ± 15 %
다) ± 20 %　　라) ± 25 %

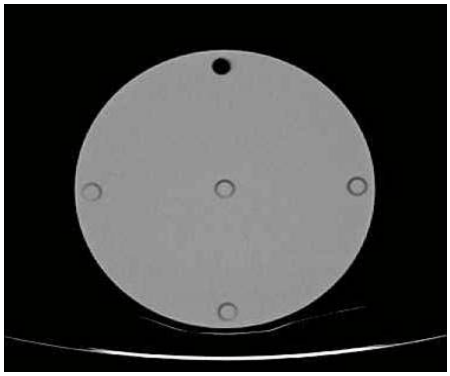
33. CTの精度管理で管電流が 250mAsである時の基準値で正しいことは?
1) ± 10 %　　2) ± 15 %
3) ± 20 %　　4) ± 25 %

34. 다음 CT 영상은 무엇을 측정하기 위한 영상인가?



가) 공간분해능　　나) 대조도분해능
다) 균일도　　라) 선량지표(CTDI)

34. 次のCT画像は何を測定するためのものですか?



가) 空間分解能　　나) 対照度分解能
다) 均一度　　라) 線量指標 (CTDI)

35. 전산화단층촬영장치의 선량측정을 위해 120kVp, 340mAs, 10mm thickness, Single slice scan시 모니터에 10 mR이 측정되었다면 CTDI는 얼마인가?

가) 78 mGy　　나) 7.8 mGy
다) 10 mGy　　라) 20 mGy

35. CT線量測定のために 120kVp, 340mAs, 10mm thickness, Single slice scanを使った時モニターに 10 mRが測定されたら CTDIはいくらか?
1) 78 mGy　　2) 7.8 mGy
3) 10 mGy　　4) 20 mGy

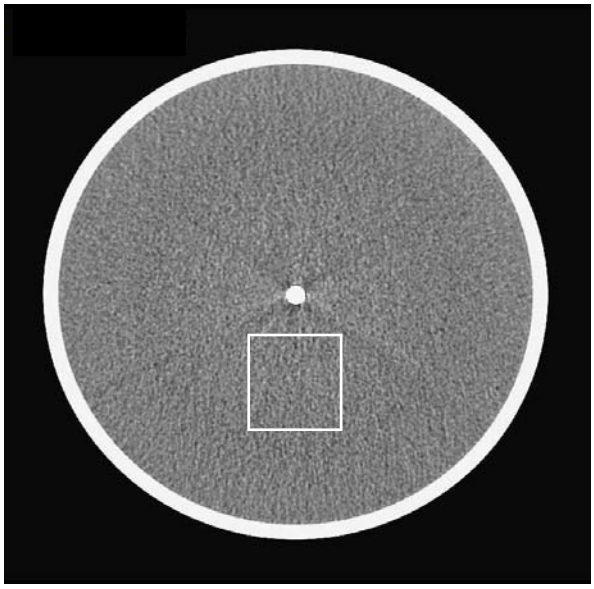
36. 다음 중 전산화단층촬영 장치의 선량측정에 사용되는 기구로 옳은 것는?

가) PMX-III multimeter　　나) AAPM phantom
다) Dynalyzer　　라) ion-chamber system

36. 次の中でCTの線量測定に使われる器具で正しいことは?

1) PMX-III multimeter　　2) AAPM phantom
3) Dynalyzer　　라4) ion-chamber system

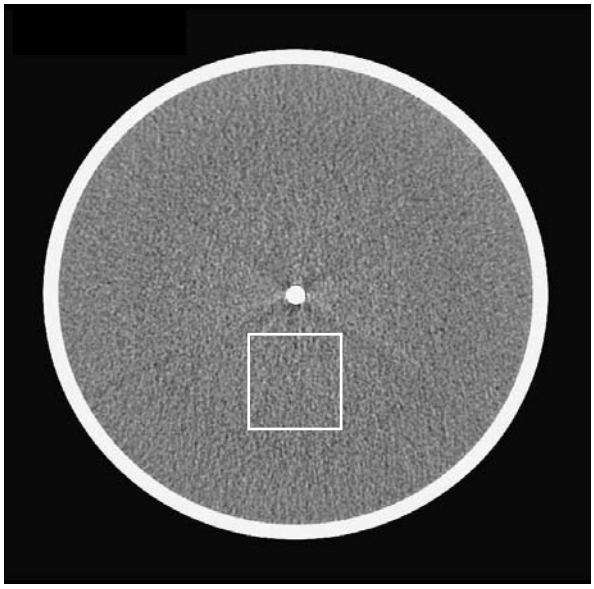
37. 다음 **CT영상에 대한 설명으로 옳지 않은 것은** ?



4cm x 4cm

가) CT number　　나) Noise
다) Uniformity　　라) Artifact

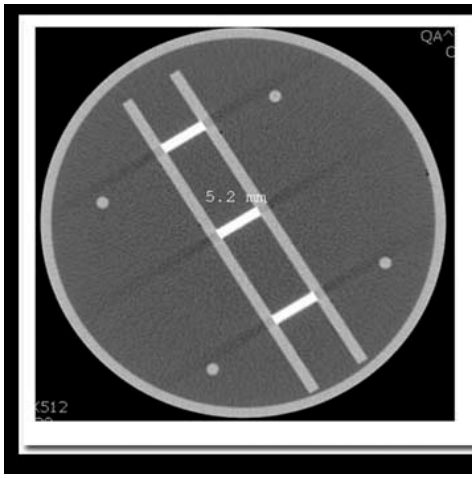
37. 次のCT画像に対する説明として正しくないのは?



4cm x 4cm

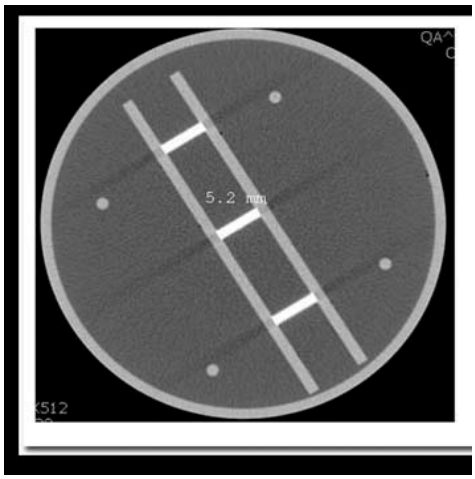
1) CT number　　2) Noise
3) Uniformity　　4) Artifact

38. 다음 CT영상에 대한 설명으로 옳은 것은 ?



가) 노이즈 나) 아티팩트
다) 슬라이스 두께 라) 균일도

38. 次のCT画像に対する説明として正しいのは?



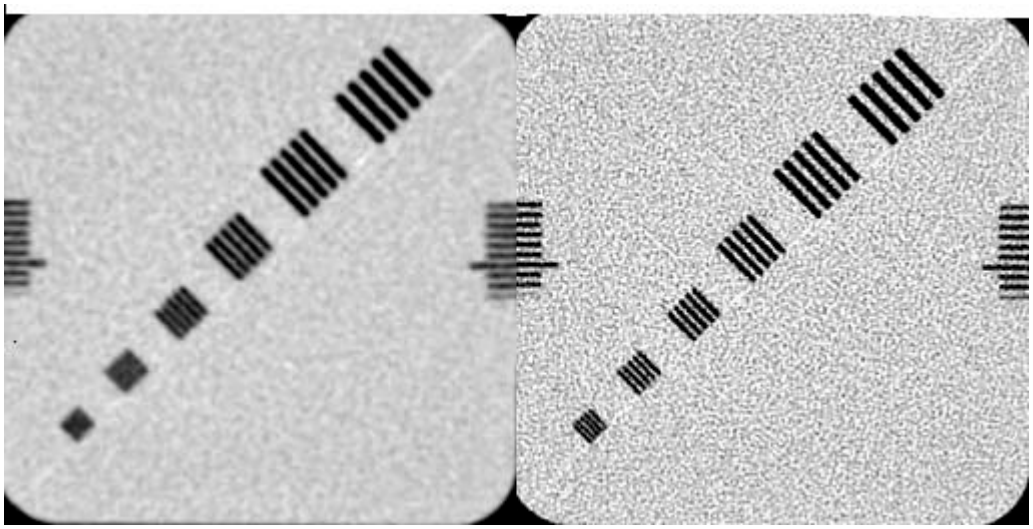
1) noise 2) artifact
3) スライスの厚さ 4) 均一度

39. 전산화단층촬영장치의 인공물의 원인으로 옳지 않은 것은 ?

가) 선속경화현상
나) 기계적인 오류
다) Detector의 결함
라) 적절한 재구성 알고리즘의 선택

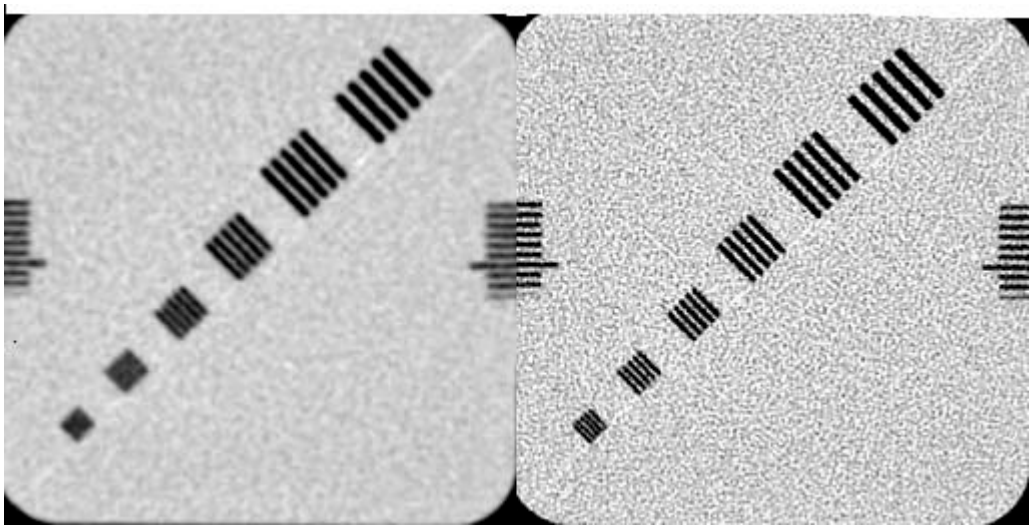
39. CT artifactの原因で正しくないことは ?
가) 船速硬化現象
나) 機械的な間違い
다) Detectorの欠陥
라) 適切な再構成アルゴリズムの選択

40. 다음 CT영상은 무엇을 측정하기 위한 것인가?



가) 단면 두께
나) 재구성 알고리즘
다) CT Number
라) 균일도

40. 次のCT画像は何を測定するためのことですか?



가) 断面の厚さ
나) 再構成アルゴリズム
다) CT Number
라) 均一度

41. CT에서 Scout localization view의 정확성 측정에 있어 교정을 요하는 범위는?

가) 1 mm 이상 나) 2 mm 이상
다) 3 mm 이상 라) 3 mm 이내

41. CTで Scout localization viewの正確性測定において校正を要する範囲は?

1) 1 mm 以上 2) 2 mm 以上
3) 3 mm 以上 4) 3 mm 以内

42. 전산화단층촬영장치의 X-선 고유의 특성에 의한 피사체내의 CT number의 불균일성을 나타내는것은?

1) Beam hardening effect 2) Cupping effect
3) Partial volume effect 4) Photon effect

42. CTのX-線固有の特性による被写体内の CT numberの不均一性を現わすことは?

가) Beam hardening effect 나) Cupping effect
다) Partial volume effect 라) Photon effect

43. 전산화단층촬영장치의 환자피폭선량의 지준치의 표시는?

가) mR/100mAs 나) mSv/100mAs
다) mGy/100mAs 라) Kv*mAs

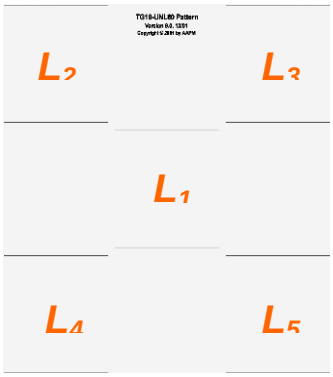
43. CTの患者被ばく線量の基準値の 表示は?

1) mR/100mAs 2) mSv/100mAs
3) mGy/100mAs 4) Kv*mAs

44. 다음 영상에 대한 설명으로 옳지 않은 것은?

가) 백색 휘도,
나) 흑색 휘도
다) 휘도 균일도
라) 기하학적 왜곡도

44. 次の映像に対する説明で正しくないことは?



가) 白色輝度,
나) 黒色輝度
다) 輝度均一度
라) 幾何学的歪曲度

45. 다음 중 MRI 정도 관리에 있어서 국제표준 시스템과 그 성격이 다른 것은?

가) AAPM standards
나) ACR
다) NEMA standards
라) MDD evaluation Report

45. 次の中で MRI 精度管理において国際標準システムとその性格が違ったものは?

1) AAPM standards
2) ACR
3) NEMA standards
4) MDD evaluation Report

46. 다음 영상은 MRI장비가 원활하게 가동하기 위하여 컴퓨터실에 설치된 항온 항습기의 영상으로 반드시 유지되어야 할 습도는?

가) 50~60%
나) 30~40%
다) 70~80%
라) 80~90%

46. 次の絵はMRI装備が円満に稼動するためにコンピューター室に設置された恒温恒湿気だ。必ず維持されなければならない湿度は?

1) 50~60%　　2) 30~40%
3) 70~80%　　4) 80~90%

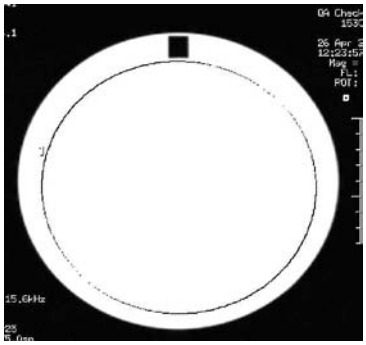
47. 다음 영상은 절편위치의 정확도를 측정한 영상으로 만약 불합격이 된다면 그 이유로 적절하지 않는 것은?

가) 촬영자가 절편 위치 설정을 잘못한 경우
나) table 이동에 오류가 생기면
다) Gradient calibration이 불량하거나 주자장 균일도가 엉망일 경우
라) Eddy current 교정이 나쁠 경우

47. 次は切片位置の正確度を測定した映像でもし不合格になったらその理由で適切ではないことは?

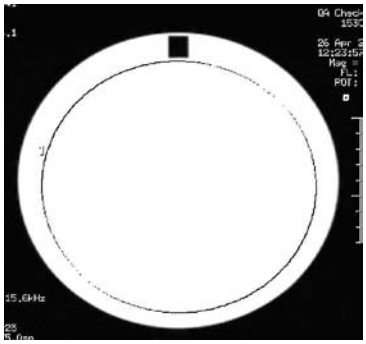
1) 検査する人が切片位置設定が間違った場合
2) tableの移動に間違いが生じれば
3) Gradient calibrationが不良とか修主磁場均一度が台無しの場合
4) Eddy current 校正が悪い場合

48. 다음 영상은 영상강도의 균일성을 측정**으로** 영상 상부에 검은 사각형을 포함하지 않고 그려야 할 ROI의 범위는?



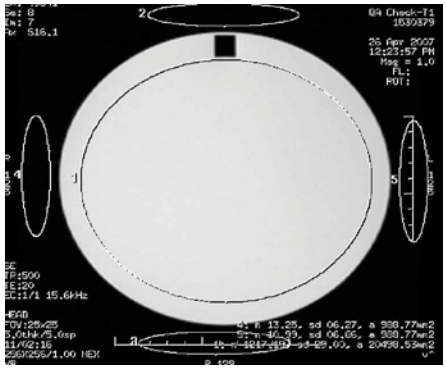
가) 185~190cm²
나) 195~205cm²
다) 210~220cm²
라) 205~215cm²

48. 次は映像 強度の均一性測定で映像上部に黒い四角形を含まないで描かなければならない ROIの範囲は?



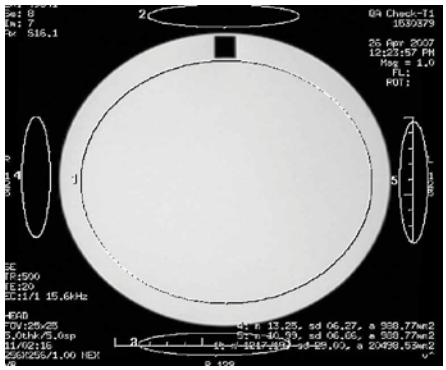
1) 185~190cm²
2) 195~205cm²
3) 210~220cm²
4) 205~215cm²

49. 다음 영상은 영상에서 고스트 인공물 생성 정도를 평가한 것**으로** 합격기준이 되는 고스트의 비율 범위는?



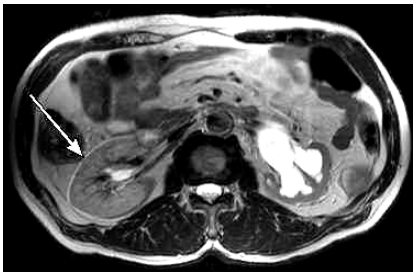
가) 2.5~2.8% 이상
나) 2.5% 이하
다) 2.5% 이상
라) 3.0% 이상

49. 次は画像でゴースト人工物生成程度を評価したことで合格基準になるゴーストの割合範囲は?



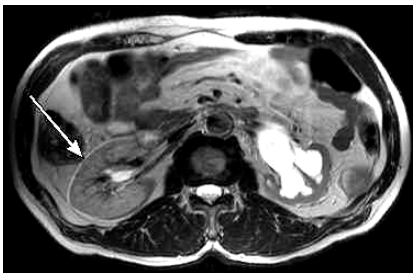
1) 2.5~2.8% 以上
2) 2.5% 以下
3) 2.5% 以上
4) 3.0% 以上

50. 다음 영상은 MRI Chemical shift artifact **옳은 것은?**



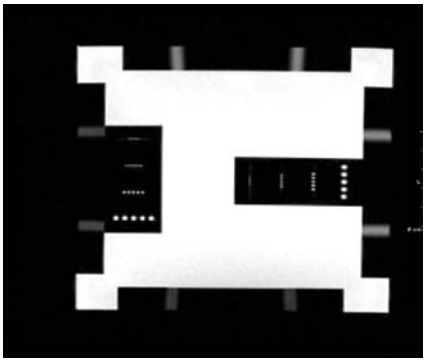
가) Chemical shift artifact는 frequency encoding 방향으로 발생한다
나) 수신대역폭을 넓게 하여 chemical shift artifact를 줄일 수 있다.
다) Chemical shift artifact는 공기와 조직의 경계면에서 발생 한다.
라) 지방 소거법을 사용하여 chemical shift artifact를 줄일 수 있다.

50. 次の MRI Chemical shift artifact で正しいことは?



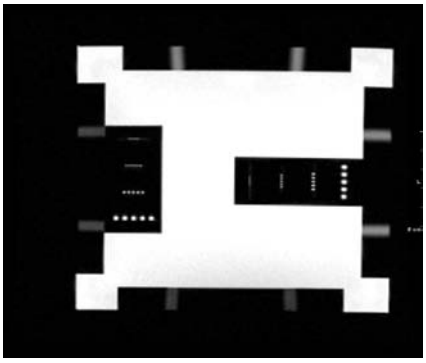
1) Chemical shift artifactは frequency encoding 方向に発生する
2) 受信帯域幅を広くして chemical shift artifactを減らすことができる.
3) Chemical shift artifactは空気と組職の境界面で発生する.
4) 脂肪消去法を使って chemical shift artifactを減らすことができる

51. 다음 영상은 무엇을 측정한 것인가?



가) 공간분해능
나) 직선성
다) 균일도
라) 단층두께 촬영

51. 次は何を測定したことですか?



1) 空間分解能
2) 直線性
3) 均一度
4) 断層厚さの撮影

52. 헬륨소거 (Quenching)가 발생했을 시 적절한 조치가 아닌 것은?

가) 검사실 문을 완전히 열어 놓는다.
나) 검사 중 발생 시 즉시 환자를 바깥으로 피난시킨다.
다) 병원의 응급 콜(CPR)방송을 한다.
라) 피난 된 환자의 활력징후 (Vital sign check)를 즉시 확인 한다.

52. ヘリウム消去 (Quenching)が発生した時適切な措置ではないことは?
1) 検事室の門を完全に開いておく
2) 検事の中で発生時直ちに患者を外で避難させる.
3) 病院の応急コール(CPR)放送をする.
4) 避難された患者のVital sign checkを直ちに確認する.

53. MRI검사를 안전하게 하기 위해서는 많은 제한이 따른다. 다음 중 MRI와 MRS검사에서의 상대적으로 금기해야 할 환자로 옳은 것은?

가) 지혈클립(뇌신경계)을 한 환자
나) 전자적 심박 조율기를 이식한 환자
다) 폐쇄 공포증 환자
라) 강자성 인공와우 이식

53. MRI検事を安全にするためには多くの制限がある. 次の中で MRIと MRS検事で 相対的に禁忌しなければならない患者で正しいことは?
1) 血止めクリップ(雷神境界)を一患者
2) 電子的心拍調律期を移植した患者
3) 閉鎖恐怖症患者
4) 強磁性人工蝸牛移植

54. 미국 FDA에서 권고하는 RF에 노출되는 특수흡수율(SAR)의 제한 범위는?

가) 4.0W/kg 나) 0.4W/kg
다) 0.8W/kg 라) 8W/kg

54. アメリカ FDAで勧告する RFに露出する特殊吸収率(SAR)の制限範囲は?
1) 4.0W/kg 2) 0.4W/kg
3) 0.8W/kg 4) 8W/kg

55. 자장세기(Gauss line)에 근거한 제한조건으로 MR장치로부터 영향을 받을 수 있는 것들로 연결이 옳지 않은 것은?

가) 1 Gauss line- CT 장치
나) 5 Gauss line- 인공 심박동기
다) 5 Gauss line- Magnet Card

라) 10 Gauss line- 공조장치

55. 磁場(Gauss line)に根拠した制限条件で MR装置から影響を受けることができるものなどで連結が正しくないことは?

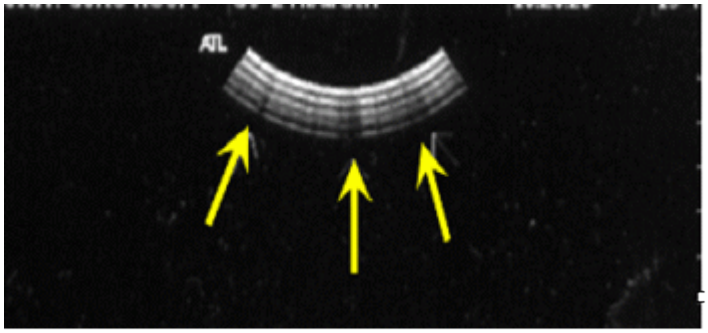
1) 1 Gauss line- CT 装置

2) 5 Gauss line- 人工心搏動期

3) 5 Gauss line- Magnet Card

4) 10 Gauss line- 空調装置

56. 다음 영상은 초음파 transducer 점검에 관한 것으로 옳지 않은 것은?



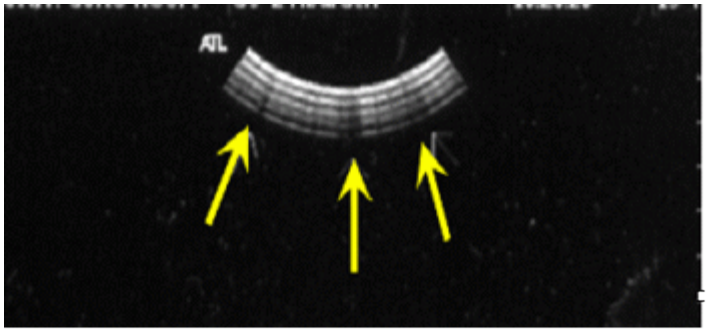
가) Rubber 가 뜨지 않았는지 확인한다.

나) crystal defect 가 있는지 확인한다.

다) 검사 후 Freeze 한다.

라) Probe를 소독하기 위해 열소독 한다.

56. 次の超音波 transducer 点検に関することで正しくないことは?



1) Rubber が浮かばなかったのか確認する.

2) crystal defect があるのか確認する.

3) 検査後 Freeze する

4) Probeを消毒するために熱消毒する

57. 표준 팬텀(ATS-539)의 특징이 아닌 것은?

가) 초음파 영상장치의 정확성과 수행능력을 평가한다.
나) Human tissue 와 동일 음향특성이다.
다) Rubber-based tissue-mimicking material 음속: 1450m/s±1.0 at 23˚
라) Attenuation Coefficient는 0.7dB/cm/MHz±5%

57. 標準ファントム(ATS-539)の特徴ではないことは?
1) 超音波映像装置の正確性と遂行能力を評価する.
2) Human tissue と同一音響特性だ.
3) Rubber-based tissue-mimicking material 音速: 1450m/s±1.0 at 23˚
4) Attenuation Coefficient는 0.7dB/cm/MHz±5%

58. 초음파 영상진단장치의 영상종류가 다양하므로 의료 동영상 처리장치를 통하여 영상을 획득하는데 이때 이용되는 의료동영상처리장치는 무엇인가?
가) PACS 나) Gateway 다) Petamotion 라) DICOM

58. 超音波映像診断装置の映像種類が多様なので医療動画処理処置を通じて映像を獲得する。この時利用される医療動画処理処置は何か?
1) PACS 2) Gateway 3) Petamotion 4) DICOM

59. 다음 설명에 해당하는 것으로 옳은 것은?
이것은 매질내의 실제 거리가 sound beam에 축을 따라 정확하게 표현되는지 측정하는 것으로 정확한 진단의 critical factor이며 구조물의 크기, 깊이, 부피를 표시한다. 이것은 무엇인가?
가) Horizontal measurement 나) Vertical measurement
다) Penetration 라) Axial&Lateral Resolution

59. 次の説明にあたることで正しいことは?
これは媒質内の実際距離が sound beam に軸に付いて正確に表現されるのか測定することで正確な診断の critical factor で構造物の大きさ, 深み, 体積を表示する. これは何か?
1) Horizontal measurement 2) Vertical measurement
3) Penetration 4) Axial&Lateral Resolution

60. 수신된 초음파 신호의 강약을 전체적으로 조절하여 밝기 정도를 조절하는 것은 무엇인가?

가) T.G.C(Time Gain Control) 나) Gain
다) Dynamic range 라) Output power

60. 受信された超音波信号の強弱を全体的に調節して明るさ位を調節することは何か?
1) T.G.C(Time Gain Control) 2) Gain
3) Dynamic range 4) Output power

61. 다음 중 초음파 표준 팬텀의 측정 시 주의사항 중 옳지 않는 것은?

가) Phantom 을 깨끗하고 평평한 곳에 놓는다.
나) 적당한 양의 Low viscosity Gel 또는 물을 scan surface 에 둔다.
다) Phantom 바닥이 Black 으로 보이도록 Gain 값을 조절한다.
라) Sono CT, TGC, Output등의 Settings을 Normal Liver와 같은 값으로 조절, 기록한다.

61. 次の中で超音波標準ファントムの測定時注意事項中正しくないことは?
1) Phantom をきれいで平たい所におく.
2) 適当な量の Low viscosity Gel または水を scan surface に置く.
3) Phantom 底が Black と見えるように Gain 値段を調節する.
4) Sono CT, TGC, Outputなどの Settingsを Normal Liverと同じ数値で調節, 記録する.

62. 초음파 출력에 관한 설명으로 틀린 것은?

가) 정성적인 방법으로는 제조회사에 따라 %, dB, Low, medium, High 으로 표시한다.
나) 정량적인 방법으로는 실시간 레벨로 표시하고 ALARA 원칙을 적용한다.
다) 정량적인 방법은 TI(Thermal index), MI(Mechanical index)로 표시한다.
라) Output 최대 출력은 프로브마다 동일하다

62. 超音波出力に関する説明で違ったことは?
1) 定性的な方法では製造会社によって %, dB, Low, medium, High で表示する.
2) 定量的な方法ではリアルタイムレベルで表示して ALARA 原則を適用する.
3) 定量的な方法は TI(Thermal index), MI(Mechanical index)で表示する.
4) Output 最大出力はプロブごとに等しい

63. 방사선 종양학과의 QA 대상 기기에 포함되지 않는 것은?

가) 선형 가속기 (Linac)
나) Co-60 원격치료장치
다) 모의 치료장치 (Simulator)
라) CT (전산화 단층 촬영장치)

63. 放射線腫瘍学科の QA 対象機器に含まれないことは?

1) 線型加速器 (Linac)
2) Co-60 遠隔治療装置
3) 謀議治療装置 (Simulator)
4) CT

64. 선형가속기(Linac)의 acceptance test 중 Radiation survey에 해당되지 않는 것은? 2

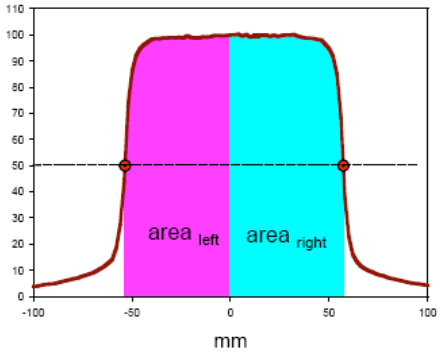
가) 치료실 문 밖　　나) 치료실 안 쪽 (치료실 내)
다) 치료실 바깥 쪽 벽면　　라) Head leakage

64. 線型加速器 (Linac)の acceptance test の中で Radiation surveyに当たらないことは?

1) 治療室の門の外　　2) 治療室の中

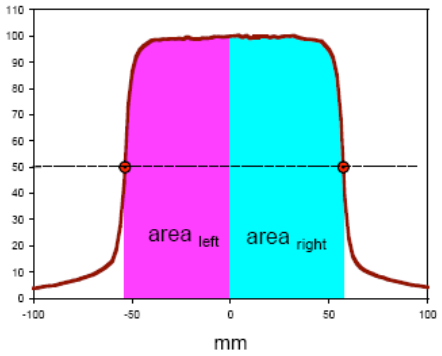
3) 治療室の外の壁面　　4) Head leakage

65. Photon beam의 점검 항목 중 다음 그림이 나타내는 측정내용과 그 허용치는? 3



가) Flatness – 2%　　나) Flatness – 3%
다) Symmetry – 2%　　라) Symmetry – 5%

65. Photon beamの点検項目の中で次の絵が現わす測定内容とその許容値は?3



1) Flatness – 2%　　2) Flatness – 3%
3) Symmetry – 2%　　4) Symmetry – 5%

66. 모의치료장치 (Simulator)의 기하학적 및 공간적 정확도 점검의 기준이 되는 장치는? 4

가) 근접치료장치 (Brachytherapy unit)
나) 전산화 단층 촬영장치 (CT)
다) 컴퓨터 선량 계산장치 (RTP)
라) 선형 가속장치 (Linac)

66. 謀議治療装置 (Simulator)の幾何学的及び空間的正確度点検の基準になる装置は? 4

가) 近接治療装置 (Brachytherapy unit)
나) CT
다) コンピューター線量計算装置 (RTP)
라) 線型加速器 (Linac)

67. 다음 중 괄호 안에 알맞은 것은?

방사선치료에서 QA &QC는 매우 중요하다. 국제 방사선 단위 측정위원회(ICRU)에서는 환자에 대한 투여선량의 정밀도는 ±(　　)%, 전 치료과정에서 불확정도는 ±(　　)% 이하로 할 필요가 있음을 권고하고 있다.

가) 2.0, 3.0
나) 3.0, 3.0
다) 3.0, 5.0
라) 2.0, 5.0

67. 次の中で(　　)の中に適当なことは?

放射線治療で QA &QCは非常に重要だ. 国際放射線単位測定委員会(ICRU)では患者に対する投与善良の精密度は ±(　　)%, 私は治療過程で不確定島は ±(　　)% 以下にする必要があることを勧告している.

1）2.0, 3.0
2）3.0, 3.0
3）3.0, 5.0
4）2.0, 5.0

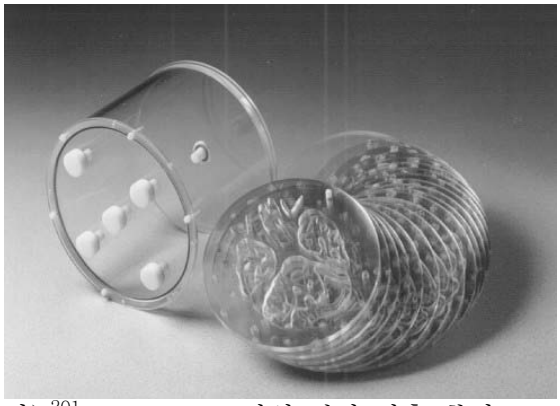
68. 다음은 핵의학 분야에 사용되는 선량 측정기로 측정기 교정 시 사용되는 선원으로 옳은 것은?

가) ^{57}Co　　나) ^{60}Co　　다) ^{99m}Tc　　라) ^{137}Cs

68. 次は核医学分野に使われる線量測定器で測定器校正時使われるsourceで正しいことは?

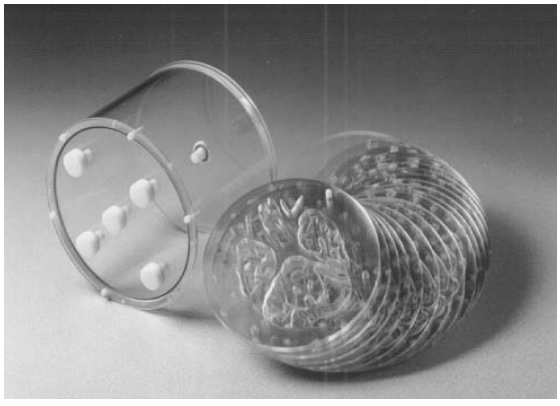
1) ^{57}Co 2) ^{60}Co 3) ^{99m}Tc 4) ^{137}Cs

69. 다음 **핵의학 팬텀 영상**에 대한 설명 중 **옳은** 것은?



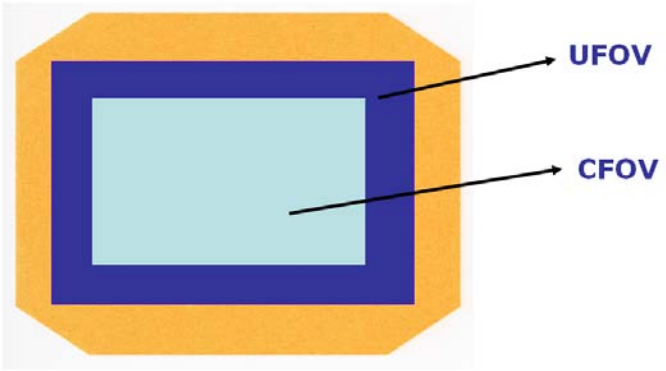
가) ^{201}Tl-chloride 단일 광자 단층 촬영
나) ^{18}F-FDG 양전자 단층 촬영
다) 호프만 뇌 팬텀
라) 단층 팬텀 (Jaszczak phantom)

69. 다음 **핵의학 팬텀 영상**에 대한 설명 중 **옳은** 것은?



가) ^{201}Tl-chloride 단일 광자 단층 촬영
나) ^{18}F-FDG 양전자 단층 촬영
다) 호프만 뇌 팬텀
라) 단층 팬텀 (Jaszczak phantom)

70 次の核医学映像に対する説明の中で正しくないことは?



1) UFOVは実際のDetectorの大きさの 95%だ.
2) UFOVは 4.5%以下である時、密集度が均一だ.
3) CFOVは実際のDetectorの大きさの 75%だ.
4) CFOVは 4.5%以下である時、密集度が均一だ.

71. 다음 중 **핵의학에서** 해상력 측정**에 대한 설명으로 옳지 않은** 것은?

가) 2선원 분해거리 측정 (PSF)
나) 반치폭의 측정 (FWHM)
다) 분해능 팬텀의 이용
라) 면선원 측정 (Flood phantom)

71. 次の中で核医学で解像力測定に対する説明で正しくないことは?

1) 2 線源分解距離測定 (PSF)
2) 半値幅の測定 (FWHM)
3) 分解能ファントムの利用
4) 面線源測定 (Flood phantom)