問題 1：關於個人劑量計的敘述，以下何者正確？

a. 光激發光(OSL)劑量計，有高敏感度可以偵測自然輻射。
b. 熱發光劑量計(TLD)不可重複使用。
c. 熱發光劑量計(TLD)有小的批次間變異。
1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 2：哪一種劑量計可測量個人使用放射治療的外部放射劑量？

a. 冷發光(OSL)劑量計
b. 全身計數器
c. 侖目(Rem)計數器
1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 3：哪一個組合是正確的？

a. 正比計數器－個人劑量計
b. 游離腔測量計－測量住宅區空氣中的劑量率
c. 熱發光劑量計(TLD)－地面的污染表面密度
1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 4：哪一個( )的文字組合是正確的？

三個基本放射保護系統的原則：所有與放射暴露有關的行動為(A)，他們是(B)以達到合理的成效，且每次暴露於(C)的劑量，必須不能超過(D)。

	A	B	C	D
1.	完美的	正當理由的	個體	劑量限制
2.	完美的	正當理由的	病患	劑量約束
3.	正當理由的	完美的	個體	劑量限制
4.	正當理由的	完美的	病患	劑量限制

問題 5：哪一個放射劑量單位無法實際測得？

1. 有效劑量　　2. 吸收劑量　　3. 曝露劑量　　4. 克馬(Kerma)

問題 6：關於偵檢器的描述，以下何者「不正確」？

1. 游離腔測量計比其它偵檢器有較佳的測量準確度。
2. 蓋格(GM)計數器偵檢器有高的能量相依性。
3. 閃爍偵檢器比其它偵檢器有較低的敏感度。
4. 可使用正比計數器測量中子輻射。

問題 7：關於聯合國組織的敘述，以下何者「不正確」？

1. IAEA 是國際原子能總署的縮寫。
2. UNSCEAR 為聯合國原子輻射效應科學委員會的縮寫。
3. IAEA 對電離輻射防護與源安全國際基本安全標準(B.S.S.)提出指導水平(guidance levels)的建議。
4. 國際放射防護委員會(ICRP)是一種聯合國組織。

問題 8：關於表面污染測量的敘述，以下何者正確？

a. 直積法對固定污染有效。
b. 間接法對鬆散污染有效。
c. 直積法對非平滑表面有效。
1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 9：關於內部放射量測的敘述，以下何者「不正確」？

1. 生物檢定法需耗費長時間。
2. 在外部計數上，僅可有效測量有 α-與 β-射線的攝取。
3. 攝取量可藉由空浮放射性物質的濃度計算，進行判定。
4. 描述放射性核生物動力的標準模式：呼吸道模式、胃腸道模式，以及系統生物動力模式。

問題 10：哪一個放射劑量測量的警告正確？

a. 當偵測到 X 光螢光攝影室的控制區內出現外漏時，應測量劑量率。
b. 當偵測到一般影像室的控制區域內有外漏時，使用整合式的偵測模式。
c. 依暴露狀況，選取所有正常使用情況中最高等級的措施。
1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 11：哪一種放射線暴露「不」被認為是醫療放射？

1. 在一般健康檢查期間源自胸部 X 光的暴露。
2. 源自市立機構安排之胃部腫瘤檢查的暴露。
3. 急診病患家屬源自於病患胸部攝影的暴露。
4. 放射技術人員源自可攜式放射攝影的暴露。

問題 12：何種放射暴露有設限制？

a. 公眾暴露　　b.　職場暴露　　c.　醫療暴露
1. a 與 b　　2. b 與 c　　3. a 與 c　　4. 以上皆是

問題 13：關於個人劑量計的敘述，以下何者「不正確」？

1. 中子射線測量附有膠片配章(film badges)。
2. 膠片配章容易受到機械衝擊的傷害。
3. 熱發光劑量計(TLD)不可重複使用。
4. 口袋型劑量計的防潮力不佳。

問題 14：何者與體內暴露控制「無」關？

1. MIRD (醫學體內輻射劑量)法　　2. 體外計數　　3. 生物檢定法　　4. 膠片法

問題 15：以下何者配對「無」關？

1. 輻射加權因子－輻射與能量的形式
2. 組織加權因子－器官/組織的輻射敏感度差異
3. 有效劑量－將各暴露身體組織的等效劑量乘上組織加權因子，並且計算總和
4. 約定有效等效劑量－估計個體一生的放射劑量

問題 16：以下何者「不是」入射表面的劑量測量？

1. 熱發光劑量計(TLD)
2. 光激發螢光玻璃劑量計(PGD)
3. 冷發光(OSL)劑量計
4. 數值劑量判定(NDD)

問題 17：在診斷領域中，何種放射傷害與其閾值「不」符？(ICRP Publ.85)

1. 早發暫時性紅斑－2 Gy
2. 永久性脫毛－10 Gy
3. 乾燥脫屑－14 Gy
4. 次發性潰瘍－24 Gy

問題 18：在 1996 年，ISRRT 出版「放射技術員的角色與專業教育標準」。以下敘述何者「不正確」？

1. 病患照顧　　2. 輻射劑量最佳化　　3. 技術發展　　4. 品質保證

問題 19：以下何者之機率性效應大小與輻射劑量「無」關，但其發生率隨輻射劑量增加而增加，且未觀察到閾值？

1. 脫毛　　2. 白內障　　3. 不孕　　4. 白血病

問題 20：依據 ICRP Publ. 60，「源自自然放射源的暴露必須視為一種職場暴露的形式」。以下何者「不」屬於自然放射源？

1. 監管機構發出氡警報，且判定某工作場所落於此類別。
2. 噴射操作
3. 太空飛行
4. 海底隧道工程

問題 21：關於輻射意外事件特徵的描述，以下何者「不正確」？

1. 這是一種自然災害的形式。
2. 必須派遣專業人員控制意外事件。
3. 可能會出現大量罹患焦慮與神經學症狀的人。
4. 意外事件本身的規模可能不大，但謠傳所引起的損害可能很大。

問題 22：依據美國輻射緊急協助中心/訓練點(REAC/TS)的輻射意外事件資料，以下何者「不正確」？

1. 在過去 50 年，已經有超過 400 件輻射意外事件案例。
2. 在不同形式的輻射意外事件中，最常見的是密封放射源的暴露事件。
3. 核反應爐的意外事件約佔總數的 10%。
4. 近期有可能在各地遭遇輻射意外事件。

問題 23：從過去的輻射意外事件中學習，是很重要的。以下何者「不正確」？
1. 除非隨時備戰，否則處理暴露輻射的緊急醫療系統將無法有效運作。
2. 與輻射及放射相關的單位，如西佛(Sv)與貝克(Bq)，對一般人而言是難以瞭解的。
3. 在核災期間的資訊必須以準確、即時且整合的方式宣傳。
4. 需要一些有能力的領導者提供暴露的緊急醫療照顧。

問題 24：依據美國國家輻射防護與度量委員會(NCRP)的報告(#138)，以下關於放射性恐怖主義的描述，何者「不正確」？
1. 輻射暴露可能會引起健康疾病。
2. 由於致力於爆炸所引起之傷害的除污工作，醫療服務的提供，可能會有所延誤。
3. 對日常生活的基礎建設不會有影響。
4. 民眾會有巨大的情緒效應、恐懼與焦慮。

問題 25：關於急性輻射疾病的描述，以下何者「不正確」？
1. 這是一種確定性效應。
2. 確定性效應之閾值劑量的定義為，族群中有 50%經驗到某些效應時的劑量。
3. 急性輻射疾病的階段可分為幾個階段。
4. 病患的治療療程會在評估暴露劑量後決定。

問題 26：關於輻射對人體的效應描述，以下何者「不正確」？
1. 個體遭遇輻射暴露的直接效應，稱為軀體效應。
2. 若生殖腺並未暴露，則不會有基因影響的問題。
3. 就輻射的效應而言，不孕屬於早期效應。
4. 就輻射效應而言，白血病是早期效應。

問題 27：關於輻射引起之皮膚疾病的描述，以下何者「不正確」？
1. 與暴露超過 8-10 Gy 有關的症狀，和與熱燒傷有關的症狀不同。
2. 肢體末端的暴露可能會引起循環疾病。
3. 暴露於 3 Gy 會引起皮膚紅斑。
4. 嚴重度取決於暴露劑量、輻射品質與暴露區域。

問題 28：關於輻射事故受害者的劑量評估，以下何者「不正確」？
1. 因為血液中淋巴球對輻射的敏感度很高，使用周邊血管淋巴球計數作為暴露日的標記，以估計輻射劑量。
2. 從血小板計數的傾向來估計輻射劑量是困難的。
3. 可對穩定染色體疾病與不穩定染色體疾病執行染色體分析，估計輻射劑量。
4. 可使用受害者牙齒琺瑯質或衣物外套鈕釦的電子自旋共振，估計輻射劑量。

問題 29：關於輻射事故受害者的劑量評估，以下何者「不正確」？
1. 體外暴露的劑量評估。
2. 傷口(體內暴露)的劑量評估。
3. 體表污染的劑量評估。
4. 空浮污染濃度的劑量評估。

問題 30：關於體內輻射的劑量評估的敘述，以下何者「不正確」？

1. 在鼻抹片法(dose evaluation method)中，使用濾紙或拭子擦拭檢體，接著使用偵檢器測量。然後就可以準確地評量吸入的放射性物質容積。
2. 在生物檢定法中，可使用排泄物質如尿液與糞便作為檢體。分析這些檢體中的放射性，以評估攝取量與體內放射性濃度。
3. 生物檢定法的劑量評估，並非十分準確。
4. 全身計數器的劑量評估，可用於γ射線的體內暴露。

問題 31：原則上，依據不同的目標，會使用不同的儀器測量放射性。以下何種組合「不正確」？

1. 測量β射線源的表面污染－蓋格計數器偵檢器(GM counter survey meter)
2. 測量α射線源的表面污染－ZnS (Ag)閃爍測量偵檢器
3. 測量γ射線在空氣中的劑量率－游離腔偵檢器
4. 測量中子射線在空氣中的劑量率－NaI (TI)閃爍偵檢器

問題 32：關於蓋格計數器偵檢器的描述，以下何者「不正確」？

1. 因為偵測元件的結構足以承受任何機械衝擊，稍微的碰撞應不會造成問題。
2. 將偵測元件帶入可能受污染的地方時，需覆上薄薄一層、透明的乙烯基。
3. 為避免斷線，請確認電線未被扭轉。
4. 在進行測量前，請確認執行電源檢查與高電壓檢查。

問題 33：為使用蓋格計數器偵檢器測量受污染區段的計數率，需將時間常數設定為 10 秒。取得正確測量所需的最少時間為何？

1. 10 秒　　2. 20 秒　　3. 30 秒　　4. 60 秒

問題 34：在急救站對居民執行身體表面污染篩檢時，「不應」執行下述何者項目？

1. 成對工作時；一位負責檢查居民，而另一位負責文書記錄。
2. 測量人員必須穿戴實驗衣外套、面罩、帽子、聚乙烯手套，並攜帶個人劑量計。
3. 蓋格計數器偵檢器的時間常數必須設定為 3 秒，且必須與衣物及體表保持約 1 公分的距離。並以大約每秒 10 公分的移動速率，進行測量。
4. 如果偵檢器針頭的震盪超過平常，請立即將時間常數變更為 10 秒，並休息 30 秒後記錄讀取的數值。

問題 35：一位身體表面受磷-32 污染的受害者被帶進急救室。使用蓋格計數器偵檢器，偵測到 22,000 (cpm)的計數值。則表面污染密度(Bq/cm^2)為多少？注意磷-32 的轉換因子為 0.05 Bq/20 (cm^2/cpm)，以及蓋格探針的有效視窗為 20 (cm^2)。

1. 45　　2. 55　　3. 65　　4. 105

問題 36：一位身體表面受鈷 60 污染的受害者被帶進急救室。使用蓋格計數器偵檢器，在 100 (cm^2)的區域內偵測到 22,000 (cpm)的計數值。依據此資訊，發現污染密度為 100 (Bq/cm^2)。皮膚的吸收劑量為 100 (μGy/h)。在離污染表面 30 (cm)工作的醫師，其暴露劑量判定為 0.041 (μGy/h)。下述何者描述在此情境中為正確的？

a. 即使蓋格計數器偵檢器的聲響很吵雜，但關掉聲音會隱蔽危險。
b. 即使醫療工作人員在距離受害者 30 公分的距離工作一小時，他們的暴露仍低於單次胸腔 X 光攝影的暴露量。
c. 如果污染固定維持一年，受害者皮膚將會出現輻射燒傷。

1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 37：關於皮膚去污的描述，以下何者「不正確」？

1. 去污的執行，是從最溫和的方式開始，再漸漸增強至較強烈的方法。
2. 若缺乏污染槽的設施，請以弱性洗潔劑與沾濕的紗布擦拭，並且以少量水沖洗。
3. 當以清潔劑與紗布擦拭時，從未污染區域開始，再朝污染中心移動。
4. 如果有污染槽設施，在流動的水下使用軟刷與紗布清潔污染區。此時不需注意水溫。

問題 38：某位放射活性污染的受害者，被帶至醫療中心。關於流程與污染控制的描述，以下何者「不正確」？

1. 一般而言，應優先治療危急受害者生命的臨床病況，而非去污。
2. 污染地區的調查，必須從體內輻射機率較高的區域開始，如傷口、嘴巴、鼻子以及耳朵。
3. 於綜合醫院的急診室內，最好使用大量清水進行去污。
4. 當受害者被帶進來時，若他/她尚未除去衣物時，請先除去衣物。除去衣物就可處理 90%的去污工作。

問題 39：關於暴露之緊急醫療照顧的可能人選之敘述，以下何者正確？

a. 由於暴露與污染，病患需要立即接受檢查與治療。
b. 居民是輻射保護措施抵抗暴露與污染的目標。
c. 執行緊急處理的工作人員(那些需要醫療檢查者)。
d. 上述以外，擔心受放射性影響健康的人。

1. a 與 b　　2. b 與 c　　3. c 與 d　　4. 以上皆是

問題 40：關於暴露之緊急醫療的特性，以下何者「不正確」？

1. 因為與正常的緊急醫療不同，並非每個人都可以隨時隨地接受到最好的照顧。
2. 由於暴露於放射性物質或輻射所造成的污染，是非常罕見的現象。因此必須適當準備，以隨時執行。
3. 醫療工作人員可能對放射性物質以及輻射特別緊張。然而擁有足夠的準備、訓練以及教育，他們應該可執行實務工作而不會緊張。
4. 因為污染程度與輻射劑量可實際測量，與執行劑量評估的人員聯合運作，將有較適當的治療策略。

問題 41：關於輻射事故期間的溝通，以下何者「不正確」？

1. 應盡快傳達重要且正確的資訊。
2. 如果發現有誤，應立即發送修正資訊。
3. 必須考量如何最佳傳遞資訊以讓大家能夠瞭解。
4. 在取得正確的讀數之前，不可提及輻射劑量。

問題 42：下述何種心理變化在災害中較「不」常見？

1. 感覺憂鬱、食慾降低
2. 失眠、失去食慾
3. 專注力降低、記憶力降低、精神恍惚
4. 高血壓、肥胖

問題 43：下列何種行為並未出現心理疾病的症狀，如憂鬱、恐慌發作、創傷後壓力症候群？

1. 自殺或意外事故
2. 飲酒或抽煙量增加
3. 家庭或社區的摩擦
4. 精神興奮

問題 44：以下何者「不是」輻射災害與其他災害間的最大差異處？

1. 涉及的輻射暴露。
2. 五官無法感覺暴露。
3. 較難區辨源自壓力與源自暴露的慮病症狀。
4. 時常涉及體外傷害。

問題 45：以下何者「不是」與輻射災害相關的歧視、偏見與傷害性的謠傳？

1. 因害怕暴露，而與暴露受害者保持距離。
2. 避免與暴露受害者結婚。
3. 否認曾載送過暴露受害者。
4. 在輻射災害期間，提供清晰的資訊是很重要的。

問題 46：關於 1mSv 在一般大眾中的劑量限制，以下何者正確？

1. 超過 1mSv 會出現健康問題。
2. 1mSv 為吸收劑量。
3. 1mSv 為在日常生活不會遭遇的大暴露量。
4. 1mSv 為有效劑量。

問題 47：關於風險溝通的描述，以下何者「不正確」？

1. 尊敬每個人在價值與環境的差異。
2. 透過彼此間相同的標準，加深對問題的瞭解。
3. 溝通每個人的想法。
4. 解釋技術知識直到瞭解為止。

問題 48：關於輻射災害的心理狀態，以下何者「不正確」？

1. 對受污染者的歧視與偏見。
2. 發展錯誤的故事與謠傳。
3. 出現有害的謠傳。
4. 犯罪率升高。

問題 49：關於輻射災害的暴露與醫療暴露間的差異，以下何者「不正確」？

1. 醫療暴露通常是出於患者本身的要求。
2. 輻射災害暴露並非出自患者的要求。
3. 可容易接受志願性醫療輻射的暴露風險。
4. 可容易接受輻射災難的暴露風險。

問題 50：關於群眾的敘述，以下何者「不正確」？

1. 指的是一群匿名的團體，並無特定的多數。
2. 是志願性/暫時性沒有組織的團體。
3. 有時會出現激進的行為，而構成社會干擾，如暴動/恐慌。
4. 成員彼此朝共通的目標合作，且彼此享有共通的規則。

問題 51：下列敘述何者「不正確」？

1. 許多人表現出來的壓力反應是暫時性的，且會隨時間而消失。
2. 在災難中遭遇到情緒壓力如極端的恐懼時，只有精神脆弱的才會經歷心理與生理上的調適。
3. 災害期間看來眼睛無神的受害者，出現了創傷反應。
4. 災害期間抱怨無法入睡的人，出現了創傷反應。

問題 52：以下何者配對正確？

1. 創傷後壓力症候群症狀－回想
2. 防衛反應－飲酒
3. 因應行為－退化
4. 自生訓練－H. Selye

問題 53：以下何者為輻射災難特徵的正確敘述？

a. 災難的規模視滲漏放射性物質的形式和總量，以及天氣、位置與發生時間而定。
b. 因為五官並無法察覺放射性，故個體常會有「無法看到」與「無法理解」的恐懼。
c. 可輕易辨識壓力為慮病症狀，還是為暴露症狀。
d. 並不容易發生偏見與有害性的謠傳。

1. a 與 b　　2. b 與 c　　3. c 與 d　　4. 以上皆是

問題 54：協助人員最「不適合」下述何種行動？

1. 前往受害者身旁詢問是否有任何問題。
2. 讚美行為愉快的人：「您看起來很棒。如果我是您，我可能無法忍受。」
3. 轉介自述「無法入睡」的人給醫師。
4. 聆聽受害者故事時潸然淚下。

問題 55：以下何者為易受傷害的族群？

a. 與父母分開的兒童　　b. 老年人　　c. 酒癮患者　　d. 外國人

1. a 與 b　　2. b 與 c　　3. c 與 d　　4. 以上皆是

問題 56：關於溝通活動的敘述，以下何者「不正確」？

a. 因為方才對災難情境發佈了新的資訊，援救人員將其轉達給受害者。
b. 援救人員對補償存有疑問，但因為他們並不確定，故請負責人出面說明。
c. 為避免經由回推以嘗試找出正確的資訊，雖然援救人員接收到新的資訊，仍須保持沈默。
d. 放射性的效應對一般人而言太過複雜而難以瞭解。因此援救人員對大眾說明「一切都沒事」而不需提供任何解釋，以緩和大眾。

1. a 與 b　　2. b 與 c　　3. c 與 d　　4. 以上皆是

問題 57：以下何者正確？

1. 好的營養與休息也是援救人員所必須的。
2. 援救人員不可能出現創傷後壓力症候群。
3. 援救人員的任務為協助受害者。然而，因為社會的高度期待，他們應持續工作而不可睡覺或休息。
4. 援救人員討論他們在援救過程中看到和經驗到的事情，是不被接受的。

問題 58：以下何者定義「不正確」？

1. 疲潰(burnout)症候群－一種生理與心理極度疲憊的狀態，以及因過度努力工作而耗盡情感。
2. 替代性創傷－專注聆聽受害者的故事時，因為個人對創傷發展出相似的情感與反應，好像本身也實際與受害者一起在現場。
3. 3.倖存者的罪惡感－對存活出現罪惡感。
4. 情感轉移－聆聽受害者的故事時，個人出現相似的情緒，如憤怒與悲傷。

問題 59：「壓力管理的 3 R」指的是什麼？

1. 風險－放鬆－娛樂
2. 休息－放鬆－娛樂
3. 休息－報復－娛樂
4. 風險－放鬆－責任

問題 60：以下何者為受害者需要的資訊？

a. 發生放射性災難的時間與原因，以及輻射或放射性物質的狀態
b. 對日常生活的影響
c. 需要的防護措施
d. 輻射或放射性物質對人體的影響

1. a 與 b　　2. b 與 c　　3. c 與 d　　4. 以上皆是

問題 61：何者為面對輻射暴露諮商的正確態度？

1. 暴露諮商是處理對檢查抱怨的一種方法。
2. 判定人們要知道什麼是很重要的。
3. 暴露諮商是要使人們信服。
4. 對暴露感到憂心的人，代表有心智問題。

問題 62：何者為輻射暴露諮商的正確方法？

1. 使用技術用語以節省時間是很重要的。
2. 當在解釋的時候，確認人們聽懂您表達的內容。
3. 提供所有人相同的回答。
4. 人們前來尋求建議時，告訴他們所有關於暴露的資訊。

問題 63：下述擔心暴露的理由，何者「不正確」？

1. 暴露使人想起原子彈的映象。
2. 據說懷孕期間的暴露具有危險性。
3. 據說兒童容易受到暴露的傷害。
4. 許多案例因這種診斷結果發展出癌症。

問題 64：何者「不是」確定性效應？

1. 掉髮　　2. 皮膚紅斑　　3. 癌症　　4. 不孕

問題 65：何者為輻射暴露諮商的「不正確」回應？

1. 仔細聆聽。
2. 判定諮商重點，釐清問題。
3. 確認釐清的問題無誤。
4. 立即否定任何可能出現的錯誤想法。

問題 66：何者為進行輻射暴露諮商的正確注意事項？

1. 尋求建議時，持續處理問題，直到完全確信為止。
2. 如果有心理問題，立即轉介給精神科專科醫師。
3. 焦慮未完全緩解的原因，完全是因為缺乏解釋所致。
4. 因為專家的觀點是正確的，解釋該想法直到他們接受為止，是很重要的。

問題 67：關於低劑量暴露的影響，何者正確？

1. 已證實暴露的基因效應可在人類中累積。
2. 因為暴露的健康問題勢必會繼續發展。
3. 使用標稱機率係數作為安全性控制的估計。
4. 標稱機率係數會指出癌症案例的數量。

問題 68：雖然做了許多解釋，但憂慮仍未緩解時，何種理由並「不」適用？

1. 提供的解釋與人們想知道的不同。
2. 不瞭解技術性專有名詞。
3. 除了擔憂暴露之外，也存在心理問題。
4. 已建立信任關係。

問題 69：以下何者「不正確」？

1. 在細胞演變為癌細胞前，會歷經幾個階段。
2. 暴露造成的傷害將永遠無法復原。
3. 身體有幾種修復機制可處理暴露造成的傷害。
4. 細胞凋亡是保護身體的其中一種系統。

問題 70：關於輻射暴露諮商的敘述，以下何者「不正確」？

1. 建立信任的關係。
2. 取得輻射相關資格。
3. 以可接受的方式建立關係。
4. 不要聆聽鬆散的閒聊。

問題 71：以下敘述何者正確？

1. 在諮商中，諮商師會盡快提供個案解決問題的建議。
2. 諮商可透過口語與非口語溝通，對個案遭遇到的改變提供協助。
3. 為了取得個案的信任，諮商師必須試著維持諮商者的尊嚴，並壓抑任何出現的個人情感。
4. 因為個案受其錯誤的想法所苦，諮商師必須矯正他們的錯誤。

問題 72：關於聆聽的意義，以下何者「不正確」？

a. 可以建立信任關係。
b. 諮商師可藉由將個案的感覺與想法向個案再次複述，以讓個案瞭解本身的感受。
c. 當諮商師的回應引起個案的感受時，可能會出現一些個案本身並未察覺的事物。

1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 73：當個案說：「我晚上無法睡著，因為都在擔憂這些事情？」時，下述何者為最佳的回應？

1. 您無法入睡真不是件好事。
2. 我在擔心某事情時，也無法入睡。
3. 所以您太過擔憂以致於夜晚無法入睡？
4. 您何不試試看安眠藥呢？

問題 74：以下敘述何者正確？

a. 並不需要提供個案詳細的解釋，因為他/她並不瞭解技術性的資訊。
b. 個案最終必須自己作判斷。因此，必須在無法吸收的部分以個案能夠瞭解的方式提供解釋。
c. 如果個案對輻射有錯誤的瞭解，必須立即矯正。

1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 75：以下關於同理心的敘述，何者正確？

1. 同理心是一種奉獻且讓自己沈浸於他人情緒與思考模式中的能力。
2. 同理心是感受他人的情緒與思考模式，感覺好像是自己本身一樣，但同時又可辨識並不相同。
3. 因為同理心是接受他人說話內容的能力，因此必須確認所說的每件事情。
4. 雖然同理心是接受他人說話內容的能力，但仍必須矯正說錯的部分。

問題 76：當個案說：「輻射對身體有害，不是嗎？」的時候，以下何者會是最佳的回應？

1. 不，您所說的並不是事實。
2. 是的，這是大多數人的想法。
3. 如果輻射真的對人體有害，為何在醫療照顧中使用他們？
4. 因此您認為輻射對人體有害？

問題 77：對一開始表示「我已經瞭解」，但不久後又詢問「您確定沒問題嗎？」的個案，解釋低劑量暴露的影響。以下何者最「不適合」用來回應該位個案？

1. 您還在想那些問題嗎？
2. 因此您仍然不認為沒問題？
3. 有任何部分您不瞭解嗎？
4. 我想知道您為何仍持續擔憂。

問題 78：在下述諮商場景中，在諮商師的回應中使用的技術，何者「不正確」？

(Cl –個案，Co –諮商師)

Cl1:我的胃約在 3 個月前有一些疼痛…

Co1:是。

Cl2:因此我在當地醫院接受了電腦斷層掃描。

Co2:您接受了電腦斷層掃描。

Cl3:是。他們使用顯影劑並且掃描兩次。

Co3:因此您完成了掃描。

Cl4:是。但我開始擔心暴露的問題。且當我在網路上找相關資料時，我發現電腦斷層掃描的暴露量很大。這就是我為何開始擔心。

Co4:所以您變得很擔心。

Cl5:我也到醫院找醫師看診，而他再次向我保證沒問題。但我無法不擔心是否真的沒問題。

Co6:您的醫師說沒問題，但您仍擔心是否真的沒問題。是什麼樣的事情讓您擔心？

Cl7:嗯~我害怕最終可能會罹患癌症或白血病。

Co8:您擔心可能因為做了電腦斷層掃描而最終可能會罹患癌症或白血病。
Cl9:是的，沒錯。
Co10:為何您認為最終可能會罹患癌症或白血病？
Cl10:…. (沈默 5 分鐘)。最近報紙有一篇報導，表示癌症的病例數因為電腦斷層掃描而增加。我也在網路上讀到一些文章，認為應嘗試避免電腦斷層掃描，因為其暴露量比其它檢查為高。
Co11:「 」

a. Co1－單純接收
b. Co2－回應情緒
c. Co4－回應關心
d. Co8－回應意義
e. Co8－彙總
1. a 與 b 與 d　　2. a 與 c 與 e　　3. b 與 c 與 d　　4. b 與 c 與 e

問題 79：在問題#78 的諮商場景中，以下何者最不適合作為 Co11「 」內的回應？
1. 您相信他們在報紙與網路上所說的嗎？
2. 從報紙與網路，您認為自己可能會因為做了電腦斷層掃描而罹患癌症與白血病嗎？
3. 您可以說得更詳細一些嗎？
4. 嗯…(稍微點頭而不需說話)。

問題 80：在問題#78 的諮商場景中，個案沈默 5 分鐘(Cl10)是什麼意思？以下何者最不適用？
1. 他/她對目前的談話感到相當滿足。
2. 他/她對於諮商師為何詢問該問題而感到困惑。
3. 他/她認為自己可能說了不適當的話而感到困窘。
4. 他/她開始懷疑為何他/她以該方式思考。

問題 81：以下何者並非在核反應爐作為燃料使用的鈾？
1. 鈾-234　　2. 鈾-235　　3. 鈾-238　　4. 鈾-239

問題 82：以下何者並非在核反應爐發現的分裂產品？
1. 鈾　　2. 鋇　　3. 鈰　　4. 鍶

問題 83：關於國際核能事件分級(INES)的敘述，何者正確？
a. 提出 IAEA 與 OECD/NEA 間的協同合作。
b. 依據 3 項標準進行評估。
c. 分為 7 個等級。
1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 84：關於核反應爐的描述，以下何者「不正確」？

1. 輕水反應爐是由沸騰的水反應爐與壓縮的水反應爐所組成。
2. 使用鈉作為快速滋生反應器內的冷卻劑。
3. 核反應爐深部的防護是源自於美國的概念。
4. 連鎖反應停止後，用過的燃料將無法在核反應爐內重新使用。

問題 85：關於建立核能電廠的敘述，以下何者「不正確」？

a. 建立在機場附近以方便燃料運輸。
b. 原則上，建立於遠離排定之航線的地方。
c. 建立於岩床上方。

1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 86：以下敘述何者正確？

a. a.上衝流(updraft)是在低壓系統中形成。
b. 風在高壓系統中的風向為順時鐘方向。
c. 高壓系統中的壓力大於 1000hPa，而低壓系統中的壓力低於 1000hPa。

1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 87：關於風速計的敘述，以下何者正確？

a. 有使用聲波的形式。
b. 有使用風車的形式。
c. 有使用都卜勒的形式。

1. 只有 a　　2. 只有 b　　3. 只有 c　　4. 以上皆是

問題 88：以下敘述何者不正確？

1. 赤道的紅外線輻射量很高。
2. 暖空氣與冷空氣間會形成鋒面。
3. 風向代表風吹的方向。
4. 可在兩個低壓系統間找到移動性的高壓系統。

問題 89：以下何者關於蒲福風力級的配對有誤？

1. 平靜(零級風力)：0 - 0.2m/s (煙可垂直上升)
2. 微風(2 級風力)：1.6 - 3.3m/s (樹葉發出微響)
3. 清風(5 級風力)：10.8 - 13.8m/s (整棵樹搖擺)
4. 暴風(11 級風力)：28.5 - 32.6m/s (廣泛破壞)

問題 90：以下何者不屬於地形風？

1. 海陸風　　2. 西風帶　　3. 山谷風　　4. 焚風

RSM provided by Taiwan (Q41-Q50 are local regulation related questions)

1. What method is used to improve a too under exposure image quality? (A) 15% rule (B) doubling method (C) 30% mAs increasing (D) 2kV/cm

2. Which of the following is the most sensitive to radiation? ①(A)GI tract ②(B)gonad ③(C)vessel (D)bone

3. How much percentage must be accurate to within of the SID? (A)100% (B)200% (C) 50% (D)2%

4. Which of the following could be used to decrease PENUMBRA effect? a) increase OID b) increase SID c) decrease OID d) larger focal spot e) decrease SID f) smaller focal spot

(A) a, b, d, f (B) b, c, f (C) b, c, d (D) a, b, d

5. Which o the following material has the highest density at radiography? (A)water (B)fatty tissue (C)muscle (D)mucosa

6. A lumbar measuring 20cm is 200mA, 0.15sec, 80kVp, 40-in SID. What technique would you use for a patient who measured 24cm? (A)the same (B)39 (C) 50 (D)65

7. The exposure from an x-ray tube operated at 70kVp, 200mAs is 400mR at 90cm, what will the exposure be at 180cm? (A)100 (B)200 (C) 300 (D)600

8. which of the following is the isotope of Radon ? (A) ^{220}Rn (B) ^{222}Rn (C) ^{224}Rn (D) ^{226}Rn

9. If N=Avogadro constant, Z = atomic number, A=atomic weight, how many electron are there in a gram?
(A) N/A (B) NZ/A (C) 1000 N/A (D) 1000 NZ/A

10. A radiation worker is exposed to 230mR/hr (2.3mGya/hr) from a radiation source. If the worker remains in that position for 36 minutes, what will be the total occupational exposure? (A) 23mR (B) 460mR (C) 3.38mR (D)138mR

11. Most radiographs are taken at an SID of 100cm. How much difference is allowed between the projection of the light field and x-ray beam at the image receptor? (A)2cm (B)20cm (C) 50cm (D)100cm

12. How much leakage radiation is allowed at a distance of 1 meter from the protective housing? (A)1 mGy_a/hr (B)10 mGy_a/hr (C) 200 mGy_a/hr (D)20 mGy_a/hr

13. The patient ESE is 410mR for a KUB examination. What will be the approximate radiation exposure at 3 m from the patient? (A)41 μR (B)23 μR (C)46 μR (D) 30 μR

14. The output intensity of a radiographic unit is reported as 3.7 mR/mAs at 100cm SID. What is the intensity at 75cm SSD? (A)3.9 (B)6.6 (C) 5.7 (D)8.9

15. The output intensity at 70kVp and 75 cm SSD is 6.6 mR/mAs. What is the output intensity at 76kVp? (A)7.8 (B)8.5 (C) 9.6 (D)15

16. If the radiographic technique for an IVP calls for 80mAs, what is the ESE when the output intensity is 7.8 mR/mAs? (A)115 mR (B)218 mR (C) 369 mR (D)624mR

17. A fluoroscopic procedure requires 2.5min at 90kVp, 2mA. What is the approximate ESE? (A)10R (B)20R (C) 30R (D)60R

18. Which of the following statement is true ? (A)the higher multislice value, the lower the patient dose will be (B)Glandular dose is approximately 35% of the ESE (C) Screen-film mammography currently is the only acceptable technique (D)Multislice CT is higher patient dose than conventional step-and-shoot CT

19. A 64-slice CT imaging system will result in a lower patient dose than fewer slices because? (A) artifact (B) partial volume (C) penumbra (D) heating system

20. A lateral skull radiograph is obtained at 64kVp, 80mAs, ESE was 400mR. If kVp is increased to 74, mAs is reduced by half. What will be the new ESE? (A)36 mR (B)125 mR (C) 329 mR (D)268mR

21. What length of a 10 MeV electronic beam is emitted in water ? (A) 1.5 cm (B) 2.5 cm (C) 3 cm (D) 5 cm

22. How much electron is emitted from cathode to anode at 80 kVp, 150 mA and 0.2 second? (A) 3.75×10^{14} (B) 7.64×10^{15} (C) 7.64×10^{16} (D) 1.88×10^{17}

23. What is the international unit for absorbed dose? (A) rad (B) kerma (C) Gy (D) Sv

24. What stands R for ALARA ? (A) rem (B) reasonably (C) radiation (D) roentgen

25. What is the following effect is direct proportional to radiation dose and unlimited? (A) infertility (B) death (C) heredity (D) vomit

26. Which of the following radiation has the minimum bioeffect to a certain tissue? (A) α (B) β (C) proton (D) neutron

27. Half life of a ^{60}Co is 5.26 y，What is the mean life of it ? (A) 3.65y (B) 5.26y (C) 7.57y (D) 10.52y

28. The transmittance of an exposed radiograph is 0.01, what is its OD value? (A) 0.01 (B) 1 (C) 2 (D) 3

29. The biding energy of Tungsten at K shell, L shell, M shell and N shell are respectively70 keV,12 keV,2.5 keV and 0.5 keV, what is the K_β of that ? (A) 58 keV (B) 67.5 keV (C) 69.5 keV (D) 9.5 keV

30. How much average energy is needed to make an ion-pair by using secondary electron ? (A) 3.4 eV (B) 33.85 J (C) 33.85 keV (D) 33.85 eV

31. How many times of α and β decay are there in a nuclide from $^{241}_{94}$Pu to $^{209}_{83}$Bi? (A) 8 , 5 (B) 8 , 4 (C) 7 , 5 (D) 7,4

32. The mass decay coefficient in water of a 20 MeV photon is 0.0182 cm^2/g, how many mean free path in centimeter (cm) ? (A) 37 (B) 46 (C) 55 (D) 64

33. β-decay is processing in $^{32}_{15}$P, what is its daughter nucleus ? (A) $^{27}_{13}$ A1 (B) $^{33}_{14}$Si (C) $^{33}_{15}$P (D) $^{32}_{16}$S?

34. Ten millicuries is equal to ? (A)370MBq (B)37Bq (C) 270MBq (D)3.7MBq

35. Which of the following is *false* of nuclear transformations? (A)Electron capture decay, Z decreases by one (B) Beta-minus decay, A increases by one (C) Alpha decay, Z decreases by two (D)none of above

36. Which of the following is never emitted during radioactive decay? (A) α particle (B)protons (C) positrons (D) γ rays

37. What determines the residual activity of a 1-week-old ^{99}Mo/^{99m}Tc generator? (A)Initial activity of molybdenum (B)number of times the generator was milked (C) half-life of ^{99m}Tc (D) half-life of ^{99}Tc

38. For ^{99m}Tc, which of the following cannot contribute to the patient dose? (A)Auger electron (B) β particle

(C) γ rays (D)characteristic x-rays

39. The effective half-life is ? (A)equal to the biological half-life (B)independent of biological clearance (C) longer than the physical half-life (D)shorter or equal to the physical half-life

40. PET scanners detect? (A)10R (B)annihilation photons in anticoincidence (C) annihilation photons in coincidence (D)positrons of the same energy in coincidence

41. In Taiwan, Radiologist is performing interventional procedures, personal film badge should be wearing? (A)outside apron (B)inside apron (C) on examining table (D) on leaded window

42. In Taiwan, radiographic workers' skin effective dose is no more than (A)5 mSv (B)50 mSv (C)150 mSv (D)500 mSv

43. In Taiwan, radiographic workers total dosage includes? (A)internal and external exposure dose (B)internal dose (C) external dose (D)background and internal dose

44. In Taiwan, how long does a sealed radioactive source manager need to report Atomic Energy Council (AEC) ? (A) 1 month (B) 3 month (C) 6 month (D) 1 year

45. In Taiwan, external radiation dose should evaluate (A) absorbed dose and total dose (B) exposure dose (R) and absorbed dose (C) effective dose (D) deep effective dose and shallow effective dose

46. How often does a radioactive material, ionizing radiation machine manager to report the current status, move, and operating to AEC in Taiwan? (A)3month (B) 0.5 year (C)1 year (D)two years

47. According to Taiwanese radiation protection regulation in 2003, which of the following weighting factors has the smallest amount ? (A) gonad; red marrow (B) Mammary gland; bone surface (C) thyroid; lung (D) thyroid; bone surface

48. According to Taiwanese radiation protection regulation, how long should issue to AEC if the radiation accident has completely investigated ? (A) within 3 days (B) within 7 days (C) within 10 days (D) within 30 days

49. According to Taiwanese radiation protection regulation, how long should issue to AEC if the radiation accident has completely investigated ? (A) within 3 days (B) within 7 days (C) within 10 days (D) within 30 days

50. According to Taiwanese radiation protection regulation, which of the following action should be taken for the person who assist patient at exposure? a) personal monitoring device b) verbal instruction c) proper training d) provide radiation protection device (A) a, b (B) b, d (C) b, c, (D) a, c

Q1. Which statement regarding personnel dosimeter is correct?

a. Optically stimulated luminescence (OSL) dosimeter has high sensitivity that can detect natural radiation.

b. Thermoluminescent dosimeter (TLD) cannot be reused.

c. Thermoluminescent dosimeter (TLD) has little lot-to-lot variation.

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

Q2. Which dosimeter measures external radiation dose of personnel using radiation treatment?

a. Optically stimulated luminescence (OSL) dosimeter

b. Whole body counter

c. Rem counter

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

Q3. Which combination is correct?

a. Proportional counter – Personnel dosimeter

b. Ionization chamber survey meter – Measurement of dose rate in air of residential areas

c. Thermoluminescent dosimeter (TLD) – Contamination surface density of a floor

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

Q4. Which combination of words for each ( ) is correct?

The three basic principles of radiation protection system: all actions related to radiation exposure are (A), they are (B) for rational achievement, and exposure to each (C) must not exceed (D).

A	B	C	D
1. optimized	justified	individual	dose limit
2. optimized	justified	patient	dose constraint
3. justified	optimized	individual	dose limit
4. justified	optimized	patient	dose limit

(1.) optimized justified individual dose limit
(2.) optimized justified patient dose constraint
(3.) justified optimized individual dose limit
(4.) justified optimized patient dose limit

Q5. Which radiation dose unit cannot be actually measured?

(1.) Effective dose
(2.) Absorbed dose
(3.) Exposure dose
(4.) Kerma

Q6. Which of the following statements regarding survey meters is incorrect?

(1.) Ionization chamber survey meters have better measurement accuracy compared with other survey meters.
(2.) GM counter survey meters have a high-energy dependency.
(3.) Scintillation survey meters have low sensitivity compared with other survey meters.
(4.) Proportional counter survey meters are used to measure neutron radiation.

Q7. Which statement regarding UN organizations is incorrect?

(1.) IAEA is the abbreviation for International Atomic Energy Agency.
(2.) UNSCEAR is the abbreviation for United Nations Scientific Committee on the Effect of Atomic Radiation.
(3.) IAEA recommends guidance levels to the B.S.S.
(4.) ICRP is a UN organization.

Q8. Which statement regarding surface contamination measurement is correct?

a. Direct method is effective for fixed contamination.

b. Indirect method is effective for loose contamination.

c. Direct method is effective with surfaces that are not smooth.

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

Q9. Which statement regarding internal radiation measurement is incorrect?

(1.) Results from the bioassay method take a long time.
(2.) In external counting, ingestion of only α- and β-ray can be effectively measured.
(3.) Ingested amount can be determined by calculating the concentration of airborne radioactive materials.
(4.) Standard models describing radionuclide biokinetics: respiratory tract model, gastrointestinal tract model, and systemic biokinetic model.

Q10. Which warning for radiation dose measurement is correct?

a. When detecting leaks in the control area of an X-ray fluoroscopy room, the dose rate is measured.

b. When detecting leaks in the control area of a general imaging room, integration is used as the detection mode.

c. For exposure conditions, select the highest level among all the normal conditions used.

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

Q11. Which radiation exposure is not considered medical radiation?

(1.) Exposure from chest X-ray during a general health examination.
(2.) Exposure from a gastric cancer mass examination organized by a municipal organization.
(3.) Exposure by the family of an emergency patient from his/her chest imaging.
(4.) Exposure by the radiation technician from a portable radiography.

Q12. Which radiation exposure has set limits?

a. Public exposure

b. Occupational exposure

c. Medical exposure

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

Q13. Which statement regarding a personnel dosimeter is incorrect?

(1.) Neutron-rays measurement with film badges.
(2.) Film badges are vulnerable to mechanical shocks.
(3.) Thermoluminescent dosimeters (TLD) cannot be reused.
(4.) Pocket dosimeters stand poorly against humidity.

Q14. Which has no relation to internal exposure control?

(1.) MIRD (Medical Internal Radiation Dose) method
(2.) External counting
(3.) Bioassay method
(4.) Film method

Q15. Which of the following pairs are not related?

(1.) Radiation weighting factor – Type of radiation and energy
(2.) Tissue weighting factor – Difference in radiation sensitivity of organs/tissues
(3.) Effective dose – Multiplying the tissue weighting factor to the equivalent dose of each exposured body tissue and calculating the total sum
(4.) Committed effective dose equivalent – Estimate of the lifetime radiation dose to an individual

Q16. Which of the following is not an entrance surface dose measurement?

(1.) Thermoluminescent dosimeter (TLD)
(2.) Photoluminescence glass dosimeter (PGD)
(3.) Optically stimulated luminescence (OSL) dosimeter
(4.) Numerical dose determination (NDD)

Q17. In the area of diagnosis, which radiation injuries and threshold do not match? (ICRP Publ.85)

(1.) Early transient erythema – 2 Gy
(2.) Permanent epilation – 10 Gy
(3.) Dry desquamation – 14 Gy
(4.) Secondary ulcer – 24 Gy

Q18. In 1996, ISRRT published "The Role of Radiological Technologists and Education Standards for Professionals." Which of the following is incorrect?

(1.) Patient care
(2.) Optimization of radiation dose
(3.) Technology development
(4.) Quality assurance

Q19. The magnitude of one of the following probabilistic effect is not related to radiation dose, but its incidence rate increases with radiation dose and the threshold level cannot be seen. Which one is it?

(1.) Epilation (2.) Cataract (3.) Infertility (4.) Leukemia

Q20. According to ICRP Publ. 60, "Exposure from a natural radiation source must be considered as a type of occupational exposure." Which of the following does not apply as a natural radiation source?

(1.) The regulatory agency declares a warning of radon and it is determined that there is a work location that falls under this category.
(2.) Jet operation
(3.) Space flight
(4.) Undersea tunnel construction

Q21. Which description regarding characteristics of radiation incidents is incorrect?

(1.) It is a type of natural disaster.
(2.) A person with expertise must be dispatched to handle the incident.
(3.) A large number of people with anxiety and neurological symptoms may arise.
(4.) The scale of the incident itself may be small, but the damage caused by rumors may be huge.

Q22. Based on the data on radiation incidents of the Radiation Emergency Assistance Center Training Site (REAC/TS) in the U.S., which of the following is incorrect?

(1.) In the past 50 years, there have been more than 400 cases of radiation incidents.
(2.) Among the different types of radiation incidents, exposure incidents by a sealed radioactive source were most common.
(3.) Nuclear reactor accidents account for about 10% of the total.
(4.) It is possible these days to encounter radiation incidents at various places.

Q23. It is important to learn our lessons from past radiation incidents. Which of the following is incorrect?

(1.) An emergency medical system for exposure will not effectively operate unless it is prepared at all times.
(2.) The units related to radiation and radioactivity, such as Sv and Bq, are difficult for an ordinary person to understand.
(3.) Information during a nuclear disaster must be disseminated accurately and in a timely and integrated fashion.
(4.) A few powerful leaders are needed in providing emergency medical care for exposure.

Q24. Based on the National Council on Radiation Protection and Measurements (NCRP) report (#138), which of the following descriptions on radioactivity terrorism is incorrect?

(1.) Health disorder may develop due to radiation exposure.
(2.) There may be a delay in providing medical service itself, due to decontamination efforts for wounds caused by explosions.
(3.) There is no effect on the infrastructure of daily life.
(4.) There is a huge emotional effect, and fear and anxiety is generated among the public.

Q25. Which of the following statements regarding acute radiation illness is incorrect?

(1.) It is a type of deterministic effect.
(2.) The threshold dose of the deterministic effect is defined as the dose pertaining to a certain effect experienced in 50% of the population.
(3.) The stages of acute radiation illness can be broken down into several stages.
(4.) Treatment course for the patient is determined after the exposure dose is evaluated.

Q26. Which of the following statements regarding effects by radiation on the human body is incorrect?

(1.) The direct effect by radiation that an exposed person encounters is called somatic effect.
(2.) Genetic effect is not a problem if the reproductive gland has not been exposed.
(3.) In terms of effects by radiation, infertility is an early effect.
(4.) In terms of effects by radiation, leukemia is an early effect.

Q27. Which of the following descriptions regarding skin disorders caused by radiation is incorrect?

(1.) Symptoms associated with exposure of above 8-10 Gy are different from those associated with burn injuries due to heat.
(2.) Exposure to the end of extremities can bring about a circulatory disorder.
(3.) Skin erythema develops with exposure of 3 Gy.
(4.) Degree of severity depends on the dose, quality of radiation, and area exposed.

Q28. Which of the following descriptions is incorrect regarding dose evaluation of victims of a radiation incident?

(1.) Since lymphocytes in blood are highly sensitive to radiation, the peripheral blood lymphocyte count is used as a marker from the day of exposure to estimate radiation dose.
(2.) It is difficult to estimate radiation dose from the disposition of a platelet count.
(3.) Radiation dose can be estimated by performing a chromosomal analysis for a stable chromosomal disorder and an unstable chromosomal disorder.
(4.) Radiation dose can be estimated by electronic spin resonance using the victim's teeth enamel or shell buttons from clothing.

Q29. Which of the following is an incorrect task for dose evaluation of a victim in a radiation incident?

(1.) Dose evaluation of external exposure.
(2.) Dose evaluation of the wound (internal exposure).
(3.) Dose evaluation of body surface contamination.
(4.) Dose evaluation of a concentration of airborne contamination.

Q30. Which of the following description regarding the dose evaluation method for internal radiation is incorrect?

(1.) In the nasal smear method, a filter paper or swab is used to swipe a sample, which is then measured by a survey meter. Inhaled volume of radioactive substances can then be accurately evaluated.
(2.) In the bioassay method, excreted matter such as urine and feces is used for sampling. Radioactivity in these samples is analyzed to evaluate the ingested amount and radioactivity levels in the body.
(3.) Dose evaluation in the bioassay method is not considered to be very accurate.
(4.) Dose evaluation by the whole body counter is used for a γ-ray in internal exposure.

Q31. In principle, different instruments are used in measuring radioactivity based on the objective. Which of the following combinations is incorrect?

(1.) Measuring surface contamination of a β-ray source – GM counter survey meter
(2.) Measuring surface contamination of a α-ray source – ZnS(Ag) scintillation survey meter
(3.) Measuring the dose rate in air of a γ-ray – Ionization chamber survey meter
(4.) Measuring the dose rate in air of a neutron ray – NaI(TI) scintillation survey meter

Q32. Which of the following descriptions regarding the use of a GM counter survey meter is incorrect?

(1.) Since the detecting element is structured so that it can sufficiently sustain any mechanical shock, bumping against it a little should not be a problem.
(2.) Cover the detecting element with a thin, clear vinyl when taking measurements in places that may be contaminated.
(3.) To avoid disconnection, make sure that the cable is not twisted.
(4.) Ensure to conduct a power source check and high-voltage check before measuring.

Q33. In order to measure the count rate of a contaminated section using the GM counter survey meter, the constant was set to 10 sec. What is the minimum time needed to obtain a correct measurement?

(1.) 10 sec. (2.) 20 sec. (3.) 30 sec. (4.) 60 sec.

Q34. When conducting a body surface contamination screening of residents at a first-aid station, which of the following should not be conducted?

(1.) Working in pairs; one examines the resident while another does the paperwork.
(2.) The person measuring must wear a lab coat, mask, hat, polyethylene gloves, and carry a personnel dosimeter.
(3.) The time constant of the GM counter survey meter must be set to 3 sec. and a distance of about 1 cm must be kept from the clothing and body surface. Measure while moving at a rate of about 10 cm per sec.
(4.) If the needle of the survey meter seems to oscillate more than usual, change the time constant to 10 sec. right then, let rest for about 30 sec. and take the reading.

Q35. A victim of body surface contamination by phosphorus-32 is brought into the emergency room. Using a GM counter survey meter, a count of 22,000 (cpm) was detected. What would be the surface contamination density (Bq/cm2)? Note that the conversion factor of phosphorus-32 is 0.05 Bq/20(cm2/cpm)and the valid window area of the GM probe is 20 (cm2).

(1.) 45 (2.) 55 (3.) 65 (4.) 105

Q36. A victim of body surface contamination by cobalt-60 is brought into the emergency room. Using a GM counter survey meter, a count of 22,000 (cpm) was detected in an area of 100 (cm2). Based on this information, the contamination density was found to be 100 (Bq/cm2). The absorption dose of the skin was 100 (μGy/h). The exposure dose of a physician working at a distance of 30 (cm) from the contaminated surface was determined to be 0.041 (μGy/h). Which of the following description would be correct in this situation?

a. Even though the GM counter survey meter beeps loudly, turning off the sound would be concealing danger.

b. Even if the medical staff may work for an hour at a distance of 30 cm from the victim, their exposure is less than that from a single chest X-ray.

c. If the contamination remains fixed for a year, radiation burns will develop on the skin of the victim.

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

Q37. Which of the following descriptions regarding skin decontamination is incorrect?

(1.) Decontamination is performed starting with the gentlest method and gradually escalating to stronger methods.
(2.) If a facility lacks a contamination tank, wipe it off with a mild detergent and wet gauze, and rinse with a little water.
(3.) When wiping it off with detergent and gauze, start wiping from the un-contaminated area moving towards the center of contamination.
(4.) If a facility has a contamination tank, clean the contaminated area under running water using a soft brush and gauze. There is no need to pay attention to the temperature of water at this point.

Q38. A victim of radioactive contamination has been brought in to the medical center. Which of the following descriptions regarding procedure and contamination control is incorrect?

(1.) In general, treatment of a clinical condition that jeopardizes the life of a victim takes priority over decontamination.
(2.) Survey of the contaminated section must begin from areas that have higher chances of internal radiation such as a wound, mouth, nose, and ears.
(3.) At the emergency room of a general hospital, it is better to use a lot of water for decontamination.
(4.) When the victim is brought in, conduct undressing if he/she still has not done so. Undressing alone takes care of 90% of the decontamination.

Q39. Which of the following regarding candidates for emergency medical care for exposure is correct?

a. Patients needing immediate examination and treatment due to exposure and contamination.

b. Residents who are the target for radiation protection measures against exposure and contamination.

c. Workers who have carried out emergency operations (those needing medical exams).

d. People, other than those above, who are worried about health effects by radioactivity.

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

Q40. Which of the following characteristics is incorrect regarding emergency medical care for exposure?

(1.) Since it is unlike normal emergency medicine, not everybody can receive the best care anytime and anywhere.
(2.) Contamination due to exposure to a radioactive substance or radiation is a rare phenomenon. Proper preparation must therefore be conducted at all times.
(3.) Medical workers may be extremely nervous about radioactive substances and radiation. With sufficient preparation, training and education, however, they should be able to practice without feeling nervous.
(4.) Since the degree of contamination and radiation dose can be physically measured, a joint operation with the person conducting the dose evaluation can lead to a proper treatment strategy.

Q41. Which of the following regarding communication during a radiation incident is incorrect?

(1.) Essential and correct information must be relayed as quickly as possible.
(2.) If there are false stories, correct information must be dispatched at once.
(3.) How to best relay the information so that it can be understood must be considered.
(4.) Radiation dose must not be mentioned at all until the correct reading is available.

Q42. Which of the following mental changes is not commonly seen in a disaster?

(1.) Feeling depressed, decreased appetite
(2.) Insomnia, loss of appetite
(3.) Decreased concentration, decreased memory, trance
(4.) High blood pressure, obesity

Q43. Which of the following behaviors do not show up as symptoms of mental disorder such as depression, panic attack, PTSD?

(1.) Suicide or accident
(2.) Increased drinking or smoking
(3.) Friction in the family or community
(4.) Mental exaltation

Q44. Which of the following is not one of the big differences between radiation disaster and other disasters?

(1.) Radiation exposure is involved.
(2.) Exposure is not felt by the five senses.
(3.) Hypochondriacal symptoms from stress and those due to exposure are difficult to distinguish.
(4.) External injury is often involved.

Q45. Which of the following does not fall in the category of discrimination, bias, and harmful rumors associated with a radiation disaster?

(1.) Keeping a distance from exposure victims for fear of exposure.
(2.) Avoiding marriage with an exposure victim.
(3.) Denying lodging for an exposure victim.
(4.) It is important to provide clear information during a radiation disaster.

Q46. Which of the following statements regarding the dose limit of 1mSv in the general public is correct?

(1.) Health problems develop above 1mSv.
(2.) 1mSv is the absorption dose.
(3.) 1mSv is a large exposure not encountered in daily life.
(4.) 1mSv is the effective dose.

Q47. Which of the following statements regarding risk communication is incorrect?

(1.) Respect each other's differences in values and circumstances.
(2.) Deepen the understanding of a problem based on the same standards as each other.
(3.) Communicate each other's thoughts.
(4.) Explain technical know-how until it is understood.

Q48. Which of the following mentality regarding radiation disaster is incorrect?

(1.) Discrimination and bias develop against contaminated people.
(2.) False stories and rumors develop.
(3.) Harmful rumors appear.
(4.) Crime rises.

Q49. Which of the following differences between medical exposure and exposure due to radiation disaster is incorrect?

(1.) Medical exposure is usually exposure due to one's own request.
(2.) Exposure due to radiation disaster is exposure that one does not request.
(3.) Exposure risk involved in voluntary medical radiation is easy to accept.
(4.) Exposure risk involved in radiation disaster is easy to accept.

Q50. Which of the following is incorrect regarding crowds?

(1.) It is an anonymous group with no special majority.
(2.) It is a body that arises spontaneously/temporarily with no organization.
(3.) It may sometimes lead to radical behavior that constitutes social disturbances such as riots/panic.
(4.) Members cooperate with each other towards a common goal, and a certain code is shared between them.

Q51. Which of the following statements is incorrect?

(1.) Stress reaction expressed by many people is temporary and disappears with time.
(2.) When emotional stress such as extreme fear is encountered during a disaster, it is only the mentally fragile that experience mental and physical modulation.
(3.) A victim who looks glassy-eyed during a disaster has a trauma reaction.
(4.) A victim who complains of not being able to sleep during a disaster has a trauma reaction.

Q52. Which of the following pairs is correct?

(1.) PTSD symptom – Flash back
(2.) Defense reaction – Drinking
(3.) Coping behavior – Regression
(4.) Autogenous training – H. Selye

Q53. Which of the following is a correct characteristic of radiation disaster?

a. The scale of the disaster depends upon the type and amount of leaked radioactive substance as well as the weather, location, and time of occurrence.

b. Since radioactivity is not picked up by the five senses, one is subjected to the fear of “cannot see” and “cannot understand.”

c. It is easy to distinguish between stress as a hypochondriacal symptom and that as a symptom of exposure.

d. Bias and harmful rumors do not easily take place.

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

Q54. Which of the following actions is most inappropriate as an aid provider?

(1.) Going to a victim to ask if he/she has any problems.
(2.) Praising a person who is acting cheerfully by saying, “You look good. If I were in your position, I wouldn’t be able stand it.”
(3.) Taking a person who says he/she “cannot sleep” to a physician.
(4.) Crying while listening to a victim’s story.

Q55. Which of the following is considered to be vulnerable people?

a. Children who got separated from their parents

b. Elderly people

c. Alcoholic patients

d. Foreign men

(1.) a and b (2.) b and c (3.) c and d (4.) All of a to d (5.)

Q56. Which of the following is incorrect regarding communication activities?

a. Since new information on the disaster situation was just released, the rescue workers relayed it to the victims.

b. The rescue workers were questioned about compensation, but since they were not sure, the person-in-charge was brought in.

c. To avoid backtracking in trying to communicate the right information, the rescue workers kept silent despite receiving new information.

d. The effect of radioactivity was considered too complicated for an ordinary person to understand. The rescue workers, therefore, appeased the public by saying, “Everything is fine,” without giving any explanation.

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

Q57. Which of the following is correct?

(1.) Good nutrition and rest are necessary for rescue workers as well.
(2.) It is impossible for rescue workers to develop PTSD.
(3.) The mission of rescue workers is to help victims. However, because of high expectations from the society, they should work without sleep or rest.
(4.) It is unacceptable for rescue workers to discuss what they saw or experienced during the rescue operation.

Q58. Which of the following definitions is incorrect?

(1.) Burnout syndrome – a condition with extreme physical and mental fatigue as well as feelings of depletion due to expending too much effort at work.
(2.) Vicarious trauma – a condition in which, while intently listening to the victim's story, similar feelings and reactions to trauma develop in a person as if he/she were actually there with the victim.
(3.) Survivor's guilt – to have a sense of guilt for surviving.
(4.) Transference – a condition in which, while listening to the victim's story, similar emotions such as anger and sadness develop in a person.

Q59. What are the "3 R's for stress management?"

(1.) Risk – Relaxation – Recreation
(2.) Rest – Relaxation – Recreation
(3.) Rest – Revenge – Recreation
(4.) Risk – Relaxation – Responsibility

Q60. Which of the following is information needed by the victim?

a. Time and reason for the occurrence of the radioactive disaster and the status of radiation or radioactive substances

b. Effect on daily life

c. Necessary protective measures

d. Effect by radiation or radioactive substances on the body

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

Q61. What is the correct attitude towards radiation exposure consultation?

(1.) Exposure consultation is a means to address complaints to examinations.
(2.) It is important to determine what the person wants to know.
(3.) Exposure consultation is convincing the person.
(4.) A person who worries about exposure has a mental problem.

Q62. Which is the correct method of radiation exposure consultation?

(1.) It is important to use technical terms in order to save time.
(2.) Make sure the person understands you while giving an explanation.
(3.) Give the same answer to everybody.
(4.) When asked for advice, tell the person all about exposure.

Q63. What is the incorrect reason for being worried about exposure?

(1.) Exposure conjures up images of the atomic bomb.
(2.) Exposure during pregnancy is said to be dangerous.
(3.) Children are said to be vulnerable to exposure.
(4.) There have been many cases where cancer developed due to the diagnoses.

Q64. Which is incorrect as a deterministic effect?

(1.) Hair loss
(2.) Skin erythema
(3.) Cancer
(4.) Infertility

Q65. Which is an incorrect response in radiation exposure consultation?

(1.) Listen closely to the person.
(2.) Sort out the issues by determining the point of the consultation.
(3.) Make sure the sorted out issues are correct.
(4.) Immediately contradict any wrong ideas the person may have.

Q66. What is the correct precaution to take when conducting radiation exposure consultation?

(1.) When asked for advice, keep dealing with the person until he/she is convinced.
(2.) If a person has a psychological problem, immediately refer him/her to a psychological specialist.
(3.) The reason if anxiety does not get resolved is completely due to the lack of explanation.
(4.) Since the opinion of the expert is correct, it is important to explain ideas until they are accepted.

Q67. Which is correct regarding the effect of low-dose exposure?

(1.) It has been confirmed that the genetic effect of exposure in humans can increase.
(2.) Health problems due to exposure will definitely develop.
(3.) The nominal probability coefficient is used as an estimate for safety control.
(4.) The only number of cancer cases that will develop is that indicated by the nominal probability coefficient.

Q68. When worries do not get resolved despite a lot much explaining, which reason does not apply?

(1.) The explanation provided was different from what the person wanted to know.
(2.) Technical terms were not understood.
(3.) In addition to worries of exposure, psychological problems also exist.
(4.) A trust relationship has been established.

Q69. Which of the following is incorrect?

(1.) Several stages are involved before cells become cancerous.
(2.) Damage due to exposure can never be recovered.
(3.) There are several repair mechanisms in the body to deal with damage from exposure.
(4.) Apoptosis is one of the systems that protect the body.

Q70. Which is incorrect regarding radiation exposure consultation?

(1.) Establish a trust relationship.
(2.) Obtain qualifications related to radiation.
(3.) Relate to the person in an accepting way.
(4.) Do not listen to idle chitchat.

Q71. Which of the following description is correct?

(1.) In counseling, the counselor provides the client with advice on solving his/her problems as soon as possible.
(2.) Counseling provides assistance to the changes that the client is encountering by means of verbal and nonverbal communication.
(3.) In order to gain the trust of the client, the counselor must try to maintain his dignity as a counselor and suppress any personal feelings that may arise.
(4.) Since the client is suffering from the wrong ideas he/she has, the counselor must set them straight.

Q72. Which is the incorrect meaning of listening?

a. A trust relationship can be established.

b. By repeating the client's feelings and thoughts back to him/her, the counselor allows the client to figure out his/her own feelings.

c. When a counselor's response stirs the client's feelings, something that the client was not aware of be brought out.

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

Q73. Which of the following would be the best response to a client who says, "I can't sleep at night worrying about all this?"

(1.) It's not good that you can't sleep.
(2.) I can't sleep either when I have worries.
(3.) So you are too worried to sleep at night?
(4.) Why don't you try some sleeping pills?

Q74. Which of the following descriptions is correct?

a. It is not necessary to give a detailed explanation to the client because he/she will not understand technical information anyway.

b. The client must ultimately make his/her own judgment. Therefore, one must provide explanation in a way that can be understood while asking at what point he/she got lost.

c. If the client has a wrong understanding of radiation, it must immediately be corrected.

(1.) Only a (2.) Only b (3.) Only c (4.) All of a to c
(5.)

Q75. Which of the following descriptions is correct regarding empathy?

(1.) Empathy is one's ability to sacrifice and immerse himself/herself in another person's emotions and mode of thought.
(2.) Empathy is one's ability to sense the emotions and mode of thought of another person as though they were his/her own, yet at the same time recognizing that they are not.
(3.) Since empathy is one's ability to accept what another person says, one must affirm everything he/she says.
(4.) Although empathy is one's ability to accept what another person says, one must correct whatever he/she says is wrong.

Q76. Which of the following would be the best response to a client who says, "Radiation is bad for the body, isn't it?"

(1.) No, that's not true.
(2.) Yes, that is what most people think.
(3.) If radiation is really bad for the body, why would they use it in medical care?
(4.) So you think radiation is bad for the body?

Q77. Effect of a low-dose exposure was explained to a client who initially said, "I understand," but, later asked, "Are you sure it's ok?" Which of the following would be the least appropriate response to him/her?
(1.) You're still dwelling on that?
(2.) So you still don't think it's ok?
(3.) Is there something you don't understand?
(4.) I wonder why you are still worried.

Q78. In the following counseling scene, which technique used in the counselor's response is defined incorrectly?

(Cl – client; Co – counselor)

Cl1: I had some pain in my stomach about 3 months ago…

Co1: Yes.

Cl2: So I had a CT scan done at a local hospital.

Co2: You had a CT scan done.

Cl3: Yes. They used a contrast agent and scanned twice.

Co3: So you had the scanning done.

Cl4: Yes. But I began to worry about the exposure. And, when I checked it out on the Internet, I found that there is a large amount of exposure involved in CT scans. That's why I became worried.

Co4: So you became worried.

Cl5: I also went to see the doctor at the hospital and he reassured me that it was ok. But I can't help but wonder if it's really ok.

Co6: Your doctor said it was ok but you are still worried whether it really is ok. What kinds of things worry you?

Cl7: Well, I'm afraid I might get cancer or leukemia somewhere down the road.

Co8: You are worried that you may get cancer or leukemia somewhere down the road because of the CT scan.

Cl9: Yes, that's right.

Co10: Why do you think you might get cancer or leukemia somewhere down the road?

Cl10: …. (5 min. silence). There was a recent article in the newspaper that said cancer cases had risen because of CT scans. I also read something on the Internet that said you should try not to have CT scans done because the exposure involved is higher than other exams.

Co11: " "

a. Co1 – Simple reception

b. Co2 – Response to emotion

c. Co4 – Response to concern

d. Co8 – Response to meaning

e. Co8 – Summary

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

Q79. In the counseling scene of question #78, which of the following would be the least appropriate response by the counselor for the " " in Co11?

(1.) Do you believe what they say in the newspapers and Internet?
(2.) From newspapers and the Internet, you thought that you might get cancer and leukemia from CT scans?
(3.) Can you give me more details as to what kind of things were described?
(4.) Hmm… (Nod silently without saying a word).

Q80. In the counseling scene of question #78, what does the client's 5 min. silence (Cl10) mean? Which of the following least applies?

(1.) He/she is feeling great satisfaction in talking right through.
(2.) He/she is feeling confused as to why the counselor was asking such a question.
(3.) He/she is feeling embarrassed thinking that he/she may have said something inappropriate.
(4.) He/she is starting to wonder why he/she was thinking that way.

Q81. Which is not the uranium used as fuel for nuclear reactors?

(1.) Uranium-234 (2.) Uranium-235
(3.) Uranium-238 (4.) Uranium-239

Q82. Which of the following is not a fission product found in nuclear reactors?

(1.) Uranium (2.) Barium
(3.) Plutonium (4.) Strontium

Q83. Which of the following descriptions regarding the International Nuclear Event Scale (INES) is correct?

a. Introduced in collaboration between IAEA and OECD/NEA.

b. Evaluation based on 3 standards.

c. Divided into 7 levels.

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

Q84. Which of the following descriptions related to nuclear reactors is incorrect?

(1.) Light-water reactors consist of boiling a water reactor and a pressurized water reactor.
(2.) Sodium is used as a coolant in a fast-breeder reactor.
(3.) Defense in depth of nuclear reactors is a concept formulated in the U.S.
(4.) Spent fuel in which the chain reaction ceases cannot be reused in a nuclear reactor.

Q85. Which of the following regarding the establishment of a nuclear power plant is incorrect?

a. Establish it near the airport for ease of fuel transport.

b. In principle, establish it away from scheduled airlines.

c. Establish it atop a bedrock.

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

Q86. Which of the following descriptions is correct?

a. An updraft is formed in a low pressure system.

b. The wind blows clockwise in a high pressure system.

c. The pressure is above 1000hPa in a high pressure system and below 1000hPa in a low pressure

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

Q87. Which of the following regarding anemometers is correct?

a. There is a type that uses sound waves.

b. There is a type that uses windmills.

c. There is a type that uses doppler effects.

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

Q88. Which of the following descriptions is incorrect?

(1.) The amount of infrared radiation is high at the equator.
(2.) A frontal surface forms at the border between warm air and cold air.
(3.) Wind direction indicates the direction the wind is blowing.
(4.) A migratory high pressure system is found between one low pressure system and another.

Q89. Which of the following pairs describing the Beaufort wind force scale is mismatched?

(1.) Calm (Force 0): 0 - 0.2m/s (Smoke rises vertically)
(2.) Light breeze (Force 2): 1.6 - 3.3m/s (Leaves rustle)
(3.) Fresh breeze (Force 5): 10.8 - 13.8m/s (The whole tree sways)
(4.) Violent storm (Force 11): 28.5 - 32.6m/s (Widespread damage)

Q90. Which of the following is not a local wind?

(1.) Land and sea breeze
(2.) Westerlies
(3.) Mountain and valley breeze
(4.) Foehn wind

Q91. From the following, which energy is <u>not</u> the line spectrum ?

(1.) α-ray
(2.) internal conversion electron
(3.) auger electron
(4.) β-ray

Q92. Which of the following has the least binding energy?

(1.) ^{2}H (2.) ^{4}He (3.) ^{56}Fe (4.) ^{1}H

Q93. Which of the following is an <u>incorrect</u> explanation about the radioactivity?

(1.) The intensity of radioactivity is the same as the number of radiation emitted per unit of time.
(2.) Under the same atomic number, if the half life is shorter, the radioactivity is larger.
(3.) dps, Bq and Ci are the units of the intensity of radioactivity.
(4.) The intensity of radioactivity reduces as time passes at the same rate of the reduction of the atomicnumber.

Q94. Choose the <u>incorrect</u> statement.

(1.) isotope: things which have the same number of protons and different number of neutrons.
(2.) isobar: things which have the same mass numbers and different number of protons and neutrons
(3.) isotone: things which have the same number of neutrons and different mass numbers
(4.) Nuclear isomer: things which have different number of protons, neutrons and mass numbers

Q95. Which of the following is <u>incorrect</u> in the decay diagram?

(1.) The kind of nuclide and half-life
(2.) The energy and intensity of emission of each radiation
(3.) The type of radiation decay
(4.) The physical and chemistry characteristics of the nuclide

Q96. Which of the following is an incorrect statement about the internal conversion and Auger effect?

(1.) The energy of internal conversion is lower than that of the Auger electron
(2.) The internal conversion electron and Auger electron have line spectrum.
(3.) Internal conversion is generated by γ- ray and Auger effect is generated by characteristic X-ray.
(4.) By internal conversion, characteristic x-ray or Auger electron are emitted.

Q97. What is the diameter of the ICRU sphere?

(1.) 10cm (2.) 20cm (3.) 30cm (4.) 40cm

Q98. Choose the incorrect statement on attentiveness before using radiation measuring instruments.

(1.) Checking the normal state of operation in instruments
(2.) Checking the validity period of correction
(3.) Checking the dry cell
(4.) Checking the geometrical efficiency.

Q99. When the radiation ionizes the gas, what is the average energy to make one ion pair?

(1.) 1.0.3 eV (2.) 2.3 eV (3.) 3.30 eV (4.) 4.300 eV

Q100. Which of the following is an incorrect method of measurement of radiation exposure dose in the body?

(1.) Human counter is used for measurement of whole body distribution
(2.) The bioassay method measures directly the in body radiation dose from out of body.
(3.) It can be calculated by contamination level of the air and amount of work time.
(4.) Sampling from the nasal cavity and pharynx is the non smear method

Q101. Which of the following is an incorrect plateau characteristics in GM counter?

(1.) The longer and closer to the horizontal line, the better it is.
(2.) The constant starting voltage is better.
(3.) The slope of the plateau below 5%/100V is better.
(4.) The operation voltage of the plateau is one third point from the superior to the inferior.

Q102. Which of the following is the field that the gas amplification occurs first at the gas enclosed type detector?

(1.) Recombination region (2.) Ionchamber region
(3.) Proportionality region (4.) Geiger-Muller region

Q103. Which of the following is an incorrect statement on the proportional counter tube and Geiger-Muller counter?

(1.) The proportional counter tube and Geiger-Muller counter have no ability to discriminate energy level.
(2.) Geiger-Muller counter has a big output pulse.
(3.) The proportional counter tube can measure α and β radiation separately.
(4.) The proportional counter tube and Geiger-Muller counter are all detectors using gas amplification.

Q104. What function of the radiation is used at the semiconductor detector?

(1.) Ionization effect
(2.) Exciting effect
(3.) Sensitization effect
(4.) Chemical effect

Q105. Which of the following is incorrect about the detectors using scintillation effect?

(1.) Luminescence is the emission phenomenon that does not accompanied by the themogenesis
(2.) Scintillation is the luminescence by the radiation
(3.) The longer decay time of the scintillator of the radiation detector is better.
(4.) If the scintillation efficiency is high, the amount of emission increases.

Q106. Which of the following has the best detection sensitivity?

(1.) Ge(Li) semiconductor detector
(2.) GM counter
(3.) PMT
(4.) NaI(Tl) scintillation detector

Q107. Which of the following is an incorrect statement on the NaI(Tl) scintillator?

(1.) It has a little deliquescence(wet-solubility)
(2.) It has a weak point about mechanical shock and heat.
(3.) The efficiency of γ-ray detection is good because of the high density.
(4.) Tl is the activator to raise efficiency.

Q108. Which of the following is the basic dose to correct the radiation detector?

(1.) Absorbed dose
(2.) Equivalent dose
(3.) Effective dose
(4.) Exposure dose

Q109. Which of the following is the correct group?

a. Measuring the exposure dose uses the Bragg-Gray principles.
b. γ-ray absorption dose is maximum on the surface of the material.
c. Absorption dose can be used regardless of the kind of radiation and material.
d. Kerma is only applied to the indirect ionizing exposure

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

Q110. Which of the following is the best method when irradiated with β and γ-ray at the same time?

(1.) Set the shielding material close to the worker.
(2.) Set the shielding material closer to the radiation source.
(3.) Set the shielding material closer to the worker and the order of setting the shielding material is β-particle shielding material prior to the γ-ray shielding material.
(4.) Set the shielding material closer to the radiation source and the order of setting the shielding material is β-particle shielding material prior to the γ-ray shielding material from the source.

Q111. Which of the following has most likely thin half-value layer at the same energy γ-ray?

(1.) concrete (2.) lead (3.) iron (4.) copper

Q112. Some radioactive elements start to decay. If the decay constant of the daughter nuclide is smaller than the mother nuclide, what is the change of the total activity according to time?

(1.) Secular equilibrium
(2.) Temporary equilibrium
(3.) Transient equilibrium
(4.) Radioactive equilibrium does not come into existence.

Q113. Which of the following is <u>not</u> directly related to the radioactive equilibrium?

(1.) Transient equilibrium (2.) cow system
(3.) Nuclear isotomer (4.) Secular equilibrium

Q114. Which of the following is a true statement about the affecting factor of radiation hazard?

(1.) The radio sensitivity is better when the frequency of cell division is low.
(2.) The influence differs according to the deposition portion in the organ.
(3.) The influence is low if the dose distribution is concentrated.
(4.) The influence on the body according to the biological half life is disregarded.

Q115. Which of the following has a different meaning?

(1.) 37% survival dose
(2.) Mean lethal dose(D_0)
(3.) Dose needed for reducing the first number of cells to the 1/e
(4.) Threshold dose

Q116. Which of the following is not proportional to the danger of radiation hazard?

(1.) Radiation energy absorbed in the tissues.
(2.) Radiation energy being irradiated
(3.) Radiation energy flux density being irradiated.
(4.) Amount of radioactivity material in the body

Q117. Which of the following is an incorrect characteristic of ichthyoisis hazard of the body by radiation?

(1.) The interval from exposure to the occurrence of symptoms is long.
(2.) There is no radiation specificity.
(3.) It can be easily occurred at low dose-long period exposure.
(4.) It can be occurred at high dose-short period exposure.

Q118. Which of the following has the least radiation hazard at the course of cell division?

(1.) Mitotic phase(M phase)
(2.) First telogen phase(G1 phase)
(3.) Synthetic phase(S phase)
(4.) Second telogen phase(G2 phase)

Q119. Which of the following is the chronic effect of radiation?

(1.) Radiological katzenjammen and a stomach ulcer
(2.) Wet dermatitis and infertillity
(3.) The reduction in the number of white blood cells and skin cancer
(4.) Shortening of life time and osteomatoid

Q120. Which of the following is an incorrect statement on the influence of radiation?

(1.) The severity of deterministic effect is proportional to the dose and the threshold dose exists.
(2.) The deterministic effect is chronic hazard.
(3.) The occurrence probability of the stochastic effect is proportional to the dose and the threshold dose does not exist.
(4.) The deterministic effect is not discriminated from hazard occurs by the other causes.

Q121. Which of the following is an incorrect deterministic effect?

(1.) There is a threshold dose between the radiation exposure level and the moderate of hazard.
(2.) Cancer occurrence is included in the deterministic effect.
(3.) Temporary anemia is included in the deterministic effect.
(4.) Temporary hazard is included in the deterministic effect.

Q122. Which of the following isotope is included in the bone seeker?

(1.) ^{90}Sr (2.) ^{131}I (3.) ^{60}Co (4.) ^{63}Ni

Q123. Choose the most correct statement on the effective half-life?

(1.) The time when the atomic number of radioactive nuclide at some point of time decreases to the half number in the course of decay of radioactive nuclide.
(2.) The time when the atomic number decreases to the half number
(3.) The time when the radioactivity of the radioactive nuclide absorbed in the body decreased to the half level by the physical decay and the biological elimination.
(4.) The time when the radioactivity of radioactive material absorbed in the body decreases to the half level by the metabolism.

Q124. Which of the following is the stage when ionization and excitation change occurs after irradiated?

(1.) Physical step (2.) Biochemistrical step
(3.) Chemistrical step (4.) Electroical step

Q125. Which of the following is the radiation exposure level that cause the radiation hazard to correspond to the LD100 of the human body ?

(1.) 100 cGy (2.) 200 cGy (3.) 400 cGy (4.) 700 cGy

Q126. Which of the following is not true?

(1.) LET is line energy imparted.
(2.) LET and relative biological effectiveness(RBE) has close relation.
(3.) If LET is high, OER decreases.
(4.) If LET is high, biological effect increases proportionally.

Q127. Which of the following is the correct cause why an adult man irradiated partly by 400 Gy γ-ray undergoes infertility temporarily?

(1.) Temporal stopping of spermatogonium division and proliferation by radiation hazard
(2.) Permanent decline in secretion of hormone
(3.) Extinction of sperms by radiation hazard
(4.) Occurrence of acute prostate cancer

Q128. Which of the following is not the affecting factor in relative biological effectiveness (RBE)?

(1.) Radical phase
(2.) Density of oxygen
(3.) Radiation quality
(4.) Dose rate

Q129. Which of the following is the most affecting factor in occurrence of cataract by radiation?

(1.) X-ray
(2.) Neutron
(3.) Electron beam
(4.) β-ray

Q130. Which of the following is the correct definition of the unit of Becquerel (Bq)?

(1.) It is the unit of radiation intensity and represents the number of nucleus decaying per unit time.
(2.) It is the unit of absorbed dose of ionizing radiation being taken into consideration of biological effect.
(3.) It represents the intensity of radiation and has the same intensity as 1 Ci.
(4.) It is absorbed dose of ionizing radiation not being taken into consideration of biological effect.

Q131. Which of the following is the yearly mean dose limit for the radiological area workers who have continued the work for over 5 years?

(1.) 1mSv (2.) 10mSv (3.) 20mSv (4.) 50mSv

Q132. If the radiation protection is divided into the source-oriented assessment and person-oriented assessment, which of the following group is included in the source-oriented assessment?

a. justification of an action
b. optimization of protection
c. dose limit
d. Colletive dose(S_C)

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

Q133. Which of the following is the applicable object of the dose limit?

(1.) Dose taken from the medical check up(X-ray exam)
(2.) Dose of people where live in location of high nature radiation
(3.) Dose of tissues or organs beside the affected part when irradiated for treating the cancer
(4.) Dose of doctor when performs fluoroscopy.

Q134. Which of the following is not used in the measurement of surface radiation contamination?

(1.) Probe method
(2.) Hand and foot contamination detector
(3.) area monitor
(4.) floor monitor

Q135. Which of the following has no direct relation to means of protecting unnecessary radiation exposure?

(1.) Attaching the indicator to the area of high radiation energy level.
(2.) Wearing the film badge or TLD
(3.) Attaching safety instructions
(4.) Attaching warning ramp

Q136. At the external exposure, if the distance from the radiation source increases by three times, which of the following is the changed exposure amount at the same time interval?

(1.) Three times
(2.) Nine times
(3.) One third times
(4.) One ninth times

Q137. Which of the following is the correct order of radiation control?

(1.) Personal management-environmental management -source management
(2.) environmental management - personal management - source management
(3.) source management - ersonal management - environmental management
(4.) source management - environmental management - ersonal management

Q138. Which of the following is an incorrect characteristic of the radiation hazard?

(1.) It is difficult to be spreaded a rumor or hearsay
(2.) It is easy to discriminate the mental symptom by stress and the symptom by exposure.
(3.) Radiation has fear not to be seen and be feeled.
(4.) The scale of hazard differs according to the kind of material that leaked , amount, weather, location and time.

Q139. Which of the following is an incorrect understanding of the effect which the radiation hazard may have on the mental health?

(1.) Decline in desire
(2.) Decline in concentration and power of remembering
(3.) Insomnia and losing one’s appetite
(4.) Hypertension and obesity

Q140. Choose the answer that does not correctly describe the measurement of the exposure dose to a medical radiation worker.

(1.) The external exposure dose is measured in terms of 1-cm dose equivalent.
(2.) It is possible to measure the internal exposure dose by calculation.
(3.) The external exposure dose is measured continuously while the radiation worker stays in a controlled area.
(4.) The external exposure dose to a pregnancy-aged woman is measured on her abdomen.

Q141. Choose the answer that does not correctly describe the basic framework of radiation protection.

(1.) Ensures human safety without unreasonably restricting beneficial activities that involve radiation exposure.
(2.) Minimizes the occurrence of deterministic effect on individuals.
(3.) Suppresses the occurrence of stochastic effect to an allowable level.
(4.) The natural radiation dose is not taken into account in radiation protection evaluation.

Q142. Choose the answer that is not a correct combination regarding radiation effect.

(1.) Radiation sickness -- Deterministic effect
(2.) Leukemia -- Stochastic effect
(3.) Cataract -- Early effect
(4.) Chromosomal abnormality -- Genetic effect

Q143. Choose the answer that correctly describes the occurrence of cancer by radiation.

(1.) Cancer always occurs when DNA is damaged by radiation.
(2.) Damage to DNA by radiation is always caused by the generation of reactive oxygen by radiation.
(3.) When DNA is damaged by radiation, the damaged cells are very difficult to restore.
(4.) When potential cancer cells are removed by apoptosis, occurrence of cancer as a disease is suppressed.

Q144. Choose the answer that is not a parameter of indirect measurement of environmental radiation.

(1.) Detection efficiency of the instrument
(2.) Effective window area of the instrument
(3.) Background count rate
(4.) Removal factor

Q145. Choose the answer that shows items in descending order of organ/tissue absorbed doses in the FDG-PET examination (when urinated every two hours).

(1.) kidney > heart > brain > lung > red marrow
(2.) kidney > brain > heart > red marrow > lung
(3.) brain > kidney > heart > red marrow > lung
(4.) brain > heart > kidney > lung > red marrow

Q146. Choose the correct combination of units of radiation dose.

(1.) Exposure dose (C/Kg), absorbed dose (Sv), effective dose (Gy)
(2.) Exposure dose (C/Kg), absorbed dose (Gy), effective dose (Sv)
(3.) Exposure dose (Gy), absorbed dose (C/Kg), effective dose (Gy)
(4.) Exposure dose (Gy), absorbed dose (C/Kg), effective dose (Sv)

Q147. Choose the answer that does <u>not</u> correctly describe the bioassay method to evaluate internal exposure.

(1.) Direct evaluation method
(2.) Possible to detect trace amounts of radioactive material
(3.) Nasal smear test
(4.) Alpha- and beta-emitting nuclides

Q148. Choose the answer that correctly explains a term.

(1.) Linear energy transfer: energy transferred to material per unit time
(2.) Indirectly ionizing radiation: radiation of charged particles, such as alpha and beta rays
(3.) 1-cm dose equivalent rate constant: the exposure dose received in one hour at a distance of 1 m from a source of 1 Bq
(4.) Dose and dose-rate effectiveness factor (DDREF): the factor showing how the effect at a high dose and high dose rate is reduced at a low dose and low dose rate by the effect of restoration

Q149. Choose the answer that does <u>not</u> correctly describe the optimization of medical radiation exposure.

(1.) Perform daily and periodic inspection of radiation diagnostic equipment.
(2.) In performing optimization, select a non-radiological method if it has the same effect as radiological examination.
(3.) It is important to grasp radiation doses at one's own facility
(4.) If radiography had to be redone, it is necessary to analyze the cause.

Q150. Choose the answer that is not recommended in the "Role of the Medical Radiation Technologist" published by the International Society of Radiographers & Radiological Technologists.

(1.) Understand and apply the laws and regulations on radiation use applicable to the patients and medical staff.
(2.) Understand the somatic and genetic risk of radiation, and reply to any questions by using appropriate words.
(3.) The radiation protection manager must develop a scheme for justification and optimization of protection.
(4.) Introduce the latest knowledge to control radiation.

Q151. Choose the answer that correctly describes exposure evaluation.

(1.) The equivalent dose is given by "tissue absorbed dose" multiplied by "radiation weighting factor."
(2.) Gonads have a tissue weighting factor of 0.4.
(3.) X-rays have a radiation weighting factor of 10.
(4.) Exposure to a male can be evaluated by installing personal dosimeters in protectors on the chest and neck.

Q152. Choose the answer that is not a correct combination of radiation terms.

(1.) Tissue absorbed dose -- Protection quantity
(2.) Absorbed dose -- Physical quantity
(3.) Personal dose equivalent -- Protection quantity
(4.) Effective dose -- Protection quantity

Q153. Choose the answer that does not correctly describe the effect of radiation on the human body.

(1.) The stochastic effect includes a natural occurrence rate.
(2.) The deterministic effect occurs with a threshold, and its probability of occurrence increases with increasing dose.
(3.) The stochastic effect is more relevant to whole-body exposure than partial-body exposure.
(4.) The deterministic effect occurs with a threshold, and the severity of its damage increases with increasing dose.

Q154. Choose the answer that does not correctly describe prevention of accidents in a nuclear power plant.

(1.) Reduce heat generation by stopping the reactor and terminating the nuclear fission reaction.
(2.) Cool the fuel to prevent it from becoming abnormally hot or from dissolving.
(3.) Even after stopping the reactor, heat is generated from the reactor core for a while; this phenomenon is called decay heat.
(4.) The coolant system has an interlock system to cope with an coolant loss accident.

Q155. Choose the correct combination of items from the following.

a. In counseling, the counselor listens to the client and gives a solution.

b. The experience of the counselor is the most important factor of counseling.

c. Because the counselor has to understand the emotions of the client, the counselor should not have an emotion different from that of the client.

(1.) a
(2.) b
(3.) c
(4.) None of a, b, and c

Q156. Choose the answer that is a correct combination of relevant pairs.

a. Involvement -- Attitudes and facial expressions

b. Simple acceptance -- Nodding and chiming in

c. Response -- Responding with an emotional expression

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

Q157. Choose the least appropriate reply to a client who said, "I'm afraid I shouldn’t have received the examination."

(1.) "Do you regret receiving the examination?"
(2.) "It is too late to say so."
(3.) "So you think you shouldn't have received the examination."
(4.) "Why do you feel that way?"

Q158. Choose the combination of items that are "closed questions."

a. "Are you worried about the possibility of a cancer occurrence?"

b. "Are you worried about the health effect of the CT examination that you received?"

c. "Do you feel that your risk of cancer was increased by the exposure?"

(1.) Only a
(2.) b and c
(3.) All of a, b, and c
(4.) None of a, b, and c

Q159. Choose the answer that represents a "response to meaning" when replying to a client who said: "My child hit his head and received a CT examination the other day. I wanted to know about radiation exposure and did a web search, and found a description stating that a CT examination could damage the immature brain of a child. So I got worried."

(1.) "So you got worried because you found a web site stating that a CT examination could damage the immature brain of a child."
(2.) "So your child received a CT examination."
(3.) "So you wanted to know about radiation exposure."
(4.) "So you are worried about the future of your child."

Q160. Choose the answer that does not correctly describe the flow of air.

(1.) As does the flow of water, air flows from higher to lower places under pressure and elevation.
(2.) Air flows slower where pressure gradient is high (isobaric lines are dense).
(3.) An atmospheric high or low pressure is a pressure that is higher or lower than the surrounding areas, respectively; it is not based on whether its pressure is higher or lower than a reference value.
(4.) In the case of a large-scale flow of air extending for more than 1000 km from higher to lower places, the flow is deflected to the right. Therefore, winds blow out from high pressure in a clockwise manner and blow into low pressure in a counterclockwise manner.

Q161. Choose the explanation that is not correct.

(1.) Wind velocity is greater on the left side than the right side of a typhoon as seen in the moving direction.
(2.) Because of the difference in thermal capacity between the sea and the land, temperature rises greater during the day and drops greater during the night on the land than the sea. As a result, wind blows from the sea to the land during the day, and from the land to the sea during the night. They are called sea and land breezes.
(3.) During the day, temperature rises on mountain slopes so that an upward flow is created, and winds blow up from valleys to compensate the air; these are valley breezes. During the night, the temperature drops on mountain slopes and winds blow down towards the valleys; these are mountain breezes.
(4.) At a fire site, a strong upward air current occurs and acts like a small, but strong cyclone or a tornado. Around the fire site, a downward air current occurs, which tends to enhance winds and spread the fire.

Q162. Choose the answer that correctly describes natural radiation.

(1.) All the types of natural radiation are cosmic rays, radiation from the earth, and airborne radon.
(2.) Among all the types of natural radiation, cosmic rays have the highest intensity of about 0.4 mSv.
(3.) The average annual dose of natural radiation in the world is about 2.4 mSv.
(4.) The incidence of cancer and leukemia is high in places with high natural radiation.

Q163. Choose the answer that does not correctly describe internal exposure.

(1.) Internal exposure means exposure caused by radioactive material deposited in the body.
(2.) The paths of taking radioactive material into the body are aspiration intake, oral intake, and skin intake.
(3.) The whole-body counter cannot measure radioactive material that emits only alpha and beta particles.
(4.) The only two methods to evaluate internal exposure doses are the external measurement and bioassay methods.

Q164. Choose the answer that does not correctly describe the role of a radiation supervisor in radiation emergency medicine.

(1.) In addition to the prevention of contamination, a highly technical evaluation of personal doses is a matter of highest priority.
(2.) Measure and check for presence of contamination with radioactive material and radiation exposure.
(3.) Control and suppress exposure doses to the medical staff.
(4.) Explain to the evacuated residents living in the vicinity about the health effect of radiation.

Q165. Choose the answer that does not correctly describe thermoluminescence dosimeters.

(1.) Repeated measurement is impossible because thermoluminescence centers are erased during reading.
(2.) The dosimeter should be handled with care because impact causes spurious luminescence.
(3.) The dosimeter can be used for a long period because its fading effect is large.
(4.) Repeated use is made possible by thermal annealing.

Q166. Choose the combination that is generally a least relevant pair regarding the detection and measurement systems of radiation measurement equipment.

(1.) Film badge -- Photographic density meter (densimeter)
(2.) Thermoluminescence device -- Pulse-height analyzer
(3.) Ionization chamber -- Direct-current amplifier
(4.) GM counter -- Count rate meter

Q167. In comparing gamma-ray survey meters of GM counter, ionization chamber, and NaI(Tl) scintillation types, choose the answer that correctly describes the NaI(Tl) scintillation survey meter.

(1.) It has the smallest energy dependence.
(2.) It is not suited for low dose rate measurement.
(3.) It is suited for beta ray dose rate measurement.
(4.) It has the highest sensitivity.

Q168. Choose the item that is not related to ionization chamber dosimeters.

(1.) Polarity effect
(2.) Annealing
(3.) Ion collection efficiency
(4.) Bragg-Gray cavity theory

Q169. Choose the answer that is not a correct combination of radiation measurement devices and items.

(1.) Gamma ray -- Air dose rate measurement -- Ionization chamber
(2.) Alpha ray -- Surface contamination measurement -- He-3 proportional counter
(3.) Beta ray -- Indirect measurement -- GM counter
(4.) Neutron -- Personal exposure dose -- Fluoroglass dosimeter

Q170. Choose the correct combination of radiation dose units.

(1). Exposure dose (Gy) -- Absorbed dose (C/kg) -- Effective dose (Sv)
(2). Exposure dose (Gy) -- Absorbed dose (C/kg) -- Effective dose (Gy)
(3). Exposure dose (C/kg) -- Absorbed dose (Sv) -- Effective dose (Gy)
(4). Exposure dose (C/kg) -- Absorbed dose (Gy) -- Effective dose (Sv)

Q171. Choose the wrong combination of items.

(1). Internal conversion electron -- Characteristic X-ray
(2). Bremsstrahlung X-ray -- Continuous spectrum
(3). Beta ray -- Bremsstrahlung
(4). Auger electron -- Bremsstrahlung X-ray

Q172. Choose the wrong statement about radioactivity.

(1). Bq (becquerel) is a unit of radioactivity.
(2). Radioactivity is expressed by the number of atoms that decay in a unit time.
(3). Radioactivity is 1 Bq when one nucleus decays in a minute.
(4). Ci (curie) is a supplemental unit to Bq (becquerel).

Q173. Choose the correct combination of items.

(1). Alpha ray -- Indirectly ionizing radiation
(2). Electron ray -- Directly ionizing radiation
(3). Neutron ray -- Directly ionizing radiation
(4). X-ray -- Directly ionizing radiation

Q174. Choose the correct explanation of a term.

(1). Linear energy transfer - Energy transferred to material per unit time
(2). Dose-rate effect - Biological effect of radiation exposure differs with dose rate even at the same dose.
(3). 1-cm dose equivalent rate constant - The exposure dose received in one hour at a distance of 1 m from a source of 1 Bq
(4). Dose and dose-rate effectiveness factor (DDREF) - The factor showing how the radiation effect at high dose and high dose rate is reduced at low dose and low dose rate by the restoration effect.

Q175. Which of the following is the minimum photon energy to create a pair of electron?

(1). 5.011 MeV
(2). 1.022 MeV
(3). 0.511 MeV
(4). 10.22 MeV

Q176. Choose the combination of correct statements.

a. Absorbed dose can be used regardless of the types of radiation and material.

b. Exposure dose is measured using the Bragg-Gray theory.

c. Kerma is used only for indirectly ionizing radiation.

d. The highest value of gamma ray absorbed dose is observed on the material surface.

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

Q177. Choose the average energy required to produce one ion pair when gas is ionized by radiation.

(1). 0.3 eV
(2). 3 eV
(3). 30 eV
(4). 300 eV

Q178. Which of the following is NOT correct about internal exposure protection?

(1). Environment control
(2). Proficiency of work
(3). Selection of shield
(4). Prevention of contamination

Q179. Choose the item that is not recommended in the "Role of the Medical Radiation Technologist" published by the International Society of Radiographers & Radiological Technologists.

(1). Understand and apply the laws and regulations on the use of radiation applicable to patients and medical staff.
(2). Understand the somatic and genetic risk of radiation, and answer questions by using appropriate words.
(3). As a radiation protection manager, develop a scheme for justification and optimization of protection.
(4). Introduce the latest knowledge to control radiation.

Q180. Choose the item not related to radioactive equilibrium.

(1). Transient equilibrium
(2). Cow system
(3). Isobar
(4). Half-life

Q181. Choose the wrong combination of items regarding radiation measurement devices.

(1). Ionization -- Gas ionization -- Proportional counter
(2). Excitation -- Scintillation -- Organic liquid
(3). Ionization -- Solid ionization -- Semiconductor detector
(4). Chemical reaction -- Oxidation reaction -- BGO

Q182. Choose the wrong statement about ionization chamber survey meters.

(1). Nitrogen-sealed ionization chambers are often used.
(2). They are less dependent on gamma and X-ray energy than GM counter survey meters.
(3). They are not suited for low dose rate measurement.
(4). They can measure both dose rates and integral doses.

Q183. Choose the wrong combination of items regarding personal dosimeters.

(1). LLD -- Thermoluminescence dosimeter
(2). OSL -- Optically stimulated luminescence
(3). Fluoroglass dosimeter -- Consideration of fading
(4). Electronic pocket dosimeter -- P-n junction silicon semiconductor detector

Q184. Choose the wrong statement about OSL dosimeters.

(1). They can measure X-, gamma and beta rays.
(2). The elemental device (aluminum oxide) is chemically unstable and sensitive to temperature and humidity.
(3). They can obtain radiation incidence and other data.
(4). They can measure both dose rates and integral doses.

Q185. Choose the correct name of the area where gas amplification first takes place in a gas-sealed detector.

(1). Region of proportionality
(2). Region of recombination
(3). Ionization chamber region
(4). Geiger-Muller region

Q186. Choose the device having the highest detection sensitivity.

(1). GM counter
(2). Nal(Tl) scintillation detector
(3). Ge(Li) semiconductor detector
(4). PMT

Q187. Choose the item not related to ionization chamber dosimeters.

(1). Annealing
(2). Polarity effect
(3). Ion collection efficiency
(4). Bragg-Gray cavity theory

Q188. Choose the wrong combination of radiation measurement items and devices.

(1). Alpha ray -- Surface contamination measurement -- He-3 proportional counter
(2). Beta ray -- Indirect measurement -- GM counter
(3). Gamma ray -- Air dose rate measurement -- Ionization chamber
(4). Neutron -- Personal exposure dose -- Fluoroglass dosimeter

Q189. Choose the wrong statement about Nal(Tl) scintillators.

(1). Tl is an activator to increase efficiency.
(2). They are weekly deliquescent.
(3). They have a high density and thus a high gamma detection efficiency.
(4). They are weak against mechanical impact and heat.

Q190. Choose the wrong statement about the plateau characteristic of GM counters

(1). The wider and more horizontal the plateau, the better the characteristic.
(2). The starting voltage should be constant.
(3). The plateau gradient should be less than 5% per 100 V.
(4). The operating voltage of the plateau is within the one-third range from the upper limit toward the lower limit.

Q191. Choose the wrong statement about proportional counters.

(1). They cannot measure neutrons.
(2). They can measure alpha and beta rays separately.
(3). They can distinguish different energy levels.
(4). Proportional counters and GM counters are detectors that use gas amplification.

Q192. Choose the wrong statement about Nal(Tl) scintillators.

(1). They have high gamma detection efficiencies because of their high atomic number.
(2). They must avoid mechanical impact and abrupt changes in temperature.
(3). Tl is an activator to increase efficiency.
(4). Being hygroscopic, they are susceptible to alteration and degradation.

Q193. Choose the area where ionization occurs at the lowest applied voltage in gaseous detectors.

(1). GM counter region
(2). Ionization chamber region
(3). Region of recombination
(4). Proportional counter region

Q194. Choose the process in which changes in ionization and excitation occur after irradiation.

(1). Physical process
(2). Biochemical process
(3). Chemical process
(4). Electrical process

Q195. Choose the radiation phenomenon utilized by semiconductor detectors.

(1). Luminescence
(2). Chemical action
(3). Ionization
(4). Excitation

Q196. Choose the correct statement about GM counter survey meters.

(1). They are not suited for beta ray measurement.
(2). They may become paralyzed and incapable of measurements in a low radiation field.
(3). Mica or other thin material is used at the entrance window.
(4). Electrons generated by radiation excitation are collected at the core wire.

Q197. Choose the wrong statement about thermoluminescence dosimeters.

(1). Repeated measurement is impossible because thermoluminescence centers are erased during the reading.
(2). They can be used for a long time period because of their large fading effect.
(3). Repeated use is made possible by thermal annealing.
(4). They should be handled with care because spurious luminescence occurs when impacted.

Q198. Choose the item not relevant to medical radiation exposure.

(1). Informed consent
(2). Justification
(3). Optimization
(4). Dose limitation

Q199. What is the effect on relative biologic effectiveness (RBE) as linear energy transfer (LET) increases?

(1). as LET increases, RBE increases
(2). as LET increases, RBE decreases
(3). as LET increases, RBE stabilizes
(4). LET has no effect on RBE

Q200. Choose the term that means "radiation is harmful at high doses but stimulates biological activity at low doses."

(1). Hormesis effect
(2). Adaptive response
(3). Bystander effect
(4). Tissue reaction

Q201. Choose the wrong statement about radiation dose measurement on a human body.

(1). Calculation can be made from airborne radioactivity concentration and working hours.
(2). A human counter is used to make measurements over the whole body.
(3). A test involving nasal and pharyngeal sampling is not a smear test.
(4). The bioassay method measures the whole body radiation dose directly from the inside.

Q202. Choose the type of radiation that most affects the incidence of cataracts.

(1). X-ray (2). Beta ray (3). Gamma ray (4). Neutron ray

Q203. Choose the wrong combination of terms related to radiation.

(1). Tissue absorbed dose -- Protection quantity
(2). Absorbed dose -- Physical quantity
(3). Personal dose equivalent -- Protection quantity
(4). Effective dose -- Protection quantity

Q204. Choose the wrong combination of items regarding radiation effect.

(1). Leucopenia -- Deterministic effect
(2). Cataract -- Early effect
(3). Leukemia -- Stochastic effect
(4). Chromosomal abnormality -- Genetic effect

Q205. When radiation protection is classified into source center evaluation and personnel center evaluation, which of the following is the bundle of source center evaluation?

a. Justification of an act
b. Optimization of protection
c. Dose limit
d. Collective dose

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

Q206. Which of the following is the critical organ of the radioactive Iodine?

(1). Lung (2). Liver (3). Colon (4). Thyroid

Q207. Choose the wrong description about the bioassay method to evaluate internal exposure.

(1). Direct evaluation method
(2). Alpha- and beta-emitting nuclides
(3). Possible to detect trace amounts of radioactive material
(4). Nasal smear test

Q208. Choose the correct procedural steps of radiation control.

(1). Source control -- Personal control -- Environmental control
(2). Environmental control -- Personal control -- Source control
(3). Source control -- Environmental control -- Personal control
(4). Personal control -- Environmental control -- Source control

Q209. Choose the correct statement about the occurrence of cancer by radiation.

(1). Cancer always occurs when DNA is damaged by radiation.
(2). Damage to DNA by radiation is always caused by the generation of reactive oxygen by radiation.
(3). When DNA is damaged by radiation, restoration of the damaged cells is very difficult.
(4). When potential cancer cells are removed by apoptosis, occurrence of cancer as a disease is suppressed.

Q210. Choose the wrong statement about the optimization of medical radiation exposure.

(1). In performing optimization, select a non-radiological method if it has the same effect as a radiological examination.
(2). Perform daily and periodic maintenance of radiation diagnostic equipment.
(3). It is important to get a hold of radiation doses at one's own facility
(4). If radiography had to be redone, analysis of the cause is necessary.

Q211. Choose the wrong statement about radiological examination.

(1). It should be done within 10 days from the start of menstruation.
(2). Gonad doses are limited to 1 mGy in plain chest X-ray imaging.
(3). When an integral dose to a fetus is 100 mGy or less, it is undesirable to perform an abortion.
(4). The integral dose to a fetus will not exceed 100 mGy in a plain pelvic CT examination.

Q212. Choose the approximate half-value thickness of lead for fluorine-18.

(1). 2 mm (2). 4 mm (3). 8 mm (4). 12 mm

Q213. Choose the correct statement about the basic concept of radiation protection.

(1). Prevent the occurrence of deterministic effect (without a threshold), and suppress the occurrence of stochastic effect (with a threshold) to an allowable level.
(2). Prevent the occurrence of stochastic effect (without a threshold), and suppress the occurrence of deterministic effect (with a threshold) to an allowable level.
(3). Prevent the occurrence of deterministic effect (with a threshold), and suppress the occurrence of stochastic effect (without a threshold) to an allowable level.
(4). Prevent the occurrence of stochastic effect (with a threshold), and suppress the occurrence of deterministic effect (without a threshold) to an allowable level.

Q214. Choose the wrong statement about the occurrence of cancer by radiation.

(1). Cancer is caused by radiation damage to DNA.
(2). Incidence of cancer is increased by removal of reactive oxygen.
(3). Cancer is caused by incomplete or erroneous restoration of damaged DNA.
(4). Cancer is caused by accumulation of cancerous mutations.

Q215. Which of the following is the right exposure dose to incur the radiation damage of the human body equal to LD100 ?

(1). 100 cGy (2). 200 cGy (3). 400 cGy (4). 700 cGy

Q216. Choose the wrong statement about external exposure.

(1). It means exposure to radiation from outside the body.
(2). Radiation workers are exposed to radiation mostly by internal exposure.
(3). Integrating dosimeters such as glass, OSL and thermoluminescence dosimeters are used to monitor the external exposure of radiation workers.
(4). The purpose of measuring personal doses is to verify that the statutory regulation limits are satisfied and to improve the work environment.

Q217. Choose the correct combination of a radioactive isotope and an organ where the isotope is distributed.

(1). Strontium-90 -- Kidney
(2). Cesium-137 -- Whole body
(3). Iodine-131 -- Bone
(4). Uranium-235 – Liver

Q218. Choose the correct arrangement of items in descending order of organ/tissue absorbed doses in the 18F-FDG-PET examination (in the case of urination every two hours).

(1). Brain > Heart > Kidney > Lung > Red marrow
(2). Brain > Kidney > Heart > Red marrow > Lung
(3). Kidney > Heart > Brain > Lung > Red marrow
(4). Kidney > Brain > Heart > Red marrow > Lung

Q219. Choose the appropriate method for shielding nuclides that emit high-energy beta rays

(1). Use a high atomic number material such as lead for shielding.
(2). Use a low atomic number material such as plastic for shielding.
(3). Place a low atomic number shielding material on the side closer to the source, and place a high atomic number shielding material on the side farther from the source.
(4). Place a high atomic number shielding material on the side closer to the source, and place a low atomic number shielding material on the side farther from the source.

Q220. Choose the correct statement about factors of radiation injury.

(1). Radiation susceptibility is increased when the frequency of cell division is low.
(2). Radiation susceptibility increases in proportion to the degree of cell differentiation.
(3). The effect of biological half life on the human body is negligible.
(4). Radiation effects depend on the location of accumulation in an organ.

Q221. Choose the item not relevant to surface radioactive contamination measurement.

(1). GM survey meter
(2). Hand and foot monitor
(3). Area monitor
(4). Smear method

Q222. Choose the wrong statement about the role of a radiation supervisor in emergency exposure medical treatment.

(1). Control and suppress exposure doses to the medical staff.
(2). Explain to the evacuated residents in the vicinity about the health effect of radiation.
(3). Identify and measure quantitatively the radioisotopes that caused contamination.
(4). Conduct a check for contamination in the treatment room after use.

Q223. Which of the following is NOT the correct cause of frequent occurrence of mental effect of radiation damage?

(1). It is hard to know the definite effect of the body
(2). It is hard to know the radiation exposure information
(3). We are fearful of radiation exposure
(4). 4. Because the very small amount radiation exposure incurs damage

Q224. Choose the wrong method for evaluating internal exposure doses.

(1). External measurement
(2). Skin dose monitor measurement
(3). Bioassay method
(4). Calculation from airborne radioactivity concentration

Q225. Choose the wrong statement about internal exposure.

(1). The three principles of protection against internal exposure are distance, shield and time.
(2). The intake of radioactive material into human bodies is mostly from respiration, oral intake and absorption through skin.
(3). A whole body counter cannot measure radioactive materials that emit only alpha and beta rays.
(4). The form of internal exposure varies with the type of nuclide.

Q226. Choose the wrong statement.

(1). The total of tissue weighting factors is one.
(2). The radiation weighting factor of X- and gamma rays of any energy is one.
(3). Equivalent dose is given by "tissue absorbed dose" multiplied by "radiation weighting factor."
(4). Effective dose is a quantity converted to uniform whole body exposure.

Q227. Choose a late radiation injury.

(1). Hair loss
(2). Dry desquamation
(3). Cataracts
(4). Metabolic disorder

Q228. A threshold dose means a radiation injury occurs in a certain percentage of the exposed population. What is this percentage?

(1). 1%
(2). 15%
(3). 20%
(4). 30%

Q229. Choose the wrong statement.

(1). LET means linear energy transfer.
(2). LET is closely related to relative biological effectiveness (RBE).
(3). The greater the LET, the lower the OER.
(4). Biological effectiveness increases in proportion to LET.

Q230. Choose the dose on which limitation is applicable.

(1). Doses to patients subjected to X-ray examinations
(2). Doses to people living in areas of high natural radiation
(3). Doses to tissues and organs around an affected area treated with radiation
(4). Doses to medical workers who conduct X-ray fluoroscopic examinations

Q231. Choose the most appropriate statement about effective half life.

(1). Time required for the activity of a radionuclide taken into a body to become reduced by half by physical decay.
(2). Time required for the activity of a radioactive material absorbed in a body to become reduced by half by excretion and the like.
(3). Time required for the activity of a radionuclide absorbed in a body to become reduced by half by both physical decay and excretion and the like.
(4). The effective half life of iodine-131 is about 100 days.

Q232. Choose the correct statement about the characteristics of radiation hazards.

(1). External wounds are often involved.
(2). Rumors tend to circulate.
(3). There is a fear that radiation cannot be felt by the human senses.
(4). It is easy to discriminate between stress-induced psychological symptoms and radiation-induced symptoms.

Q233. Choose the material used as a moderator of fast neutrons

(1). Graphite (2). Aluminum (3). Iron (4). Lead

Q234. Choose the wrong statement about nuclear reactors.

(1). The number of neutrons and power output are controlled by moving control rods.
(2). Water (light water) is used as a moderator to reduce the velocity of neutrons.
(3). Steam is directly generated in a pressurized water reactor (PWR).
(4). Both a boiling water reactor (BWR) and pressurized water reactor (PWR) use a sturdy metal material that can sustain high pressure and have stainless steel lining.

Q235. Choose the wrong statement about prevention of nuclear power plant accidents.

(1). A reactor is scrammed to stop a nuclear fission reaction and reduce heat generation.
(2). A reactor is cooled to avoid the fuel from becoming abnormally high in temperature or melt.
(3). After scramming a reactor, heat is still generated from the reactor core for a while; this is called decay heat.
(4). As a preparation to a loss of coolant accident, an interlock system is provided for cooling.

Q236. Choose the wrong statement about client-centered therapy.

(1). It is a psychotherapeutic method proposed by an American psychologist and is based on his theory of the self.
(2). Therapists listen to clients closely and give psychoanalytical explanations and instructions.
(3). Therapists extract the growth power of clients, leading the clients to make changes by themselves.
(4). Attention is focused on how patients perceive the matters that has happened in the real world.

Q237. Choose the correct combination of items.

(1). Freud -- Gestalt therapy
(2). Rogers -- Psychoanalytic therapy
(3). Perls -- Client-centered therapy
(4). Berne -- Transactional analysis

Q238. Choose the correct combination of items regarding counseling techniques.

a. Response to meaning -- Responding by making a connection between matters and emotions

b. Simple acceptance -- Nodding and chiming in

c. Response to matters -- Responding with emotional expressions

(1). a, b (2). b, c (3). a, c (4). All a, b and c

Q239. Choose the least appropriate reply to a client who said, "I wouldn't have let my son receive the examination if I knew that he would be X-rayed so many times."

(1). "Do you regret letting your son receive the examinations?"
(2). "It is too late to do anything about it now."
(3). "So you're wondering why you let your son receive the examinations?"
(4). "Why do you feel that way?"

Q240. Choose the correct combination of items that are "open questions."

a. You're worried about the possibility of cancer formation?

b. You're worried about the effect of the CT examination on your body?

c. Are you worried that the risk of cancer formation has increased because of the exposure?

(1). Only a (2). b and c
(3). All of the above (4). None of the above

Q241. Choose the item for which an IAEA guidance level for CT examination has not been set.

(1). Adult head (2). Adult chest
(3). Adult abdomen (4). Adult lumbar region

Q248. Choose the wrong statement about natural radiation.

(1). The average annual dose of natural radiation in the world is about 2.4 mSv.
(2). Among all sources of natural radiation, radon gas represents the highest percentage of exposure.
(3). Ramsar(Iran) and Guarapari(Brasil) are high background radiation area.
(4). An increased incidence of cancer is observed in some areas with high natural radiation doses in the world.

Q249. Choose the wrong statement.

(1). Wind velocity is greater on the left side than the right side of a typhoon as seen in the moving direction.
(2). Air flows slower at locations where isobaric lines are dense.
(3). Air flows toward the center in a low pressure area.
(4). High and low pressures indicate relative values of pressure, not absolute values.

Q250. Choose the item not directly related to radiation.

(1.) IEC (2.) UNSCEAR (3.) ACLS (4.) IAEA

Q251. ^{14}C in the air is as a result of

(1). a nuclear transformation induced by the cosmic-ray
(2). diffusion from the water
(3). diffusion from the earth
(4). a man-made formation.

Q252. Bremsstrahlung is a kind of

(1). α particle (2). γ ray
(3). neutron (4). X ray.

Q253. When a photon interacted with an atom, the total energy of the photon was absorbed by an electron of the atom. It will be

(1). pair production (2). photoelectric effect
(3). Compton effect (4). annihilation.

Q254. If the thickness of a radiation shielding is 1HVL + 2TVL, the radiation will be attenuated to _____ of its original.

(1). 1/12 (2). 1/20 (3). 1/40 (4). 1/200

Q255. The physical half-life for iodine is 8.05 days and the effective half-life is 4.0 days. Therefore, the biological half-life is

(1). 2.7days (2). 4.1 days
(3). 8.0 days (4). 12.1 days.

Q256. Which one is not one of the three classes of the acute radiation syndrome

(1). the hemopoietic syndrome
(2). the urinary system syndrome
(3). the gastrointestinal syndrome
(4). the central nervous system syndrome.

Q257. What percentage of a given amount of radium will decay during a period of 1000 years? (The half life of radium is a.6×10^3 yr.)

(1). 35.5%
(2). 43.8%
(3). 56.2%
(4). 64.5%.

Q258. Radiation produces biological effects indirectly by production of free radicals in

(1). water
(2). glucose
(3). carbohydrate
(4). protein in the body.

Q259. External radiation protection may apply one or more of the TDS technics to achieve. The D means:

(1). Dilute
(2). Disperse
(3). Distance
(4). Decontaminate.

Q260. When the activity of ^{32}P is measured daily over a period of about 3 months, and the activity(as Y-axis) is plotted as a function of time(as X-axis), then the curve will show as

(1). the sine curve
(2). the cosine curve
(3). the exponential curve
(4). the straight line.

Q261. For tungsten, the binding energy of the K shell electron is 70keV, L shell electron is 11keV and M shell electron is b.5keV. When a K shell electron is ejected from the atom, which energy of the following characteristic X-ray can not happen

(1). 59 keV
(2). 67.5 keV
(3). 8.5 keV
(4). 11.0 keV.

Q262. The mean life of a radioactive nuclide is 4 days. What is the half life of this nuclide?

(1). 2.08 days
(2). 2.77 days
(3). 4.32 days
(4). 6.04 days.

Q263. The result of the pair production of a single 10MeV photon interacting with material is producing a positron and an electron with the kinetic energy of the electron

(1). 5MeV
(2). 4.49MeV
(3). 2.5MeV
(4). 1.99MeV.

Q264. What is the unit of Gy ?

(1). Bq · s
(2). J/kg
(3). Sv
(4). C/kg.

Q265. What kind of radiation detector includes photomultiplier tubes?

(1). scintillation counter
(2). semiconductor detector
(3). Geiger counter
(4). high pressured ionization chamber.

Q266. What kind of radiation detector inherently holds the best energy resolution?

(1). ionization chamber
(2). proportional counter
(3). NaI(Tl) scintillation detector
(4). pure germanium detector.

Q267. The maximum energy of the beta particle emitted from ^{32}P is a.71 MeV and the average energy of a ^{32}P beta particle is

(1). 0.34 MeV (2). 0.70 MeV
(3). 1.14 MeV (4). 1.71 MeV.

Q268. Which of the following is not the thermoluminescent crystal ?

(1). LiF (2). CaF_2:Mn
(3). $CaSO_4$:Dy (4). $Fe(OH)_2$

Q269. $^{57}_{26}Fe$ and $^{57}_{27}Co$ are

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

Q270. Which of the following MOST effectively minimizes radiation exposure to the patient ?

(1). small focal spot (2). low ratio grids
(3). long focal-film distance (4). beam restriction.

Q271. Which of the following radiation-induced conditions is MOST likely to have the longest latency period?

(1). malignancy (2). hematologic effects
(3). local tissue effects (4). acute radiation lethality.

Q272. The primary function of filtration in X-ray tube is to

(1). reduce patient skin dose (2). reduce operator dose
(3). reduce film noise (4). reduce scattered radiation.

Q273. A radiation “controlled area” is defined as one that

(1). is occupied by general population
(2). is occupied by radiation workers
(3). is monitored by survey meters
(4). must not be occupied by radiation workers.

Q274. The unit of absorbed dose is the

(1). Roentgen (2). Gy
(3). Sv (4). Bq.

Q275. Isotopes are the atoms that have

(1). the same mass number but a different atomic number
(2). the same atomic number but a different mass number
(3). the same atomic number but a different proton number
(4). the same mass number but a different neutron number.

Q276. Which of the following structure(s) can be demonstrated during the barium swallowing examination?

a. pylorus b. sigmoid c. duodenum

(1). a. and b. only (2). a. and c. only
(3). b. and c. only (4). c. only

Q277. A patient with an upper respiratory infection is transported to the radiology department for a chest examination. Who of the following should be masked?

a. technologist b. transporter c. patient

(1). a. only (2). a. and c. only
(3). b. and c. only (4). a., b., and c.

Q278. The advantages of using non-ionic, water-soluble contrast media include

a. cost containment benefits b. low toxicity
c. less patient discomfort

(1). a. only (2). a and b. only
(3). b. and c. only (4). a., b., and c.

Q279. Gamma rays and x-ray photons differ in their

(1). velocity (2). charge (3). mass (4). Origin

Q280. Following exposure to 1 rad of each of the following ionizing radiations, which would result in the greatest dose to the individual?

(1). external source of 1 MeV x-rays
(2). external source of diagnostic x-rays
(3). internal source of alpha particles
(4). external source of beta particles

Q281. Which of the following(s) is (are) possible long-term somatic effects of radiation exposure?

a. cataractogenesis b. carcinogenesis c. albinism

(1). a. only (2). a. and b. only
(3). b. and c. only (4). a., b., and c.

Q282. Almost all the radioactive isotopes of the lighter elements achieve stability through beta decay or K capture. In this process

(1). atomic number keeps constant
(2). mass number keeps constant
(3). the number of neutron keeps constant

Q283. A cobalt 60 unit gives an exposure rate of 80R/min at a 1 meter when the source is "on". Protection regulations require that, when the source is "off', the radiation level at 1 meter distance be less than 2 mR/h. Estimate the thickness of lead shielding required if the attenuation coefficient is $66m^{-1}$

(1). 0.105m (2). 0.210m (3). 0.231m (4). 0.021m

Q284. Somatic effects of radiation may manifest themselves as

a. reproductive cell mutations in the individual exposed
b. carcinogenesis in the exposed individual, 20 years after exposure
c. congenital abnormalities in the progeny of the exposed individual

(1). a. only
(2). a. and b. only
(3). b. and c. only
(4). a., b, and c.

Q285. The maximum permissible dosage (MPD) for occupationally exposed individuals is valid for

(1). alpha, beta, and x-radiations
(2). x and gamma radiations
(3). beta, x, and gamma radiations
(4). all ionizing radiations

Q286. Medical and dental radiation accounts for what percentage of the general public's exposure to man-made radiation?

(1). 10% (2). 50% (3). 75% (4). 90%

Q287. Which stage of mitosis is considered the most radiosensitive?

(1). prophase
(2). metaphase
(3). anaphase
(4). telophase

Q288. The dose-response curve that appears to be valid for genetic and some somatic effects is the

a. linear b. sigmoidal c. non-threshold

(1). a. only
(2). a. and c. only
(3). b. and c. only
(4). a., b, and c.

Q289. Which of the following contributes most to patient dose?

(1). photoelectric effect
(2). Compton scatter
(3). Classical scatter
(4). Thompson scatter

Q290. Stochastic effects of radiation are those that

a. are late effects
b. may be described as all or nothing effects
c. exhibit a threshold

(1). a. only
(2). a. and b. only
(3). b. and c. only
(4). a., b, and c.

Q291. A thermoluminescent dosimetry system would use which of the following crystals?

(1). silver bromide
(2). sodium sulfate
(3). lithium fluoride
(4). ferrous sulfate

Q292. The x-ray interaction with matter that is responsible for the majority of scattered radiation reaching the film is

(1). photoelectric effect
(2). Compton scatter
(3). Classical scatter
(4). Thompson scatter

Q293. Linear energy transfer (LET) is

a. a method expressing radiation quality
b. a measure of the rate at which radiation energy is transferred to soft tissue
c. absorption of polyenergetic radiation

(1). a. only
(2). a. and b. only
(3). a. and c. only
(4). a., b, and c.

Q294. Which of the following would most likely cause the greatest skin dose?

(1). short SID
(2). high kVp
(3). increased filtration
(4). increased mA

Q295. Which of the following is associated with Compton scattering?

a. high energy incident photons
b. outer-shell electrons
c. characteristic radiation

(1). a. only
(2). a. and b. only
(3). a. and c. only
(4). a., b, and c.

Q296. The purpose of inherent and added filtration in the x-ray tube is to

(1). reduce patient skin dose
(2). shorten the scale of contrast
(3). reduce scattered radiation
(4). shorten the x-ray beam

Q297. All of the following statements regarding thermoluminescent dosimeters (TLDs) are true, except

(1). TLDs are re-usable
(2). TLDs store energy
(3). The TLD's response is proportional to the quantity of radiation received
(4). Following x-ray exposure, TLDs are exposed to light and emit a quantity of heat in response

Q298. Classify the following tissue according to increasing radio-sensitivity:

a. liver cells
b. intestinal crypt cells
c. muscle cells

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

Q299. Due to the anode heel effect the intensity of the x-ray beam is greatest along the

(1). path of the central ray
(2). anode end of the beam
(3). cathode end of the beam
(4). transverse axis of the film

Q300. Which of the following quantities of filtration is most likely to be used in mammography?

(1). 0.5mm Mo
(2). 1.5mm Al
(3). 1.5mm Cu
(4). 2.0mm Cu

Q301. Which of the following exposure factors is used to regulate radiographic contrast?

(1). mA
(2). exposure time
(3). mAs
(4). kVp

Q302. An increase in kilovoltage will serve to

(1). produce a longer scale of contrast
(2). produce a shorter scale of contrast
(3). decrease the radiographic density
(4). decrease the production of scatter radiation

Q303. A compensating filter is used to

(1). absorb the harmful photons contributing only to patient dose
(2). even out widely differing tissue densities
(3). eliminate much of the scattered radiation
(4). improve fluoroscopy

Q304. P+ e → n + ν (P : proton n: neutron ν: neutrino), This process is called

(1). internal conversion
(2). fluorescent yield
(3). electron capture
(4). isomeric transition

Q305. Which of the following is the most sensitive to radiation?

(1). GI tract
(2). gonad
(3). vessel
(4). bone

Q306. How much percentage must be accurate to within of the SID?

(1). 100% (2). 200% (3). 50% (4). 2%

Q307. Which of the following could be used to decrease PENUMBRA effect?

a. increase OID
b. increase SID
c. decrease OID
d. larger focal spot
e. decrease SID
f. smaller focal spot

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

Q308. Which o the following material has the highest density at radiography?

(1). water
(2). fatty tissue
(3). muscle
(4). mucosa

Q309. A lumbar measuring 20cm is 200mA, 0.15sec, 80kVp, 40-in SID. What technique would you use for a patient who measured 24cm?

(1). the same
(2). 39
(3). 50
(4). 65

Q310. The exposure from an x-ray tube operated at 70kVp, 200mAs is 400mR at 90cm, what will the exposure be at 180cm?

(1). 100 (2). 200 (3). 300 (4). 600

Q311. Which of the following is the isotope of Radon?

(1). ^{220}Rn (2). ^{222}Rn (3). ^{224}Rn (4). ^{226}Rn

Q312. If N=Avogadro constant, Z = atomic number, A=atomic weight, how many electron are there in a gram?

(1). N/A
(2). NZ/A
(3). 1000 N/A
(4). 1000 NZ/A

Q313. A radiation worker is exposed to 230mR/hr (b.3mGya/hr) from a radiation source. If the worker remains in that position for 36 minutes, what will be the total occupational exposure?

(1). 23mR (2). 460mR (3). 3.38mR (4). 138mR

Q314. Most radiographs are taken at an SID of 100cm. How much difference is allowed between the projection of the light field and x-ray beam at the image receptor?

(1). 2cm (2). 20cm (3). 50cm (4). 100cm

Q315. How much leakage radiation is allowed at a distance of 1 meter from the protective housing?

(1). 1 mGy_a/hr (2). 10 mGy_a/hr
(3). 200 mGy_a/hr (4). 20 mGy_a/hr

Q316. The patient ESE is 410mR for a KUB examination. What will be the approximate radiation exposure at 3 m from the patient?

(1). 41μR (2). 23μR (3). 46μR (4). 30μR

Q317. The output intensity of a radiographic unit is reported as c.7 mR/mAs at 100cm SID. What is the intensity at 75cm SSD?

(1). 3.9 (2). 6.6 (3). 5.7 (4). 8.9

Q318. The output intensity at 70kVp and 75 cm SSD is 6.6 mR/mAs. What is the output intensity at 76kVp?

(1). 7.8 (2). 8.5 (3). 9.6 (4). 15

Q319. If the radiographic technique for an IVP calls for 80mAs, what is the ESE when the output intensity is 7.8 mR/mAs?

(1). 115 mR (2). 218 mR (3). 369 mR (4). 624mR

Q320. A fluoroscopic procedure requires b.5min at 90kVp, 2mA. What is the approximate ESE?

(1). 10R (2). 20R (3). 30R (4). 60R

Q321. Which of the following statement is true ?

(1). the higher multislice value, the lower the patient dose will be
(2). Glandular dose is approximately 35% of the ESE
(3). Screen-film mammography currently is the only acceptable technique
(4). Multislice CT is higher patient dose than conventional step-and-shoot CT

Q322. A 64-slice CT imaging system will result in a lower patient dose than fewer slices because?

(1). artifact (2). partial volume
(3). penumbra (4). heating system

Q323. A lateral skull radiograph is obtained at 64kVp, 80mAs, ESE was 400mR. If kVp is increased to 74, mAs is reduced by half. What will be the new ESE?

(1). 36 mR (2). 125 mR (3). 329 mR (4). 268mR

Q324. What length of a 10 MeV electronic beam is emitted in water?

(1). 1.5 cm (2). 2.5 cm (3). 3 cm (4). 5 cm

Q325. How much electron is emitted from cathode to anode at 80 kVp, 150 mA and 0.2 second?

(1). 3.75×10^{14} (2). 7.64×10^{15}
(3). 7.64×10^{16} (4). 1.88×10^{17}

Q326. What is the international unit for absorbed dose?

(1). rad (2). kerma (3). Gy (4). Sv

Q327. What stands R for ALARA ?

(1). rem (2). reasonably
(3). radiation (4). roentgen

Q328. What is the following effect is direct proportional to radiation dose and unlimited?

(1). infertility (2). death
(3). heredity (4). vomit

Q329. Which of the following radiation has the minimum bioeffect to a certain tissue?

(1). β (2). α (3). proton (4). neutron

Q330. Half life of a ^{60}Co is 5.26 y，What is the mean life of it?

(1). 365y (2). 5.26y (3). 7.57y (4). 10.52y

Q331. The transmittance of an exposed radiograph is 0.01, what is its OD value?

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

Q332. The biding energy of Tungsten at K shell, L shell, M shell and N shell are respectively70 keV,12 keV,b.5 keV and 0.5 keV, what is the K_β of that?

(1). 58 keV (2). 67.5 keV
(3). 69.5 keV (4). 9.5 keV

Q333. How much average energy is needed to make an ion-pair by using secondary electron?

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

Q334. How many times of α and β decay are there in a nuclide from $^{241}_{94}$Pu to $^{209}_{83}$Bi?

(1). 8 , 4 (2). 8 , 5 (3). 7 , 5 (4). 7,4

Q335. The mass decay coefficient in water of a 20 MeV photon is 0.0182 cm^2/g, how many mean free path in centimeter (cm)?

(1). 37 (2). 46 (3). 55 (4). 64

Q336. Ten millicuries is equal to ?

(1). 370MBq (2). 37Bq (3). 270MBq (4). 3.7MBq

Q337. Which of the following is *false* of nuclear transformations?

(1). Electron capture decay, Z decreases by one
(2). Beta-minus decay, A increases by one
(3). Alpha decay, Z decreases by two
(4). none of above

Q338. Which of the following is never emitted during radioactive decay?

(1). α particle
(2). protons
(3). positrons
(4). γ rays

Q339. What determines the residual activity of a 1-week-old $^{99}Mo/^{99m}Tc$ generator?

(1). number of times the generator was milked
(2). Initial activity of molybdenum
(3). half-life of ^{99m}Tc
(4). half-life of ^{99}Tc

RSM

1. 다음 중 방사선이 기체를 전리하는 경우, 하나의 이온쌍을 만드는데 소비되는 평균에너지로 옳은 것은?

가) 0.3 eV
나) 3 eV
다) 30 eV
라) 300 eV

1. 次の中で放射線が気体を電離する場合，一つのion(イオン) 雙 を作るのに消費する平均エネルギーで正しいことは?
1) 0.3 eV
2) 3 eV
3) 30 eV
4) 300 eV

2. 다음 중 붕괴도에 나타나는 사항으로 옳지 **<u>않은</u>** 것은?

가) 핵종의 종류 및 반감기(Half-life)
나) 핵종의 물리적, 화학적 특성
다) 각 방사선의 에너지 및 방출강도
라) 방사성붕괴(decay)의 방식

2. 次の中で崩壊度に現われる事項で正しくないことは?

1）核種の種類及び半減期（Half-life）
2）核種の物理的，化学的特性
3）各放射線のエネルギー及び 放出強度
4）放射性崩壊(decay)の方式

3. 다음 설명 중 옳지 **<u>않은</u>** 것은?

가) 동위원소: 양성자수는 같고 중성자수가 다른 핵종
나) 동중원소: 양성자수와 중성자수는 다르나, 질량수가 같은 핵종
다) 동중성자원소: 중성자수는 같으나, 질량수가 다른 핵종
라) 핵이성체: 양성자수, 중성자수, 질량수가 모두 다른 핵종

3. 次の説明の中で正しくないことは?

1）同位元素: 陽性子数 は同じで中 性子数 が違う核種
2）同重元素: 陽性子数と 中 性子数は 違うが，質量数が同じ核種
3）同中性子元素: 中 性子数は同じですが，質量数が 違う核種
4）核異性体: 陽性子数，中 性子数，質量数が 全部違う核種

4. 어떤 방사성 원소가 붕괴를 시작하였다. 다음 중 딸핵종(Daughter)의 붕괴상수가 어미핵종(Parent)의 붕괴상수보다 작을 경우 Total activity의 시간에 따른 변화는?

가) 방사평형이 성립되지 않는다.
나) 영속평형
다) 일시평형
라) 과도평형

4. ある放射性元素が崩壊を始めた．次の中でDaughterの崩壊定数がParentの崩壊定数より小さい場合 Total activityの時間による変化は?
1）放射平衡が成立されない.
2）永続平衡
3）日時平衡
4）過渡平衡

5. 다음 설명 중 핵자당 결합에너지가 가장 **작은** 것은?

가) ^{1}H
나) ^{2}H
다) ^{4}He
라) ^{56}Fe

5. 次の説明の中で核子当り結合エネルギーが一番小さなことは?

1）^{1}H
2）^{2}H
3）^{4}He
4）^{56}Fe

6. 다음은 방사능에 대한 설명으로 옳지 **않은** 것은?

가) 방사능의 세기는 단위시간당 방출되는 방사선의 수와 같다.
나) 같은 원자수일 때 반감기가 짧은 원소의 방사능이 더 크다.
다) dps, Bq , Ci 는 방사능 세기의 단위이다.
라) 방사능의 세기는 시간 경과에 따라 원자수 감소와 같은 비율로 감소한다.

6. 次の放射能に対する説明で正しくないことは?

1）放射能の強さは単位時間当り放出される放射線の数の同じだ.
2）同じ原子数である時半減期が短い元素の放射能がもっと大きい.
3）dps, Bq , Ci は放射能 強さの単位だ.
4）放射能の 強さは時間経過によって原子数減少と同じ割合で減少する.

7. 다음 중 베크렐(Bq) 단위에 대한 설명으로 옳은 것은?

가) 생물학적 효과를 고려해서 정한 전리 방사선의 흡수선량 단위이다.
나) 방사능의 강도를 나타내는 단위로 1 Ci와 같은 강도를 갖는다.

다) 방사능 강도의 단위로서 단위 시간당 붕괴하는 원자핵수를 표시한다.
라) 생물학적 효과를 고려하지 않는 전리방사선의 흡수선량이다.

7. 次の中でベクレル(Bq) に対する説明で正しいことは?
1）生物学的効果を考慮して決めた電離放射線の吸収線量単位
2）放射能の強度を現わす単位で 1 Ciのような強度を持つ.
3）放射能の強度を現わす単位で 単位時間当り崩壊する原子核数を表示する.
4）生物学的効果を考慮しない電離放射線の吸収線量だ.

8. 다음 중 자연방사선에 대한 설명으로 옳은 것은?

가) 자연방사선은 우주선, 지각 또는 공기 중에 존재하는 천연방사성 동위원소, 공기 중의 라돈, 인공방사선을 포함한다.
나) 우주선에 2차로 생성된 자연방사선의 피폭은 0.4 mSv이다.
다) 자연방사선에 의한 인간의 피폭은 평균 2.4 mSv 이다.
라) 암과 백혈병은 자연방사선이 높은 지역에서 주로 발생한다.

8. 次の中で自然放射線に対する説明で正しいことは?

1）自然放射線は宇宙線, 地殻または空気の中に存在する自然放射性同位元素, 空気中のラドン,人工放射線を含む.
2）宇宙線に 2次に生成された自然放射線の被爆は 0.4 mSvだ.
3）自然放射線による人間の被爆は平均 2.4 mSv である.
4）癌と白血病は自然放射線が高い地域から主に発生する.

9. 다음 에너지 중 선스펙트럼이 <u>아닌</u> 것은?

가) 알파선
나) 베타선
다) 내부전환전자
라) 오제전자

9. 次のエネルギーの中で 線 スペクトルではないことは?

1）アルファ線
2）ベータ線
3）内部転換電子
4）オージェ電子

10. 다음 중 시료의 계수치가 10분에 20000카운트, 자연계수치가 10분에 5600카운트이다. 이 시료의 정확한 계수율은 몇 cpm 인가?

가) 1440 ± 12
나) 1440 ± 16
다) 1440 ± 22
라) 1440 ± 38

10. 次の中で試料の係数治家が10分に 20000カウント, 自然界数値が 10分に 5600カウントだ. この試料の正確な係数率は何 cpm が?

1) 1440 ± 12
2) 1440 ± 16
3) 1440 ± 22
4) 1440 ± 38

11. 다음 중 전자쌍 생성을 위한 최소 광자 에너지는?

가) 5.011 MeV
나) 1.022 MeV
다) 0.511 MeV
라) 10.22 MeV

11. 次の中で電子 雙 生成のための最小光子エネルギーは?
1) 5.011 MeV
2) 1.022 MeV
3) 0.511 MeV
4) 10.22 MeV

12. 다음 설명 중 올바르게 조합된 것은?

a. 조사선량의 측정에는 Bragg-Gray의 원리를 사용한다. b. γ선의 흡수선량은 입사한 물질의 어느 깊이와 비교하더라도 표면에서 최대가 된다. c. 흡수선량은 방사선, 물질의 종류에 무관하게 사용할 수 있다. d. 커마는 간접 전리방사선에만 적용된다.

가) a, b
나) b, d
다) b, c
라) c, d

12. 次の説明の中で正しく答えの組合は?

a. 照射線量の測定には Bragg-Grayの原理を使う. b. γ線の吸収線量は入射した物質のどの深みと比べても表面で最大になる. c. 吸収線量は放射線, 物質の種類に関わらず使うことができる. d. コマは間接電離放射線にだけ適用される.

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

13. 다음 중 방사선 방호에서 면밀한 작업계획을 통해 모의훈련, 기능숙달 등으로 가장 큰 효과를 볼 수 있는 것은?

가) 체내피폭저감
나) 피폭시간단축

다) 외부노출방지
라) 방사성물질의 농도 감소

13. 次の中で放射線防護で綿密な作業計画を通じて謀議訓練, 機能上達などで最大の効果を見られることは?
1) 体内被爆低減
2) 被爆時間短縮
3) 外部露出防止
4) 放射性物質の濃度減少

14. 다음 중 체내피폭방어 방법으로 옳지 **<u>않은</u>** 것은?

가) 환경관리
나) 작업숙달
다) 오염방지
라) 차폐물 선택

14. 次の中で体内被爆防御方法で正しくないことは?
1) 環境管理
2) 作業上達
3) 汚染防止
4) 遮蔽物選択

15. 다음 중 방사평형과 직접관계가 **<u>없는</u>** 것은?

가) 과도평형
나) 영속평형
다) 핵이성체
라) Cow system

15. 次の中で放射平衡と直接に関係のないことは?
1) 過渡平衡
2) 永続平衡
3) 核異性体
4) Cow system

16. 다음 중 불필요한 방사선 피폭을 방지하기 위한 수단과 직접적인 관련이 **<u>없는</u>** 것은?

가) 방사선준위가 높은 구역 등에 대한 표시판 부착
나) 안전수칙 부착
다) Film badge 또는 TLD 착용
라) 경고등 부착

16. 次中不必要な放射線被爆を防止するための手段と直接的な関連がないことは?
1) 放射線数値が高い区域などに対する表示版付着
2) 安全守則付着
3) Film badge または TLD 着用
4) 警告燈の付着

17. 다음 중 환경방사선의 간접 측정 요소에 해당 되지 **않은** 것은?

가) 장비의 적절한 창영역(window area)의 설정
나) 측정 장비의 검출효율
다) 백그라운드 카운트율(count rate)
라) 제거요소(removal factor)

17. 次の中で環境放射線の間接測定要素に当たらないことは?
1) 装備の適切なwindow area設定
2) 測定装備の検出効率
3) バックグラウンドカウント率 (count rate)
4) 除去要素 (removal factor)

18. 다음 중 조사선량에 대한 설명으로 **옳은** 것은?

가) 1R이란 방사선 조사로 인하여 표준상태(0°C, 1 기압)의 공기 $1m^3$ 당 생성된 전하량이 1 esu 일 때를 말한다.
나) 조사선량은 X 선이나 r 선과 같은 광자에만 적용된다.
다) 조사선량의 중간매질은 공기로 정의한다.
라) 공기의 이온화 현상에 의해 측정 된다.

18. 次の中で 照射線量 に対する説明で正しいことは?
1) 1Rと言うのは放射線の照射によって標準状態(0° C, 1 気圧)の空気 $1m^3$ 当たり生成された電荷量が 1 esu である時を言う.
2) 照射線量は X線や r線のような光子にだけ適用される.
3) 照射線量 の中間媒質は空気で定義する.
4) 空気のイオン化現象によって測定される.

19. 다음 중 표면 방사성오염의 측정에 사용되는 방법으로 옳지 **않은** 것은?

가) Probe 법
나) 손발오염 검사기
다) Area monitor
라) Floor monitor

19. 次の中で表面放射性汚染の測定に使われる方法で正しくないことは?
1) Probe 法
2) 手足汚染検査機
3) Area monitor
4) Floor monitor

20. 다음 중 열형광선량계(TLD)에 대한 설명으로 옳지 **않은** 것은?

가) 가열냉각과정으로 초기특성으로 회복시켜 반복사용이 가능하다.
나) 기록의 영구보존이 불가능하지만, 재사용이 가능하다.
다) 선량계는 형광소자가 충격에 약하기 때문에 주의하여 다루어야 한다.
라) 퇴행현상(fading effect)이 크기 때문에 오랜 기간 동안 사용이 가능하다.

20. 次の中でTLDに対する説明で正しくないことは?
1) 加熱冷却過程で初期特性で回復させて繰り返し使用が可能だ.
2) 記録の永久保存が不可能だが, 再使用が可能だ.
3) 線量係は蛍光素子が衝撃に弱いから気を付けて扱わなければならない.
4) 退行現象(fading effect)が大きいから長期間にかけて使用が可能だ.

21. 다음 중 기체봉입형 검출기의 기체증폭이 최초로 일어나는 영역은?

가) 비례영역
나) GM 영역
다) 전리함영역
라) 재결합영역

21. 次の中で気体封入型検出器の気体増幅が最初に起きる領域は?
1) 比例領域
2) GM 領域
3) 電離艦影役
4) 再結合領域

22. 다음 중 NaI(Tl) 섬광체의 특성을 설명한 것 중 옳지 **않은** 것은?

가) 조해성이 작다.
나) 기계적 충격이나 열에 약하다.
다) 밀도가 높아 γ선 측정효율이 좋다.
라) Tl은 발광율을 높이기 위한 활성제(activator)이다.

22. 次の中で NaI(Tl) 閃光体の特性を説明したこと中正しくないことは?

1) 潮解性が小さい.
2) 機械的衝撃や熱に弱い.
3) 密度が高くて γ線測定效率が良い.
4) Tlは発光率を高めるための活性制(activator)だ.

23. 다음 중 반도체 검출기는 방사선의 어떤 작용을 이용한 검출기 인가?

가) 감광작용
나) 전리작용
다) 여기작용
라) 화학작용

23. 次の中で半導体検出器は放射線のどんな作用を利用した検出器か?
1）感光作用
2）電離作用
3）励起作用
4）化学作用

24. 다음 중 γ선에 대한 검출감도가 가장 좋은 측정기는?

가) NaI(Tl) 섬광검출기
나) Ge(Li) 반도체 검출기
다) GM 계수관
라) PMT

24. 次の中で γ線に対する検出感度が一番良い測定器は?

1）NaI(Tl) 閃光検出器
2）Ge(Li) 半導体検出器
3）GM 計数管
4）PMT

25. 다음 중 내부피폭에 대한 설명으로 옳지 **<u>않은</u>** 것은?

가) 내부피폭은 체내의 방사성 물질에 의해 생기는 피폭이다.
나) 내부피폭을 평가하는 방법은 체외측정과 Bioassay법의 두 가지 방법만 있다.
다) 체내 섭취 경로는 호흡기, 소화기, 피부이다.
라) 전신계측기는 α, β 입자를 방출하는 방사성 물질을 측정할 수 없다.

25. 次の中で内部被爆に対する説明で正しくないことは?
1）内部被爆は体内の放射性物質によって生ずる被爆だ.
2）内部被爆を評価する方法は体外測定と Bioassay法の二つの方法だけある.
3）体内摂取経路は呼吸器, 消火器, 肌だ.
4）全身計測器は α, β 粒子を放出する放射性物質を測定することができない.

26. 다음 중 베타(β)선과 감마(γ)선이 동시에 조사되었을 경우 가장 좋은 차폐방법은?

가) 차폐물은 작업자 가까이 설정한다.
나) 차폐물은 선원 가까이 설정한다.
다) 차폐물은 작업자 가까이 설정하고, 차폐물 설정 순서는 β입자 차폐물 γ선 차폐물 순서로 한다.
라) 차폐물은 선원 가까이 설정하고 차폐물 설정 순서는 선원에서 β입자 차폐물, γ선 차폐물 순서로 한다.

26. 次の中でベータ(β)線とガンマ(γ)線が同時に調査された場合一番良い遮蔽方法は?

1）遮蔽物は作業者の近くに設定する.
2）遮蔽物は線源の近くに設定する.
3）遮蔽物は作業者の近くに設定 して, 遮蔽物設定順序は β粒子遮蔽物 γ線遮蔽物の順番にする.
4）遮蔽物は線源の近くに設定 遮蔽物設定 順番 では船員で β粒子遮蔽物, γ線遮蔽物 順番 にする.

27. 다음 중 방사선 사고 발생시 응급조치 원칙으로 옳지 **않은** 것은?

가) 안전유지 원칙
나) 과소평가원칙
다) 통보원칙
라) 확대방지원칙

27. 次の中で放射線事故発生の時応急措置原則で正しくないことは?

1) 安全維持原則
2) 過小評価原則
3) 通報原則
4) 拡大防止原則

28. 다음 단위 중 방사선 피폭으로 인하여 일어나는 신체의 생물학적 영향을 나타내기 위한 단위는?

가) R
나) Gy
다) Sv
라) Ci

28. 次の中で放射線被爆によって起きる身体の生物学的影響を現わすための単位は?
1) R
2) Gy
3) Sv
4) Ci

29. 다음 중 섬광작용을 이용한 검출기에 대한 설명으로 옳지 **않은** 것은?

가) Luminescence(냉광, 찬 빛)란 열발생을 동반하지 않는 발광현상을 말한다.
나) 섬광이란 방사선에 의한 Luminescence를 말한다.
다) 방사선검출기에 사용되는 섬광체는 섬광의 감쇠시간이 긴 것이 좋다.
라) 섬광체의 섬광효율이 높으면 발광량이 높아진다.

29. 次の中で閃光作用を利用した検出器に対する説明で正しくないことは?
1) Luminescenceと言うのは熱の発生を伴わない発光現象を言う.
2) 閃光というのは放射線による Luminescenceを言う.
3) 放射線検出器に使われる閃光体は閃光の減衰時間が長いことが良い.
4) 閃光体の閃光効率が高ければ発狂量が高くなる.

30. 다음 중 선량한도의 적용대상이 되는 것은?

가) 신체검사(X선 촬영)로 인해 피검자가 받는 선량
나) 방사선 투시검사로 인해 담당의사가 받는 선량
다) 자연방사선 준위가 높은 지역에 사는 주민이 받는 선량
라) 방사선을 조사하여 암을 치료할 때 환부 이외의 조직이나 장기에 받는 선량

30. 次の中で線量限度の適用対象になることは?
1）身体検査(X線撮影)によって被検者が受ける善良
2）放射線透視検事によって担当医者が 受ける善良
3）自然放射線ェベルが高い地域に住む住民が 受ける善良
4）放射線を利用して癌を治療する時病所以外の組職や臓器に受ける善良

31. 다음 설명하는 내용은 무엇인가?

> 방사선 편익(유익)효과라고도 하며, 저준위방사선의 인체피폭은 반드시 해롭지만은 않다는 실험결과가 T.D. lucky 교수를 비롯한 일부 학자들이 발표하였다. 이주장에 의하면, 저준위 방사선은 세포기능을 자극하고 증식과 재생능력을 증진시켜, 결과적으로는 면역학적 반응 증진과 체내 호르몬의 평형조절 등으로 인한 인체의 자연방어 메커니즘이 향상된다.

가) 호르메시스 효과(hormesis effect)
나) 적응적 반응(adaptive response)
다) 방관자 효과(bystander effect)
라) 조직 반응(tissue reaction)

31. 次に説明する内容は何か?

> 放射線便益(有益)効果とも言って，低水準放射線の人体被爆は必ず有害ではないという実験結果が T.D. lucky 教授を含めた一部学者たちが発表した．移住場によれば，低水準放射線は細胞機能を刺激して増殖と再生能力を増進させて，結果的には免疫学籍反応増進と体内ホルモンの平衡調節などによる人体の自然防御メカニズムが向上する．

1）hormesis effect
2）adaptive response
3）bystander effect
4）tissue reaction)

32. 다음 중 방사선작업 중 사고 발생시 조치사항 중 가장 기본이 되는 것은?

가) 관계자에게 통보의 원칙
나) 오염확대 방지의 원칙
다) 조기제염의 원칙
라) 인체안전보호의 원칙

32. 次の中で放射線作業の中で事故発生の時 措置事項の中で一番基本になることは?
1）関係者に通報の原則
2）汚染拡大防止の原則
3）早期措置の原則
4）人体安全保護の原則

33. 다음 중 내부피폭 측정에 사용되는 Bioassay 법과 관련 **없는** 것은?

가) 미량의 방사성 물질의 측정이 가능
나) 비 스메어 법 (Nasal Smear Method)
다) 알파, 베타 (α, β) 방출 핵종
라) 직접 측정 방법

33. 次の中で内部被爆測定に使われる Bioassay 方法と関係ないことは?
1）微量の放射性物質の測定が可能
2）Nasal Smear Method)
3）α, β 放出核種
4）直接測定方法

34. 체외피폭에서 방사선원으로부터의 거리가 3배로 멀어지면 같은 시간에 피폭되는 양은 어떻게 되는가?

가) 3 배
나) 9 배
다) 1/3 배
라) 1/9 배

34. 体外被爆で放射線源 からの距離が 3倍で遠くなると同じ時間に被爆されるようにはどうなるか?
1）3 倍
2）9 倍
3）1/3 倍
4）1/9 倍

35. 감마선 검출에서 GM counter, ionization chamber, NaI(Tl) scintillation survey meter 를 비교하여 NaI(Tl) scintillation survey meter 에 대한 설명으로 옳은 것은?

가) 에너지 의존도가 가장 작다.
나) 감도가 가장 높다.
다) 저에너지측정에는 적절하지 않다.
라) β선 측정에는 가장 적절하다.

35. ガンマ線検出で GM counter, ionization chamber, NaI(Tl) scintillation survey meter を比べて NaI(Tl) scintillation survey meter に対する説明で正しいことは?
1）エネルギー依存度が一番小さい.
2）感度が一番高い.
3）低エネルギー測定には適切ではない.
4）β線測定には一番適切だ.

36. 다음 중 동일한 에너지를 가진 γ선에 비해 반가층의 두께가 가장 **얇은** 것은?

가) 콘크리트
나) 납
다) 철
라) 구리

36. 次の中で同日韓エネルギーを持った γ線に比べてHVLの厚さが一番薄いことは?
1) コンクリート
2) 鉛
3) 鉄
4) 銅

37. 다음 중 유효반기에 대한 정의로 옳은 것은?

가) 방사성 핵종의 붕괴과정에서 어느 시점에 존재하는 방사성 핵종의 원자수가 반으로 감소하는데 소요되는 시간
나) 방사성 핵종의 원자수가 반으로 감소하는 데 소요되는 시간
다) 인체 내에 섭취된 방사성 핵종의 방사능이 물리적 붕괴와 생물학적 배출로 인하여 그 방사능이 반으로 감소하는데 소요되는 시간
라) 인체 내에 들어간 방사성 물질의 방사능이 신진대사 작용에 의하여 그 양이 반으로 감소하는데 소요되는 시간

37. 次の中で有效半期に対する正義で正しいことは?

1) 放射性核種の崩壊過程でどの時点に存在する放射性核種の原子数が半分で減少するのに必要となる時間
2) 放射性核種の原子数が半分で減少するのに必要となる時間
3)人体内に取られた放射性核種の放射能が物理的崩壊と生物学的排出によってその放射能が半分で減少するのに必要となる時間
4) 人体内に入った放射性物質の放射能が新陳代謝作用によってその壌夷半分で減少するのに必要となる時間

38. 다음 중 방사선방어를 선원 중심의 평가와 개인 중심의 평가로 나눌 때 선원 중심의 평가에 속하는 것을 묶은 것은?

a. 행위의 정당화
b. 방어의 최적화
c. 선량한도
d. 집단선량

가) a, b, c
나) a, b, d
다) a, c, d
라) b, c, d

38. 次の中で放射線防御を線源中心の評価と個人中心の評価で分ける時線源中心の評価に属することを縛ったことは?

a. 行為の正当化
b. 防御の最適化
c. 線量限度
d. 集団線量

1) a, b, c
2) a, b, d

3) a, c, d
4) b, c, d

39. 다음 중 방사선 방어의 기본개념(frame work)에 대한 설명으로 옳지 **않은** 것은?

가) 방사선 피폭을 수반하는 어떤 행위/작업으로 인한 손해 또는 위험보다, 이로 인하여 얻어지는 이익이 커야 한다.
나) 개인의 결정적 영향을 방지하기 보다 최소화하여야 한다.
다) 허용하는 수준에서 확률적 영향의 발생을 최소화하여야 한다.
라) 자연 방사선은 방사선 방어 평가에서 고려되지 않는다.

39. 次の中で放射線防御の基本概念(frame work)に対する説明で正しくないことは?

1) 放射線被爆を伴うどんな行為/作業による損害または危険より，これによって得られる利益が大くなければならない.
2) 個人の決定的影響を防止するより最小化しなければならない
3) 許容する水準で確率的影響の発生を最小化しなければならない.
4) 自然放射線は放射線防御評価で考慮されない

40. 다음 중 의료방사선 피폭에 대한 설명으로 옳지 **않은** 것은?

가) 진단에 이용되는 방사선 장비는 일일, 주기별 점검을 시행한다.
나) 각 기관에서 보유한 선량측정 장비로 방사선량을 측정하는 것은 중요하다.
다) 방사선 검사와 비방사선 검사에서 같은 진단 유용성이 있다면, 방사선 검사를 선택한다.
라) 방사선 검사의 재촬영이 발생한 경우, 그 원인을 파악하는 것은 필요하다.

40. 次の中で医療放射線被爆に対する説明で正しくないことは?

1) 診断に利用される放射線装備は一日，週期別点検を施行する.
2) 各機関で保有した線量測定装備で放射線量を測定することは重要だ.
3) 放射線検事と誹謗斜線検事で同じ診断有用性がいたら，放射線検事を選択する.
4) 放射線検事の再撮影が発生した場合，その原因を把握することは必要だ.

41. 다음 중 의료방사선 종사자에 대한 설명으로 옳지 **않은** 것은?

가) 외부피폭은 반드시 1cm 등가선량으로 측정한다.
나) 내부피폭은 계산에 의하여 측정이 가능하다.
다) 방사선 종사가가 방사선 구역에 있는 동안 외부피폭은 지속적(계속적)으로 측정된다.
라) 임신 가능 연령(가임기) 여성의 외부피폭은 복부에서 측정된다.

41. 次の中で医療放射線従事者に対する説明で正しくないことは?
1) 外部被爆は必ず 1cm 等価善良で測定する.
2) 内部被爆は計算によって測定が可能だ.
3) 放射線従事者が放射線区域にあるうちに外部被爆は持続的(継続的)で測定される.
4) 姙娠可能年齢(可姙期) 女性の外部被爆は腹部で測定される.

42. 다음 중 방사선장해의 위험과 정비례에 관계에 있지 **않은** 것은?

가) 조직에 흡수된 방사선에너지량
나) 피폭하는 방사선에너지
다) 피폭하는 방사선속밀도
라) 체내에 섭취한 방사성물질의 양

42. 次の中で放射線障害の危険と正比例に関係にないことは?
1）組職に吸収された放射線エネルギー量
2）被爆する放射線エネルギー
3）被爆する放射線速密度
4）体内に接収した放射性物質の量

43. 다음 중 방사선 관련 용어의 조합으로 옳지 **않은** 것은?

가) 장기흡수선량 – 장기 전체질량에 대한 평균 흡수선량
나) 흡수선량 – 피폭하는 물체에 흡수되는 방사선의 에너지 양
다) 개인선량당량 – 심부선량당량은 신체 표면에 위치한 조직의 감시에 적합
라) 유효선량 – 등가선량에 조직가중치를 가중하여 합한 값

43. 次の中で放射線関連用語の組合で正しくないことは?

1）臓器吸収線量 – 臓器全体質量に対する平均吸収線量
2）吸収線量–被爆する物体に吸収される放射線のエネルギー羊
3）個人線量当量–深部線量当量は身体表面に位した組職の監視に適合
4）有效 線量–等価 線量 に組職加重値を重くなって合わせた数値

44. 다음 중 중성자선 차폐에 가장 좋은 물질은?

가) Pb
나) 콘크리트
다) 물
라) 공기

44. 次の中で中性子線遮蔽に一番良い物質は?

1）Pb
2）コンクリート
3）水
4）空気

45. 방사선이 인체에 미치는 영향에서 확률적 영향이 관리목적으로 사용되는 것은?

가) 조사선량
나) 흡수선량
다) 등가선량
라) 유효선량

45. 放射線が人体に及ぶ影響で確率的影響が管理目的に使われることは?

1）照射線量
2）吸収線量
3）等価線量
4）有効線量

46. 다음 중 방사선에 의한 만발성 장해로 옳지 **않은** 것은?

가) 백혈병
나) 재생불량성 빈혈
다) 백내장
라) 유전적 효과

46. 次の中で放射線による満発性障害で正しくないことは?
1）白血病
2）再生不良性貧血
3）白内障
4）遺伝的効果

47. 다음 중 조직(장기)의 방사선 감수성이 가장 **낮은** 것은?

가) 흉선
나) 비장
다) 소아 골세포
라) 신경세포

47. 次の中で組職(臓器)の放射線感受性が一番低いことは?

1）胸腺
2）脾臓
3）小児骨細胞
4）神経細胞

48. 다음 중 방사선의 영향에 대한 설명 중 옳지 **않은** 것은?

가) 결정적 영향(Deterministic effect)의 심각도는 선량에 비례하고 문턱선량이 존재한다.
나) 확률적 영향(Stochastic effect)은 발생확률이 선량에 비례하며, 문턱선량이 없다.
다) 결정적 영향(Deterministic effect)은 만성장해이다.
라) 확률적 영향(Stochastic effect)은 다른 원인으로 발생되는 장해와 구별이 안 된다.

49. 다음 중 방사선에 의한 인체의 만발장해의 특성으로 옳지 **않은** 것은?

가) 피폭에서 증상 발생까지의 시간이 길다.
나) 방사선 특이성이 없다.

다) 고선량 단기간 피폭 시 발생된다.
라) 저선량 장기간 피폭 시 발생된다.

50. 다음 중 방사선 옥소(Iodine) 결정장기는 다음 중 무엇인가?

가) 갑상선(Thyroid)
나) 폐(Lung)
다) 간(Liver)
라) 대장(Colon)

51. 다음 중 인체에 LD_{100} 에 해당되는 방사선 장해를 일으킬 수 있는 피폭 선량으로 옳은 것은?

가) 100 cGy
나) 200 cGy
다) 400 cGy
라) 700 cGy

52. 다음 중 방사선이 생체에 조사 후 전리, 여기변화를 가져오는데 이것을 무슨 단계인가?

가) 물리적 단계
나) 생화학적 단계
다) 화학적 단계
라) 전기적 단계

53. 다음 중 방사선의 만성효과에 속하는 것은?

가) 방사선 숙취와 위궤양
나) 습성 피부염과 불임
다) 백혈구수 감소와 피부암
라) 수명의 단축과 골종양

54. 방사선 장해에 대한 설명으로 **옳은** 것은?

가) 방사선 감수성은 세포분열빈도가 작을수록 좋다.
나) 장기 내 침착부위에 따라 영향이 다르다.
다) 선량분포가 집중될수록 영향이 작다.
라) 체내에서의 생물학적 반감기에 따른 영향은 무시한다.

55. 결정적 영향에 관한 설명 중 옳지 **않은** 것은?

가) 피폭선량과 장해의 중등도 사이에 문턱선량을 갖는다.
나) 백내장은 결정적 영향에 속한다.

다) 암 발생은 결정적 영향에 속한다.
라) 일시적 장해는 결정적 영향에 속한다.

56. 감마선 400 Gy의 국소피폭을 받은 성인 남자가 일시적으로 불임이 되는 이유로 옳은 것은?

가) 방사선 장해에 의한 정원세포 분열, 증식의 일시정지
나) 호르몬 분비의 영구저하
다) 방사선장해에 의한 정자사멸
라) 급성 전립선암의 발생

57. 방사선 장애 유발 중 백내장의 발생에 가장 큰 영향을 미치는 방사선으로 옳은 것은?

가) X-선
나) 중성자선
다) 전자선
라) β-선

58. 다음 중 화재 대책에서 방사성동위원소와 관련하여 평상시 명확히 해두어야 할 사항으로 옳지 **<u>않은</u>** 것은?

가) 방사성 핵종의 보관 장소 확인
나) 화재에 의한 비산위험성 대처
다) 정전, 단수 대책
라) 방사선안전관리담당자, 소방서와 연락관계

59. 다음 중 올바른 설명으로 조합된 것은?

a. 상담에서 상담자는 고객의 이야기를 듣고, 해결책을 제시한다. b. 상담자의 경험은 상담에서 가장 중요한 요소 중 하나이다. c. 상담자는 고객마다 감정이 다르기 때문에, 고객에 따라 감정을 이해 해야 한다.

가) a, b
나) b, c
다) a, c
라) a, b, c

60. 다음 중 방사선에 의한 암의 발생에 대한 설명으로 옳은 것은?

가) 방사선에 의한 암의 발생은 항상 DNA의 손상에 의하여 발생한다.
나) 방사선에 의한 DNA 손상은 항상 반응성 산소 생성(Reactive Oxygen Generation)에 의해 발생한다.
다) 방사선에 의하여 DNA가 손상되었을 때, 손상된 세포는 절대 회복이 불가능하다.
라) 잠재적인 암세포가 세포사로 인해 제거되면, 암의 발생은 억제 될 수 있다.

61. 방사선 재해의 특징으로 옳은 것은?

가) 편견이나 유언비어에 의한 소문이 일어나기 어렵다.
나) 스트레스에 의한 정신적 증상과 피폭에 의한 증상은 구별이 용이하다.
다) 방사선은 볼 수 없고, 느낄 수 없는 공포가 있다.
라) 누출된 방사성 물질의 종류, 양, 발생시의 기후, 장소, 시간에 따라 재해의 규모는 모두 동일한 것으로 간주한다.

62. 방사선에 의한 재해 시 정신적인 현상으로 옳지 **않은** 것은?

가) 의욕의 저하
나) 집중력의 저하, 기억력의 저하
다) 불면, 식욕부진
라) 고혈압, 비만

63. 다음 중 방사선응급의학에서 방사선안전관리자의 역할을 설명한 것 중 옳지 **않은** 것은?

가) 방사선 오염 방지보다 개인선량을 측정하는 것이 최우선 작업이다.
나) 방사능 핵종과 방사선 조사의 오염의 상태 유무를 측정하고 점검한다.
다) 의료인에 대한 방사선 선량을 조절하고 억제한다.
라) 방사선 사고 시 인근에 대피한 거주민에게 방사선이 건강에 미치는 영향에 대하여 설명한다.

64. 방사선 피해의 심리적 영향이 일어나기 쉬운 원인으로 옳지 **않은** 것은?

가) 신체의 영향을 명확히 알기 어렵기 때문
나) 미량의 방사능 노출에서도 건강 장해가 발생하기 때문
다) 방사능 노출 정보를 쉽게 알기 어렵기 때문
라) 방사능 노출에 대한 공포감이 있기 때문

65. 방사선 핵종을 취급하던 중 상처를 입었을 경우 응급조치로 옳지 **않은** 것은?

가) 15초 이내로 흐르는 물에서 상처를 씻는다.
나) 피를 짜내는 등의 역류를 막는다.
다) 위험한 핵종은 지혈을 하고 의사에게 조치를 받는다.
라) 지혈보다 오염제거를 반드시 우선하여야 한다.

66. 다음 중 재해 상담 시 요령으로 옳지 **않은** 것은?

가) 가치관이나 입장의 차이를 존중한다.
나) 서로가 동일한 기준을 정한 후에 세부적인 문제에 대하여 이해한다.
다) 상담자가 이해하고 알아들을 때까지 계속 충분히 설명한다.
라) 전문 지식을 이해시키기 보다는 생각을 같이 공유할 수 있는 것이 중요하다.

67. 다음 중 방사선안전관리사의 행동으로 적합하지 **않은** 것은?

가) 새로운 정보가 입수되면 대중에게 신속히 알려야 한다.
나) 새로운 정보가 이전 정보와 다르다면 정확한 정보가 무엇인지를 확인하기 위하여 알아보고 그 사실이 정확해지기 전까지는 알려주지 말아야 한다.
다) 일반인들이 알아듣기 쉬운 용어로 설명하며, 구체적인 지식의 도움을 받기 원하는 경우는 눈높이에 맞게 자세히 설명한다.
라) 방사선 관련 이외의 재해에 관해서는 해당 전문가에게 의견을 구하고, 도움을 받을 수 있도록 연결해 준다.

68. 고기압[高氣壓, anticyclone]의 설명으로 옳지 **않은** 것은?

가) 주위보다 상대적으로 기압이 높은 곳을 가리키며, 고기압권 안에서는 하강기류가 있어서 날씨가 맑다.
나) 중심 부근의 상승기류에서 단열냉각에 의해 구름이 만들어지고 비가 내리므로, 일반적으로는 날씨가 나쁘고 비바람이 강하다.
라) 하강기류로 인해 날씨가 맑다. 구름이 있어도 소멸되며 전선이 형성되기 어렵다. 그러나 쇠약단계의 고기압 또는 고기압 후면에서 하층이 가열되면 대기가 불안정하여 대류성 구름이 발생하고 심하면 소나기, 뇌우를 동반한다.
라) 기압이 높은 중심쪽에서 낮은 바깥쪽으로 바람이 분다. 이때 북반구에서는 시계방향으로, 남반구에서는 시계반대방향으로 불어나간다. 풍속은 중심에 가까워질수록 약하다.

69. 방사선 재해가 다른 재해와 다른 점으로 옳지 **않은** 것은?

가) 방사선 피폭은 오감으로 느끼기 어렵다.
나) 스트레스에 의한 심적증상과 피폭에 의한 증상과의 구별이 어렵다.
다) 대부분 외상을 수반한다.
라) 방사선 피로를 수반한다.

70. 방사선 피폭에 의한 피폭 상담의 내용으로 옳은 것은?

가) 피폭 상담은 설득이다.
나) 상대가 알고 싶어 하는 부분을 파악하는 것이 중요하다.
다) 피폭 상담은 피해자에게 나올 수 있는 불평대응이다.
라) 피폭을 불안하게 생각하는 것은 정신적을 문제이다.

71. 방사선방어에 관한 설명 중 옳지 **않은** 것은?

가) 방사선피폭을 수반하는 행위를 부적절하게 제한 하여서는 안 된다.
나) 방사선피폭에 의한 결정적 영향을 방지하고, 확률적 영향은 사회에서 용인 가능한 수준까지 낮추어야 한다.
다) 방사선피폭의 정당화란 계획 및 실행에 있어서 방사선피폭을 경제적, 사회적 인자를 고려하여 합리적으로 달성 가능한 한 낮게 유지하는 것을 의미한다.

라) 어떠한 개인도 피폭이 제어되고 있는 행위에 대해서 법으로 규정한 선량 한도를 초과할 수 없다.

72. 다음의 카운셀링(상담)의 상황에서, 상담자의 응대에 관한 설명으로 옳지 **않은** 것은?

> ***Cl*** **: 환자(클라이언트: client)**
> ***Co*** **: 상담자 (카운셀러: counselor)**
>
> *Cl 1* : 3개월 정도 전에 복부에 통증이 있었습니다
> *Co 1* : 네.
> *Cl 2* : 그래서 가까운 병원에서 CT를 검사했습니다.
> *Co 2* : 예, CT검사를 하셨군요
> *Cl 3* : 네. 조영제라는 주사를 맞고 2회 검사했습니다.
> *Co 3* : 2회, 하셨군요.
> *Cl 4* : 네. 그런데, 방사선에 피폭된 것이 마음에 걸려 인터넷으로 찾아보니 CT는 피폭량이 많다고 쓰여져 있어 걱정이 되었습니다.
> *Co 4* : 걱정이 많이 되셨군요.
> *Cl 5* : 병원에 가서 의사에게 물어 봤는데 괜찮다는 말만했습니다. 하지만 정말로 괜찮은지, 신경이 쓰여 어찌 할지 모르겠습니다.
> *Co 6* : 주치의가 괜찮다고 말했다면, 정말 괜찮겠지요. 걱정이 된다면 무엇이 걱정입니까?
> *Cl 7* : 장래에 암이나 백혈병에 걸리지 않을까하는 걱정이 됩니다.
> *Co 8* : CT검사를 한 것 때문에 앞으로 암이나 백혈병에 걸리지 않을까 걱정되시는군요.
> *Cl 9* : 네, 그렇습니다.
> *Co 10* : 왜 장래에 암이나 백혈병에 걸린다고 생각하십니까?
> *Cl 10* : [침묵(5분간)] 조금 전의 신문에서 CT검사 때문에 암이 증가되었다는 기사를 보았고, 인터넷에서도 CT검사는 다른 검사에 비해 피폭량이 많아서 될 수 있으면 검사를 하지 않는 것이 좋다고 나왔습니다.
> *Co 11* : 「 」

a. *Co 1* – 가벼운 응대
b. *Co 2* – 감정적인 응대
c. *Co 4* – 업무적인 응대
d. *Co 8* – 의미있는 응대
e. *Co 8* – 간단한 응대

가) a, b, d
나) a, c, e
다) b, c, d
라) b, c, e

73. [문제 72]의 상담 상황에서 *Co 11* 의 「 」에 들어갈 상담자(counselor)의 응답으로 옳지 **않은** 것은?

가) 신문 기사나 인터넷에 쓰여져 있는 것을 무조건 믿으세요?
나) 신문 기사나 인터넷을 보지 않았다면, CT검사를 하여도 암이나 백혈병에 걸리지 않을 거라 생각 하셨겠지요.
다) 어떠한 것이 쓰여져 있었는지, 좀 더 자세하게 이야기해주실 수 있겠습니까?
라) 응응. (아무것도 말하지 않고 응대)

74. [문제 72]의 상담 상황에서 *CI 10* 의 환자(client)의 5분간의 침묵에는 어떠한 의미를 담고 있는가?

가) 대충 이야기해 끝내고, 만족감을 느낀다.
나) 어째서 그런 일을 묻는 걸까? 당황하고 있다.
다) 자신이 이상한 것을 말하지 않았나 생각해 위축되어 있다.
라) 자신이 어째서 그렇게 생각하기 시작했는지를 생각하고 있다.

75. 원자로에서 사용되는 우라늄 연료로 옳지 **않은** 것은?

가) 우라늄 234
나) 우라늄 235
다) 우라늄 238
라) 우라늄 239

76. 원자로내 핵분열 생성물로 옳은 것은?

가) 우라늄
나) 토륨
다) 트리티움
라) 라돈

77. 원자로에 대한 내용 중 옳지 **않은** 것은?

가) 경수로에는 가열 수로와 가압 수로가 있다.
나) 고속 증식로의 냉각제에는 나트륨이 사용되고 있다.
다) 원자로의 심층 방어는 미국에서 도입한 개념이다.
라) 원자로에서 연쇄 반응을 계속할 수 없게 된 연료는 재 이용할 수 없다.

78. 원자력 발전소의 설치에 대해 옳지 **않은** 것은?

a. 연료 운반의 편리를 위해 공항의 근처에 설치
b. 원칙으로서 정기항공로로부터 멀어진 위치에 설치
c. 암반 위에 설치

가) a
나) b
다) c
라) a, b, c

79. 다음 중 옳지 **않은** 것은?

가) 적도에서는 자연 방사선량이 크다.
나) 난기와 한기의 경계선에 전선면이 생긴다.
다) 풍향은 바람이 불어 오는 방향을 말한다

라) 저기압과 저기압의 사이는 이동성 고기압이 된다.

80. 다음 중 국지풍으로 옳지 **<u>않은</u>** 것은?

가) 해륙풍
나) 편서풍
다) 산풍과 곡풍
라) 푀엔(foehn)

1. Which of the following is true about characteristics of sound-wave?

A) Mechanical, transverse

B) Mechanical, longitudinal

C) Non-mechanical, longitudinal

D) Longitudinal, transverse

2. Which of the following is true about characteristics of ultrasound?

A) Air faster than liquid

B) Liquid attenuated bigger than air

C) Sound wave is transmitted of the bone and has lower attenuation

D) When the frequency is higher, transmit depth is lower.

3. Which of the following has the highest speed of sound?

A) Air

B) Muscle

C) Liquid

D) Bone

4. Unit for intensity in the field of an ultrasound transducer is?

A) Watts

B) dB

C) lb/cm²

D) Watts/cm²

5. Which of the following is the ratio of pulse duration and the period?

A) Duty factor

B) Spatial pulse length

C) Pulse repetition period

D) Pulse repetition frequency

6. Which of the following is NOT a feature artifact?

A) Comet tail

B) Edge shadowing

C) Ring down

D) Mirror image

7. Which of the following below has the lowest attenuation coefficient?

A) Lung B) Water C) Liver D) Fat

8. Which of the following is true about matching layer?

A) Located crystal posterior region

B) Normal thickness in wavelength 1/4

C) During the increasing thickness and then sensitive is more decrease.

D) During the increasing thickness and then axial resolution is decrease

9. If the patient has GB stone, what can be used the physical phenomenon about diagnostic results?

A) Acoustic enhancement

B) Acoustic shadowing

C) Reverberation

D) Ring-down

10. Which of the following is the reason for edge shadowing the cyst?

A) Absorption

B) Scattering

C) Refraction

D) Reflection

11. Which of the following is NOT true about the method that makes NEAR FIELD longer?

A) Increase the diameter

B) Shorten the cycle

C) Enhance the frequency

D) Focus the sound

12. What is the purpose of focusing the sound for?

A) For better the axial resolution

B) For longer the near field.

C) For bigger the beam divergence

D) For better the lateral resolution

13. Which of the following is true about the DR (dynamic range)?

A) Controls the echo texture according to the depth.

B) Decides extend of echo texture according to the displaying monitor.

C) Adjusts the overall echo intensity.

D) Controls focal legion by the sweeping.

14. Which of the angle is NOT producing Doppler shift?

A) 0°

B) 45°

C) 60°

D) 90°

15. Which of the following producing artifacts is made from diaphragm echo?

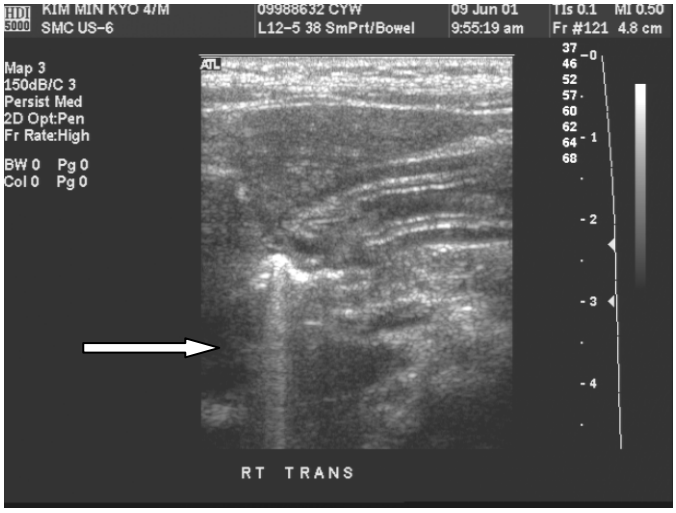
A) Side lobe artifacts

B) Posterior acoustic shadowing

C) Reverberation

D) Mirror effects

16. Which of the following is a feature of marked arrows?



A) Ring down

B) Reverberation

C) Side lobe

D) Comet tail

17. This is the evaluation of performance in ultrasound equipment. What are the arrows indicated for?

A) Axial resolution

B) Lateral resolution

C) Focal zone resolution

D) Dead zone resolution

18. Which of the following is for the region without reflection echo?

A) Echogenic

B) Echo-free

C) Hyperechoic

D) Isoechoic

19. Which of the following is NOT related with the kidney image?

A) Hydronephrosis
B) Posterior shadowing
C) Caused by hematuria
D) Chronic renal disease

20. Which of the following is NOT true about liver cirrhosis?

A) Ascites
B) Bleed of vein
C) Coma of liver
D) Dysuria

21 Which of the following is NOT associated with sonographic findings in liver cirrhosis?

A) Contour irregularities

B) Increase of echogenicity

C) Increase of the number of vessels visualized

D) High attenuation

22. Which of the following is a disease of pediatric liver?

A) Hepatoblastoma
B) Metastatic disease
C) Polycystic liver and kidney disease
D) Hepatic fibrosis

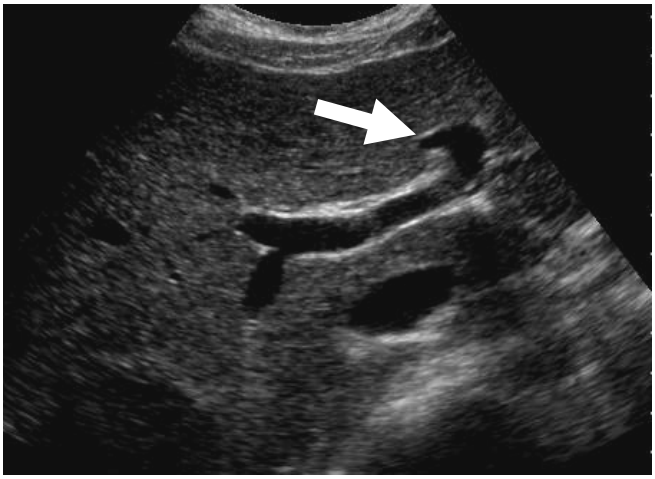
23. Which of the following is NOT true the difficulty diagnostic of choledocholithiasis ?

A) GB collapse
B) Non shadowing stone
C) Floating stone
D) Stone is located in body dependent portion

24. Which of the following is correct the explanation about the indicated arrow?

A) This is located in almost the same axis level of middle hepatic vein.
B) This is the landmark to classify the right and the left lobe.
C) This is coincided with Cantle's line which is connecting with gallbladder and IVC.
D) This is located in the upper area of left lobe.

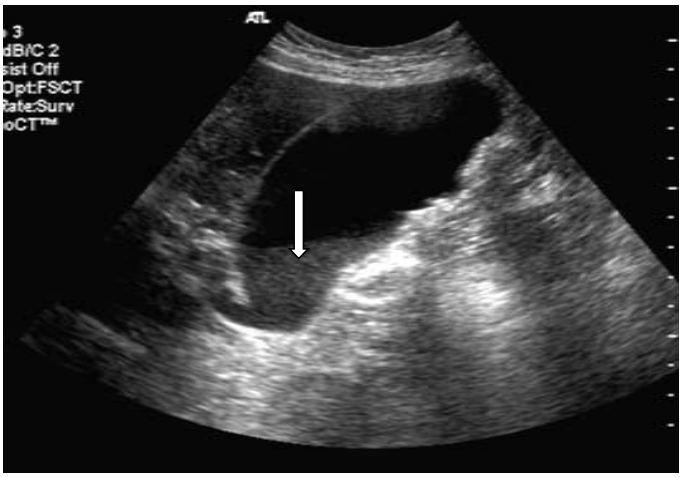
25. What is the indicated arrow?



A) Common bile duct
B) Umbilical portion
C) Hepatic vein
D) Porta hepatis

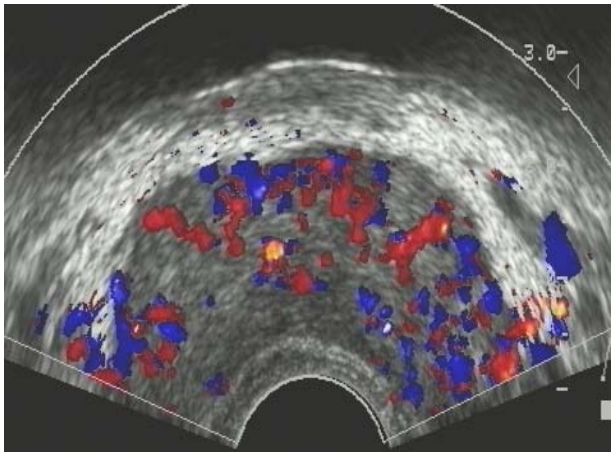
26. Which of the following is NOT the reason for GB wall thickening?
A) Contraction of normal GB
B) Inadequate TGC and Gain
C) Adenomyomatosis
D) Ascites

27. What is the indicated arrow?



A) It is sandy stone and is changed depends on the position
B) It depends on exam direction changed the fundus artifact
C) Sludge bile makes the parallel to fundus level by the changed position.
D) GB Carcinoma's position is not changed.

28. The sonographic finding of prostatits can NOT be seen?

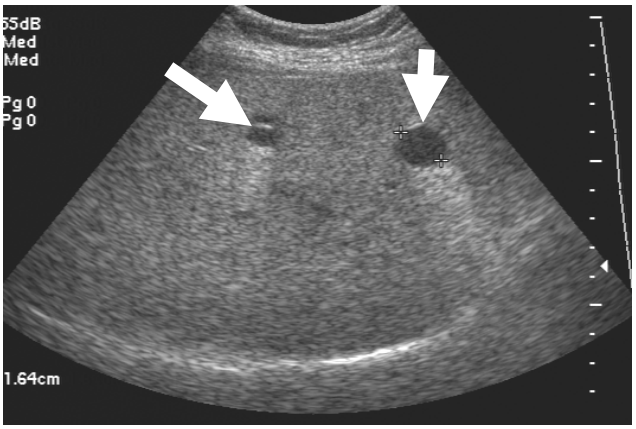


A) Can observe the moderate enlargement with poor margination.
B) Prostatic Cancer can be diagnosed if the asymmetric gland shape and echo-poor mass pattern are shown
C) Prostatic malignancy is similar with echo-texture
D) Increased blood pattern can be seen by color Doppler examination

29. Which of the followings are the reasons for reasplenic infarction EXCEPT.
A) Splenomegary
B) Thrombose
C) Pancreatitis
D) Leukemia

30. There are 3 branches of the celiac axis EXCEPT.
A) Common hepatic artery
B) Lt. gastric artery
C) Splenic artery
D) Superior mesenteric artery

31. Which of the following is NOT true about the pointed arrows?



A) Internal material is fluid.
B) Observed Posterior enhancement
C) Diagnosed as hemangioma
D) Has Oval shape and benign tumor

32. Where is proper position for measuring the BPD?
A) Outer to outer edge
B) Outer to inner edge
C) Inner to inner edge
D) Outer to mid edge

33. What ascites is caused by the shortage of?
A) Albumin
B) Fibrinogen
C) Heparin
D) Prothrombin

34. When the scanning the Abdominal transverse, where is the best position for observing Left Renal Vein?
A) In front of IVC
B) Behind the Aorta area
C) Between the SMA and Aorta
D) Between the IMA and IVC

35. The followings are consisted of collecting systems EXCEPT
A) Ureter
B) Renal pelvis
C) Minor calyces
D) Major calyces

36. What is the same meaning with echolucent?
A) Sonolucent, echogenic
B) Hyperechoic, echogenic
C) Anechoic, hyperechoic
D) Anechoic, sonolucent

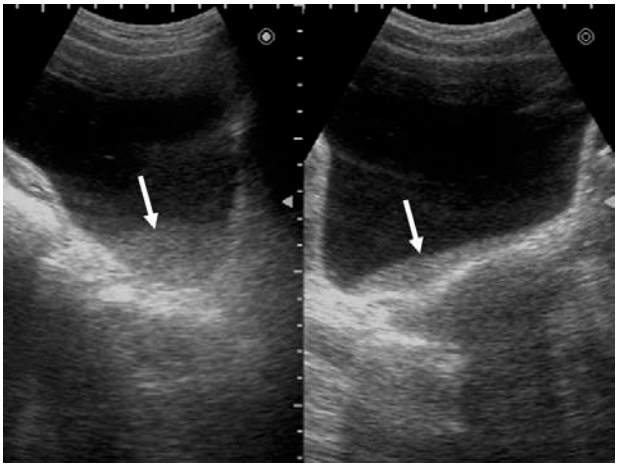
37. What is the tumor maker for diagnosing the prostate cancer?
A) AFP
B) PSA
C) HCG
D) ALP

38. Which of the following is NOT true about below image?

A) Parallel channel sign
B) Dilated in intra hepatic duct
C) Abnormal gallbladder
D) Elevated bilirubin

39. Which of the following is NOT true about the nephritis ?
A) Acute – fever, back pain, cystitis
B) In chronic – acute has same symptoms
C) 80% acute is E-coli.
D) Ureter obstruction, ureter stone, ureter tumor, pregnancy

40. Which of the following is NOT true about the bladder image below?



A) After surgery.
B) Hemorrhagic of cystitis
C) Position change required
D) High frequency transducer

41. In sonographic diagnostic, Which one of the following is for acute hepatitis EXCEPT.
A) Enlarge of liver
B) Increased of parenchymal echo texture
C) Portal vein branch brighter is seen
D) Gallbladder wall thickening

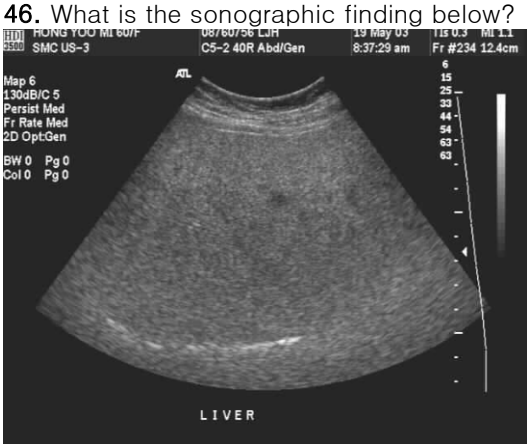
42. Which one following below is the nearest strap muscle from the THYROID lateral lobe?
A) Sternohyoid
B) Sternothyroid
C) Omohyoid
D) Anterior scalene

43. Which one is not the symptom about the shortage of thyroxine?
A) Nervousness
B) Weight loss
C) Hypertension
D) Bradycardia

44. Which of the following is related with spermatic cord EXCEPT.
A) Testicular artery
B) Ductus deferens
C) Mediastinum testes
D) Pampiniform plexus veins

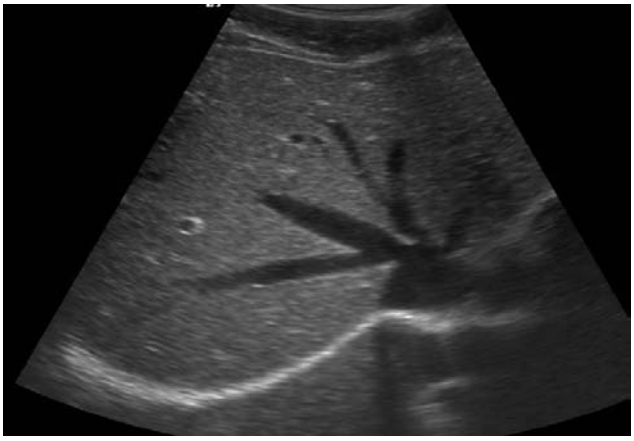
45. Which of the following is NOT accompanied with ascites?
A) Liver cirrhosis B) Congestive heart failure
C) Nephritic syndrome D) Adenomyomatosis

46. What is the sonographic finding below?



A) Adenoma B) Abscess
C) Calcification D) Fatty liver

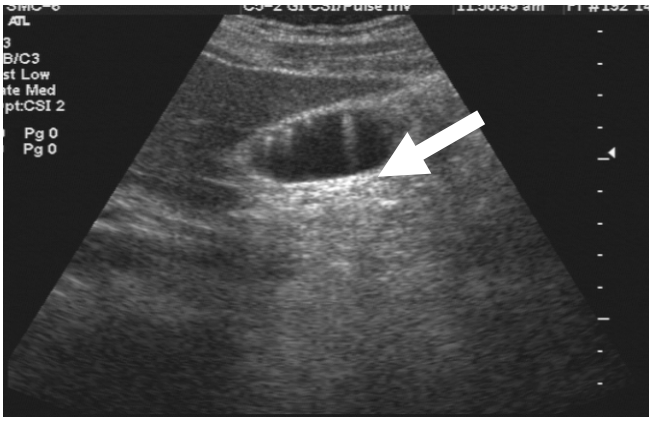
47. Which one of the following is NOT true?



A) Porta hepatis
B) Liver echo texture is homogeneous.
C) Not seen hepatic artery
D) Middle hepatic vein.

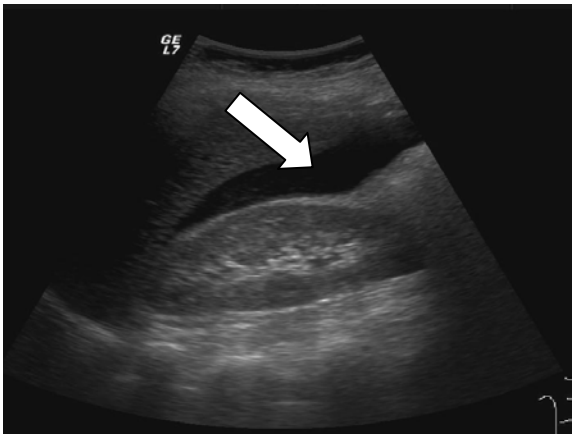
48. After taking meal, this enable bile juice to letout to the duodenum. What is this ?
A) Glycogen
B) Insulin
C) Carboxypeptide
D) Cholecystokinin

49. Which of the following is NOT related with pointed GB IMAGE?



A) Rokitansky Aschoff sinuses
B) Adenomyomatosis
C) Obstruction
D) Ring down artifact

50. Identify the anatomical structure labeled arrow



A) Cul-de-sac
B) Morison's pouch
C) Douglas pouch
D) Lesser sac

51. Where is "spiral valve of Heister" located ?
A) Common bile duct
B) Cystic duct
C) Gallbladder
D) Common hepatic duct

52. Which of the following is NOT true about chronic cholecystitis?
A) Porcelain GB
B) Adenomyomatosis
C) Emphysematous cholecystitis
D) GB cancer

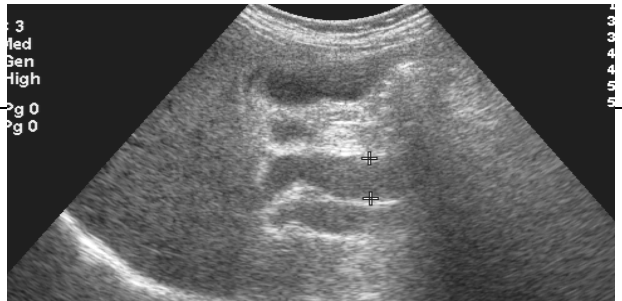
53. Which one of the following is correct about gallbladder polyp ?
A) This is a kind of malignant tumor
B) This is attached GB wall.
C) It has posterior acoustic shadow
D) Diameter is more than 1cm, it is mono type

54. What's the landmark of gallbladder when it is not visualized gallbladder?
A) Superior mesenteric artery
B) Common hepatic duct
C) Ligamentum venosum
D) Main lobar fissure

55. Which of the following is NOT correct about image?

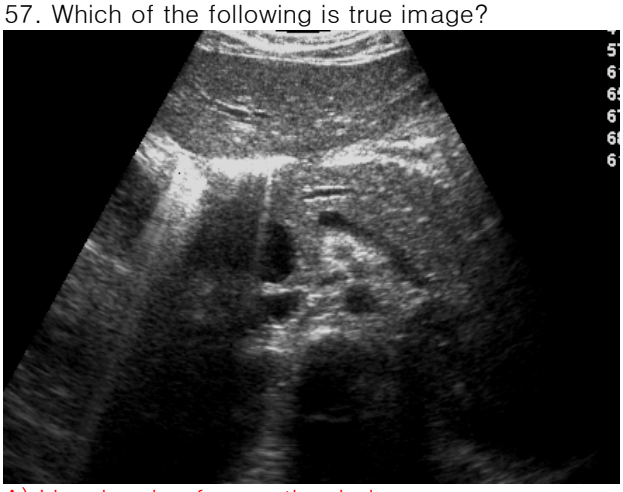
A) Visualized reverberation artifact
B) Longitudinal image
C) Porcelain GB image
D) Visualized junctional fold by GB

56. Which of the following is NOT correct about image?



A) Cause of portal vein
B) Pancreas head cancer
C) Abnormal intrahepatic duct
D) Ampullar of Vater's cancer

57. Which of the following is true image?



A) Liver is role of acoustic window .
B) Pancreas function
C) Double bleb sign
D) Low frequency probe

58. Which of the following is NOT true about the finding of cavernous hemangioma sonographic?
A) Always seen as echogenic
B) Distinguished a hepatoma
C) Well defined the tumor and internal was seen as anechoic.
D) Seen as a single or multiple lesions

59. Which one of the following is true about Budd-Chiari syndrome?
A) Cause of obstruction portal venous flow
B) Cause of obstruction hepatic venous flow
C) Always obstruction IVC
D) Shrunken of the liver

60. Which one of the following is NOT true about OB/GYN examination?
A) Yolk sac can be seen at 1'st trimester
B) Can find the fetal age by measuring CRL, BPD, FL.
C) Fetus has lung breathing during the prenatal period.
D) Two umbilical veins are seen normally.

61. Which of the following is NOT true about kidney anatomy?
A) Kidney consists of sinus and cortex
B) Cortex includes nephron- the kidney's functional unit.
C) Urine excretes in order to minor renal calyx-major renal
calyx-pelvis of kidney
D) Renal sinus consists of blood vessel, fat, lymph, vessel and collecting system

62. Pancreatic pseudo cyst is occurred from intra and extra pancreas each. What's the most likely occurred location in the extra pancreatic
A) Porta hepatic
B) Mediastinum
C) Greater sac
D) Lesser sac of anterior pararenal space

63. what splenic variation can be seen after splenectomy?
가) Accessory spleen
나) Born-again spleen
다) Wandering spleen
라) Upside-down spleen

64. Which of the following is most commonly occurred for 1years to 3 years Solid tumor?
A) Hepatoblastoma
B) Wilm's tumor
C) Renal cell carcinoma
D) Transitional cell carcinoma

65. Which of the following is the reason for compression abdominal wall at pancreatic ultrasonography?
A) Pancreatic anterior to posterior width is seen
B) Reduce of ultrasound beam scattering
C) For the observation splenic vein

D) Move the air in the gastric tract and observe the pancreas more closely.

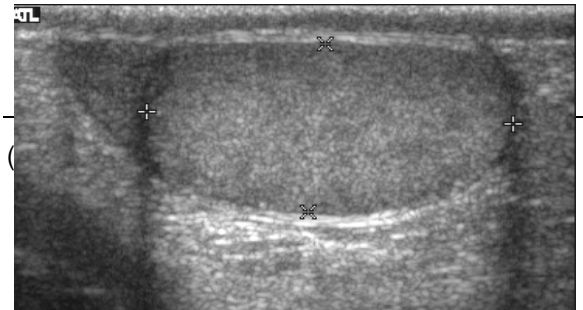
66. Which of the following is NOT true about uterine adenomyosis?
A) Endometrial tissue in the myometrium
B) Commonly occurred at pubertal stage
C) Most commonly, anterior wall is thinner than posterior wall
D) Seen as diffuse or focal type

67. The following is Rt. subcostal scan image, What the Arrow is pointed?

A) Pancreas head
B) Esophagus
C) Duodenum
D) Dilatation of CBD

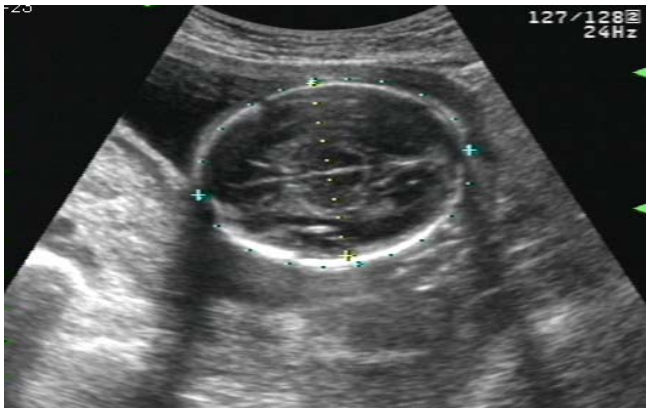
68. Which of the following is NOT correct about malignant bladder tumor?
A) Most of malignant bladder tumor is squamous cell carcinoma
B) Most of symptoms are painless hematuria
C) It is required to take a cystoscopy and biopsy for the exact diagnose
D) It is required to changing position for diagnosing whether the mass seen is the blood clot or not.

69. Identify the anatomical structure that is pointed arrow



A) Seminoma
B) Mediastinum
C) Testis
D) Epididymis

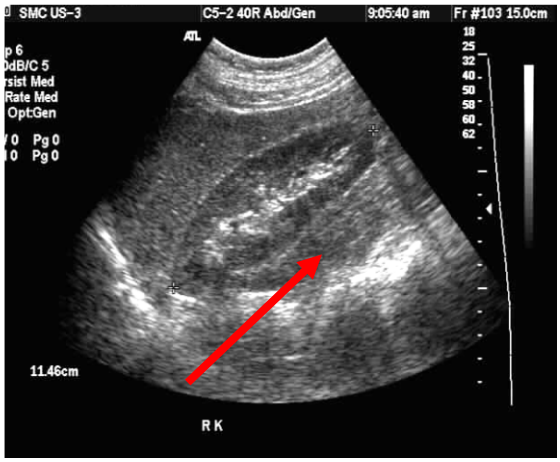
70. Which of the following is NOT true about image?



A) BPD, OFD, HC measurement image
B) Transthalamic plane image
C) Can be Known the fetal age
D) Transabdominal image

71. Which of the following is NOT true about the abdominal Aorta?
A) Flows to the inferior and heading to the posterior of the body
B) Vessel diameter becomes narrow toward the inferior.
C) The origin of the Abdominal vessel is celiac axis
D) Tunica media is thicker than IVC wall.

72. The arrow is pointed for?



A) Ascending colon
B) Right ureter
C) IVC
D) Quadratus lumburum muscle

73. Which of the following is true about normal follicles growing stages?
A) Follicle – Corpus luteum – Corpus albicans
B) Corpus luteum – Follicle – Corpus albicans
C) Follicle – Corpus albicans – Corpus luteum
D) Corpus albicans – Follicle – Corpus luteum

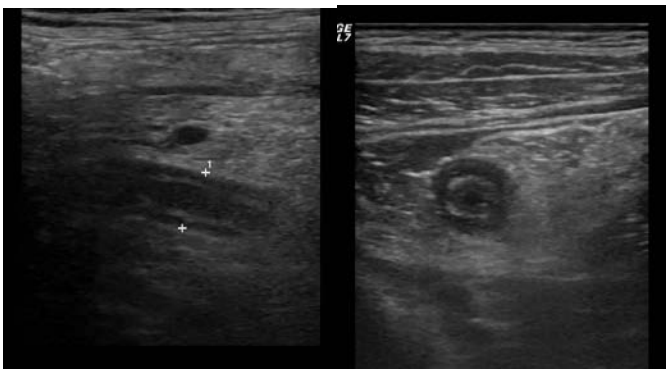
74. Which of the following is NOT correct about this image?

A) acquired by radial transducer.
B) Must use latex cover to prevent the inflammation
C) For confirming cancer invasion
D) A kind of electronic linear transducer

75. Which of the following is NOT correct about simple cyst?
A) Round or ovoid type
B) Well-defined wall
C) Anechoic, echo-free
D) Posterior sonic attenuation

76. Which of the following is NOT correct about transducer for infants?
A) The various ranges of transducers is required depends on body shape.
B) Generally, 5MHz transducer is used at first
C) Low MHz transducer is used for new-born
D) 3.5MHz transducer is used for obesity infant

77. Which is the most related with disease?



A) Appendicitis
B) Ileus image
C) Colitis image
D) Diverticulitis image

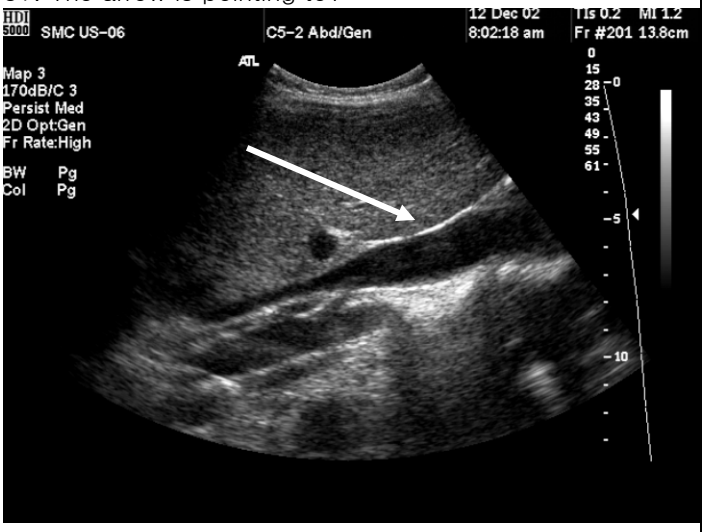
78. Which one of the following is commonly occurred Pancreatic malignant mass & ultrasound finding?
A) Islet cell tumor, hypoechoic
B) Mucinous cystadenoma, hyperechoic
C) Adenocarcinoma, hyperechoic
D) Adenocarcinoma, hypoechoic

79. At the Normal patient's Doppler waveform, which of the following below is NOT affected by respiration?
A) Hepatic vein
B) Portal vein
C) Carotid artery
D) IVC

80. Which of the hydronephrosis is NOT considered as

external factor?
A) Renal stone
B) Uterine fibroid
C) Pregnancy
D) Ovarian neoplasm

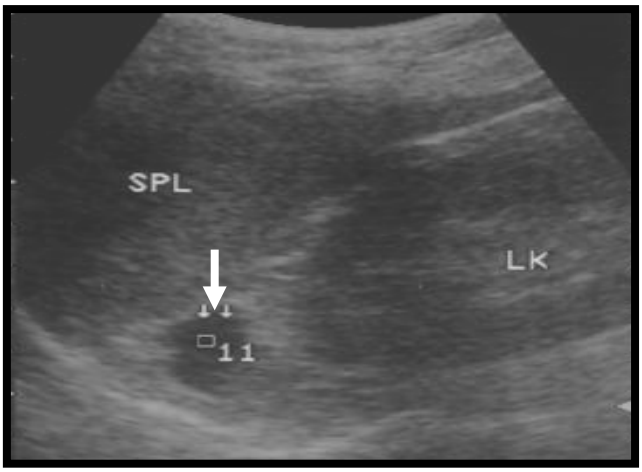
81. The arrow is pointing to?



A) Aorta
B) Inferior vena cava
C) Left hepatic vein
D) Main portal vein

82. Which of the following is associated animal with echinococus granulosus?
A) Pig B) Cow C) Dog D) Cat

83. Arrow is pointing to?



A) Spleen B) Lt. adrenal gland
C) Kidney D) Retroperitoneum

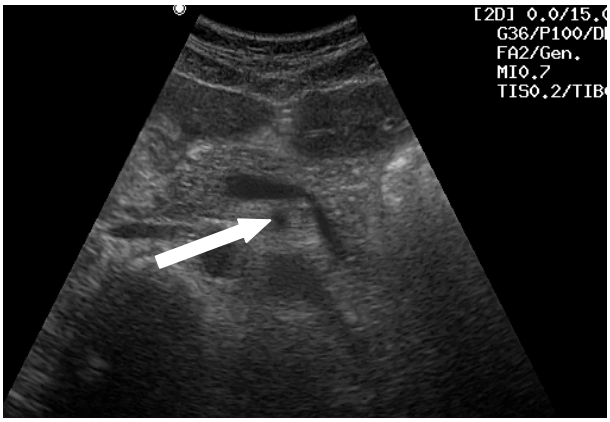
84. Which of the following is NOT true about peri-pancreas anatomy?
A) Pancreas head is located anterior of IVC
B) CBD is located postero-lateral portion of Pancreas head
C) SMA & SMV is located posterior of Pancreas neck
D) Pancreas head is located on the lateral side of Duodenum 2nd portion

85. Which of the following is NOT true about pitfall of suspicious aortic aneurysm?
A) Severely Skinny patient
B) Serious scoliosis or kyphosis patient
C) Abdominal fat of obese patient
D) Horseshoe Kidney patient

86. Which of the following is NOT associated with acute scrotitis?
A) Testis torsion
B) Epididymitis
C) Testis infarct
D) Varicocele

87. Which of the following is not associated with retroperitoneal organ?
A) Kidney B) Pancreas
C) Liver D) Prostate

88. The arrow is pointing to?



A) Aorta B) SMA
C) SMV D) IVC

89. What is the limitation splenomegaly?
A) 8cm B) 10cm C) 12cm D) 14cm

90. Which of the following is not true the reason for formation of the thrombosis?
A) Slow flow
B) Decrease of RBC
C) Vessel wall damage
D) lower production of Heparin

시험이 끝났습니다.
수고하셨습니다.