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### Test Questions

#### Chapter 1

1. Ultrasound is the term used to describe sound of frequencies above \_\_\_\_\_ Hertz (Hz), beyond the range of human hearing.
  - A. 20
  - B. 200
  - C. 2,000
  - D. 20,000
2. Frequencies of \_\_\_\_\_ megahertz (MHz) are typical for diagnostic ultrasound.
  - A. 1-30
  - B. 2-20
  - C. 3-40
  - D. 4-50
3. Diagnostic ultrasound imaging depends on the computerized analysis of reflected \_\_\_\_\_, which non-invasively build up fine images of internal body structures.
  - A. ionizing radiation
  - B. ultrasound waves
  - C. magnetic resonance
  - D. none of the above
4. \_\_\_\_\_ are **usually** made of thin discs of an artificial ceramic material such as lead zirconate titanate.
  - A. Ultrasound transducers
  - B. MRI transducers
  - C. CT transducers
  - D. X ray transducers
5. \_\_\_\_\_ is a vibration transmitted through a solid, liquid or gas as mechanical pressure waves that carry kinetic energy.
  - A. X ray
  - B. Light
  - C. Sound
  - D. Radioisotope
6. The \_\_\_\_\_ of sound depends on the density and compressibility of the medium.
  - A. velocity
  - B. mass
  - C. weight
  - D. atomic number
7. The \_\_\_\_\_ of ultrasound influences the resolution of the images that can be obtained.
  - A. wavelength
  - B. mass
  - C. weight
  - D. atomic number
8. Which of the following are forms of interaction between ultrasound and the medium?
  - A. reflection
  - B. scattering
  - C. diffraction and refraction
  - D. all of the above
9. The three-dimensional **ultrasound field** from a focused transducer can be described as a beam\_\_\_\_\_.
  - A. color
  - B. length

- C. shape
- D. brightness

10. The form and especially the diameter of the beam strongly influence the lateral resolution and thus the quality of the ultrasound image.

- A. TRUE
- B. FALSE

11. \_\_\_\_\_ is defined as the **minimum** distance between two objects that are still distinguishable.

- A. Spatial resolution
- B. Mass
- C. Weight
- D. wavelength

12. \_\_\_\_\_ is the **usual** term for the reflected or back-scattered parts of the emitted ultrasound pulses that reach the transducer.

- A. Color
- B. Length
- C. Echo
- D. Brightness

13. The Doppler effect was originally postulated by which of the following Austrian scientist in relation to the colors of double stars?

- A. Sigmund Freud
- B. Nikola Tesla
- C. Wilhelm Röntgen
- D. Christian Doppler

14. \_\_\_\_\_ is a special B-scan technique that can be used to show movement without relying upon the Doppler effect.

- A. B-flow
- B. X-flow
- C. Y-flow
- D. Z-flow

15. Doppler frequencies within the range  $\pm$  one half the pulse repetition frequency, known as the \_\_\_\_\_.

- A. dose limit
- B. beam limit
- C. Nyquist limit
- D. none of the above

16. The combination of B-scan with color Doppler and spectral Doppler is called the \_\_\_\_\_.

- A. single technique
- B. triplex technique
- C. double technique
- D. none of the above

17. The contrast agents in Ultrasound administered intravenously into the systemic circulation were initially used to obtain \_\_\_\_\_.

- A. bone mineral data
- B. soft tissue sample
- C. stronger signals from blood flow
- D. none of the above

18. The \_\_\_\_\_ is displayed in real time as an indication of the **maximum temperature rise** that may occur in a tissue during a prolonged ultrasound examination.

- A. thermal index (TI)
- B. therapeutic index
- C. toxic index
- D. statistical index

Chapter 2

19. The ultrasound examination is **usually** carried out with the patient in the \_\_\_\_\_.

- A. oblique position

- B. supine position
- C. lateral position
- D. none of the above

20. A \_\_\_\_\_ is necessary to ensure good contact between the transducer and the skin during ultrasound.

- A. coupling agent
- B. contrast agent
- C. patient immobilization
- D. sedation

21. Generally, a modern ultrasound equipment consists of 'all-round scanners' that includes a curved array for the range 3–5 MHz and a linear array for the range greater than 5 MHz to 10 MHz

- A. TRUE
- B. FALSE

22. An **advantage** of ultrasound is that the patient's \_\_\_\_\_ can carry out the examination, and this provides a good opportunity to talk to the patient about his or her problem.

- A. medical assistant
- B. doctor
- C. lab technologist
- D. none of the above

23. As a rule, which of the following should be prepared for each ultrasound examination?

- A. verbal report
- B. written report
- C. pictorial documentation
- D. both B and C

24. An evaluation of which of the following is based on the known **normal** anatomy of an organ?

- A. presence
- B. position
- C. size
- D. all of the above

25. Increased \_\_\_\_\_ of ultrasound in an organ may indicate pathological alterations, such as fibrosis.

- A. signal
- B. timing
- C. attenuation
- D. none of the above

### Chapter 3

26. \_\_\_\_\_ is defined as any diagnostic or therapeutic procedure performed under ultrasound guidance for any tissue or organ that is visualized by ultrasound.

- A. Interventional ultrasound
- B. Radiography
- C. Endoscopy
- D. MRI

27. Therapeutic procedures in ultrasound include which of the following?

- A. contrast injections
- B. radiation therapy
- C. drainage of fluid collections by needle or catheter
- D. radioisotopes injections

28. Before any ultrasound-guided procedure is performed, the patient's **informed** \_\_\_\_\_ should be obtained.

- A. insurance card
- B. consent
- C. life insurance policy
- D. ID

29. Ultrasound-guided **diagnostic procedures** include which of the following?

- A. cytological sampling
- B. tissue sampling
- C. fluid collection by needle aspiration
- D. all of the above

30. Although sonography cannot be used to study bone lesions, ultrasound images are clear enough to perform an ultrasound-guided biopsy on some patients with lytic lesions characterized by disruption of the cortical structure.

- A. TRUE
- B. FALSE

31. Which of the following procedure is done under ultrasound guidance that reduces the risks for lung or heart injury, and is much safer and easier than the previously used blind puncture technique?

- A. Pleurocentesis
- B. Paracentesis
- C. Pericardiocentesis
- D. none of the above

32. Abdominal \_\_\_\_\_ is the **first line** of treatment for infected or symptomatic fluid collection.

- A. biopsy
- B. abscess drainage
- C. chemotherapy
- D. radiation therapy

33. During Seldinger technique a \_\_\_\_\_ gauge needle is inserted into the collection site and a guide wire passed through the needle.

- A. 18 to 20
- B. 25 to 30
- C. 35 to 40
- D. 40 to 50

#### Chapter 4

34. Which of the following are the indications for ultrasonography of the neck?

- A. thyroid gland diseases and suspected parathyroid adenoma
- B. malignant lymphoma, staging and follow-up
- C. palpable masses and abscesses
- D. all of the above

35. The thyroid is shaped like the letter \_\_\_\_\_, with an oval lobe on each side of the trachea connected by the isthmus.

- A. H
- B. X
- C. Y
- D. Z

36. The number of the lymph nodes is especially high in the neck and high-frequency ultrasound frequently demonstrates normal lymph nodes, which are **usually** \_\_\_\_\_ shape, with a maximum diameter of 8 mm.

- A. rectangular
- B. square
- C. oval
- D. triangular

37. Which of the following are important as anatomical landmarks and serve as a reference point for evaluating the echo pattern of the thyroid?

- A. ribs
- B. diaphragm
- C. neck muscles
- D. lungs

38. Papillary and follicular carcinomas are the **commonest** \_\_\_\_\_ carcinomas.

- A. thyroid
- B. brain
- C. urinary

D. prostate

39. Which of the following is/are **primary** tumors of the neck?

- A. Lipomas and lipofibromas
- B. Glomangioma
- C. Malignant tumors
- D. all of the above

#### Chapter 5

40. Although the sonographic image does not provide a complete overview of the chest, it is useful for which of the following indications?

- A. chest pain
- B. dyspnea and fever
- C. inflow congestion
- D. all of the above

41. Ultrasound examination of the chest wall and the axilla and supraclavicular regions generally requires a linear probe with frequencies of \_\_\_\_\_.

- A. 0–1 MHz
- B. 5–8 MHz
- C. 15–25 MHz
- D. 18–30 MHz

42. It is surprising that rib fractures are diagnosed twice as frequently by sonography than by chest radiography.

- A. TRUE
- B. FALSE

43. What are the **direct** sonographic signs of rib and sternum fractures at the site of pain?

- A. gap
- B. step
- C. dislocation
- D. all of the above

44. In contrast to X-ray, ultrasound can detect pleural effusions of **as little as** \_\_\_\_\_ ml laterodorsally to the angle between the chest wall and the diaphragm, with patients in either a standing or sitting position.

- A. 5
- B. 15
- C. 25
- D. 30

45. All of the following are sonographic findings in tuberculosis **EXCEPT**:

- A. pleural effusion
- B. fragmentation of visceral pleura
- C. subpleural infiltrations of various forms
- D. calcification of aorta

#### Chapter 6

46. In ultrasound, the linear array transducers of \_\_\_\_\_ are **best suited** for abdominal wall and superficial structures.

- A. 0–1 MHz
- B. 5–10 MHz
- C. 25–35 MHz
- D. 40–50 MHz

47. The \_\_\_\_\_ forms the '**roof**' of the abdomen and appears as a thin, echo-poor layer or structure, but only in those parts that do not border the air-containing lung.

- A. diaphragm
- B. liver
- C. spleen
- D. gallbladder

48. The abdominal \_\_\_\_\_ is easily visualized as a nearly echo-free structure, with strong wall echoes running in front of the vertebral column from the aortic hiatus to the bifurcation.

- A. femoral artery
- B. spinal cord
- C. aorta
- D. jugular vein

49. Peritoneal tuberculosis is a **common** extrapulmonary manifestation that is seen in advanced stages of \_\_\_\_\_ infection.

- A. HIV
- B. brain
- C. liver
- D. gallbladder

50. A \_\_\_\_\_ in the vena cava usually originates from a thrombosis of a feeding vein.

- A. tumor
- B. calcification
- C. thrombus
- D. stone

51. During ultrasound findings, which of the following represents echo-poor mass in front of the vessels and smooth, sharp contour connection to the kidneys?

- A. Malignant lymphoma
- B. Horseshoe kidney
- C. Aneurysm
- D. Retroperitoneal fibrosis

## Chapter 7

52. Which of the following are indications for ultrasonography of the liver?

- A. hepatomegaly and suspected liver abscess
- B. jaundice and ascites
- C. suspected metastases in the liver and liver mass
- D. all of the above

53. Real-time imaging of the liver is performed with the patient in which of the following position?

- A. supine
- B. left-oblique
- C. left-lateral decubitus
- D. all of the above

54. \_\_\_\_\_ is the general term for inflammatory and infectious disease of the liver, of which there are many causes.

- A. Hepatitis
- B. Pancreatitis
- C. Gastritis
- D. Nephritis

55. Which of the following are sonographic features of diffuse fatty liver?

- A. bright liver with greater echogenicity than the kidney
- B. decreased portal vein wall visualization
- C. poor penetration of the posterior liver and hepatomegaly
- D. all of the above

56. The presence of ascites, hepatosplenomegaly and collateral circulation are causes of \_\_\_\_\_.

- A. jaundice
- B. pancreatitis
- C. gastritis
- D. nephritis

57. \_\_\_\_\_ is used **more often** than sonography to evaluate the presence and extent of liver laceration during trauma, while sonography is usually used to monitor the pattern of healing.

- A. MRI
- B. Nuclear Medicine

- C. CT
- D. Radiography

## Chapter 8

58. What are the indications for ultrasonography of the gallbladder and bile ducts?

- A. pain in the right upper abdomen
- B. palpable right upper abdominal mass
- C. recurrent symptoms of peptic ulcer
- D. all of the above

59. Ultrasound of gallbladder/bile ducts exams for children and thin adults, use a \_\_\_\_\_ transducer.

- A. 5-MHz
- B. 15-MHz
- C. 25-MHz
- D. 35-MHz

60. For gallbladder/bile ducts ultrasound examination, the patient should take nothing by mouth for \_\_\_\_\_ before the examination.

- A. 16 hours
- B. 24 hours
- C. 8 hours
- D. 48 hours

61. The biliary system consists of which of the following?

- A. right and left hepatic ducts
- B. common hepatic and bile duct,
- C. gallbladder and the cystic duct
- D. all of the above

62. When the gallbladder is filled with small stones or with a single large stone, the gallbladder fossa appears as \_\_\_\_\_ echogenic lines.

- A. one
- B. two
- C. three
- D. four

63. \_\_\_\_\_ are the single **most** important finding in cases of acute calculous cholecystitis.

- A. Gallstones
- B. Malignant tumor
- C. Mass
- D. Pus

64. Gallbladder perforation occurs in \_\_\_\_\_ of cases and requires immediate cholecystectomy or percutaneous cholecystostomy because of the high mortality rate (greater than 20%).

- A. 0%
- B. 5-10%
- C. 40-50%
- D. 70%

65. Calcification of the gallbladder wall develops as a result of chronic inflammation can cause which of the following?

- A. porcelain gallbladder
- B. marble gallbladder
- C. translucent gallbladder
- D. none of the above

66. Cholesterol polyps account for \_\_\_\_\_ of all polypoid gallbladder lesions.

- A. 0%
- B. 10%
- C. 15%
- D. 50-60%

67. Gallbladder carcinoma occurs **mainly** in the \_\_\_\_\_ and is three times commoner in women than in men.
- A. elderly
  - B. infants
  - C. young children
  - D. teenagers

#### Chapter 9

68. It is best to perform an ultrasound examination of the pancreas on patients who have **not** fasted overnight.
- A. TRUE
  - B. FALSE
69. The pancreas is a nonencapsulated, retroperitoneal structure that lies in the anterior pararenal space between the \_\_\_\_\_ loop and the splenic hilum over a length of 12.5–15 cm.
- A. gastric
  - B. duodenal
  - C. large intestine
  - D. esophagus
70. Acute inflammation of the pancreas has numerous causes; however, acquired conditions such as \_\_\_\_\_ abuse and biliary calculi account for the **majority** of cases.
- A. alcohol
  - B. drug
  - C. pain killer
  - D. none of the above
71. Pancreatic carcinoma is the \_\_\_\_\_ leading cause of death from cancer among both males and females in **western countries**.
- A. second
  - B. third
  - C. fourth
  - D. fifth

#### Chapter 10

72. An enlarged spleen is called \_\_\_\_\_.
- A. hepatomegaly
  - B. splenomegaly
  - C. pericarditis
  - D. gastritis
73. In ultrasound echo pattern, the normal spleen has a uniform homogeneous texture and is slightly less echogenic than the liver.
- A. TRUE
  - B. FALSE
74. Which of the following may be **mistaken** for splenic lesions during ultrasound examination?
- A. a kidney lesion
  - B. the tail of the pancreas
  - C. adrenal tumors or the stomach
  - D. all of the above
75. The **commonest** malignant neoplasms involving the spleen are \_\_\_\_\_, which may produce either focal hypoechoic masses or diffuse enlargement of the spleen.
- A. lymphomas
  - B. cysts
  - C. polyps
  - D. none of the above
76. If the splenic vein appears large on ultrasound and remains larger than \_\_\_\_\_ mm in diameter on normal respiration, portal hypertension should be suspected.
- A. 0.5
  - B. 1



- C. 1.5
- D. 10

77. Which of the following are the **advantages** of ultrasound in assessing splenic trauma?

- A. speed
- B. portability with no delay of therapeutic measures
- C. absence of ionizing radiation
- D. all of the above

#### Chapter 11

78. High-frequency transducers of \_\_\_\_\_ MHz, linear or curved array of good quality are needed for a detailed ultrasound examination of the gastrointestinal tract.

- A. 0-1
- B. 1-1.5
- C. 5-7.5
- D. none of the above

79. Distinguishing the anatomical layers of the wall of the gastrointestinal tract depends on the frequency and the quality of the transducer on the one hand and, on the other, on the \_\_\_\_\_ of the layers.

- A. thickness
- B. type
- C. length
- D. none of the above

80. Which of the following are the indications for ultrasonography of the stomach?

- A. pain in the upper abdomen and gastroscopy
- B. dysphagia and vomiting
- C. palpable mass in the upper abdomen
- D. all of the above

81. Which of the following can be administered intravenously to stop peristalsis and to achieve good distension of the stomach during ultrasound examination?

- A. scopolamine N-butyl bromide (Buscopan®)
- B. barium sulfide
- C. gastrografen
- D. iodine-50

82. Absence of the esophageal-gastric junction and a digestive tract of diameter greater than 16 mm at the level of the diaphragm are regarded as sonographic symptoms of a \_\_\_\_\_.

- A. hepatomegaly
- B. hiatus hernia
- C. pericarditis
- D. gastritis

83. \_\_\_\_\_ may cause swelling of the mucosa and submucosa and thus thickening of the gastric wall.

- A. hepatomegaly
- B. splenomegaly
- C. pericarditis
- D. gastritis

84. Gastric ulcers are **usually** situated on the \_\_\_\_\_ of the distal part of the stomach.

- A. small curvature
- B. body
- C. fundus
- D. none of the above

85. **Generally**, ultrasound is **not** suitable for diagnosing carcinomas of the large bowel, as only advanced tumors can be visualized.

- A. TRUE
- B. FALSE

86. \_\_\_\_\_ is characterized by a granulomatous inflammation that affects all parts of the gastrointestinal tract, but usually the distal ileum and parts of the colon.
- A. Hepatomegaly
  - B. Crohn disease
  - C. Ulcerative colitis
  - D. Gastritis
87. Ultrasound demonstrates a tubular structure with a blind end and a diameter greater than \_\_\_\_\_ mm in cases of appendicitis.
- A. 8
  - B. 18
  - C. 28
  - D. 38
88. What is the consequence of appendicitis?
- A. chemotherapy
  - B. radiation therapy
  - C. appendectomy
  - D. organ transplant

#### Chapter 12

89. Which of the following modality is easier to use in adrenal glands examination?
- A. MRI
  - B. CT scans
  - C. Radiography
  - D. Ultrasound
90. In ultrasound, the adrenals are scanned in a lateral oblique plane through the upper pole of the \_\_\_\_\_.
- A. kidneys
  - B. liver
  - C. spleen
  - D. pancreas
91. In neonates, the adrenal glands may be one third the size of the kidneys and are relatively easy to see during ultrasound exam.
- A. TRUE
  - B. FALSE

#### Chapter 13

92. Ultrasound **cannot** be used to assess renal function.
- A. TRUE
  - B. FALSE
93. **Normal** adult kidneys measure \_\_\_\_\_ cm in length.
- A. 0-1
  - B. 1-1.5
  - C. 9-12
  - D. 30-50
94. The renal arteries run retroperitoneally from the \_\_\_\_\_ to the renal hila.
- A. femoral artery
  - B. aorta
  - C. superior vena cava
  - D. inferior vena cava
95. Which of the following condition involves fusion of the lower poles of the two kidneys?
- A. Horseshoe kidneys
  - B. Ptotic kidneys
  - C. Dysplastic kidneys
  - D. Pelvic kidneys
96. Horseshoe kidneys are more prone to which of the following?
- A. trauma and renal calculi

- B. pelviureteric junction obstruction
- C. Wilms tumors in children
- D. all of the above

97. Which of the following kidney may be seen as a retrocardiac mass on a chest X-ray, but not visible in ultrasound?

- A. Thoracic kidney
- B. Ptotic kidney
- C. Horseshoe kidney
- D. Pelvic kidney

98. A single functioning kidney will hypertrophy to compensate in which of the following population?

- A. men
- B. women
- C. children and young adults
- D. elderly

99. Pyelonephritis is an infection involving which of the following?

- A. adrenal glands
- B. renal parenchyma
- C. urinary bladder
- D. ureters

100. Which of the following term is used to describe the progressive renal failure that occurs in HIV infection and AIDS?

- A. HIV-associated hepatomegaly
- B. HIV-associated splenomegaly
- C. HIV-associated pericarditis
- D. HIV-associated nephropathy

101. On ultrasound, renal scars appear as indentations on the renal surface that can be due to which of the following?

- A. previous reflux
- B. infection
- C. surgery or trauma
- D. all of the above

102. Which of the following tumors occur in boys under the age of 4 years, girls under the age of 5 years and women aged between 40–60 years?

- A. Multilocular cystic tumors
- B. Oncocytomas
- C. Angiomyolipomas
- D. Small hyperechoic cortical lesions

103. Nephrocalcinosis is \_\_\_\_\_ in the cortex or medulla.

- A. fluid
- B. pus
- C. calcification
- D. blood

104. Renal artery stenosis may be suspected in patients with which of the following?

- A. severe hypertension
- B. a bruit heard over the renal arteries
- C. combined hypertension and renal impairment
- D. all of the above

#### Chapter 14

105. The urinary bladder can be properly assessed only when it is \_\_\_\_\_ during ultrasound examination.

- A. empty
- B. full
- C. half empty
- D. none of the above

106. For urinary bladder sonography, the patient should be in the \_\_\_\_\_ position.

- A. prone
- B. lateral
- C. supine
- D. oblique

107. The thickness of the **normal** bladder wall is about \_\_\_\_ mm for a full bladder and 5 mm for a non-distended bladder.

- A. 3
- B. 13
- C. 23
- D. 30

108. Assessment of urinary bladder\_\_\_\_\_is the **commonest** reason for an ultrasound study of the bladder.

- A. filling
- B. emptying
- C. biopsy
- D. none of the above

109. \_\_\_\_\_ is an inflammation of the bladder.

- A. Cystitis
- B. Pancreatitis
- C. Gastritis
- D. Nephritis

110. Ultrasound is a cheaper and less invasive alternative to cystoscopy in surveillance for tumors.

- A. TRUE
- B. FALSE

111. Which of the following is an outpouching of the bladder mucosa through a defect in the muscular layer of the bladder wall?

- A. Calculi
- B. Patent urachus
- C. bladder diverticulum
- D. urachal cyst

112. Which of the following is the **preferred** mode of imaging the urethra?

- A. ultrasound
- B. contrast urethrography
- C. MRI
- D. CT

113. \_\_\_\_\_ ultrasound is necessary for the diagnosis of prostate cancer.

- A. Transrectal
- B. Contrast
- C. Biopsy
- D. none of the above

## Chapter 15

114. Scrotal masses that are clinically suspected to be intratesticular or that are of indeterminate position are an absolute indication for an ultrasound scan.

- A. TRUE
- B. FALSE

115. The epididymis is divided into which of the following parts?

- A. head
- B. body
- C. tail
- D. all of the above

116. \_\_\_\_\_ is a condition in which the testis twists, resulting in obstruction of the spermatic artery and vein.

- A. Schistosomiasis
- B. Tuberculous epididymo-orchitis

- C. Testicular torsion
- D. Bacterial epididymo-orchitis

117. Which of the following are ultrasound appearances of testicular atrophy?

- A. the testis are small
- B. an inhomogeneous parenchymal texture
- C. irregular hyperechoic and hypoechoic areas
- D. all of the above

#### Chapter 16

118. \_\_\_\_\_ is defined as a sudden onset of severe abdominal pain connected with tenderness, visceral dysfunction and possibly delayed circulatory decompensation.

- A. Acute abdomen
- B. Acute headache
- C. Chronic pain
- D. none of the above

119. During abdominal ultrasound, which of the following features to be looked at for **spleen**?

- A. abscess
- B. infarction
- C. rupture
- D. all of the above

120. Ultrasound is useful as a **first-level** imaging modality for patients with HIV infection, particularly for examination of the abdomen.

- A. TRUE
- B. FALSE