

電腦斷層測驗

Computed Tomography

2016年8月28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
<i>Name</i> 姓名	請填寫英文姓名
<i>Test Title</i> 試題名稱	不用填寫
<i>Item</i> 項目	不用填寫
<i>Subject</i> 科目	CT Test
<i>Test I/D</i> 受試者識別代碼	您的准考證號碼 <u>060XX</u> 將您選定之數字的圓圈塗滿。
<i>subject Code</i> 科目代碼	007
<i>作答方式</i>	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的答案填入答案卡的Answer choices選 項●，Q2 = Answer choices 2... Q90 = Answer choices 90。

# IABSRT CT

Q1. Choose the right time for washing hands during CT exam.

- 1) after moving the inpatient from bed to CT table
- 2) before calling outpatient's name for explanation of exam
- 3) after touching urinary bag of emergency room's patient
- 4) after call with patient of health care center

Q2. Which of the following is the appropriate measure for exam of the active TB patient?

- 1) put on the gloves and gown
- 2) no matter that stay with normal patients
- 3) wear the N95 mask
- 4) don't use the contrast media if possible

Q3. Which of the following is the not-correct example for infection control and wearing protection equipment of staffs?

- 1) when exposed to infection, inform to doctor and get treatment
- 2) acquire immunity by vaccination for hepatitis B
- 3) wear the mask or safety glasses depends on diseases of patient if possible to be exposed to blood
- 4) change the gown immediately when stained with patient's blood

Q4. Choose the right normal range of Glomerular Filtration Rate for using contrast media.

- 1) above 90
- 2) 30~59
- 3) 15~29
- 4) below 15

Q5. Which of the following statements about contrast medium is true ?

- 1) A accurate prediction of a contrast reaction could be achieved by test injection.
- 2) Vasovagal reactions are common and characterized by hypotension with tachycardia.
- 3) Prior reaction to contrast injection is the best predictor of recurrent adverse reaction.
- 4) Nearly all life-threatening reactions occur 20 minutes later after contrast medium administration.

Q6. Which of the following is the reason for prohibition of taking metformin for 48 hours before and after the exam with contrast media?

- 1) elevation of blood pressure
- 2) elevation of blood sugar
- 3) occurrence of lactic acidemia when the renal function is low
- 4) occurrence of arrhythmia when using the contrast media

Q7. Which of the following is not a category of iodinated contrast agents?

- 1) Ionic monomer
- 2) Ionic dimer
- 3) Nonionic dimer
- 4) Nonionic trimer

Q8. Choose the right part for defibrillation electrodes.

- 1) below the both clavicles
- 2) above and below the sternum
- 3) right abdomen and above the left scapula
- 4) below the right clavicle and below the left lateral ribs

Q9. Non-ionic dimeric, iso-osmolar, contrast agents have an osmolality of \_\_\_\_\_ mOsm/Kg water.

- 1) 100
- 2) 200
- 3) 250
- 4) 290

Q10. Which of the following is the not-correct example about CPR?

- 1) press on the center of chest
- 2) repeat 30 times of chest compressions and 2 times of artificial respiration for adults
- 3) press the chest 50 times per minute for adults
- 4) cover the lips of the patient completely and blow up for a second to raise patient's chest

Q11. Which of the following is the result of this artifact?



- 1) increasing CT HU
- 2) increasing noise
- 3) loss of contrast resolution
- 4) low CT HU

Q12. Which of the following is the artifact that occurred at below image?

- 1) truncation artifact
- 2) ring artifact
- 3) view insufficiency artifact
- 4) motion artifact

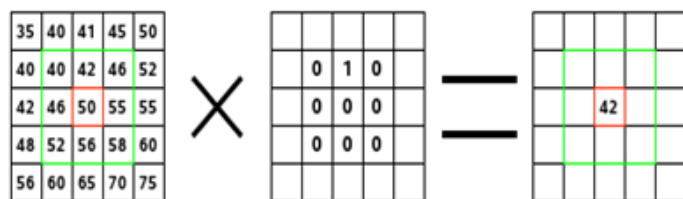


Q13. What factor would the signal-to-noise ratio (SNR) in a CT image change by when the slice thickness is changed from 1.25 to 2.5 mm keeping the same x-ray technique (kV and mAs)?

- 1) The SNR will increase by a factor of  $\sqrt{2}$
- 2) The SNR will increase by a factor of 2
- 3) The SNR will decrease by a factor of  $\sqrt{2}$
- 4) The SNR will decrease by a factor of 2

Q14. Which of the following is the correct answer?

- 1) back-projection
- 2) convolution filter
- 3) sinogram
- 4) repeated back-projection



Q15. All of the following diseases or conditions may increase a patient's risk for contrast-induced nephropathy, except:

- 1) diabetes
- 2) cardiovascular disease
- 3) colitis
- 4) multiple myeloma

Q16. CT detector technology: which item is NOT correct?

- 1) Solid-state detectors are formed from a scintillant such as cadmium tungstate and a silicon photodiode.
- 2) Should have negligible afterglow
- 3) Separation of detectors to prevent light crossover increases the detection efficiency of the array
- 4) Solid-state detectors can be produced to a width of approximately 0.5mm

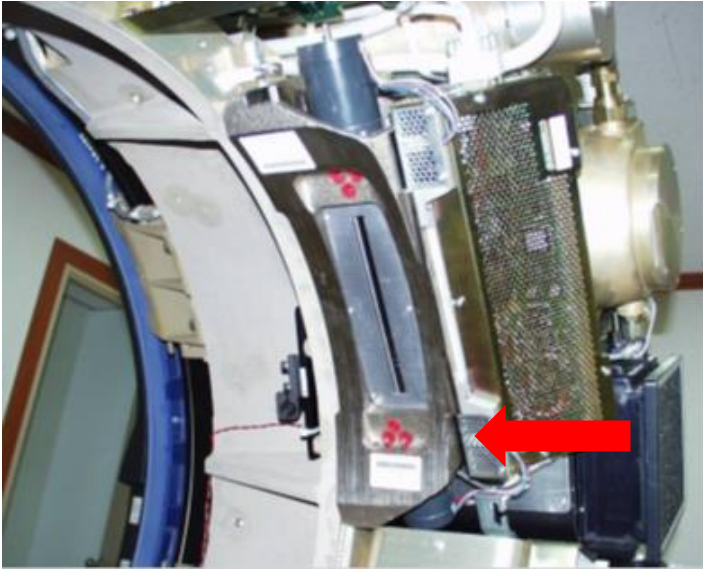
Q17. What is the main reason of cone beam distortion in MDCT?

- 1) Expansion of fan beam
- 2) Decrease of cone beam width
- 3) Reduction of both number and efficiency of detector elements
- 4) X-ray focus and detector row are not vertical to the rotating axis

Q18. Regarding spiral and multi-slice CT: which one is true?

- 1) Means that several parallel beams are used in data acquisition.
- 2) The number of slices a scanner is capable of producing per gantry revolution is determined by the number of detector rows
- 3) Slice width is determined by collimation
- 4) Beam divergence in the z-axis is a potential problem

Q19. Choose the correct name and function of the part pointed with the arrow.



- 1) collimator of detector - decrease the scatter ray
- 2) collimator of x-ray tube - decrease the penumbra
- 3) high voltage generator - maximize the detection efficiency
- 4) generator - make the high voltage and supply it to x-ray tube

Q20. Which of the following is the correct flow of conversion of signal?

- 1) Scanning→Coding→Quantization→Sampling
- 2) Scanning→Quantization→Sampling→Coding
- 3) Scanning→Quantization→Coding→Sampling
- 4) Scanning→Sampling→Quantization→Coding

Q21. Which of the following is the appropriate material for bowtie filter?

- 1) Teflon
- 2) tungsten
- 3) rhenium
- 4) molybdenum

Q22. Which of the following clinical laboratory tests is not an indicator of renal function?

- 1) BUN
- 2) Renin
- 3) Serum creatinine
- 4) Glomerular filtration rate

Q23. The disadvantage about MDCT including:

- 1) Reduce motion artifact
- 2) Perfusion imaging and CTA
- 3) Reduce volume of contrast at the same time improve scanning of parenchymal organs
- 4) Image noise grows as section collimation is reduced

Q24. Which of the following is INCORRECT?

- 1) Isotropic voxels describe any cuboidal-shaped voxel
- 2) Axial CT images acquired using most modern scanners can be reformatted to coronal and sagittal images without losing any data quality
- 3) MPR techniques can allow oblique sections to obtain true coronal and sagittal images even if the patient was rotated in the scanner
- 4) The isotropic voxel can be used to create a three-dimensional data map

Q25. The fundamental radiation dose parameter in CT is the

- 1) CT dose index (CTDI)
- 2) dose length product (DLP)
- 3) the effective dose (E)
- 4) the peak tube voltage (kVp)

Q26. Which is the LEAST appropriate combination in three-dimensional imaging?

- 1) The appendicular skeleton--MinIP
- 2) The vertebra--MPR
- 3) The aorta--VR
- 4) The digestive tract--VE

Q27. Choose the correct example about below image.



- 1) SSD of underlying artery
- 2) use bolus tracking method for underlying artery
- 3) MIP of lower extremity vein
- 4) volume rendering of lower extremity vein

Q28. How many image gray-levels will be on nowadays CT systems?

- 1)  $2^{11}=2048$  (2K).
- 2)  $2^{12}=4096$  (4K).
- 3)  $2^{16}=65536$  (256K).
- 4)  $2^{10}=1024$  (1K).

Q29. Which of the following CT numbers would appear as a white when a window width of 400 and a window level of 60 are selected?

- 1) CT numbers above + 60
- 2) CT numbers between -140 and +260
- 3) CT numbers below -400
- 4) CT numbers above +260

Q30. Increasing kVp of MDCT would have what effect on the CTDIw?

- 1) increase
- 2) decrease
- 3) no change
- 4) stochastic increasing

Q31. Which of the following disease requires special attention if the contrast media injected through lower extremity?

- 1) aortic arch dissection
- 2) pulmonary embolism
- 3) carotid stenosis
- 4) SVC syndrome

Q32. Choose the correct disease of below image.



- 1) renal artery dissection
- 2) ADPKD
- 3) renal infarct
- 4) ARF(acute renal failure)

Q33. What is the structure of the section marked with an arrow?



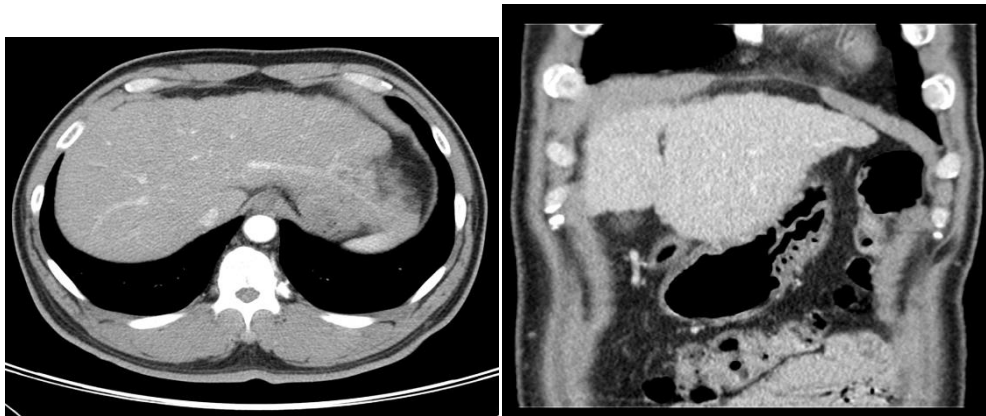
- 1) illeum
- 2) duodenum
- 3) jejunum
- 4) colon



Q34. Partial volume artifacts are best avoided by

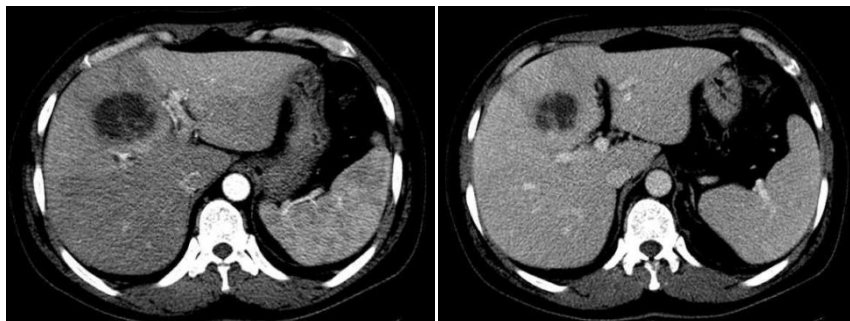
- 1) using thin slice acquisition
- 2) increasing kVp
- 3) decreasing mAS
- 4) using faster rotation

Q35. Which of the following is the liver disease shown at the below images in common?

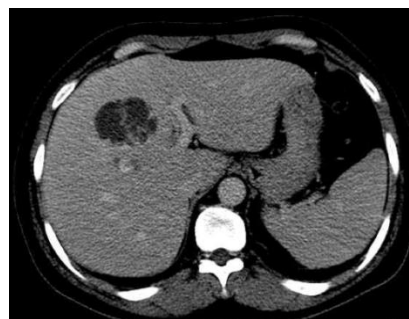


- 1) fatty liver
- 2) liver cirrhosis
- 3) hepatocellular carcinoma
- 4) focal nodular hyperplasia

Q36. Which of the following is correct disease of the nodule shown at the images of liver 3 phase CT?



- 1) cyst



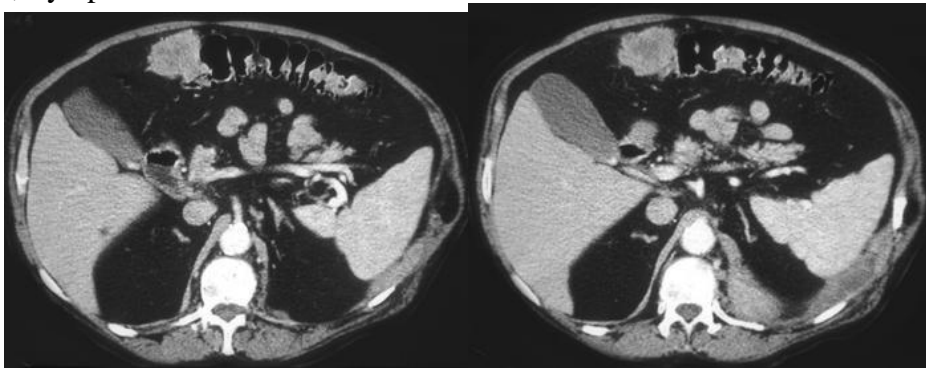
- 2) abscess
- 3) hemangioma
- 4) hepatocellular carcinoma

Q37. With MDCT scanners, the longitudinal resolution is influenced by many factors, but excluding

- 1) the DAS channel width
- 2) the interpolation reconstruction algorithm
- 3) pitch
- 4) FOV size

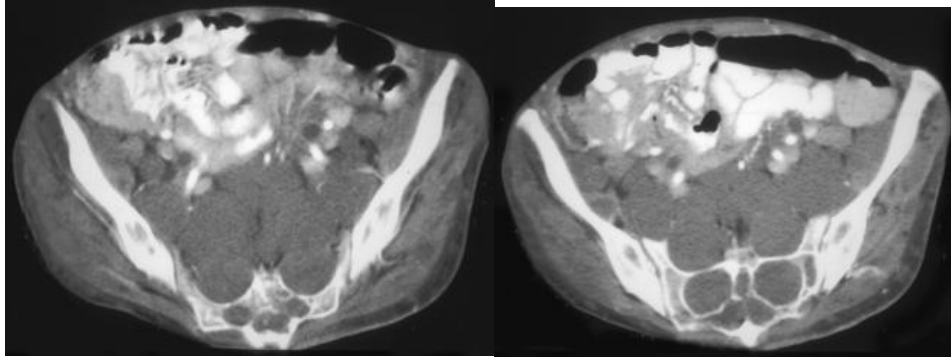
Q38. In this patient with small cell lung cancer the finding seen on staging CT represents:

- 1) metastases to the colon
- 2) apseudomass
- 3) stool in the bowel
- 4) lymphoma



Q39. Middle aged patient with abdominal pain. What is the diagnosis?

- 1) lymphoma
- 2) neurofibromatosis
- 3) ovarian cysts
- 4) ovarian cancer



Q40. Which of the following statement about CTDI or DLP is not true?

- 1)  $CTDI_{vol}$  is a measure of exposure per slice.
- 2) DLP is measure of total radiation exposure for the whole series of images.
- 3)  $CTDI_{vol}$  is dependent of scan length.
- 4) DLP is proportional to scan length.

Q41. If fresh blood(liquid) is 55HU, and a chronic subdural hematoma is 10HU, what HU density is clotted blood?

- 1) Less than 55 but greater than 10
- 2) 55
- 3) 45
- 4) Greater than 55

Q42. Which of the following is NOT an advantage to performing a CT scan for stroke?

- 1) CT can be rapidly performed.
- 2) It is always possible to distinguish between old and new infarcts.
- 3) CT allows easy exclusion of hemorrhage.
- 4) CT allows the assessment of parenchymal damage.

Q43. Which of the following is NOT true concerning CT?

- 1) CT is the imaging modality of choice for the detecting subarachnoid hemorrhage.
- 2) Small subarachnoid bleeds may be inapparent.
- 3) On CT, subarachnoid hemorrhage appears as high density within sulci and CSF cisterns.
- 4) CT becomes more sensitive days to weeks after the acute phase of a subarachnoid hemorrhage.

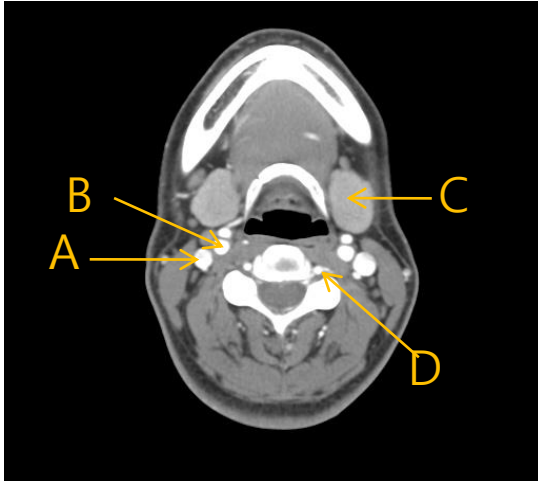
Q44. Which imaging finding on CT is uncommon for acute cerebral infarction within 24 hrs after ictus?

- 1) dense MCA sign
- 2) hemorrhagic transformation
- 3) grey-white interface loss
- 4) frank hypodensity of basal ganglia

Q45. Which one is related to radiation risk ?

- 1) DLP
- 2) MTF
- 3)  $CTDI_{vol}$
- 4) FWHM

Q46. Which of the following is correct about below image?

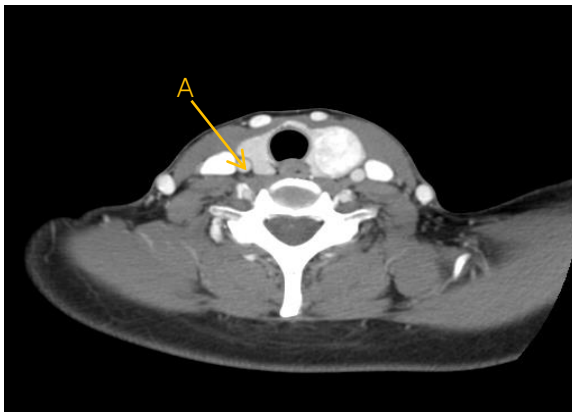


- 1) A : external carotid artery
- 2) B : internal jugular vein
- 3) C : thyroid
- 4) D : vertebral artery

Q47. Which of the following is correct about salivary gland CT?

- 1) observation of tumor, stone, abscess and inflammation in salivary gland
- 2) cover from chin to hyoid bone level
- 3) delay scan for stone
- 4) set window width 10, window center 400 for soft tissue

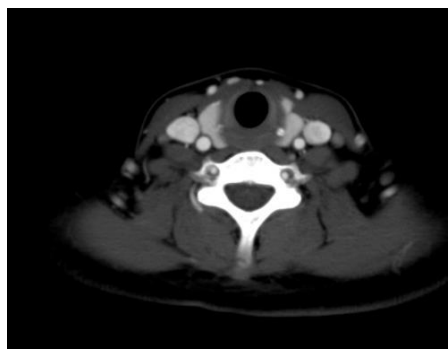
Q48. Which of the following is correct about below image?



- 1) T-spine is shown
- 2) Thyroid cancer is shown
- 3) A is external carotid artery
- 4) Mucous membrane of trachea became thick

Q49. Which of the following is not shown on the image below?

- 1) Trachea
- 2) Common carotid artery
- 3) Thyroid gland



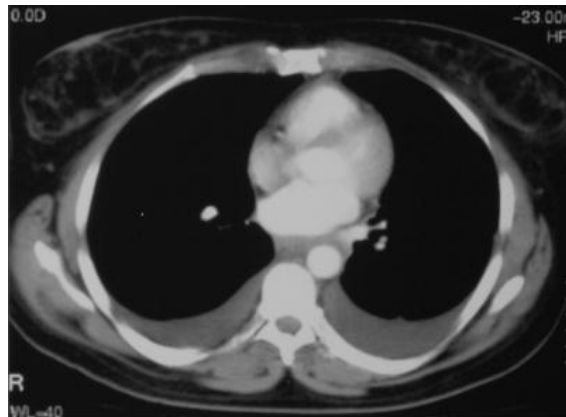
4) Pharynx

Q50. According to the following formulas, which one is not true?

- 1)  $CTDI_w = 1/3 CTDI_{100,center} + 2/3 CTDI_{100,edge}$
- 2)  $CTDI_{vol} = pitch / CTDI_w$
- 3)  $DLP = CTDI_{vol} \times scan\ length$
- 4)  $Effective\ dose = k \times DLP$  (k: a conversion factor)

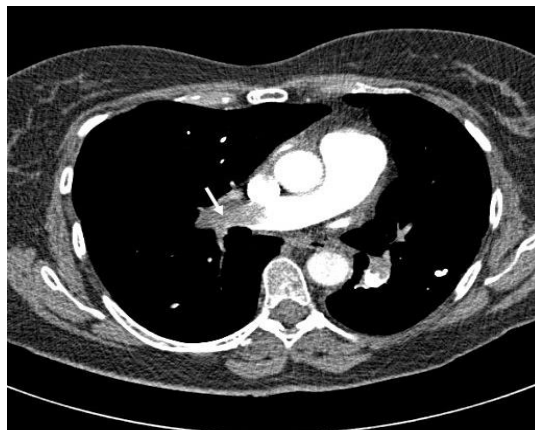
Q51. This 47-year-old woman was admitted with abdominal pain and became short of breath. CT chest was performed.

- 1) Bilateral pneumonia
- 2) Bilateral pleural thickening
- 3) A pulmonary nodule
- 4) Bilateral pleural effusions



Q52. Arrow in CT image points to.

- 1) Aorta
- 2) SVC
- 3) Right Pulmonary Artery
- 4) Main Pulmonary Artery



Q53. With dual source CT, which is the most improved ?

- 1) temporal resolution
- 2) reduce the slice width
- 3) noise
- 4) contrast.

Q54. In dual-source CT, which is the best angle between the two x-ray tubes?

- 1) 45
- 2) 90
- 3) 120
- 4) 180

Q55. Which is not true about GI contrast media for CT scan?

- 1) Agents with positive HU values are considered positive contrast agent.
- 2) Agents with negative HU values are considered negative contrast agent.
- 3) Water is a neutral agent.
- 4) 50-70% conventional radiography barium sulfate suspension is used for CT scan.

Q56. Which is not true about contrast arrival times after injection into the right cubital vein in a normal patient ?

- 1) Aorta: 15-22 seconds
- 2) Renal artery: 18-27 seconds
- 3) Renal vein: 22-30 seconds
- 4) Hepatic vein: 30-40 seconds

Q57. Which is the most common material of urinary tract stone ?

- 1) Calcium salts
- 2) Cystine
- 3) Uric acid
- 4) Xanthine

Q58. Choose the disease shown at below images.



- 1) muscle rupture
- 2) varicose vein
- 3) muscle tumor
- 4) lower extremity edema

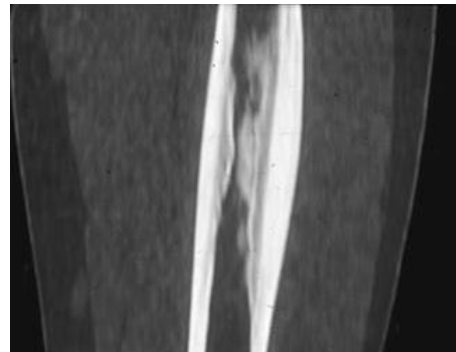
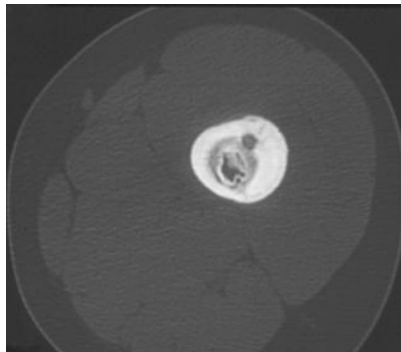
Q59. The 41-year-old man complained of slowly progressive ongoing low back pain. No specific traumatic event was identified. He was otherwise healthy with normal lab values. The lumbar CT scan abnormality as identified by the arrow most likely corresponds to:

- 1) an acute L4 body fracture
- 2) a lumbar chordoma
- 3) L4 body spondylolysis
- 4) vacuum phenomenon in the facet joint



Q60. Teenager with pain in the leg. What is the diagnosis?

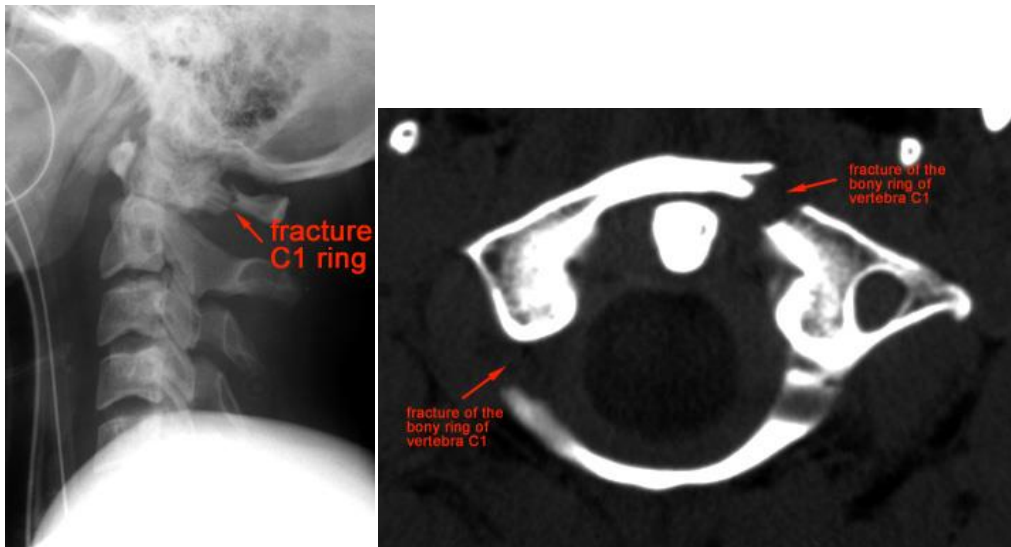
- 1) bone infarct
- 2) osteoidosteoma
- 3) osteosarcoma
- 4) osteoarthritis



Q61. After seeing this lateral view, the radiologist obtains a CT. This is a:

- 1) Hangman's fracture.

- 2) Jefferson fracture.
- 3) Odontoid fracture.
- 4) Teardrop fracture.



Q62. Which of the image processing technique is used on the image below?

- 1) Multiplanar Reformation
- 2) Curved Planar Reformation
- 3) Average Intensity Projection
- 4) Maximum Intensity Projection



Q63. Which of the following is correct about



- 1) use  $\beta$ -blocker for dilatation of vessel
- 2) use volume rendering for calcium scoring



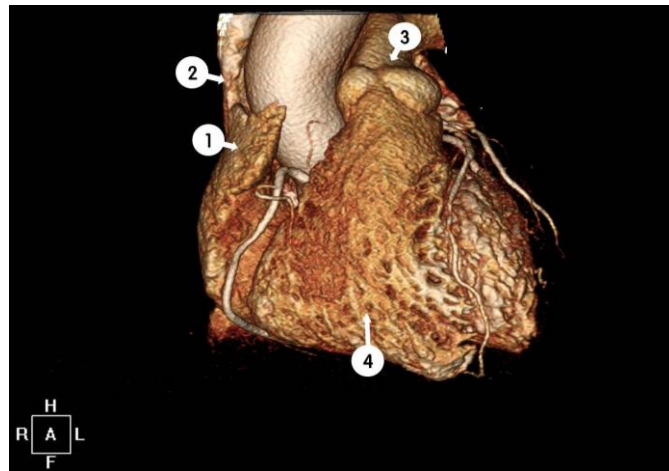
- 3) Short temporal resolution is good for image quality
- 4) give a nitroglycerin to lower heart rate

Q64. Which one of the following operations will need to set the “pixel value threshold”, when you manipulate 3D volumetric CT data into some image outcomes?

- 1) MIP – Maximum Intensity Projection.
- 2) SSD – Shaded Surface Display.
- 3) MPR – Multi Planar Reformat.
- 4) CPR – Curve Planar Reformat.

Q65. Which of the following is correct name of the structures marked with arrows?

- 1) 1 : Rt ventricle
- 2) 2 : SVC
- 3) 3 : descending aorta
- 4) 4 : Lt atrium

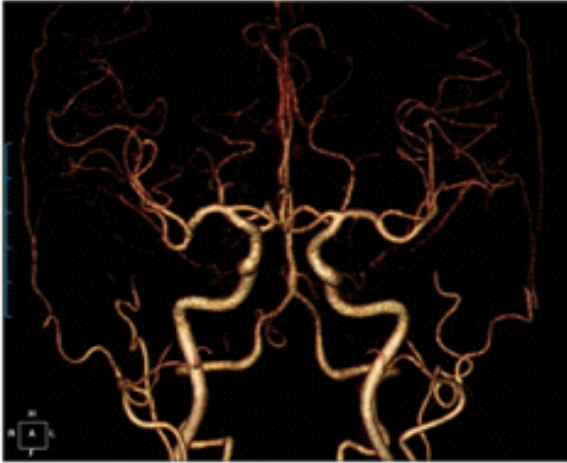


Q66 What is the diagnosis for the image below?

- 1) Occipital condyle fracture
- 2) C1 fracture
- 3) C2 fracture
- 4) C3 fracture



Q67. Which of the following is correct ab



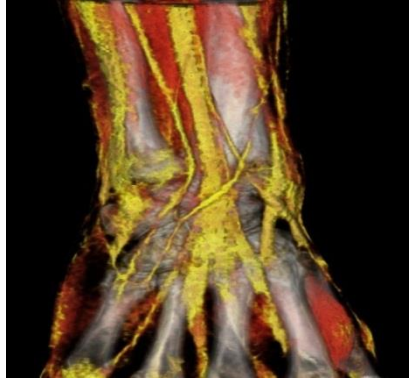
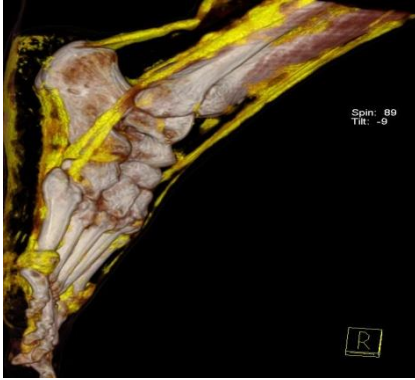
- 1) well-shown of brain vein
- 2) used bolus tracking
- 3) dissection of vertebral artery
- 4) drip infusion of contrast media for prevention of extravasation

Q68. Which of the following is correct about below image?



- 1) Distal part of the trachea is narrowed
- 2) Both inspiration and expiration scan are required
- 3) The patient should keep making voice 'e~' to observe the esophagus
- 4) It is reconstructed by SSD method with threshold of -650~ -230

Q69. Which of the following is correct about below image?



- 1) fusion image of two images
- 2) for diagnosis of tendon
- 3) The single source is better than the dual sources
- 4) for diagnosis of muscle

Q70. Choose the INCORRECT statement for the image below.

- 1) The purpose of study is to examine the cerebral vascular system.
- 2) This is volume rendering image.
- 3) This image could be made without contrast.
- 4) Basilar artery is shown.

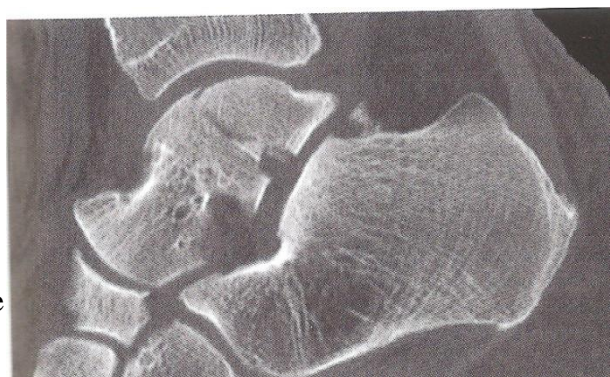


Q71. Which of the following is the factor for increasing of patient dose?

- 1) high pitch
- 2) decreased MSAD
- 3) using filter
- 4) large scan FOV

Q72. What's the impression about the image?

- 1) Talus fracture
- 2) Calcaneal fracture
- 3) Metatarsal bone fracture
- 4) Cuboid bone fracture



Q73. Which of the following is the dose in range

- 1) 20 mGy
- 2) 200 mGy
- 3) 2 mGy
- 4) 2000 mGy

Q74. What does the image below show?

- 1) Aortic valve Prosthesis
- 2) Mitral valve Prosthesis
- 3) Tricuspid valve Prosthesis
- 4) Pulmonary valve Prosthesis



Q75. Which of the following is the method for dose reduction by operator of CT?

- 1) reduction of electric noise
- 2) development of fine focus x-ray tube
- 3) using dose modulation
- 4) reduction of skin dose by beam hardening

Q76. Visibility of small high-contrast CT lesions would most likely improve with decreasing:

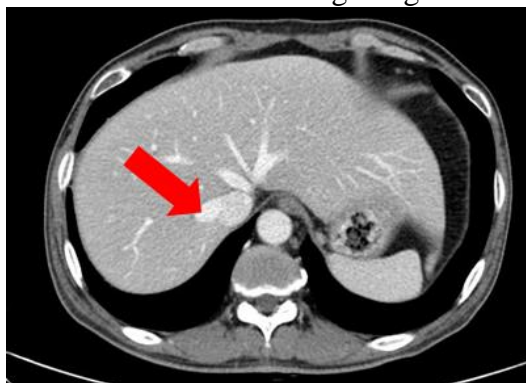
- 1) Patient dose
- 2) Scan time
- 3) Field of view
- 4) Slice thickness

Q77 What is incorrect about infection control in CT rooms?

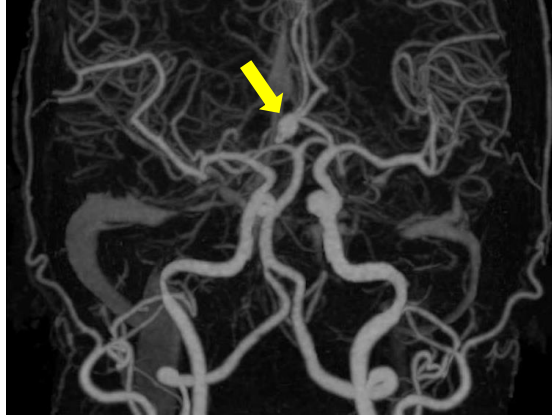
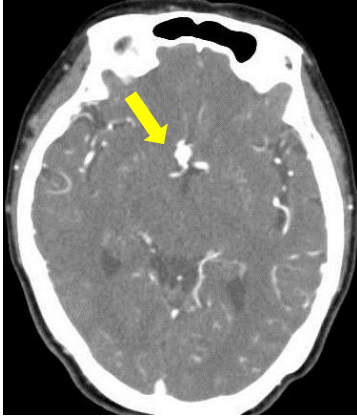
- 1) Asepsis is applied for every invasive procedure or management.
- 2) We should re-use clearly used injections and alcohol swabs as much as possible.
- 3) We should keep sterilized materials in fixed place.
- 4) Except single used materials, all materials used in invasive procedure should be sterilized and re-used.

Q78. What is the anatomic term of indicated arrow in the following image?

- 1) Hepatic artery
- 2) Superior mesenteric artery
- 3) Portal vein
- 4) Hepatic vein



Q79. The following images show intracranial aneurysm. The arrows indicate:



- 1) Middle Cerebral Artery
- 2) Anterior Communicating Artery
- 3) Posterior Communicating Artery
- 4) Basal Artery

Q80. About measuring the CTDI (CT dose index), which one of the following is correct?

- 1) An X-ray film or an image plate must be used
- 2) The reading on the ion-chamber is in the unit of mGy.
- 3) There are 2 cylindrical phantoms with different diameters, 16cm and 32cm.
- 4) On the CT image of the phantom, there must be drawn 5 circular ROIs and one of these ROIs must be on the isocenter.

Q81. Which is the following is the method for increasment of contrast resolution?

- 1) decreasing mAs
- 2) using edge algorithm
- 3) increasing slice thickness
- 4) using small focal spot size



Q82. Which is the following is the method for reduction of artifact?

- 1) increasing tube current
- 2) decreasing slice thickness
- 3) fixing the patient head
- 4) using high resolution algorithm

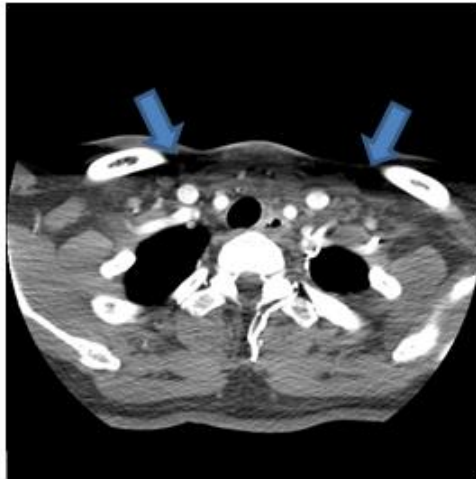


Q83. Which of the following is correct about linearity for evaluation of image quality?

- 1) to distinguish the adjacent structures have high contrast
- 2) to show the fine change of the object density
- 3) to show the change of the CT number of ROI for uniform material like water
- 4) to show the relation between CT number of imaged object and linear attenuation coefficient

Q84. Which of the following is incorrect regarding increase factors of occurred artifact in the figure below?

- 1) Tube voltage
- 2) Thickness of tissue.
- 3) Density of tissue.
- 4) Tube current.



Q85. Methods of reducing CT image noise include:

- 1) increases x-ray dose
- 2) decreases x-ray dose
- 3) decreases the FOV
- 4) none of the above

Q86. If a CT detector has an offset or gain difference of 0.1% with neighboring detectors, which type of artifact will be depicted ?

- 1) stair-step artifact
- 2) beam hardening
- 3) partial volume
- 4) ring

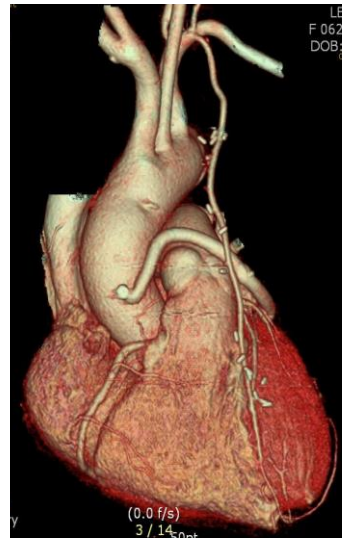
Q87. What is the anatomic term of indicated arrow in bottom figure?

- 1) Scaphoid bone
- 2) Lunate bone
- 3) Trapezium bone
- 4) Capitate



Q88. What is not related to the following image?

- 1) MIP (Maximum intensity projection)
- 2) VRT (Volume rendering technique)
- 3) LIMA (Left internal mammary artery)
- 4) CABG (Coronary artery bypass graft)



Q89. Which one is the appropriate method to improve this kind of low quality image?

- 1) Increase the pitch.
- 2) Hold a respiration.
- 3) Remove the metal.
- 4) Magnify the SPOV.



Q90. The modulation transfer function (MTF) of CT is one method of measuring:

- 1) Attenuation
- 2) Contrast resolution.
- 3) Spatial resolution.
- 4) Slice profile