

CT Scanning Techniques and Applications

Chapter 1

1. CT Angiography (CTA) has become the first imaging technique of choice for patients suspected of _____.
 - a. Stroke
 - b. Pulmonary embolism (PE)
 - c. Heart attack
 - d. Cancer
2. True or false. The development of faster CT scanning techniques has resulted in a substantial decrease in the percentage of non-interpretable scans.
 - a. True
 - b. False

For questions 3 through 6, choose the correct scan duration for the scanner type listed.

3. 256 detector rows
 - a. < 1
 - b. ≤ 20
 - c. ≤ 8
 - d. < 2
4. 128 detector rows
 - a. < 3
 - b. < 1
 - c. < 4
 - d. < 2
5. 64 detector rows
 - a. < 2
 - b. ≤ 4
 - c. < 3
 - d. < 1
6. 4 detector rows
 - a. < 1
 - b. < 2
 - c. ≤ 20
 - d. < 10
7. Lowering the kV from 120 – 130 kV or even 80 kV substantially decreases radiation dose roughly up to _____.
 - a. 40%
 - b. 50%
 - c. 60%
 - d. 70%
8. The first CT pulmonary angiography (CTPA) protocols proposed a scan range between _____ cm above the aortic arch to _____ cm below the pulmonary veins.
 - a. 1, 1
 - b. 2, 2
 - c. 2, 3
 - d. 3, 3

9. Which of the following is the most important cause of insufficient enhancement during CTPA?
- Low injection rate
 - Wrong bolus timing
 - Decreased heart function
 - All the above
10. Using the _____ technique, the chest can be scanned from apex to the diaphragm with the thinnest collimation in less than 1 second.
- Speedy
 - Enhanced
 - Flash
 - Coverage
11. Venous thrombo-embolic disease has a _____ to _____ fold increased incidence during pregnancy.
- 1, 3
 - 2, 4
 - 3, 4
 - 4, 5
12. At the time this text was written, the preferable CT slice reconstruction is _____.
- 0.8 – 1.0 mm
 - 0.8 – 1.1 mm
 - 0.9 – 1.0 mm
 - 0.9 – 1.5 mm
13. True or false. Axial slices in both soft tissue window setting, and pulmonary window setting represent the base for diagnostic interpretation.
- True
 - False
14. Which of the following is warranted to interpret the large number of slices for a multi-detector CTA?
- Dedicated workstation
 - PACS workstation
 - Dedicated reading area
 - A & B
15. Which of the following is a direct sign of acute PE?
- A complete intraluminal filling defect
 - A partial filling defect centrally located in the vessel lumen
 - An eccentric partial filling defect that makes an acute angle with the PA
 - All the above
16. Which of the following are interpretation pitfalls related to technique?
- Motion artifact
 - Image noise
 - Pulmonary veins
 - A & B
17. What is one of the most common technique-related pitfalls, and a major cause of an indeterminate CT pulmonary angiogram finding?
- Motion artifact
 - Low kVp
 - High mAs
 - Slice thickness

18. A normal hilar lymph node is usually less than ____ mm.
- 1
 - 2
 - 3
 - 4
19. What is the incidence of PA stump thrombosis in patients who underwent pneumonectomy?
- 10%
 - 12%
 - 14%
 - 16%

Chapter 2

20. Which of the following **is not** a new radiotherapy technique?
- Intensity modulated radiation therapy
 - Stereotactic radiosurgery
 - Modulated radiosurgery
 - High dose rate radiosurgery
21. What type of dosimeter has emerged as a promising candidate for 3D dosimetry?
- Film
 - TLD
 - Gel
 - Ion chamber
22. Optical CT is a technique utilizing _____.
- X-rays
 - Dose distribution
 - Visible light
 - A & B
23. At the time this text was written, how many groups of optical CT scanners had been built?
- One
 - Two
 - Three
 - Four

Chapter 3

24. True or false. Clinical imaging exists for the noninvasive study of disease in the body.
- True
 - False
25. PET is used to study which of the following processes?
- Blood flow
 - Tissue perfusion
 - Neurological function
 - All the above
26. After a positron and electron self-annihilation, the energy is released as _____ 511 keV photons.
- One
 - Two
 - Three
 - Four

27. According to the text, the port diameter size of a typical gantry is _____.
- 40 – 50 cm
 - 50 – 60 cm
 - 60 – 70 cm
 - 70 – 80 cm
28. Which of the following **is not** a physical effect that can corrupt PET acquisition data?
- Photon attenuation
 - Field of view
 - Random registration
 - Gantry geometry
29. The random coincidence rate is related to the _____ of the timing window, and the singles rate on the detectors.
- Slope
 - Length
 - Size
 - Position
30. In addition to the noise in the prompt counts, PET data is also degraded by other effects including _____.
- Contrast
 - Attenuation
 - Windowing
 - Emission activity
31. What year did Dr. Ron Nutt and Dr. David Townsend build the first PET/CT scanner?
- 1996
 - 1997
 - 1998
 - 1999
32. In a 3D PET exam _____ of the data may be from scattered photon events.
- 10 – 20%
 - 25 – 35%
 - 30 – 45%
 - 40 – 60%
33. The first PET scans were conducted in the _____ at Washington University by Michael Phelps.
- 60s
 - 70s
 - 80s
 - 90s
34. At the time this text was written, the five-year survival rate for oral cavity and pharynx cancer remained relatively dismal at _____.
- 20%
 - 30%
 - 40%
 - 50%

Chapter 4

35. Hepatic masses constitute only _____ of all intra-abdominal masses in children.
- 1% - 2%
 - 3% - 4%
 - 5% - 6%
 - 7% - 8%

36. Primary hepatic neoplasms are the _____ most common abdominal malignancy in childhood.
- 2nd
 - 3rd
 - 4th
 - 5th
37. What is usually the initial imaging modality in the evaluation of a child with a suspected abdominal mass?
- Ultrasound
 - CT
 - Radiography
 - MRI
38. Most malignant hepatic neoplasms are _____.
- Angiosarcomas
 - Hepatoblastomas
 - Hepatocellular carcinomas
 - Hemangiomas
39. Intravenous pentobarbital sodium is an effective form of sedation with a failure rate of less than _____.
- 2%
 - 3%
 - 4%
 - 5%
40. At the time this text was written, the CT protocol for evaluation of a possible liver mass performed with a dual-phase spiral CT scan has a slice thickness of _____.
- 3 mm
 - 4 mm
 - 5 mm
 - 6 mm
41. What is the visualization and manipulation of objects represented as sample data in three or more dimensions called?
- Multiplanar reconstruction
 - Volume rendering
 - Maximum intensity projection
 - 3D reformatting
42. What is the most common liver mass in the first 6 months of life?
- Hepatoblastomas
 - Mesenchymal hamartoma
 - Hemangioendothelioma
 - Hepatic adenoma
43. Hepatoblastomas have a male to female ratio of _____.
- 2:1
 - 3:1
 - 4:1
 - 5:1
44. The median age of patients with hepatocellular carcinoma is _____ years.
- 8
 - 10
 - 12
 - 14

45. Hepatic hemangiomas and hemangioendotheliomas are the most common vascular hepatic tumor in the _____ year of life.
- First
 - Second
 - Third
 - Fourth
46. What is the second most common benign hepatic lesion typically composed of multiple cysts?
- Hepatic adenoma
 - Mesenchymal hamartoma
 - Hepatic hemangioma
 - Hemangioendothelioma
47. True or false. Hepatic adenomas **are not** rare tumors in the pediatric population.
- True
 - False
48. Which of the following is a type of liver resection?
- Left lobectomy
 - Left lateral segmentectomy
 - Trisegmentectomy
 - All the above
49. According to the text, worldwide _____ is undoubtedly the most frequently used diagnostic tool for studying the liver.
- MRI
 - PET/CT
 - CT
 - Ultrasound

Chapter 5

50. Few new technological developments have revolutionized medical diagnostics as extensively as has _____ technology.
- CT
 - MRI
 - PET
 - X-ray
51. True or false. The first cone-beam tomography unit was a fixed unit.
- True
 - False

Chapter 6

52. What year did Shi J. Malik propose Normalized Cut (Ncut) as a good image segmentation method?
- 2000
 - 2005
 - 2010
 - 2015
53. Which of the following is a Ncut-based image segmentation category?
- Local filtering method
 - Active contour or snake
 - Region growth, split and merge algorithm
 - All the above

Questions 54 through 58, utilizing the coarse classification results, choose the correct precision rate for the body part.

54. Stomach

- a. 99.84%
- b. 83.20%
- c. 90.30%
- d. 90.19%

55. Head

- a. 90.19%
- b. 98.08%
- c. 90.30%
- d. 99.84%

56. Pelvis

- a. 90.30%
- b. 99.84%
- c. 98.08%
- d. 96.15%

57. Back

- a. 99.84%
- b. 98.08%
- c. 90.30%
- d. 99.84%

58. Face

- a. 83.20%
- b. 98.08%
- c. 99.84%
- d. 90.30%

Chapter 7

59. Which of the following are traditional treatment options for bimaxillary deficiencies (BMD)?

- a. Compensating orthodontics
- b. Functional appliances
- c. Orthopedic devices
- d. All the above

60. What is a surgical process used to reconstruct skeletal deformities and lengthen the long bones of the body called?

- a. Distraction osteogenesis (DO)
- b. Surgical osteotomy
- c. Controlled displacement
- d. Neurovascular displacement

61. Which of the following **is not** a DO category?

- a. Monofocal
- b. Bifocal
- c. Trifocal
- d. Segmented

Questions 62 and 63, choose the systemic bone-healing factor that influences the long bone healing factor.

62. Infection

- a. Age
- b. Metabolic disorders
- c. Vitamin D deficiency
- d. Steroid therapy

63. Blood supply

- a. Age
- b. Metabolic disorders
- c. Steroid therapy
- d. Calcium deficiency

Chapter 8

64. True or false. Cervical laminoplasty **is not** commonly performed for posterior decompression.

- a. True
- b. False

65. What is a serious postoperative complication that can cause paralysis in the upper extremities and pain?

- a. C3 palsy
- b. C4 palsy
- c. C5 palsy
- d. C6 palsy

Chapter 9

66. Head injury occurs in over _____ of patients who experienced trauma.

- a. 25%
- b. 30%
- c. 40%
- d. 50%

67. What is the modality of choice in trauma centers to evaluate the brain?

- a. MRI
- b. CT
- c. Radiography
- d. Ultrasound

68. What year was the New Orleans Criteria (NOC) introduced for minor head injury patients?

- a. 1995
- b. 1999
- c. 2000
- d. 2001

69. The Canadian CT Head Rule Study included adults over the age of _____.

- a. 60 years
- b. 65 years
- c. 70 years
- d. 75 years

70. According to the text, what is the estimated lifetime cancer mortality risk for a one-year-old from a head CT scan?
- 1 in 1500
 - 2 in 1500
 - 3 in 1500
 - 4 in 1500

Chapter 10

71. What percentage of trauma-related deaths are attributed to chest injuries?
- 10%
 - 15%
 - 20%
 - 25%
72. Sternal fractures are found in _____ of blunt chest traumas.
- 3 – 5%
 - 6 – 9%
 - 8 – 10%
 - 12 – 15%
73. What is the examination of choice when a sternal fracture is suspected?
- Frontal chest radiograph
 - Spiral CT with sagittal and coronal reformation
 - Ultrasound
 - MRI
74. Thoracic spine fractures account for ____ of all spinal fractures.
- 5 to 8%
 - 10 to 12%
 - 15 to 18%
 - 16 to 30%
75. What is an air collection in the pleural space called?
- Pneumothorax
 - Pulmonary contusion
 - Pulmonary laceration
 - Pulmonary trauma
76. What is a focal parenchymal injury with edema and alveolar and interstitial hemorrhage called?
- Pneumothorax
 - Pulmonary laceration
 - Pulmonary contusion
 - Pulmonary trauma
77. More than _____ of bronchial injuries occur in the main bronchi within 2.5 cm of the carina.
- 70%
 - 75%
 - 80%
 - 85%
78. True or false. Diagnosis of acute aortic injury is critical.
- True
 - False

Chapter 11

79. True or false. Low back pain is becoming one of the most diffuse chronic pathologies and represents one of the highest direct and indirect costs for national welfare.
- True
 - False
80. According to the text, what percentage of spine disease is located in the lumbar spine?
- 80%
 - 85%
 - 90%
 - 95%
81. The lumbar spine structure bears at least _____ of the total body mass.
- 55%
 - 60%
 - 65%
 - 70%
82. The sacrum consists of _____ vertebrae fused together.
- 3
 - 4
 - 5
 - 6
83. Between each vertebra there is a _____ that serves to cushion the vertebrae.
- Disc
 - Nerve
 - Cartilage
 - Endplate

Chapter 12

84. According to the text, each year lung cancer is diagnosed in approximately _____ people worldwide.
- 1.2 million
 - 1.3 million
 - 1.4 million
 - 1.5 million
85. Standard risk assessment in thoracic surgery is based on conventional techniques like ____ and ____.
- MRI, CT
 - CT, PET
 - X-ray, CT
 - MRI, x-ray
86. True or false. The segmentation of pulmonary arteries and veins **does not** play an important role in pre-operative image analysis.
- True
 - False
87. Which of the following plays a substantial role in radiological diagnosis and planning of surgical intervention for lung cancer?
- Size
 - Shape
 - Location and number of lung tumors
 - All the above

88. At the time the text was written, what is the standard method for functional lung parenchyma analysis?
- a. PET
 - b. PET/CT
 - c. MRI
 - d. Perfusion scintigraphy
89. Computed tomography has gained in importance in _____ diagnostics.
- a. Tumor
 - b. Emphysema
 - c. Metastasis
 - d. Cardiac

Chapter 13

90. At the time the text was written, restoration using _____ is the most popular treatment in the field of dentistry.
- a. Dental implants
 - b. Porcelain caps
 - c. Porcelain filling
 - d. None of the above
91. The long-term survival rate of dental implants is defined as a rate of _____ at the end of 5 years.
- a. 75%
 - b. 80%
 - c. 85%
 - d. 90%
92. After implant, which of the following **is not** a factor affecting primary stability?
- a. Bone quality and quantity
 - b. Surgical technique
 - c. Implant surface conditions
 - d. Length of surgery
93. What class of bone is defined as a large marrow-filled space that exists between the bone trabeculae?
- a. Class I
 - b. Class II
 - c. Class III
 - d. Class IV
94. What level of bone quality is defined as entirely homogeneous compact bone?
- a. Quality I
 - b. Quality 2
 - c. Quality 3
 - d. Quality 4
95. What has been indicated as the main risk factor of implant failure?
- a. Skill of the surgeon
 - b. Type of implant
 - c. Poor bone density
 - d. A & B

Questions 96 through 98, choose the correct density for the Hounsfield units listed.

96. 850 – 1250

- a. D1
- b. D2
- c. D3
- d. D4

97. 150 – 350

- a. D1
- b. D2
- c. D3
- d. D4

98. 350 – 850

- a. D1
- b. D2
- c. D3
- d. D4

Chapter 14

99. Winter's classification of congenital formation failures includes which of the following?

- a. Hemivertebra with one lateral pedicle
- b. A butterfly vertebra
- c. Posterior vertebra
- d. A & B

100. Bone fusion is also known as _____.

- a. Segmentation failure
- b. Winter's failure
- c. Formation failure
- d. Non-segmented hemivertebra

Chapter 15

101. What does the acronym TAR stand for?

- a. Total anterior repair
- b. Total ankle replacement
- c. Total alignment replacement
- d. None of the above

102. CT is useful when imaging the ankle after TAR especially in situations when the patient has _____ related symptoms.

- a. Surgical
- b. Pain
- c. Implant
- d. A & B

103. True or false. Periprosthetic osteolysis is a common problem with total joint replacement.

- a. True
- b. False

104. At the time this text was written, the 5-year survival of total ankle replacement reported by some centers was ____.
- a. 40 to 47%
 - b. 50 to 58%
 - c. 60 to 67%
 - d. 70 – 93%
105. At the time this text was written, Ankle Evolutive System was the most used TAR used in _____.
- a. United States
 - b. Germany
 - c. Sweden
 - d. Finland
106. On radiographs after total ankle replacement, what is defined as a new or expanding sharply demarcated lucency adjacent to prosthesis components called?
- a. Osteolysis
 - b. Osteoarthritis
 - c. Osteopenia
 - d. Osteoporosis
107. True or false. Titanium causes less artifacts on CT scans than stainless steel and cobalt-chrome.
- a. True
 - b. False

Chapter 16

108. What is the most common indication for removal of a cardiovascular implanted electronic device (CIED)?
- a. Generator infection
 - b. Lead infection
 - c. Poor capture rate
 - d. A & B
109. True or false. FDG-PET and PET-CT scans have been used in the past decade in the diagnosis of patients with infection and inflammatory disorders.
- a. True
 - b. False

Chapter 17

110. _____ aims to deliver a radiation dose to the tumor which is high enough to kill all tumor cells.
- a. FDG -PET
 - b. Radiotherapy
 - c. PET-CT
 - d. PET
111. Which of the following has been a concern for radiotherapy?
- a. Daily patient localization variation
 - b. Internal organ motion
 - c. Deformation
 - d. All the above
112. What does the acronym PTV stand for?
- a. Planning target volume
 - b. Planning target variation
 - c. Posterior target volume
 - d. Positive target volume

113. At the time this text was written, in the Brain Lab 6D system, the on-board imager consists of a kV-x-ray source and a flat-panel detector using an amorphous _____ detector.
- Metalloid
 - Germanium
 - Silicon
 - Carbon

Chapter 18

114. In forensic medicine, which of the following **is not** an important reason to investigate the deceased?
- Science
 - Education
 - Quality
 - Profit
115. Which of the following is of particular importance when identifying postmortem remains?
- Odontology
 - Fingerprints
 - DNA-profile
 - All the above
116. True or false, CT **does not** offer a significant advantage over plain film x-rays in the investigation of firearm fatalities.
- True
 - False

SECTION TWO

Chapter 1

117. When was the first CCTA performed using electron beam CT?
- 1960s
 - 1970s
 - 1980s
 - 1990s
118. What was the slice thickness of the first CCTA?
- 1.0 – 2.0 mm
 - 1.5 – 2.0 mm
 - 1.5 – 2.5 mm
 - 1.5 – 3.0 mm
119. Dual-source CT cuts image acquisition time by _____.
- 50%
 - 55%
 - 60%
 - 65%
120. Typical MSCT detectors have solid-state _____ detectors.
- Tungsten
 - Ceramic
 - Silicon
 - Carbon

121. What is one of the most important limitations in CCTA affecting overall accuracy?
- Slice thickness
 - Processing
 - Motion artifact
 - Image noise
122. What is defined as the ratio of mean coronary pressure distal to a coronary stenosis to the mean aortic pressure during maximal coronary blood flow?
- Fraction flow reserve
 - CT perfusion
 - Transluminal attenuation gradient
 - CT gradient
123. An FFR value of _____ or less suggests lesion-specific hemodynamic significance.
- 0.65
 - 0.70
 - 0.75
 - 0.80
124. Clinical trials demonstrated CT FFR has a higher diagnostic accuracy of _____ compared to invasive FFR in the identification of significant stenosis.
- 53%
 - 71%
 - 86%
 - 90%
125. Which of the following limit or affect FFR calculation with CT?
- Presence of heavy calcification
 - Motion artifacts
 - Presence of viable or scarred myocardium
 - All the above
126. Which of the following **is not** a pharmacologic stress agent for myocardial CT perfusion?
- Adenosine
 - Dipyridamole
 - Iodine
 - Regadenosin
127. True or false. The two ways to set up a stress and rest myocardial CT perfusion protocol is the stress phase first followed by the rest phase, or vice versa.
- True
 - False
128. What modality/method is based on the contrast attenuation difference across a stenosis which may predict functional significance?
- Transluminal attenuation gradient (TAG)
 - Perfusion CT
 - FFR
 - SPECT

Chapter 2

129. What is a radiotherapy method in which a source of ionizing radiation is administered directly into the tumor area or to its nearest surroundings?
- Low-dose rate
 - Pulsed dose rate
 - High dose rate
 - Permanent
130. Which of the following **is not** part of the three-step process to define the ionizing area for brachytherapy?
- Gross tumor volume clinical target volume
 - Clinical target volume
 - Planning target volume
 - Recovery target volume
131. The main purpose of treatment planning based on _____ images is to determine the best possible dosage in the therapeutic area and decreasing its volume in organs and critical structures.
- PET
 - CT
 - SPECT
 - Radiographic
132. In lung cancer where the tumor area allows for applying the catheter into the tumor, usually _____ applicator(s) is used.
- One
 - Two
 - Three
 - Four
133. In skin cancers with small and superficial changes, usually, _____ applicators are being used.
- Freiburg flap
 - Leipzig
 - Merkel
 - Hamstead
134. True or false. Another way to distribute dose and therefore protection for critical organs, is the adoption or use of shields.
- True
 - False
135. Which of the following **is not** a feature of the thermoplastic mask?
- Very good tracing qualities
 - Forming process takes place on the patient's body
 - High level of reproducibility
 - Very cost effective
136. Before breast cancer brachytherapy treatment begins after a radical dissection, it is necessary to perform _____.
- PET/CT
 - Three- dimensional imaging
 - Tumor bed imaging
 - A & B
137. True or false. The so-called freehand technique requires extensive experience from the person performing the treatment.
- True
 - False

138. At the time this text was written, the standard hospitalization procedure for patients with prostate cancer undergoing HDR brachytherapy is _____ imaging.
- PET/CT
 - Ultrasound
 - MRI
 - Nuclear Medicine

Chapter 3

139. Femoroacetabular impingement (FAI) is a relatively new pathology described in the early _____.
- 1970s
 - 1980s
 - 1990s
 - 2000s
140. The acetabulum is considered normal if it has an anterior orientation called _____.
- Retroversion
 - Anteversion
 - Vertical
 - Horizontal
141. Acetabular dysplasia is considered retroversion when the angle is _____.
- ≤ 10 degrees
 - ≤ 12 degrees
 - ≤ 15 degrees
 - ≤ 17 degrees
142. In a regular pelvis, the acetabulum is in _____.
- Anteversion
 - Retroversion
 - Supination
 - Pronation
143. A Wiberg angle is considered normal between _____.
- 10 to 30 degrees
 - 15 to 35 degrees
 - 20 to 35 degrees
 - 20 to 40 degrees
144. A Wiberg angle less than _____ is associated with hip dysplasia.
- 10 degrees
 - 20 degrees
 - 30 degrees
 - 40 degrees
145. What is the distance between the anterior margin of the femoral neck and the anterior margin of the femoral head called?
- Femoral head-neck offset
 - Femoral angle
 - Femoral anteversion
 - Femoral retroversion
146. Which of the following is known about a woman's hip anatomy?
- Greater acetabular anteversion
 - Greater acetabular inclination
 - Greater femoral anteversion
 - All the above

Chapter 4

147. The spine is a structure commonly involved in several prevalent diseases causing, in most cases, _____.
a. Stiffness
b. Back pain
c. Numbness
d. A & C
148. Back pain is a common cause for which of the following?
a. Disability
b. Activity limitations
c. Hospital admissions
d. A & B
149. The _____ is the most frequent place of bone metastasis.
a. Spine
b. Rib
c. Femoral neck
d. Skull
150. What type of bone metastasis is associated with bone resorption?
a. Osteoblastic
b. Blastic
c. Osteolytic
d. Osteosarcoma
151. The metastatic spine is prone to several complications such as _____ and spinal cord compression.
a. Pain
b. Paralysis
c. Subluxation
d. Fracture
152. _____ is the preferred modality for the diagnosis of intervertebral disc pathology and spinal stenosis.
a. PET
b. CT
c. MRI
d. Radiography
153. True or false. When 3D data is loaded, relevant information such as image data, resolution, acquisition details or patient identification is stored as a structure to be included in the final segmentation output file.
a. True
b. False

Chapter 5

154. What is a quick non-invasive technique to diagnose stone disease?
a. Ultrasound
b. KUB radiograph
c. CT KUB
d. MRI
155. What year was CT shown to be superior to intravenous urography?
a. 1990
b. 1995
c. 1997
d. 1999

156. CT KUB is usually considered the initial imaging modality for which of the following conditions?
- Suspected acute renal colic
 - Dipstick positive hematuria
 - Initial diagnostic evaluation of upper tract obstruction
 - All the above
157. CT KUB allows a rapid, contrast-free anatomically accurate diagnosis of urolithiasis (kidney stone) with a sensitivity of _____.
- 92 – 95%
 - 96 – 98%
 - 97 – 98%
 - 96 – 100%
158. At the time this text was written, the effective dose of a standard CT KUB is estimated to be between ____ and ____ mSv.
- 2, 4
 - 3, 5
 - 6, 8
 - 9, 11
159. CT KUB is a reasonable first-line test for all patients presenting in the ER with _____.
- Hematuria
 - Pain while urinating
 - Flank pain
 - Nausea
160. Instead for CT KUB, children, pregnant women and patients that have musculoskeletal pain are more appropriate for _____ as a first approach.
- Ultrasound
 - MRI
 - Radiography
 - PET
161. An incidental finding of _____ on ultrasound requires a CT KUB.
- Tumor
 - Hydronephrosis
 - Stricture
 - Cysts
162. True or false. Acute onset of flank pain suggestive of ureteral obstruction is a common presentation in the emergency room.
- True
 - False
163. In an elective percutaneous nephrolithotomy, stones greater than ____ cm are associated with a significantly higher rate of postoperative pyrexia (fever) and the need for transfusion.
- 2
 - 3
 - 4
 - 5
164. What is the most minimally invasive treatment in the management of urolithiasis (kidney stones)?
- Percutaneous lithotripsy
 - Shock wave lithotripsy
 - Surgical stone removal
 - Fluids and pain management

Chapter 6

165. What modality uses radioactive probes commonly referred to as tracers for diagnosis and treatment of disease?
- SPECT
 - PET
 - Nuclear Medicine
 - MRI
166. What are the visualization, characterization, and measurement of biological processes at the molecular and cellular level in humans and other living systems called?
- Molecular imaging
 - Organic imaging
 - Atomic imaging
 - Biological imaging
167. Tracer imaging in _____ has the highest molecular sensitivity.
- PET
 - SPECT
 - MRI
 - Nuclear medicine
168. The advantage of functional imaging is the increasing _____ because metabolic changes precede anatomical changes.
- Specificity
 - Sensitivity
 - Accuracy
 - Detection
169. The advantage of anatomical imaging by _____ is its high anatomical resolution and usually good topographical information.
- Nuclear medicine
 - CT
 - PET
 - SPECT
170. The cost-effectiveness of PET plus CT was shown as early as the late _____.
- 1970s
 - 1980s
 - 1990s
 - 2000s
171. True or false. In nuclear medicine, imaging can be performed as whole-body imaging or dual-phase imaging without additional radiology exposure.
- True
 - False
172. In PET/CT the biggest advantage was improving _____.
- Image reconstruction
 - Anatomical imaging
 - Clinical imaging
 - B & C
173. The spectrum of photon energy from the anode of the x-ray tubes used in CT range from _____ keV up to peak energy.
- 0
 - 1
 - 2
 - 3

174. The origins of PET, SPECT, and CT date back to the early _____.
- 1960s
 - 1970s
 - 1980s
 - 1990s
175. Who developed a multi-crystal positron camera in 1972?
- Hoffman
 - Ter-Pogossian
 - Phelps
 - Burnham
176. The first PET/CT scanner design reduced the number of detectors from 144 to _____.
- 120
 - 80
 - 64
 - 32
177. What was the first company to use a slip ring for its gamma camera gantry, allowing > 360 degrees?
- Siemens
 - General Electric
 - Phillips
 - Picker
178. What year was the first PET/MR system installed by Siemens?
- 2001
 - 2005
 - 2008
 - 2010
179. The absorbed dose in CT is dependent on which of the following operator-dependent factors?
- mAs
 - kVp
 - Pitch
 - All the above
180. At the time the text was written, a diagnostic CT of the chest, abdomen, and pelvis will give an effective dose of _____ mSv.
- 8
 - 11
 - 13
 - 15
181. ^{99m}Tc labeled white blood cells has one of the highest effective dose of _____ mSv.
- 15.5
 - 16.5
 - 17.5
 - 18.5

Questions 182 through 185, choose the appropriate ACR radiation level definition based on the effective dose range listed.

182. Effective dose range of <0.1 mSv
- High
 - Low
 - Minimal
 - Medium

183. Effective dose range of 0.1–1 mSv
- High
 - Low
 - Minimal
 - Medium
184. Effective dose range of >10 mSv
- High
 - Low
 - Minimal
 - Medium
185. Effective dose range of 1–10 mSv
- High
 - Low
 - Minimal
 - Medium
186. True or false. The most important way to reduce radiation dose in hybrid systems is to optimize CT protocols.
- True
 - False
187. According to the text, it has been reported that integrated PET/CT devices provided additional information in approximately _____ of all lesions.
- 6-7%
 - 8-9%
 - 10-11%
 - 12-13%
188. PET is most frequently used in _____.
- Neurology
 - Cardiology
 - Oncology
 - Radiation therapy planning
189. What percentage of cervical metastasis is below one centimeter in diameter?
- 30%
 - 40%
 - 45%
 - 50%
190. What is superior to PET/CT for T staging and in identifying locoregional nodes from esophageal cancer?
- FDG PET-CT
 - PET
 - Endoscopic ultrasound
 - CT
191. At the time the text was written, transrectal ultrasound and _____ provide much better anatomic resolution for colorectal cancer than PET/CT.
- CT
 - PET
 - Nuclear medicine
 - MRI
192. True or false. PET/CT **is not** the method of choice for the staging of gastrointestinal stromal tumors.
- True
 - False