

SUBJECT 1 - ALARA

1. The (ICRP) introduced the "As Low As Reasonably Achievable" (ALARA) principle in:
A 1960 B 1989 C 1977 D 1972

2. The US Nuclear Regulation Commission recommends that the total exposure of the fetus during pregnancy should be less:
A than 2.0 mSv B than 5.0 mSv C than 1.0 mSv D than 7.0 mSv

SUBJECT 2 - MEASURING RADIATION DOSE

3. Determination of the energy --- matter by radiation is the subject of dosimetry.
A squared in B duplicated in C imparted to D lost from

4. Several of the changes produced in matter by radiation are proportional to the absorbed dose.
A True B False

5. When a(n) --- particle - for instance an X ray photon - interacts with matter, part of its energy is transferred in various interaction events.
A hydrogen-based B carbon-based C uncharged D relatively massive

6. The physical, non-stochastic quantity --- is related to the energy transferred from uncharged particles to matter.
A joule B kerma C electronvolt D mAs

7. The collision kerma results in ionization and --- of atoms in matter.
A excitation B deadening C slowing D departure

8. Photons in the diagnostic energy range are \leq :
A 150 keV B 120 keV C 100 keV D 80 keV

9. As the photon interactions occur, electrons are liberated, contributing to the --- of the energy imparted.
A gradual decline B stasis C sharp decline D growth

10. Conditions that guarantee the CPE include that the medium is homogenous in:
A neither atomic composition nor mass density B both atomic composition and mass density C only atomic composition D only mass density

11. The development of the Bragg-Gray theory began in:
A 1910 B 1920 C 1915 D 1972

SUBJECT 3 - IMAGE QUALITY AND RADIATION DOSE IN CT

12. All CT scanners have patient positioning lights which identify the tomographic plane, often referred to as the:
A CT lights B sharp lights C internal lights D interior lights

13. The external patient positioning/marking lasers consist of three sets of lasers: axial, --- and sagittal.
A oblique B lateral C coronal D cross

14. The relationship between the external lasers and the CT tomographic plane should be accurate to within --- mm.
A 2 B 5 C 7 D 10

15. The --- unit scale is the accepted scale on all modern CT units.
A Havectury B Havershum C Hounsun D Hounsfield

16. The CT number for water is ---- HU.
 A -1000 B -100 C 0 D 1000
17. The CT number for air is ---- HU.
 A -1000 B -100 C 0 D 1000
18. In CT, ---- artifacts tend to be caused by inconsistencies in neighboring projections.
 A streaking B shading C ring D aliasing
19. In CT, ---- artifacts tend to be due to inappropriate beam hardening corrections.
 A streaking B shading C ring D aliasing
20. In CT, the partial volume effect can be considered as a type of blurring of the ---- axis.
 A x B s C y D z
21. The early development of the CTDI started when the slice width of a CT scanner was typically ---- or less.
 A 3 mm B 5 mm C 10 mm D 7 mm
22. A DICOM standard supplement was issued in ---- for the reporting of dose parameters in CT.
 A 2007 B 2010 C 2001 D 2011

SUBJECT 4 - QA FOR PATIENT DOSE IN CT

23. The CT number for air is preferably in the range -1000 ± 10 , but the study indicated that ---- out of 18 met that criterion.
 A 15 B 13 C 10 D 7
24. The specification for CTDI_w for the general chest CT is that it should be less than ---- mGy.
 A 20 B 30 C 40 D 50

SUBJECT 5 - BASIC PRINCIPLES OF QA IN CT

25. It is recommended that the radiologist review the radiographer's test results at least every:
 A 2 months B 6 months C year D 3 months

SUBJECT 6 - RADIATION PROTECTION IN CT

26. The use of radiation for medical diagnostic examination contributes over ---- of human made radiation.
 A 64% B 78% C 83% D 95%
27. Clinical audits have found a disturbing incidence of inappropriate use of CT, to the degree of at least ---- of scans.
 A 17% B 8% C 25% D 10%
28. Whole body scans in just a few seconds with submillimetre spatial resolution are possible today.
 A True B False
29. From the early ----, 120 kV was the commonly used voltage value since the respective technology was available.
 A 1960s B 1970s C 1980s D 1990s
30. Contrast enhanced CT coronary angiography can be carried out at dose levels reduced by ---- in small and medium sized patients when reducing the voltage to 80 kV.
 A 10-20% B 40-50% C 20-30% D 30-40%
31. A 2009 NCRP report estimates that ---- of CT examinations in the United States of America are performed on children.
 A 8-10% B 10-22% C 3-5% D 6-7%
32. The DRLs (diagnostic ---- levels) of paediatric CT showed a decreasing trend over time.
 A relative B responsible C reference D referred

33. ---- is the most common expression of CT dose.

- A CTDI B CQRI C RTDI D DDCT

34. Modern CT scanners permit modulation of the tube current (mA) in the angular (x-y axis) and the longitudinal (---- axis) directions.

- A z B q C r D t

SUBJECT 7 - QA CONTROL TESTS IN CT

35. CT manufacturers usually require a daily startup procedure to calibrate the detectors and check the operability of the system.

- A True B False

36. The ---- projection radiograph (SPR) is used by the radiographer to prescribe the start and finish of a CT acquisition series.

- A supine B straight C scan D startup

37. In testing the CT number accuracy for water, a tolerance of ---- from the baseline value is acceptable.

- A +/- 20 B +/- 15 C +/- 5 D +/- 10

38. In assessing the accuracy of measured dimensions, tests should be repeated every:

- A 2 months B 6 months C year D 3 months

39. For the measurement of noise, the diameter of the ROI should be approximately ---- of the diameter of the image of the phantom and the ROI should be placed in the centre.

- A 20% B 40% C 60% D 15%

40. The aim of the linearity test is to assess CT scanner performance for imaging materials of different:

- A absorbance B mass C weight D volume

41. Regarding linearity tests for radiotherapy applications, the tolerance is ---- from the baseline value.

- A +/-10 HU B +/-20 HU C +/-30 HU D +/-25 HU

42. The X ray beam width test can determine the extent of overbeaming (i.e. the difference between the ---- and beam width).

- A image width B phantom part width C scatter width D plate width

43. In testing spatial resolution for resolution patterns (e.g. bars, rods), ---- is (are) appropriate.

- A resolution goggles B a radiologist's review C visual analysis D analysis software

44. In assessing spatial resolution, the test is performed during acceptance and after changes that affect imaging.

- A True B False

SUBJECT 8 - QA TESTING FOR THE CT TECHNOLOGIST

45. The tolerance of an SPR (scoutview) in CT has an acceptable range of:

- A +/- 2 mm B +/- 15 mm C +/- 5 mm D +/- 10 mm

46. In analysis, the CT number is the measured ROI mean value and the noise is the ROI standard deviation.

- A True B False

47. Increased image noise can result from selection of inappropriately ---- or mAs, or both.

- A high kV B low SID C high gantry angulation D low kV

48. Image display and printing analysis employs the use of ---- inset patches.

- A 35% and 75% B 15% and 65% C 5% and 95% D 10% and 85%

SUBJECT 9 - ADVANCEMENTS IN CT SAFETY

49. ----beam computed tomography (CBCT) is a medical imaging technique that uses X-rays to generate three-dimensional (3D) images of the body.

- A Central B Cloud C Cone D Contained

50. Patient----- dose optimization (PSDO) is a technique used in medical imaging to tailor the radiation dose received by the patient based on their size, shape, and anatomy, as well as the imaging procedure being performed.

- A scan B screen C stage D specific

51. The benefits of PSDO include reduced radiation exposure by up to ---, improved image quality, and increased efficiency.

- A 50% B 40% C 30% D 20%

SUBJECT 10 - QA FOR SPECT/CT

52. --- is the ability to centre an energy window over a radionuclide's gamma or X ray emission photopeak that is used for imaging.

- A Cresting B Tipping C Overlaying D Peaking

53. The MHR (Multiple Head ---) test is used to ensure that each detector head in a multiple detector SPECT system samples the same volume.

- A Reference B Registration C Rotation D Resolution

54. The dosimetric quantity for CT is the computed tomography dose --- (CTDI).

- A inference B indication C index D incidence

SUBJECT 11 - QA SCINTILLATION CAMERAS

55. In an analog camera, the pulses from all the photomultipliers are electronically processed after passing through a preamplification stage.

- A True B False

56. Regarding pulse arithmetic circuits, a drift of one amplifier will cause a round object to give a(n):

- A square image B round image C oval image D shadow-like image

57. Regarding analogue input, special line driver circuits are commonly used to drive the --- scintillation camera signals to the computer.

- A high power B erratic power C interval D low power

58. Regarding camera performance, test protocols for reference tests have been developed by the American Association of:

- A Certified Radiologists B Imaging Administrators C Physicists in Radiology D Physicists in Medicine

59. Energy --- describes the capability of the scintillation camera to distinguish between photons of different energies.

- A reference B resolution C differentiation D indexing

60. The count --- performance of a scintillation camera describes the non-linearity in the relationship between the count rate and the intensity of incident gamma radiation on the crystal surface.

- A rate B reduction C skip D interval

61. The --- of data collection describes the capability of the camera-computer system to partition data accurately into the desired temporal segments or frames.

- A interval accuracy B timing accuracy C periodic accuracy D segment accuracy

62. Detector head shielding leakage is a measure of the --- of the lead shielding incorporated in the detector head.

- A existence B excess C adequacy D type

63. The count rate in any test, unless otherwise specified, should not exceed 10,000 counts in cameras manufactured before:

- A 1975 B 1987 C 1980 D 2010

64. Computer timing in dynamic acquisition should be performed:

- A every 2 years B weekly C yearly D half yearly

65. If any or all preset energy windows appear maladjusted, this would suggest an incorrect energy calibration of the system.

- A True B False

66. In digital analysis the central field of view (CFOV) is the area defined by scaling all linear dimensions of the UFOV by a factor of:
- A 75% B 30% C 40% D 70%
67. The test of system flood field uniformity involves the use of a flood phantom containing ---- MBq of ^{99m}Tc in solution.
- A 200-400 B 500 C 700-900 D 100-200
68. The test of system spatial resolution is carried out in terms of the FWHM of its ---- spread function.
- A circular B line C efficiency D maximum
69. If a value for the FWHM is obtained that is ---- or more above the manufacturer's worst case value for the collimator in question, the collimator should be replaced.
- A 7% B 10% C 20% D 5%
70. (Regarding the test of system spatial resolution and spatial linearity) Ideally, the matrix size and zoom should be chosen so that there are ---- sampling points within the FWHM.
- A 2 B 5 C 7 D 10
71. The test of system ---- tests the count rate response of a scintillation camera to a radionuclide source of known radioactivity.
- A planar sensitivity B ionic sensitivity C spherical sensitivity D magnetic sensitivity
72. The test of collimator hole angulation tests the ---- alignment and angulation for all parallel hole collimators used.
- A septal B incomplete C acute D supplementary
73. The test for intrinsic count rate performance – the decaying source method - takes about ---- days to complete.
- A thirty B two C seven D ten
74. The test of intrinsic count rate performance – two source method - is appropriate for most cameras manufactured before:
- A 1994 B 1996 C 2001 D 2010
75. The test of maximum count rate uses a point source consisting of about ---- MBq (100-500 mCi) of ^{99m}Tc in solution.
- A 1 B 7 C 12 D 4
76. The test of basic computer timing uses radiation source consisting of ^{99m}Tc in solution contained in a small vial placed in an open lead pot with walls and floor about ---- thick.
- A 3 mm B 2 mm C 6 mm D 15 mm
77. Regarding the test of basic computer timing materials, the initial activity should be about ---- MBq (300 mCi).
- A 5 B 10 C 15 D 25
78. The test of basic computer timing is intended to be performed as a reference test at the time of acceptance and at:
- A half-yearly intervals B yearly intervals C biennial intervals D triennial intervals
79. Regarding the test of basic computer timing, a time difference of ---- or greater at either count rate may indicate a failure.
- A 1% B 3% C 5% D 7%
80. For the test of computer timing in dynamic acquisition, time lost between frames should be not more than ---- frame time.
- A 3% of the shortest B 2% of the shortest C 5% of the shortest D 10% of the shortest
81. The test of detector head shielding leakage tests that the detector head of a scintillation camera responds only to radiation incident upon the crystal ---- transmission through the collimator.
- A before B during C either before or during D after
82. The check of energy calibration of PHA is to centre the manufacturer's default PHA window of a scintillation camera on the:
- A photocrest B phototop C photospark D photopeak

83. For the check of energy calibration of PHA data analysis, record the results on a control chart designed to cover an interval of:
 A about 2 months B about 3 months C about 6 months D about 1 year
84. The check of background count rate examines the background count rate of a scintillation camera under the conditions of routine clinical imaging with:
 A gamma radiation B a particular radionuclide C alpha radiation D beta radiation
85. For the check of film handling and processing, the humidity must be sufficiently high to prevent static discharges.
 A True B False

SUBJECT 12 - QA SPECT/CT SYSTEMS

86. SPECT is a modality whose roots were established in the early:
 A 1970s B 1950s C 1960s D 1980s
87. On the advent of systems using the ----, SPECT was recognized as a novel imaging technology.
 A Kuhl gamma camera B Wu gamma camera C Anger gamma camera D Tesser gamma camera
88. As with standard gamma camera imaging, the number of ---- determines the noise properties of the image.
 A crystal plates B acquired counts C angles D radioisotope injections
89. Traditionally, SPECT requires images obtained from ----, which for multiple head systems can be split between each detector.
 A 270 degrees of arc B 180 degrees of arc C 90 degrees of arc D 360 degrees of arc
90. One of the issues with MLEM is that during the iterative process the estimated image can become increasingly:
 A noisy B higher contrast C lower contrast D foggy
91. In emission tomography an external detector measures the distribution of ---- radioactivity.
 A attenuated B in vivo C ambient D externally sourced
92. The potential difference across the CT tube determines the ---- of X ray photons produced.
 A inherent quality B efficiency C maximum energy D minimum energy
93. Up until ----, almost all CT scanners only utilized FBP for image reconstruction.
 A 2005 B 2008 C 2001 D 1999
94. In oncology, many radiopharmaceuticals are specific for tumour physiology.
 A True B False
95. In ----, General Electric was the first of the major manufacturers to release a clinical SPECT/CT system with its Millennium VG Hawkeye product.
 A 1997 B 2001 C 1995 D 1999
96. The three SPECT/CT products from Siemens are the ---- T2, T6 and T16 with 2, 6 and 16 slice CT subsystems, respectively.
 A Tertio B Navstar C Symbia D Starlite

SUBJECT 13 - BASIC RADIATION PHYSICS

97. Two classes of fundamental particle are known: quarks and:
 A liponaids B leptons C levitars D litewhips
98. Rutherford's model of the atom is based on the results of an experiment carried out by Geiger and Marsden in:
 A 1909 B 1915 C 1921 D 1935
99. Protons and neutrons are commonly referred to as ---- and are bound in the nucleus with the strong force.
 A cleonites B nukers C nucleons D nucrones

100. As an energetic electron traverses matter, it interacts with matter through ---- with atomic orbital electrons and atomic nuclei.

- A Coulomb interactions B Columbo interactions C Lagunov interactions D Vasilyev interactions

101. In electron-orbital electron interactions, ionization refers to the ejection of an orbital electron from the ----atom.

- A transitory B deflected C unstable D absorber

102. The photoelectric effect is sometimes referred to as the:

- A light-effect B brilliance-effect C photo-transition D photoeffect

103. In coherent (----) scattering the photon interacts with a bound orbital electron.

- A Rayleigh B Chernenko C Horobets D Moroz

104. The ---- (incoherent scattering) represents a photon interaction with an essentially 'free and stationary' orbital electron.

- A Compton effect B Davies effect C Lee effect D Campbell effect

105. Photonuclear reactions are also referred to as ---- reactions.

- A photolysis B nuc-disintegration C photodisintegration D photo-kinetic

106. In general, the photoelectric effect predominates at high photon energies,

- A True B False

107. In the photoelectric effect vacancies are produced in atomic ---- through the ejection of orbital electrons.

- A voids B nuclei C shells D neutrons

108. Pair production and triplet production are followed by the annihilation of the positron with a 'free' and ---- electron.

- A rapidly moving B slowly moving C stationary D radical

SUBJECT 14 - BASIC RADIOBIOLOGY

109. Broadly speaking, radiobiology is a combination of two disciplines: radiation physics and:

- A chemistry B biology C pathology D radioluminescence

110. ---- cells exist to self-perpetuate and produce cells for a differentiated cell population.

- A Base B Stem C Prokaryotic D Bacterial

111. About ---- of the biological damage by low LET radiations such as X rays or electrons is due to indirect action.

- A one-fifth B two thirds C one third D one half

112. The timescale involved between the breakage of chemical bonds and the biological effect may be hours to years.

- A True B False

113. ---- effects are harm that exposed individuals suffer during their lifetime, such as radiation induced cancers.

- A Genetic B Hereditary C Simbiose D Somatic

114. A ---- effect (tissue reaction) is one that increases in severity with increasing dose.

- A detrimental B determining C stochastic D deterministic

115. Radiation is a known ---- (i.e. it causes birth defects).

- A transduction B turbidity C teratogen D terpene

116. Densely ionizing radiations exhibit a cell survival curve that is almost an exponential function of dose.

- A True B False

117. The effects of radiation on tissue as a function of dose are measured with:

- A kVp B mAs C assays D disease incidence

118. ---- assays measure the reproductive integrity of the clonogenic stem cells in tissue.

- A Functional B Clonogenic C Lethality D Osmolarity

119. In the early days of radiotherapy it was usually assumed that normal cells were less sensitive to single doses of radiation than tumour cells.

- A True B False

120. The presence or absence of molecular ---- within a cell influences the biological effect of ionizing radiation.

- A oxygen B hydrogen C sulfur D chlorine

121. ---- is the process by which cells that are hypoxic become oxygenated after irradiation.

- A Deoxygenation B Hemolysis C Hyperoxygenation D Reoxygenation

SUBJECT 15 - IMAGE OPTIMIZATION IN CT

122. Technical and clinical developments in CT have not, in general, led to a reduction in patient dose per examination.

- A True B False

123. When intrinsically high contrast objects are required for diagnosis, larger noise values can be tolerated without significant loss of diagnostic ability.

- A True B False

124. The lower attenuation of the chest compared with the abdomen or pelvis results in ---- image noise for the same mAs.

- A slightly higher B much higher C lower D fluctuating

SUBJECT 16 - SPECT SYSTEMS

125. ---- refers to a line perpendicular to a projection, going through the volume which is being examined or reconstructed.

- A A projection image B A projection radius C A projection ray D A projection line

126. A ---- is an image formed from a set of projection lines, for some fixed offset, for angles around the object to be reconstructed.

- A t-gram B latent f-gram C projection image D sinogram

127. Position ---- devices are devices whereby information such as angular position and radius of rotation are displayed.

- A data-spread B readout C authentication D biometric

128. ---- uniformity is the uniformity of the reconstruction of a slice through a uniform distribution of activity.

- A Wedge B Tomographic C Intermittent D Rendered

129. A tomographic point source is a conventional point source, preferably small enough so that it can be contained within a:

- A 2 mm sphere B 5 mm sphere C 7 mm sphere D 10 mm sphere

130. The test of tomographic resolution in air is a useful system test to ensure that the centre of rotation of the system has been accurately calibrated.

- A True B False

131. The test of variations of ---- and sensitivity with angle determine the variations in system sensitivity as a function of angular position of the detector.

- A output B attenuation C uniformity D input

132. ---- verifies that the system is performing adequately in a high count study. To estimate the contrast of objects of known size.

- A The total performance test B The total count test C The count-stress test D The total contrast test

SUBJECT 17 - SPECT/CT PHYSICS AND OPTIMIZATION

133. Attenuation is the single biggest factor degrading quantification in SPECT.

- A True B False

134. Attenuation ---- methods require as an input an attenuation map giving the attenuation coefficient in each image pixel.
 A baseband B compensation C allotment D apportionment
135. In SPECT, scatter fractions are in the order of ---- in the brain and 40% or more in the thorax and abdomen.
 A 10% B 40% C 30% D 20%
136. The spatially variant CDR significantly degrades spatial resolution and creates significant ---- (PVEs) for small objects.
 A partial vector effects B partial virtual effects C partial vertical effects D partial volume effects
137. For radionuclides and collimators where septal penetration and scatter are important, ---- can be implemented to include these effects.
 A CRD modelling B DCR modelling C CDR modelling D RCD modelling
138. The ---- is a function of the object shape, size, activity relative to the background and the position in the image.
 A resolution coefficient B recovery coefficient C rendering coefficient D response coefficient
139. Blurring due to ---- is generally smaller or similar in size to CDR blurring and is thus not a major effect.
 A the beating of the heart B deep breathing C side-to-side movement D fast motions

SUBJECT 18 - CAMERA-COMPUTER SYSTEM FOR SPECT

140. With the scintillation camera-computer interface, a computer is required for handling dynamic studies and for tomography.
 A True B False
141. In a purely analogue camera, the X and Y outputs, essentially the same as those used to drive the analogue display, are fed into:
 A DACs B CDAs C CADs D ADCs
142. ---- windowing can be performed by gating the whole process by a signal from the camera's PHA.
 A Color B Output C Energy D Conglomeration
143. Processing in the host computer can be divided into two types: list mode and:
 A redundancy mode B frame mode C transfer mode D rendering mode
144. Energy correction (and ----) can be performed if multiple energy frames exist (e.g. frames for different energy windows).
 A contrast correction B noise correction C blurring correction D scatter correction
145. In a ---- type of ADC, instead of using a single comparator, a separate comparator is used for each voltage level.
 A luminescent B ZAP C redundant D flash
146. The test of ---- is intended to determine whether the digital image of a uniform source of radioactivity is uniform.
 A interface uniformity B visual uniformity C radiation uniformity D rendered uniformity
147. A point source or ---- source is used for the conventional scintillation camera quality control test of uniformity.
 A median B flood C acceptance D random
148. The purpose of the ECG ---- acquisition test is to check that data acquisition is triggered correctly from the ECG signal and that the ventricular volume curve is clinically valid.
 A gated B interpreted C filtered D assisted
149. There are two useful types of data that serve to validate computer programs: validated clinical data and:
 A control data B simultaneous data C simulated data D random data
150. It is recommended that a set of ---- be established or obtained, if possible, for each type of clinical procedure.
 A control data B validated clinical data C simulated data D random data

151. An example of the low level image processing would be that of time-activity curve generation.
 A True B False
152. Automatic ROI algorithms typically fail in about ---- of all cases.
 A 1-5% B 10-15% C 5-10% D 15-20%
153. For patient demographic information, systems have been observed where up to ---- of patient studies were mislabelled.
 A 10% B 20% C 30% D 40%
154. Most colour printers do not give a good rendition of a monitor display and can give rise to false interpretation.
 A True B False
155. Tests of monitor quality, for example, ---- and positioning, are increasingly important with respect to the health and comfort of the users.
 A noise B flashing C graininess D flicker
156. The scintillation camera-computer system's clinical software is sometimes referred to as ---- software.
 A technologist-interactive B applications C visual D user interface
157. ---- plot is made by plotting the difference between the means on the Y axis against the average of the means on the X axis.
 A A Bland-Huems plot B A Bland-Altman plot C A Bleeker-Altman plot D A Bland-Rivet plot

SUBJECT 19 - SPECT/CT PROCEDURES

158. CT images are obtained ---- the SPECT acquisition.
 A more than 1 hour after B directly before C at least 1 hour prior to D immediately following
159. For ¹³¹I-iodide SPECT/CT in thyroid cancer, well differentiated thyroid cancer has an incidence of approximately:
 A 1:20 000 B 1:30 000 C 1:10 000 D 1:4 000
160. Neuroblastoma is the second-most common extracranial solid tumour of childhood.
 A True B False
161. ---- tumours are often localized in the abdomen and it can be difficult to precisely localize a suspicious lesion.
 A Neuroendocrine B Colorectal C Hepatic D SMZL
162. The ---- lymph node is the first node to which lymphatic drainage and metastasis from the primary tumour occur.
 A sentinel B inguinal C cervical D mesenteric
163. The characterization of ---- pulmonary nodules (SPNs) represents an important clinical problem because, although they may be caused by many benign conditions, bronchogenic carcinoma is being increasingly identified as one of the main etiologies.
 A septic B sensitive C solitary D sarcoid
164. An early report by Gayed et al. suggested that SPECT/CT had a significant impact on surgical management of patients in only a limited fraction of patients (---- out of 48 cases in their experience).
 A 1 B 2 C 3 D 5
165. MPI-SPECT soft tissue artefacts are estimated to range between 20% and ---- of patients.
 A 60% B 50% C 40% D 30%
166. Stress/---- MPI is the established imaging modality for non-invasive diagnosis of presence, severity and extent of CAD.
 A rest B delay C perfusion D arterial
167. The presence of CAC is often associated with only insignificant (---- luminal narrowing) coronary stenosis.
 A <70% B <60% C <50% D <40%

168. PCTA with ---- of iodinated contrast medium and dedicated imaging procedures and protocols can directly visualize thromboembolic filling defects as well as pleural effusions.

- A 30 ml B 50 ml C 100 ml D 40 ml

SUBJECT 20 - WHOLE BODY SCANNING AND OPTIMIZATION

169. ---- problems associated with whole body scanning systems will affect the spatial resolution.

- A Around 40% of B Less than 10% of C No D Most

170. The test of ---- time corrections tests that there is no reduction in the count density at the lateral edges of the whole body image.

- A study B exposure C exam D intake

171. The field of view of many scintillation cameras does not span the width of the body of a patient.

- A True B False

SUBJECT 21 - SPECT/CT USE IN AREAS OF MEDICINE

172. Technetium----m-tetrofosmin can be used to differentiate between radiation necrosis and recurrence of gliomas.

- A -99 B -55 C -64 D -12

173. The reported detectability rate of SPECT-CT for PTAs ranges between ---- and 96%

- A 70 B 80 C 90 D 60

174. Regarding calcium scanning performed on SPECT-CT, Calcifications are identified as areas of hyperattenuation of at least 1 mm² measuring more than ---- Hounsfield units (HU).

- A 110 B 130 C 90 D 80

175. One study reported a sensitivity of 96%, specificity of ----, PPV of 77% and NPV of 99% for detecting haemodynamically significant stenosis.

- A 85% B 99% C 95% D 92%

176. Bone SPECT-CT is reported to have a sensitivity of 90% and specificity of ---- in detecting screw loosening.

- A 85% B 90% C 95% D 100%

177. In patients with pain, swelling or stiffness after TKA, bone SPECT-CT changed the clinical diagnosis and final treatment in:

- A 65% of cases B 35% of cases C 45% of cases D 55% of cases

178. SPECT-CT has been found to be reliable in differentiating viable and non-viable bone tissue with a sensitivity and specificity of 90% and ----, respectively.

- A 75% B 89% C 94% D 99%

179. The spatial resolution of planar and/or SPECT cameras is limited, between ----, and reduces the sensitivity of bone scintigraphy.

- A 13 mm and 15 mm B 7 mm and 15 mm C 4 mm and 15 mm D 7 mm and 20 mm

180. Diagnosis of spondylodiscitis is difficult and is often delayed or missed. Nuclear medicine procedures are used as an adjunct to ---- in this clinical setting.

- A US B MRI C x-ray D CT

181. Neuro---- neoplasms (NENs) are a heterogeneous group of tumours that originate from neuroendocrine cells.

- A endoplasmic B epidemiological C epithelial D endocrine

182. The term '---- node' (SLN) indicates the first lymph node encountered by lymphatic vessels draining the primary tumour.

- A sentinel lytic B symbiotic lymph C symbiotic lytic D sentinel lymph

183. In endometrial cancer, the SLN procedure is not used in clinical routine and the detection rate was shown to be lower when compared with breast cancer and melanoma.

- A True B False

184. ---- cancer is the most common non-skin cancer and the second leading cause of cancer mortality in women.

- A Breast B Lung C Colorectal D Uterine

185. Transarterial radioembolization is a therapeutic approach that involves the injection of micrometre-sized embolic particles, known as:

- A microspheres B microcylinders C microcubes D microflakes

186. Technetium-99m-pertechnetate scintigraphy is the imaging procedure that can detect the presence of gastric mucosa in Meckel's diverticulum with a sensitivity of:

- A 65% B 75% C 85% D 95%

187. As with adult indications, SPECT-CT in paediatric patients is never used to evaluate a cause of pain.

- A True B False

188. One study found that SPECT-CT had ---- accuracy, sensitivity and specificity for diagnosis of osteoid osteoma compared with planar bone scan and CT in 31 patients.

- A 85% B 90% C 95% D 100%

SUBJECT 22 - LOOKING AHEAD WITH SPECT/CT

189. ---- zinc telluride (CZT) detectors provide superior energy resolution and higher sensitivity compared to conventional detectors.

- A Cesium B Cerium C Cadmium D Calcium

190. Advanced ---- reconstruction algorithms improve image quality by reducing noise and artifacts.

- A interpretive B iterative C intermittent D isotope

191. ---- medicine involves tailoring medical treatments to the specific needs of individual patients.

- A Focused B Fitted C Precision D Pinpoint

192. ---- involves the use of imaging to guide therapy.

- A Metagnostics B Clinicagnostics C Theragnostics D Adjunctagnostics

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Option 1: Submit the post-test answers online at radunits.com on the course page for instant grading and emailed CE certificate. A password is required, which is found in your email receipt.

Option 2: Fax this answer sheet to us at 866-386-0472, or you may instead email a picture of both answer sheets to clark@radunits.com. Allow 2 days for grading, and we will email the CE certificate.

First name:

Last name:

Email:

ARRT license number:

Florida techs only - enter state license number. All others enter N/A.

Telephone:

Date:

When part of a group order or if the post-test is purchased under another name - enter the order number or purchasing name:

1		25		49		73		97	
2		26		50		74		98	
3		27		51		75		99	
4		28		52		76		100	
5		29		53		77		101	
6		30		54		78		102	
7		31		55		79		103	
8		32		56		80		104	
9		33		57		81		105	
10		34		58		82		106	
11		35		59		83		107	
12		36		60		84		108	
13		37		61		85		109	
14		38		62		86		110	
15		39		63		87		111	
16		40		64		88		112	
17		41		65		89		113	
18		42		66		90		114	
19		43		67		91		115	
20		44		68		92		116	
21		45		69		93		117	
22		46		70		94		118	
23		47		71		95		119	
24		48		72		96		120	

SPECT/CT SCANS COURSE POST-TEST

(Page 2 of 2)

121		145		169	
122		146		170	
123		147		171	
124		148		172	
125		149		173	
126		150		174	
127		151		175	
128		152		176	
129		153		177	
130		154		178	
131		155		179	
132		156		180	
133		157		181	
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140		164		188	
141		165		189	
142		166		190	
143		167		191	
144		168		192	