電腦斷層測驗
Computed Tomography

2025 年 8 月 24 日星期日

1. 除題意不清楚或是圖片有問題，禁止詢問與試題有關的問題。

2. 應答時禁止使用任何文件。

3. 請在電腦答案卡上圈選作答

項目	**填寫內容**
姓名	您的中文與英文姓名
試題名稱	CT Test
項目	不用填寫
科目	不用填寫
受試者識別代碼	您的准考證號碼後五碼：24XXX 將您選定之數字的圓圈塗滿。
科目代碼	不用填寫
地點代碼	不用填寫
作答方式	本測驗共有 90 題問題。請使用 1 到 90 作答欄位。 請將測驗卷 Q1 的答案填入答案卷的答案選擇 1。Q2 = 答案選擇 2，Q3 = 答案選擇 3…Q90 = 答案選擇 90。

1. Which of the following statements about cone-beam geometry in MDCT is correct?
   (A) It reduces scatter
   (B) It can cause reconstruction artifacts
   (C) It is only used in first-generation CT
   (D) It is found in single-detector CT only

2. Which of the following does NOT affect spatial resolution in CT?
   (A) Focal spot size
   (B) Detector size
   (C) Window width
   (D) Reconstruction filter

3. What happens to CT image contrast when the window width is reduced?
   (A) Increases
   (B) Decreases
   (C) Anatomic detail disappears
   (D) No effect

4. What is the effect of the partial volume phenomenon in CT images?
   (A) Streak artifact
   (B) Signal loss
   (C) Blurred tissue boundaries
   (D) Overexposed images

5. How can low contrast resolution be improved?
   (A) Use low mAs
   (B) Increase pitch
   (C) Increase slice thickness and mAs
   (D) Reduce kVp

6. What is the best use for a non-contrast head CT?
   (A) Brain tumor
   (B) Brain edema
   (C) Acute intracranial hemorrhage
   (D) Brain abscess

7. What is the typical arterial phase appearance of renal cell carcinoma (RCC) on CT?
   (A) Homogeneous enhancement
   (B) Minimal enhancement
   (C) Ring enhancement
   (D) Strong central enhancement

8. Which medication is commonly used to control heart rate in cardiac CT?
   (A) Atropine
   (B) Beta-blockers
   (C) Nitroglycerin

(D) Antihistamines

9. What is the major advantage of nonionic dimer contrast agents?
(A) Low cost
(B) Low osmolality
(C) Strong enhancement
(D) Short half-life

10. What is the main risk of using metformin with iodinated contrast?
(A) Hyperglycemia
(B) Allergic reaction
(C) Lactic acidosis
(D) Arrhythmia

11. At what eGFR level should iodinated contrast generally be avoided?
(A) Below 90 mL/min/1.73m²
(B) Below 60 mL/min/1.73m²
(C) Below 45 mL/min/1.73m²
(D) Below 30 mL/min/1.73m²

12. What does CTDIvol represent?
(A) Independent of pitch
(B) Single-slice dose
(C) Reconstruction dose range
(D) Average radiation dose per scan volume

13. Which of the following best improves resolution in multi-planar reconstruction (MPR)?
(A) Increase slice thickness
(B) Use high mA
(C) Use overlapping reconstruction
(D) Decrease scan time

14. In spiral CT, what is the effect of increasing pitch?
(A) Decreased dose and z-axis resolution
(B) Increased dose and resolution
(C) No significant effect
(D) Reduced noise

15. Filtered Back Projection (FBP) in CT image reconstruction is most likely to cause which artifact?
(A) Ring artifact
(B) Star artifact
(C) Streak artifact
(D) Noise artifact

16. What scan parameter set is optimal for high-resolution chest CT?
(A) Thick slices, low mA
(B) Thin slices, high mA
(C) Wide window, low kV
(D) Long exposure time

17. Which is the best metric for assessing low-contrast resolution in CT?
(A) DLP
(B) CNR
(C) PSF
(D) Window width

18. What is the relationship between CTDI and pitch in helical CT?
(A) Directly proportional
(B) Inversely proportional
(C) No relationship
(D) Squarely proportional

19. Among the following, which organ is most radiosensitive in head CT?
(A) Brainstem
(B) Salivary glands
(C) Eyeballs
(D) Thyroid gland

20. Perfusion CT is most commonly used in evaluating which condition?
(A) Acute myocardial infarction
(B) Stroke
(C) Liver tumors
(D) Splenic trauma

21. Acceptance testing is required in which scenario?
(A) Patient change
(B) Protocol update
(C) Detector replacement
(D) Routine image check

22. Modulation Transfer Function (MTF) is used to evaluate:
(A) Image uniformity
(B) Spatial resolution
(C) Dose accuracy
(D) Contrast sensitivity

23. A ring artifact on CT images is most commonly caused by:
(A) Detector malfunction
(B) Metal implants
(C) Short scan time

(D) Narrow window width

24.In the event of a severe contrast media reaction, what is the first-line treatment?
(A) Antihistamines
(B) Corticosteroids
(C) Epinephrine
(D) Oxygen therapy

25.Which shielding method is most effective in reducing radiation exposure to the eyes during a head CT scan?
(A) Lead apron
(B) Bismuth eye shields
(C) Gonadal shielding
(D) Thyroid collar

26.What is the primary advantage of using a thinner slice thickness in CT imaging?
(A) Reduced scan time
(B) Decreased radiation dose
(C) Improved spatial resolution
(D) Enhanced contrast resolution

27.What is the effect of increasing the matrix size in CT imaging?
(A) Decreased spatial resolution
(B) Increased pixel size
(C) Improved spatial resolution
(D) Reduced image noise

28.Which artifact is commonly associated with metal implants in CT imaging?
(A) Beam hardening
(B) Ring artifact
(C) Motion artifact
(D) Partial volume artifact

29.In CT imaging, what is the significance of the equilibrium phase?
(A) It shows peak arterial enhancement
(B) It demonstrates early portal venous filling
(C) It assesses contrast washout and fibrosis
(D) It evaluates biliary excretion

30.Which liver lesion typically shows rapid washout in the delayed phase, aiding in its diagnosis?
(A) Hemangioma
(B) Focal nodular hyperplasia
(C) Hepatocellular carcinoma
(D) Cholangiocarcinoma

31. The Hounsfield Unit (HU) value of pure water is:
(A) -1000
(B) 0
(C) 1000
(D) 50

32. What is the typical kVp range used in adult body CT scans?
(A) 40–60 kVp
(B) 70–90 kVp
(C) 100–140 kVp
(D) 160–200 kVp

33. Increasing the pitch in a helical CT scan will:
(A) Increase dose
(B) Decrease image noise
(C) Decrease scan time
(D) Improve spatial resolution

34. Which protocol is most appropriate for evaluating pulmonary embolism?
(A) Non-contrast chest CT
(B) CT pulmonary angiography (CTPA)
(C) High-resolution CT
(D) PET-CT

35. A patient with suspected ureteral stones should undergo which CT protocol?
(A) Contrast-enhanced abdominal CT
(B) Delayed phase CT urography
(C) Non-contrast helical CT
(D) Dual-energy CT

36. In CT perfusion studies, the area under the time-density curve represents:
(A) Blood volume
(B) Flow rate
(C) Mean transit time
(D) Delay time

37. What unit is used to measure effective radiation dose?
(A) Gray
(B) Rad
(C) Sievert
(D) Becquerel

38. What is the main advantage of low-kVp scanning in CT angiography?
(A) Reduces motion artifact
(B) Increases image contrast of iodine
(C) Improves temporal resolution

(D) Decreases patient discomfort

39. The signal-to-noise ratio (SNR) in CT can be increased by:
(A) Decreasing mAs
(B) Increasing matrix size
(C) Using iterative reconstruction
(D) Lowering slice thickness

40. Which phantom is commonly used for spatial resolution QC in CT?
(A) ACR CT phantom
(B) Leeds phantom
(C) Jaszczak phantom
(D) Tissue-equivalent phantom

41. CT urography reveals left-sided hydronephrosis and a hyperdense 5 mm focus in the proximal ureter. What is the most likely cause?
(A) Renal cyst
(B) Transitional cell carcinoma
(C) Ureteric stone
(D) Pyelonephritis

42. A CT pulmonary angiography shows a large filling defect within the right main pulmonary artery. Which condition is indicated?
(A) Pulmonary embolism
(B) Pulmonary hypertension
(C) Lung cancer
(D) Pneumonia

43. A patient with abdominal pain undergoes CT, which reveals a "target sign" in the terminal ileum with bowel wall thickening and mesenteric fat stranding. What is the most probable diagnosis?
(A) Crohn’s disease
(B) Appendicitis
(C) Lymphoma
(D) Small bowel obstruction

44. The slip ring technology in CT scanners enables which of the following?
(A) Beam collimation
(B) Power transmission and data communication without cable entanglement
(C) Better image resolution
(D) Improved spatial filtering

45. The spatial resolution of a CT system is primarily influenced by:
(A) Pitch and kVp
(B) Slice thickness and matrix size
(C) Tube current and table speed

(D) Gantry rotation speed

46. In dual-source CT, what is the primary advantage of using two X-ray tubes and two detectors?
(A) Doubling radiation dose
(B) Generating 3D reconstructions
(C) Improving time resolution and dual-energy imaging
(D) Replacing bowtie filters

47. What is the function of automatic exposure control (AEC) in CT?
(A) Adjust kVp based on patient habitus
(B) Automatically select contrast dose
(C) Modulate mA during scan to reduce dose
(D) Focus the beam to lesion area

48. Which of the following is the main mechanism of iodine-based contrast enhancement in CT?
(A) T1 shortening
(B) Increased X-ray attenuation due to iodine's high atomic number
(C) Proton resonance
(D) Decreased signal-to-noise ratio

49. Which contrast media characteristic is associated with lower incidence of adverse reactions?
(A) High-osmolar ionic contrast
(B) Low-osmolar non-ionic contrast
(C) High viscosity contrast
(D) High iodine concentration

50. Which of the following is a key advantage of MDCT over single-detector CT?
(A) Lower radiation dose per rotation
(B) Slower scan time
(C) Greater anatomical coverage per rotation
(D) Reduced beam collimation requirements

51. In cardiac MDCT, why is temporal resolution important?
(A) To reduce beam hardening
(B) To decrease iodine dose
(C) To freeze cardiac motion and reduce artifacts
(D) To increase contrast resolution

52. What is the main cause of cone beam artifact in multi-detector CT (MDCT)?
(A) Beam hardening from metallic implants
(B) Misregistration due to patient motion
(C) Divergence of X-ray beam in the z-axis (longitudinal direction)
(D) Undersampling during axial acquisition

53. Which of the following strategies reduces cone beam artifacts in MDCT?
(A) Using thicker slices
(B) Increasing pitch
(C) Limiting total z-axis coverage per rotation
(D) Decreasing gantry rotation speed

54. Ring artifacts are typically caused by:
(A) X-ray beam collimation error
(B) Patient mispositioning
(C) Defective or miscalibrated detector elements
(D) Incorrect slice thickness

55. What is a common strategy to reduce partial volume artifacts?
(A) Increase pitch
(B) Use thicker slices
(C) Apply low-pass filters
(D) Use thinner slice thickness and high-resolution mode

56. Which artifact is commonly seen in the posterior fossa on head CT due to rapid changes in tissue density?
(A) Cone beam artifact
(B) Beam hardening artifact
(C) Ring artifact
(D) Streak artifact from contrast

57. Which factor most directly increases CT radiation dose to the patient?
(A) Reducing kVp
(B) Increasing pitch
(C) Increasing mAs
(D) Narrowing the scan field of view

58. What is the unit of DLP (Dose-Length Product) in CT dosimetry?
(A) mGy
(B) mSv
(C) mGy·cm
(D) Sv·cm²

59. What is the main advantage of iterative reconstruction (IR) over filtered back projection?
(A) Increases scan speed
(B) Allows thicker slice thickness
(C) Reduces image noise and radiation dose
(D) Improves bone contrast only

60. Which reconstruction method is best for visualizing airways and lung structures by showing low-density voxels?
(A) MIP
(B) Min IP (Minimum Intensity Projection)
(C) VR
(D) IR

61. What is the definition of 'pitch' in CT?
(A) The product of tube voltage and current
(B) The ratio of table movement per rotation to beam width
(C) The size of the reconstruction matrix

62. In multi-slice helical CT, increasing the pitch results in which of the following effects?
(A) Improved image resolution
(B) Increased scan time
(C) Reduced patient dose
(D) Increased image noise

63. Which factor primarily determines spatial resolution in CT?
(A) Tube voltage
(B) Tube current
(C) Detector size and focal spot size
(D) Image matrix size

64. Dual-energy CT relies mainly on which parameters?
(A) Different pitches and rotation speeds
(B) Different window widths and levels
(C) Different X-ray energy levels (kVp)
(D) Different FOV settings

65. The Hounsfield Unit (HU) in CT is related to which physical property?
(A) Electron density
(B) Atomic number
(C) Linear attenuation coefficient

66. What is the primary X-ray generation mechanism used in CT?
(A) Radioisotope decay
(B) Beta particle bombardment
(C) Bremsstrahlung radiation
(D) Synchrotron acceleration

67. What is the function of a reconstruction kernel in CT?
(A) To correct image orientation
(B) To optimize image properties (smoothing or sharpening)
(C) To reduce radiation dose

(D) To increase image matrix size

68. Increasing mAs in CT primarily results in?
(A) Increased spatial resolution
(B) Increased image noise
(C) Reduced image noise
(D) Changed HU values

69. Image noise in CT is most inversely related to which parameter?
(A) Pitch
(B) kVp
(C) mAs
(D) FOV

70. The main purpose of uniformity testing in CT is to:
(A) Evaluate HU accuracy
(B) Assess image noise
(C) Detect ring artifacts
(D) Ensure image consistency across the field

71. Which of the following is NOT typically included in daily CT quality control?
(A) Mechanical alignment check
(B) Noise evaluation
(C) HU accuracy check
(D) Gamma ray uniformity test

72. The most common cause of ring artifacts in CT is:
(A) Tube voltage instability
(B) Faulty detector elements
(C) Patient breathing motion
(D) Incorrect reconstruction algorithm

73. Which method can reduce metal artifacts in CT?
(A) Using low kVp
(B) Reducing pitch
(C) Using metal artifact reduction (MAR) algorithms
(D) Using small focal spot

74. What is the most likely cause of ghosting artifacts in CT images?
(A) Low tube current
(B) Patient movement
(C) Detector saturation
(D) Unstable focal spot

75. Excessive HU deviation in QC indicates:
(A) Normal metal artifact

(B) Overheated X-ray tube
(C) Abnormal attenuation calculation
(D) Incorrect kernel setting

76. According to standard QC protocols (e.g., AAPM), how often should spatial resolution be tested?
(A) Daily
(B) Weekly
(C) Monthly
(D) Yearly

77. Which CT protocol is most suitable for low-dose application?
(A) Triphasic liver scan
(B) High-resolution chest screening (HRCT)
(C) Intracranial hemorrhage detection
(D) Coronary artery imaging

78. What contrast agent is commonly used in CT angiography?
(A) Fluorine-18
(B) Iodinated contrast
(C) Barium sulfate
(D) Magnesium salts

79. CT perfusion is most commonly used to evaluate which acute condition?
(A) Pulmonary embolism
(B) Acute stroke
(C) Abdominal aortic aneurysm
(D) Renal insufficiency

80. What is the main clinical advantage of dual-source CT?
(A) Reduced scan time
(B) Increased radiation dose
(C) Lower noise
(D) Reduced thermal effects

81. One key advantage of helical scanning is:
(A) Reduced spatial resolution
(B) Less data acquisition
(C) Shorter scan time for patients
(D) Higher noise

82. Cardiac CT requires which of the following conditions?
(A) End-expiration breath hold
(B) Suitable for renal failure patients
(C) Stable rhythm and heart rate control
(D) Intravenous glucose injection

83. What is the optimal timing for corticomedullary phase in renal CT?
(A) 5 seconds
(B) 15 seconds
(C) 30 seconds
(D) 90 seconds

84. On a normal chest CT, how do trachea and bronchi appear?
(A) Hyperdense
(B) Hypodense (black air density)
(C) Mixed density
(D) Not visible

85. Acute intracranial hemorrhage appears as what on a non-contrast CT?
(A) Hypodense
(B) Isodense
(C) Hyperdense
(D) Invisible

86. Which hepatic lesion shows strong enhancement during arterial phase CT?
(A) Fatty liver
(B) Hepatocellular carcinoma (HCC)
(C) Hepatic cyst
(D) Soft tissue sarcoma

87. In HRCT, what does honeycombing indicate?
(A) Lung cancer
(B) End-stage pulmonary fibrosis
(C) Acute pneumonia
(D) Emphysema

88. What is the typical CT appearance of gallstones?
(A) Hyperdense round lesion
(B) Isodense mass
(C) Intermediate-density star-shaped lesion
(D) Hypodense fluid collection

89. What is the typical CT finding in acute cerebral infarction?
(A) Hyperdense lesion
(B) Loss of gray-white matter differentiation with edema
(C) Metal artifact
(D) Isodense mass

90. How do renal calculi typically appear on CT?
(A) Hypodense fluid lesion
(B) Hyperdense solid lesion

(C) Isodense lesion
(D) Difficult to detect