Q1.

Which of the following combinations is not appropriate?

1. 1st generation – Pencil beam
2. 2nd generation – Translate-rotate (T-R)
3. 3rd generation – Nutate-rotate (N-R)
4. 3rd generation – Multislice CT

Q2.

Which of the following statements is incorrect?

1. Single slice CT has a detector array only on the slice plane axis.
2. With multislice CT, multiple images are obtained with a single rotation.
3. With multislice CT, detectors with superior X-ray dose efficiency are required.
4. The detectors of multislice CT are exclusively asymmetric matrix.

Q3.

Which of the following statements is incorrect?

1. The number of cone-angle artifacts with multislice CT is high compared to single slice CT.
2. The number of partial volume artifacts with multislice CT is high compared to single slice CT.
3. Multislice CT allows shorter imaging times than with single slice CT.
4. Multislice CT allows wider imaging than with single slice CT.

Q4.

Which of the following is an incorrect Multi Slice CT?

1. Multiple sectional images can be acquired at the same time.
2. Isotropic images can be acquired.
3. Cone beam X-ray is used.
4. Heart image cannot be acquired.

Q5.

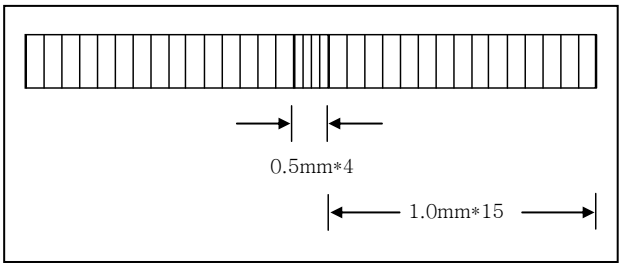
Which of the following is related to Multi slice CT?

a. Pencil beam	b. Cone beam
c. Water bath	d. DAS

1. a, b, c
2. a, c
3. b, d
4. a, b, c, d

Q6.

Which of the following correctly illustrates the diagram below?



1. Single array detector
2. Matrix detector
3. Fixed array detector
4. Hybrid detector

Q7.

Which of the following is the main cause of cone beam distortion in MDCT equipment?

1. Magnify of fan beam
2. Decreas of con beam width
3. The reduction of both the number of detector and the detection efficacy of decrease
4. X-ray forcus and detector row is not vertical to the axis

Q8.

Which of the following combinations is not appropriate?

1. Cathode – Tungsten
2. Characteristic X-ray – Anode target substance
3. Continuous X-ray – Beam hardening
4. Compton scattering – Knocked-on atom

Q9.

Which of the following combinations is not appropriate?

1. Slip ring – Power supply
2. DAS – Fixed part of the gantry

3. X-ray tube – Rotating part of the gantry
4. Bow-tie filter – Elimination of scattered radiation

Q10.

Which characteristic is not appropriate for a high-voltage generator?

1. The tube voltage ripple should be sufficiently high.
2. The tube voltage waveform rise and fall time should be sufficiently short.
3. The tube voltage should be stable.
4. The tube current should be stable.

Q11.

An advantage of scintillation detectors over xenon gas detectors is:

1. Greater detection efficiency.
2. Better packing efficiency.
3. Less expense.
4. Less complicated electronics.

Q12.

Heat units for a constant-potential x-ray tube are given by:

1. kVp x mAs.
2. Joules/1.4.
3. 1.4 x kVp x mAs.
4. Joules x 1.4.

Q13.

Which of the following is not related to collimator?

1. Slice thickness
2. Detection ability of the detector
3. Radiation dose
4. Transmission width of the X-ray

Q14.

Which of the following statements is incorrect?

1. The CT number is a comparative value where water is 0 and air is -1000.
2. Reducing the width of the window improves the contrast.

3. Reducing the width of the window makes it easier to observe bone and lung fields.
4. Raising the window level makes the image density darker.

Q15.

If the linear attenuation coefficient of a certain substance is twice the linear attenuation coefficient of water, which of the following substances is the closest?

1. Air
2. Fat
3. Muscle
4. Bone

Q16.

When pixel size is 0.5 mm and the matrix is 512, how big is the FOV generally?

1. 256 mm
2. 512 mm
3. 320 mm
4. 100 mm

Q17.

What the factor to calculate the CT number?

1. linear attenuation coefficient 2. kV 3. mAs 4.atomic number

Q18.

What the highest CT number (no contrast medium)?

1. liver 2. bladder 3. spleen 4. fat

Q19.

In chest CT , what is the window level (HU) in lung window?

1. 100 2. 40 3. -100 4. -400

Q20.

Select the correct CT number range. The width is 100 and the level is 10?

1. +100~-100HU
2. +110~-90

3. +90 ~ +10HU
4. +60~-40HU

Q21.

Which of the following combinations is not appropriate?

1. Sinogram vertical axis – View
2. Projection – Inverse Radon transform
3. Aliasing – Low sampling frequency
4. Linear attenuation coefficient – Density of the substance

Q22.

The revision of offset & calibration file, logarithm processes and the standardization are performed at which stage?

1. pre-processing
2. post-processing
3. back projection
4. convolution

Q23.

The x-ray beam is heavily filtered in CT scanners to:

1. Increase the x-ray output.
2. Reduce the beam-hardening artifact.
3. Improve spatial resolution.
4. Improve low-contrast resolution.

Q24.

What causes the "Cupping" artifact on a CT image?

1. Decline of linearity
2. Decline of contrast resolution
3. Decline of uniformity
4. An error of reconstruction Algorithm

Q25.

Choose the most important feature which must be implied in order to obtain a heart image with the minimal motion.

1. High voltage of over 150kV
2. ECG gating

3. Low voltage of under 50mA
4. Used axial scan mode

Q26.

What is the patient motion artifacts?

1. streaks 2. shading 3. rings 4. bands

Q27.

Which of the following combinations is not appropriate?

1. Segment reconstruction – Multiple heartbeats
2. Number of segments – Heart rate
3. ECG dose modulation – Exposure reduction
4. Prospective ECG-gated scanning – High heart rate

Q28.

Which of the following statements about CT-AEC is incorrect?

1. With patient size AEC, the X-ray dose can be controlled based on the difference in X-ray absorption according to the size of the subject.
2. With Z-axis AEC, the X-ray dose is controlled by analyzing the anatomy of the subject along the body axis with a scanogram.
3. 3D dose modulation includes a method in which X-ray output is modulated with each 1/4 rotation of the X-ray tube.
4. With CT-AEC, setting the standard deviation is required for the equipment of all manufacturers.

Q29.

Which of the following is an incorrect statement of the dose reduction effectiveness by dose modulation?

1. Decrease dose by low voltage
2. Decrease dose at cadio systolic
3. Decrease dose by Z-axis of patient
4. Decrease dose by patient diameter

Q30.

Which of the following combinations is not appropriate?

1. BHC – Head
2. Quantum denoising filter – Smoothing filter
3. Streak artifact – Pelvic region

4. Cupping artifact – Beam hardening correction

Q31.

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

1. Cerebellum
2. Lateral ventricle
3. 4th ventricle
4. Petrous bone

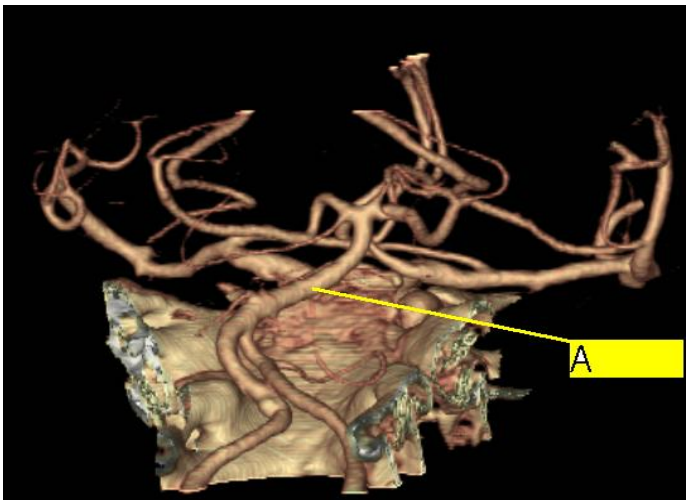
Q32.

Select the correct CT number on the section marked ‘A’ on the image below.

1. About 200 ~ 250
2. About 0 ~ 20
3. About -80 ~ -90
4. About -500 ~ -600

Q33.

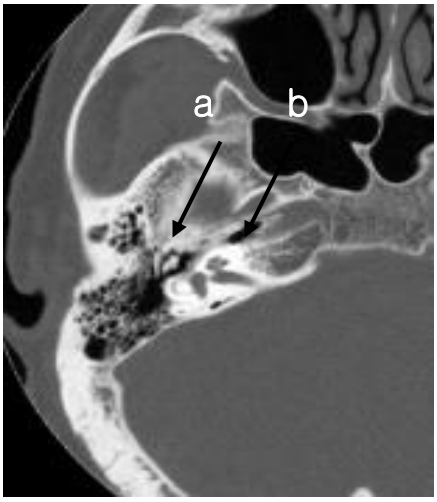
Below is a three dimension image of intracranial blood vessel. Name the section marked with ‘A’.



1. Vertebral artery
2. Middle cerebral artery
3. Anterior cerebral artery
4. Basilar artery

Q34.

Choose the correct answer for the sections marked ‘A’ and ‘B’.



1. a: cochlea b: auditory ossicles
2. a: cochlea b: vestibule
3. a: auditory ossicles b: vestibule
4. a: auditory ossicles) b: cochlea

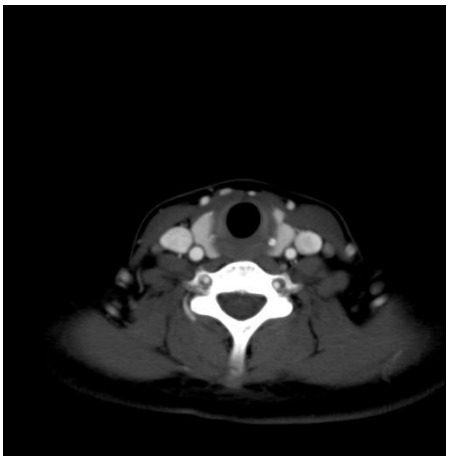
Q35.

Which of the following is <u>not</u> shown on the PNS image?

1. Frontal sinus
2. Maxillary sinus
3. Inferior concha
4. Nasal septum

Q36.

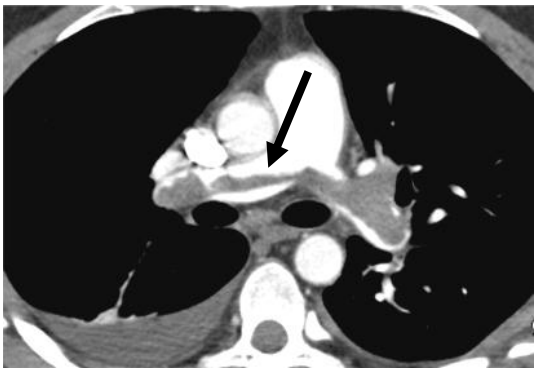
Which of the following is <u>not</u> shown on the image below?



1. Trachea
2. Common carotid artery
3. Thyroid gland
4. Pharynx

Q37.

What disease is illustrated in the anatomical structure on the image below?



1. Aorta - aneurysm
2. Aorta - embolism
3. Pulmonary artery – embolism
4. Pulmonary vein - embolism

Q38.

Which of the following is the correct explanation of the pathway of contrast media which has injected on the pedal?

1. IVC - Rt.atrium - Rt.ventricle - Pulmonary vein - pulmonary artery - Lt. atrium - Lt. ventricle - Aorta
2. IVC - Rt.atrium - Rt.ventricle - Pulmonary artery - pulmonary vein - Lt. atrium - Lt. ventricle - Aorta
3. SVC - Rt.atrium - Rt.ventricle - Pulmonary artery - pulmonary vein - Lt. atrium - Lt. ventricle - Aorta
4. SVC - Rt.atrium - Rt.ventricle - Pulmonary vein - pulmonary artery - Lt. atrium - Lt. ventricle - Aorta

Q39.

Which of the following in an incorrect statement on the chest structure?

1. Rt lung – 3 lobes – 10 segment
2. Lt lung – 2 lobes – 8 segment
3. Rt lung – major fissure – minor fissure
4. Lt lung – major fissure – minor fissure

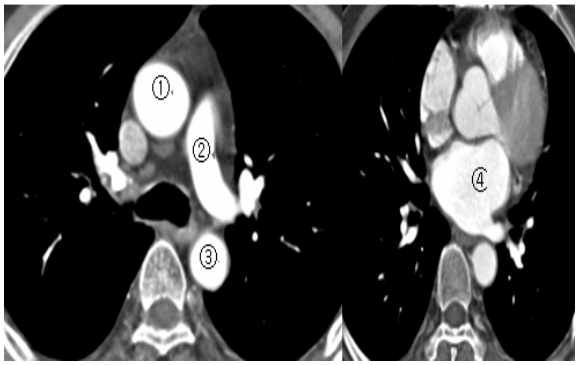
Q40.

Which of the following is an incorrect explanation of the pathway from big to small?

1. Aorta – Artery - Arteriole
2. Venacava – Vein - Venule
3. Trachea – Bronchi - Bronchioles
4. Trachea – Bronchioles - Bronchi

Q41.

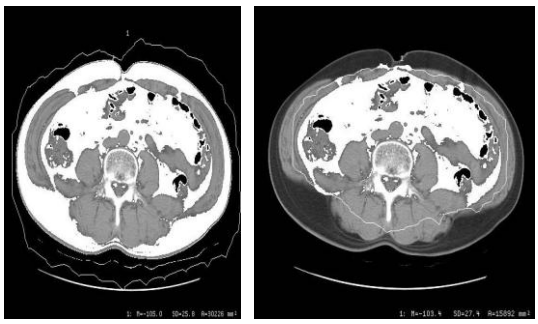
Which of the following is enhanced last on the image below?



1. ①
2. ②
3. ③
4. ④

Q42.

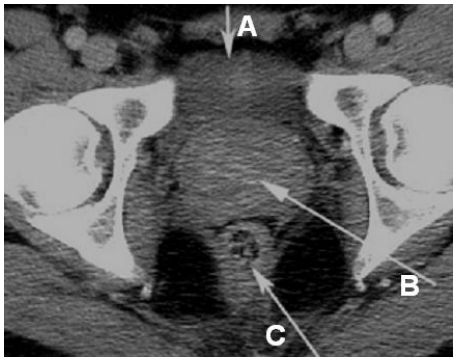
Choose the <u>incorrect</u> statement for the image below.



1. It was scanned to evaluate the fat in the abdomen.
2. It was scanned with high resolution.
3. The threshold of abdomen was adjusted between -250HU and -50HU.
4. The 10mm of slice thickness and large FOV were used to display whole soft tissues around abdomen.

Q43.

Which of the following correctly names the section marked with an arrow?

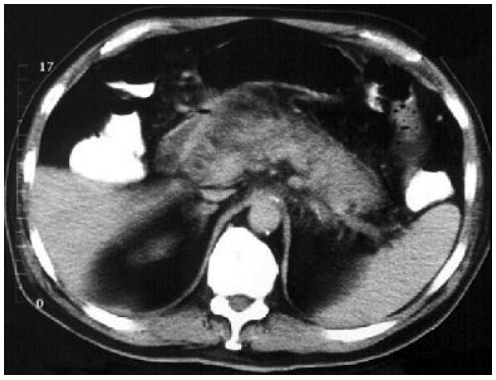


a. A-urinary bladder
b. B-prostate gland
c. B-seminal vesicle.
d. C-rectum

1. a, b 2. b, c 3. c, d 4. a, b, d

Q44.

Which of the following is suspected on the image below?



1. Cholecystitis
2. Pyelonephrosis
3. Renal cell carcinoma
4. Pancreatitis

Q45.

Where is the fracture shown on the image below?

1. Cuboid
2. Navicular
3. Calcaneus
4. Talus

Q46.

Where is the fracture shown on the image below?

1. Scaphoid
2. Capitate
3. Trapezium
4. Trapezoid

Q47.

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

1. C1(atlas)
2. C2(axis)
3. C4
4. C6

Q48.

Name the anatomical structure indicated by the arrow.

1. Inferior Vena Cava Filter
2. Gelform
3. Graft
4. Balloon catheter

Q49.

What problem can occur during the CT Guided lung biopsy?

1. Lung metastasis
2. Pleural effusion
3. Pneumothorax
4. Pneumonia

Q50.

Which of the following explanations of CT-AP and CT-HA is not appropriate?

1. CT-AP is a portography method where a contrast agent is introduced from the superior mesenteric artery or other vessel.
2. Hepatic cysts are not densely stained with either CT-AP or CT-HA.
3. It is necessary to use more contrast agent with CT-HA than with CT-AP.
4. Classic hepatocellular carcinoma is more densely stained with CT-HA.

Q51.

Which of the following explanations of a head examination is not appropriate?

1. In order to obtain sufficient contrast in the brain substance, it is desirable to set conditions such that the standard deviation of the image is from 3 to 5.
2. Beam hardening and partial volume effects are typical problems.
3. Epidural hematoma shows a high absorption crescent shape.
4. The thalamus is a favored site for hypertensive intracerebral hemorrhage.

Q52.

Which of the following explanations of TDC is not appropriate (other factors being the same)?

1. The heavier the body weight, the lower the peak CT number.
2. The heavier the body weight, the longer the time until a peak forms.
3. The faster the speed of injection, the higher the peak CT number.
4. The faster the speed of injection, the shorter the peak is maintained.

Q53.

What disease is shown in image No.1 in the supplement (simple, arterial phase, portal phase, balance phase)?

1. Hepatic hemangioma
2. Hepatocellular carcinoma
3. Hepatic cyst

4. Hepatic abscess

Q54.

What is the major clinical applications of perfusion CT?

1. nodules 2. acute stroke 3. cyst 4. liver disease

Q55.

What is the factor does not use in perfusion CT?

1. MTT 2. CVB 3. CVF 3. CVT

Q56.

Which of the following statements concerning the relationship between the viscosity and osmotic pressure of contrast agents is incorrect?

1. The viscosity of nonionic monomers is greater than that of nonionic dimers.
2. The viscosity of nonionic dimers is greater than that of ionic monomers.
3. The osmotic pressure of nonionic monomers is less than that of ionic monomers.
4. The osmotic pressure of nonionic dimers is less than that of nonionic monomers.

Q57.

Which of the following is not appropriate as a high-risk factor in adverse reactions to contrast agent?

1. Sex
2. Heart disease
3. Asthma
4. Allergic reaction to contrast agent

Q58.

Which of the following response is not appropriate if the agent leaks from the blood vessel?

1. If the agent is being injected, stop injection immediately.
2. Administer antihistamine medication according to the amount leaked.
3. If the amount of leakage is small and not a problem, find a new route and resume injection.
4. If compartment syndrome is suspected, consult a specialized physician.

Q59.

Which of the following is an incorrect statement of the vital sign?

1. The beating of the pulse in adult is 60~80/min
2. There are body temperature, breath, blood pressure, and the beating of the pulse
3. A normal systolic blood pressure in adult is 110-140mmHg
4. A hypertensive diastolic blood pressure is 60mmHg..

Q60.

When urticaria appears after the iodine contrast media is injected, what medicine is prepared?

1. Pain killer
2. Antihistamines
3. Anti-inflammatory gent
4. Anti-biotics

Q61.

Which of the following statements is incorrect?

1. Increasing the tube voltage reduces image noise.
2. Increasing the tube voltage reduces the difference in linear attenuation coefficient (μ).
3. Beam hardening is due to the fact that CT is a continuous X-ray.
4. Increasing the tube voltage improves the spatial resolution.

Q62.

Which of the following statements is incorrect?

1. Increasing the tube current increases the number of X-ray photons.
2. Increasing the tube current reduces image noise.
3. Increasing the tube current improves the spatial resolution.
4. Increasing the tube current improves low contrast resolution.

Q63.

Which of the following statements is incorrect?

1. Using thin slices mitigates the partial volume effect.
2. Using thin slices mitigates results in improved low contrast resolution.
3. Using thin slices mitigates dark band artifacts at the back of the skull.
4. Using thin slices improves the spatial resolution along the body axis (Z axis).

Q64.

Which of the following statements concerning helical scans with single slice CT is incorrect?

1. The sensitivity distribution along the body axis takes on a rectangular shape.
2. The greater the pitch factor, the thicker the effective slice.
3. Increasing the pitch factor has no effect on image noise.
4. Resolution along the body axis differs with 360° interpolation reconstruction and 180° opposed beam interpolation.

Q65.

Which of the following statements concerning multislice CT is incorrect?

1. Increasing the number of detector arrays increases the effect of cone angle.
2. The smaller the smallest element of the collected slice, the worse the X-ray dose efficiency.
3. For image reconstruction, two-dimensional filtered backprojection (2D-FBP) is used irrespective of the number of detector arrays.
4. After scanning, the thickness of each image slice can be changed.

Q66.

Which of the following statements is incorrect?

1. The reconstruction factor is a frequency filter for mitigating blurring during back propagation.
2. The high frequency accentuation factor improves low contrast resolution.
3. The high frequency accentuation factor improves spatial resolution.
4. A wide window is used to observe images using a high frequency accentuation factor.

Q67.

Which of the following statements is incorrect?

1. SD (standard deviation) is used to compare noise levels between equipment.
2. Spatial resolution can be expressed as an objective physical quantity with a modulation transfer function (MTF).
3. The product of contrast threshold and diameter %·mm is the index of low contrast resolution.
4. Slice thickness is expressed by the half width of the slice sensitivity profile obtained from the center of rotation.

Q68.

Which of the following statements is incorrect?

1. It is possible to identify the location where artifacts resulting from data collection abnormalities occur from the shape of the artifact and the sinogram.
2. Cupping and capping artifacts are streak-shaped artifacts.
3. Windmill artifacts are specific to helical scans.
4. Artifacts due to the effects of cone angle are specific to multislice CT.

Q69.

Which of the following explanations concerning low contrast resolution is incorrect?

1. The greater the quantum number of the X-ray, the better.
2. The greater the electrical noise and system noise, the lower it is.
3. It is not affected by the reconstruction factor.
4. CNR is one method of evaluating low contrast resolution.

Q70.

Which of the following explanations concerning spatial resolution is incorrect?

1. The greater the focus size of the X-ray tube, the better.
2. It is affected by the ratio between the focus of the X-ray tube, the focus center distance, and the distance between detectors.
3. Increasing the number of views improves the spatial resolution.
4. High resolution is obtained with offset reconstruction.

Q71.

A tube with a small focal spot:

1. Can use a higher kVp.
2. Decreases the heat-loading capability of the tube.
3. Improves low-contrast resolution.
4. Improves beam-hardening artifact.

Q72.

The spatial resolution of a CT scanner is affected by all of the following except:

1. Detector-to-detector spacing.
2. The display matrix size.
3. The scanner cycle time.
4. The x-ray tube focal spot size.

Q73.

Which of the following statement is correct?

1. if the width of the pixel increase, the noise decrease, but spatial resolution decreases

2. if the width of the pixel increase ,the noise increase ,but spatial resolution decreases

3. if the width of the pixel increase, the noise increase ,but spatial resolution decrease

4. if the width of the pixel increase, the noise increase, but spatial resolution increase.

Q74.

Which of the following statement is correct?

1. the noise increase with the dose increase

2. the noise increase with the inverse square root of the dose

3. the noise decrease with the inverse square root of the dose

4. the noise increase with the dose decrease

Q75.

What is the most commonly used descriptor of spatial resolution?

1. point spread function

2. line spread function

3. contrast transfer function

4. modulation transfer function

Q76.

Which of the following is the correct explanation of using the small focal spot?

a. Increase the spatial resolution
b. Decrease patient's radiation dose
c. Decrease the sharpness

1. a
2. a, b
3. a, b, c
4. a, b, c, d

Q77.

Which of the following is/are the correct factor/s that affects the z-axis geometric dose efficiency of MDCT based on

cone beam geometry?

a. The size of focal spot
b. beam collimation
c. The width of fan beam

1. a
2. a, b
3. a, b, c
4. a, b, c, d

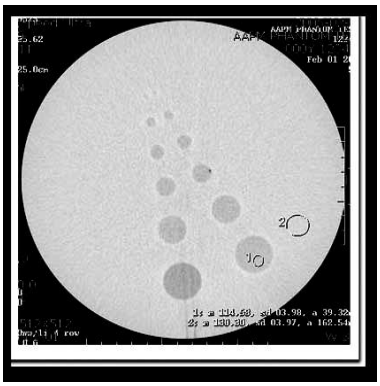
Q78.

Choose the correct method used to reduce the partial volume artifacts in the spiral CT?

1. Increase the pitch
2. Change the reconstruction plan
3. Decrease the slice thickness
4. Shorten the scan time

Q79.

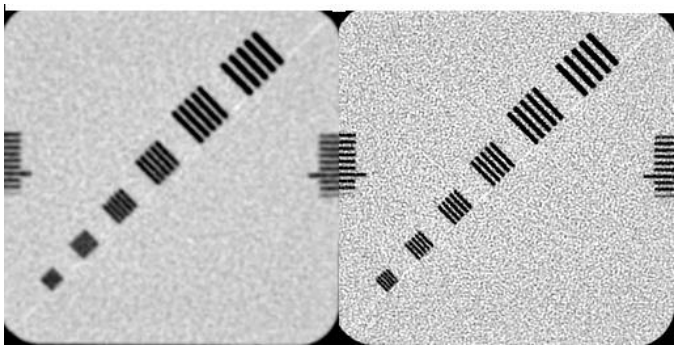
Which of the following is measured on the image below?



1. High contrast resolution
2. Low contrast resolution
3. Noise
4. Linearity

Q80.

Observe and identify the image below.



1. Measurement of plane thickness
2. Measurement of reconstruction algorithm
3. Measurement of CT number
4. Measurement of uniformity

Q81.

Which of the following statements is incorrect?

1. Carcinogenesis is the main concern in terms of the probabilistic effects of CT radiation exposure.
2. With $CTDI_{100,}$ if the evaluated slice is thick (X-ray beam width), there is a concern that the dose may be underestimated.
3. Indices for the dose shown on CT equipment include CTDIvol, DLP, and dose efficiency.
4. ECG dose modulation is a function for optimizing image quality and exposure based on body size.

Q82.

In CT, to measurement the radiation dose, what is the easiest and probably the most accurate? 1.CTDI 2.MSAD 3. TLD 4.CTRH

Q83.

What is the SI unit of an effective dose?

1. mR
2. mGy
3. mSv
4. rad

Q84.

Which of the following is an incorrect statement on the CT dose unit?

1. CT dose index (CTDI) is measured with pencil type ionchamber.
2. $CTDI_W$ is the concept of average dose that are collected both $2/3CTDI_W$ of center part and $1/3CTDI_W$ of

surrounding part.

3. In conventional CT scan, $CTDI_{VOL}$ is $CTDI_W$ multiply packing factor.
4. Dose length product(DLP) is $CTDI_{vol}$ multiply scanned distance and unit is mGy.cm

Q85.

Name the phantom used for dose calculation by the Monte Carlo simulation.

1. Acryl phantom
2. Anthropomorphic phantom
3. Hermaphrodite phantom
4. Water phantom

Q86.

Which of the following is an incorrect statement on the effective dose?

1. It is a weighting factor to tissue and organ considering probability influence of biological dimension
2. It is a unit for the dose evaluation of CT equipment
3. It is an index to reflect the radiation dangerous
4. It is the amount of absorbed average energy (J/kg) per unit mass

Q87.

Which of the following combinations is not appropriate?

1. Volume rendering – Threshold
2. Surface modeling – Geometric modeling
3. Modeling – 3D geometry definition
4. Shading – Brightness value

Q88.

Which of the following combinations is not appropriate?

1. MWM – Patient information
2. Dual injector – Saline flush
3. Workstation – Server processing system
4. Liquid crystal display – Phosphor

Q89.

What is the volume rendering method that express the whole volume information not surface of structure that one voxel has many density values.

1. MIP
2. Min IP
3. VRT
4. SSD

Q90.
Which of the following enables the observation of the internal organs in the CT virtual endoscope?
1. Perspective drawing
2. Fly through
3. Fly around
4. Non-perspective drawing

CT

1.Lung has an attenuation coefficient of 0.137 cm-1 and, thus, a Hounsfield number of approximately:
(A)-300.
(B)30.
(C)-30.
(D)300.

2.The intensity of x-ray energy emerging from a CT x-ray tube:
(A)Is proportional to the mA setting of the generator.
(bIs inversely proportional to the mA setting of the generator.
(C)Increases with the generator's kVp setting.
(D)Both a and c.

3.How does the photoelectric component of the linear attenuation coefficient depend on beam energy?
(A)It varies approximately as $1/(E)^3$, where E is the photon energy.
(B)It is proportional to the HVL.
(C)It is largely independent of beam energy.
(D)It depends on beam energy exactly the same way the Compton component does.

4.Post-patient detector collimation perpendicular to the scan plane affects:
(A)Patient dose.
(B)Scatter rejection.
(C)Slice thickness.
(D)Voxel size.

5.A disadvantage of slip-ring technology is that:
(A)The tube can rotate in only one direction.
(B)Scan times can be very short.
(C)The reconstruction algorithm is more complicated.

(D)High-voltage cables must be rewound after each scan series.

6.If a CT display is set at a window width of 200 and a window center of 200, which range of CT numbers will be displayed as black?

(A)Greater than 100

(B)Less than 100

(C)Greater than 200

(D)Less than 0

7.Windowing:

(A)Determines which Hounsfield numbers will occupy the black-to-white range.

(B)Determines resolution.

(C)Is dependent on mAs and kVp.

(D)Determines post-patient collimation.

8.The radiation dose limit outside the CT room for the general public is set at:

(A)1000 mrem/year or 20 mrem/week.

(B)100 mrem/year or 2 mrem/week.

(C)200 mrem/year or 50 mrem/week.

(D)None of the above.

9.Tissue contrast enhancement in CT is achieved by:

(A)Increasing the radiation dose to improve contrast.

(B)Using iodinated contrast material to improve differentiation between tissue structures.

(C)Decreasing slice thickness to improve contrast.

(D)Using a higher kVp technique.

10.Which of following is the reference material in calculating CT numbers?

(A) Fat (B) Air (C) CSF (D) Water

11.Comparing to MRI, which of following is the most benefit for CT scan?

(A) higher spatial resolution (B) lower radiation dose

(C) higher contrast in soft tissues (D) directly obtain sectional images in any orientation

12.Which of following is the range of CT numbers?

(A) -1023 ~ 1024 (B) -2047 ~ 2048 (C) -512 ~ 512 (D) -1023 ~ 3095

13.Which of following is the dominant factor of in-plane spatial resolution in CT image?

(A) detector size (B) kVp (C) mAs (D) slice thickness

14.Which of following algorithms is most used in CT image reconstruction?

(A) Laplace transform (B) Iterative algorithm (C) Filtered Back-projection

(D) Exponential interpolation

15.Which generation of CT scanner will not appear ring artifact?

(A) 1st generation (B) 2nd generation (C) 3rd generation (D) 4th generation

16.Which of following is most common unit for CT spatial resolution?

(A) lp/cm (B) lp/mm (C) LUX (D) cd/m2

17.Which of following is most used in testing CT's monitor?

(A) SMPTE (B) NEMA-2 (C) TG-19 (D) Barten's model

18.Which of following is not one of annual CT QA tests?

(A) low contrast object detectability (B) slice thickness

(C) half-value layer (D) accuracy of CT number from water

19.Which of following algorithm is used in CT images for facial bone reconstruction operation?

(A) MIP (maximum intensity projection) (B) MPR (multiple plane reconstruction)

(C) SSD (surface shaded display) (D) mIP (minimum intensity projection)

20.Which of following is most close to the CT number of normal liver parenchyma?

(A) 150 (B) 500 (C) 1000 (D)-50

21.Which of following is best for children less than 5 year-old to have a brain CT exam?

(A) 80 kVp (B) 100 kVp (C) 120 kVp (D) 140 kVp

22.Which of following is the most used material for IV-injected CT contrast medium?

(A) iron (B) iodine (C) barium (D) gadolinium

23.CT perfusion technique is usually used in:

(A) Brain tumor (B) Aneurysm (C) Aortic dissection (D) Stroke

24.Which of following exam is best to detect lung cancer in early stage?

(A) MRI (B) X-ray plain film (C) Ultrasonography (D) CT

25.Which of the following is the characteristic of small bore CT scanner ?

(A) higher spatial resolution (B) higher radiation dose to patient

(C) less partial volume artifact (D) less beam hardening effect

26.Which of following artifact is most seen in skull base CT image?

(A) ring artifact (B) motion artifact (C) beam hardening artifact (D) star pattern artifact

27.Which of following disease usually requires dynamic CT scan?

(A) brain aneurysm (B) brain tumor (C) liver tumor (D) gastric tumor

28.Which of following display settings are best to review CT image for detection of alveolus abnormities?

(A) 1500/-500 (B) 400/40 (C) 350/50 (D) 1600/400

29.Which of following could increase the SNR of CT images?

(A) decrease slice thickness (B) increase kVp

(C) increase mAs (D) increase scanning pitch

30.Which of following CT scan parameters has highest SNR?

(A) high kVp, low mA, large pitch (B) low kVp, low mA, small pitch

(C) high kVp, high mA, small pitch (D) high kVp, high mA, large pitch

31.Which of following is the index of radiation dose in CT?

(A) SNR (B) SAR (C) DLP (D) DAP

31.Which of following is not a characteristic of an HRCT scan?

(A) thinner slice thickness (B) lower radiation dose (C) higher mA (D) higher kVp

32.Which one is not an advantage by using multislice CT instead of single slice CT?

(A) increase dynamic use in function study (B)wide range of 3D application

(C) reduce scanning time (D) limit the volume coverage of scanning

33.Which statement about ADC (analog-to-digital conversion) is not true?

(A) ADC samples the analog signal

(B) more samples taken, more accurate information presented

(C) ADC is irrelevant to the number of levels or shades of gray in the image

(D) speed of ADC means the time taken to digitize the analog signal

34.In CT, why do we use high-kV technique?

(A) To reduce the dependency of attenuation coefficients on photon energy

(B) To enhance the contrast between soft tissues

(C) To reduce the contrast of bone relative to soft tissues

(D) To produce a high radiation flux at the detector

35.Slip –ring technology makes CT continuous scan possible. Which following statement is false?

(A) there are two common brush design. Wire brush and composite breus

(B) both low-voltage and high-voltage exists in CT machine (C) low-voltage slip ring offers high voltage to x-ray tube

(D) high-voltage slip ring offers high voltage to x-ray tube

36.In CT, the function of filtration is

(A) remove long wavelength x-ray (B) remove short wavelength x-ray

(C) increase patient dose (D) cause x-ray distribution focus on patient

37.Which following statement about detector is false?

(A) scintillation detector convert x-ray into light, and than into electrical energy

(B) gas detector converts x-ray directly into electrical energy

(C) ceramic is often used as scintillator in photodiode

(D) gas detector has high detection efficiency

38.Which following statement about filtered back- projection is false?

(A) often used in modern CT (B) referred to as the convolution method

(C) it combines back-projection algorithm and filter (D) star artifact still can be seen

39. (A) raw data (B) convolution (C) image data (D) filtered data (5) back-projection, the evolution of data in CT is

(A) 12453 (B) 14253 (C) 15243 (D) 15423

40.When we adjust window/level, many factors should be noticed. Exclude

(A) wide window should be used to tissue of greatly differing attenuation within the image

(B) wide window often used to see brain image

(C) narrow window is good at showing tissues with similar density

(D) level should be centered near the average attenuation of the tissue of interest

41.4D image can be created in volume rendering technology of CT field. What is the fourth dimension?

(A) length (B) time (C) opacity (D) brightness

42.Which following statement about MTF (modulation transfer function)is true?

(A) MTF=0 means the imaging system has produced the object exactly

(B) MTF=1 indicates no transfer of object to image

(C) MTF describe contrast resolution

(D) MTF describe spatial resolution

43.Which is not the characteristic of HRCT?

(A) can be applied any part of body (B) narrow beam collimation

(C) high spatial frequency algorithm (D) small pixel size

44.Which artifact don't we usually see in modern CT scanner?

(A)motion artifact (B) rings and band artifact (C) streak artifact (D) shading artifact

45.Which statement is wrong about interpolation mathematical technique?

(A) get some unknown value

(B) usually use linear interpolation in CT

(C) currently 360-degree linear interpolation algorithm is mostly used

(D) currently 180-degree linear interpolation algorithm is mostly used

46.If mAs per rotation is 100, pitch is 1.5. What are the effective mAs and CTDIvol?

(A) 67, 0.67 (B) 200, 2 (C) 67, 2 (D) 200, 0.67

47.Which one doesn't affect the longitudinal (z-axis) resolution?

(A) detector size (B) FOV (C) reconstruction interval (D) reconstruction algorithm

48.Which of the following factors is used to adjust contrast of CT images?

(A). kVp meter

(B). mA meter

(C). window width & level

(D). magnetic plate

49.Which of the following is an incorrect multi slice CT?

(A). It is possible to get several tomography same time.

(B). It is possible to get isotropic images.

(C). Cone beam X-ray is used.

(D). The thickness of images is determined by collimator.

50.Which of the following is an incorrect CT detector?

(A). The detector has the scintillation type and the gas type.

(B). The curve linear detector has the better uniformity concerning the length of ray than the Linear detector.

(C). The scintillation type is better than the gas type for effectiveness of detection.

(D). The gas detector has no way to reduce scattered rays.

51.Which of the following explanations is a correct spatial resolution?

(A). PSF (point spread function)

(B). LSF (line spread function)

(C). CTF (contrast transfer function)

(D) MTF (modulation transfer function)

52.Which of the following explanations concerning direct oil cooling method of CT tube is incorrect?

(A). It is contacted with insulating oil directly from outside of tube.

(B). It is circulated by air from outside of tube.

(C). The anode is directly contacted with insulating oil.

(D). The cathode is directly contacted with insulating oil.

53.Which of the following image processing is needed to convert collected measurement data from DAS to raw data?

(A). pre-processing

(B). convolution

(C). back projection

(D). post-processing

54.Which of the following factors can affect Z-axis geometric dose efficiency of MDCT based on the cone beam geometry?

(A). To minimize focal spot

(B). beam collimation

(C). The breadth of the fan beam

(D). The number of detector cell

55.What is fundamental reason of cone beam distortion in MDCT?

(A). The expansion of fan beam

(B). The decrease of cone beam width

(C). The reduction in both number of detector elements and effectiveness of detection

(D). X-ray focus and detector row is not vertical to the axis.

56.Which of the following problems could occur when CT guided lung biopsy is conducted?

(A). Lung metastasis

(B). Pleural effusion

(C). Pneumothorax

(D). Pneumonia

57.What is the subject contrast of white matter and gray matter when white matter has 42 HU and gray matter has 46 HU in CT images?

(A). 0.1%

(B). 0.4%

(C). 1%

(D). 4%

58.Which of the following window level/ window widths would be most appropriate for imaging brain?

(A). WL 0 WW 50

(B). WL 40 WW 100

(C). WL 300 WW 1000

(D). WL 500 WW 2000

59.After injection of contrast medium, the CT number for a region of the brain changes from 10HU to 20HU. This represents what increase in the linear attenuation coefficient.

(A). 0.1%

(B). 0.5%

(C). 1%

(D). 5%

60.For spiral CT, the high- voltage cable and signal cable are replaced by?

(A). DAS

(B). kernel

(C). algorithm

(D). slip ring

61.Which of the following is increased with increasing spiral CT pitch?

(A). axial resolution

(B). effective resolution

(C). contrast resolution

(D). spatial resolution

62.Spatial resolution in CT is approximately 1 Lp/cm. what is the smallest sized object that can be imaged?

(A). 0.1mm

(B). 0.2mm

(C). 0.3mm

(D). 0.5mm

63.The principal reason to use high kVp during CT examination is…

(A). fewer artifacts

(B). reduced scan time

(C). improved spatial resolution

(D). reduced patient dose

64 A 40cm field of view is imaged using a 512 matrix and 10mm slice thickness, what is the approximate voxel size ?

(A). $4.2mm^3$

(B). $5.8mm^3$

(C). $7.8mm^3$

(D). $10mm^3$

65 A multislice CT image is obtained at 120kVp, 200mA, 2sec. the resulting anode heat load is approximately ?

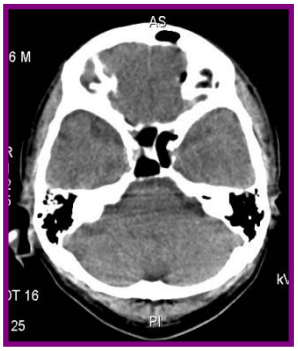
(A). 500kHU

(B). 650kHU

(C). 700Khu

(D). 850kHU

66.Which of the following is shown on the artifact image below?



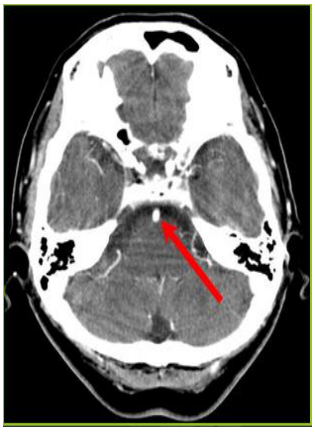
(A). photon starvation artifact

(B). beam hardening artifact

(C). respiratory artifact

(D). moving artifact

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



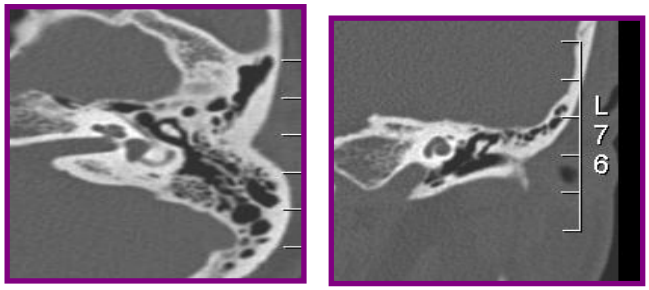
(A). internal carotid artery

(B). basilar artery

(C). middle cerebral artery

(D). vertebral artery

68.These are the images of temporal bone CT. Which of the following explanations of examination method & image display is correct?



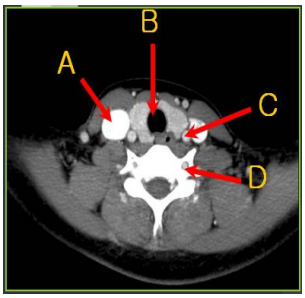
(A). bone algorithm, 1-2mm slice thickness, wide window width

(B). standard algorithm, 3-5mm slice thickness, narrow window width

(C). standard algorithm, 3-5mm slice thickness, wide window width

(D). bone algorithm, 1-2mm slice thickness, narrow window width

69.Choose the answer that point vertebral artery correctly.



(A). A

(B). B

(C). C

(D). D

70.Choose the incorrect statement for the image below.

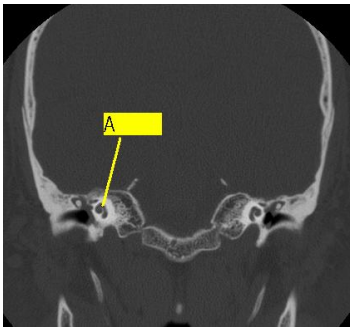
(A). The purpose of study is to examine the cerebral vascular system.

(B). This is volume rendering image.

(C). This image could be made without contrast.

(D). Vasilar artery is shown.

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



(A). INCUS

(B). COCHLEA

(C). MASTOID AIR CELL

(D). INTERNAL ACOUSTIC CANAL

72.What is the correct name of artifact marked with an arrow?

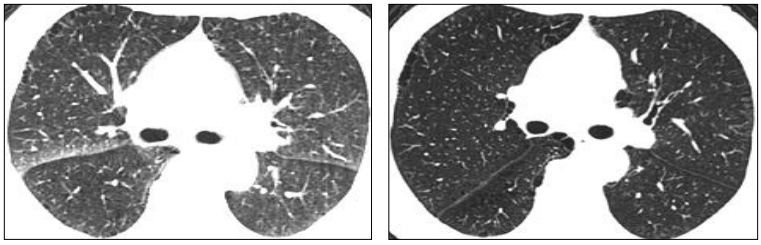
(A). Edge gradient artifact

(B). Motion artifact

(C). High contrast foreign body artifact

(D). Aliasing artifact

73.Which of the following factors that make differences at same position is appropriate?



(A). window setting

(B). slice thickness

(C). breath

(D). kVp

74.What is the correct level of the image below?

(A). T1~3

(B). T4~6

(C). T6~7

(D). T8~10

75.Choose the correct combination of name and disease. ?

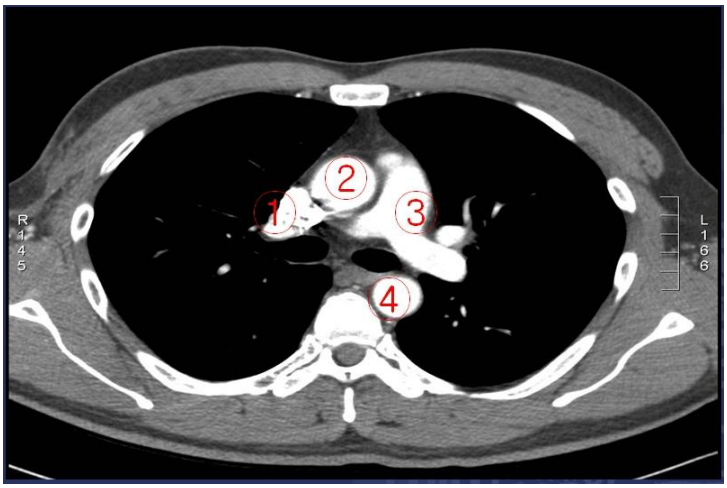
(A). Aorta - aneurysm

(B). Aorta - embolism

(C). Pulmonary artery - embolism

(D). Pulmonary vein - embolism

76. Choose the correct combination of 2nd and 4th enhancing order when ante-cubital vein contrast has injected.?



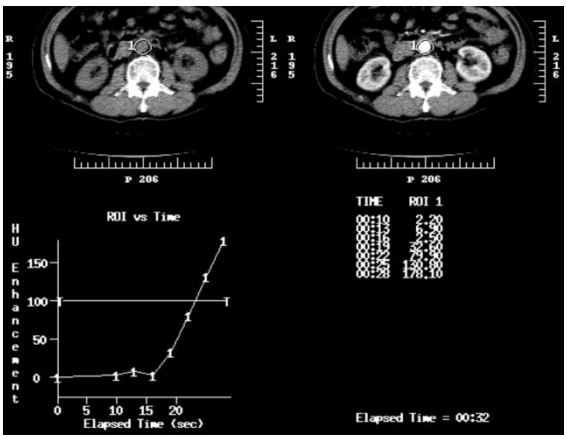
(A). ① ②

(B). ③ ④

(C). ① ④

(D). ② ③

77. Which of the following explanations of the Auto bolus tracking method is incorrect?



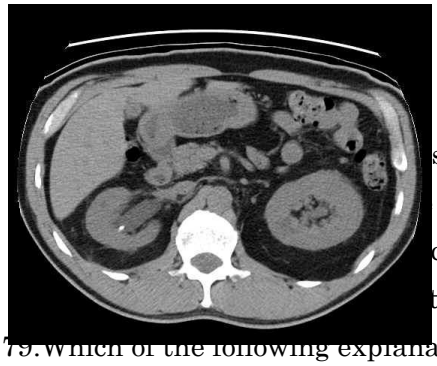
(A). After setting ROI at abdominal aorta, get appropriate peak time by dynamic scan at regular intervals.

(B). To monitor contrast enhancement through the time-density characteristic curve

(C). This is the software which is used for image acquisition with optimal condition of appropriate contrast enhancement.

(D). To set mA and kVp following the examination condition equally for high spatial resolution in the case of dynamic scan.

78.Which of the following statements is correct?



st enhancement.

is for evaluating kidney.

cted.

t renal calyx.

79.Which of the following explanations is incorrect?

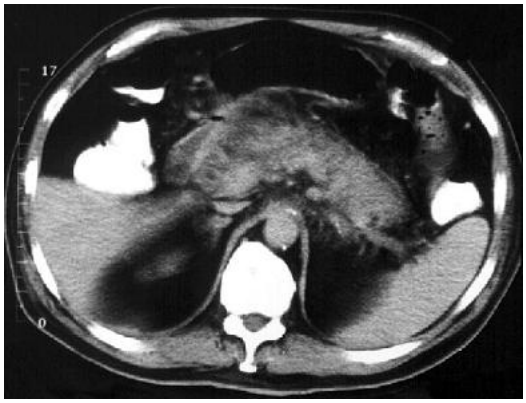
(A). This study is for intervention of HCC patient.

(B). Insert catheter into SMA and RHA.

(C). HA is shown at image B.

(D). The name of this study is lipiodol CT.

80.Which of the following diseases could guess from the image below?



(A). Cholecystitis

(B). Pyelonephrosis

(C). Renal cell carcinoma

(D). pancreatitis

81.Which of the following explanations of disease that could guess from the image below is incorrect?

(A). The organ indicated by arrow is gall bladder.

(B). Acute cholecystitis symptom is accompanied.

(C). Emergent surgery is needed.

(D). This is contrast enhancing image of venous phase.

82.Which contrast enhanced image will be acquired after 20 seconds when 120ml of contrast is injected with the velocity of 4ml/s by auto injector for Liver CT examination at spiral CT?

(A). early arterial phase

(B). late arterial phase

(C). portal phase

(D). delayed phase

83.Which of the following statements is optimal for pelvis CT to examine bladder?

(A). To examine the bladder fully filled with urine

(B). To examine the bladder after voiding of urine

(C). To examine the bladder fully filled with contrast

(D). To examine the bladder after removing urine by catheter insertion

84.Which of the following positions is appropriate for the suspected patient who has fracture of shoulder and scapula in CT scan?

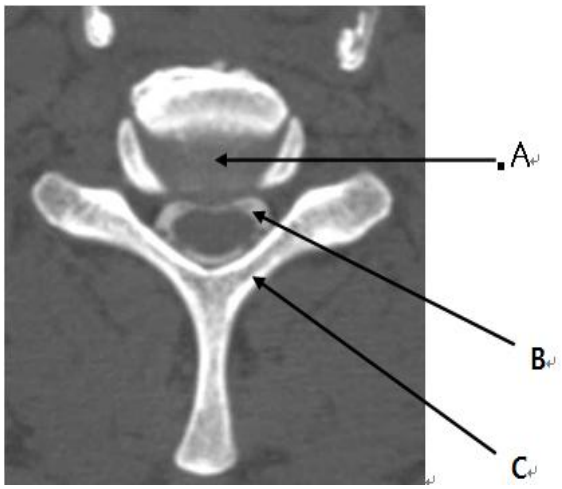
(A). supine position with pronated both arms.

(B). supine position with supinated both arms.

(C). supine position with raised both arms.

(D). supine position with bended both arms.

85.Which of the following explanations is incorrect concerning the image below?



(A). This is the CT myerography image.

(B). The anatomical terminology of A is intervertebral disc.

(C). The anatomical terminology of B is subarachnoid space.

(D). The anatomical terminology of C is pedicle.

86.What is the passage of injected contrast in myelography CT?

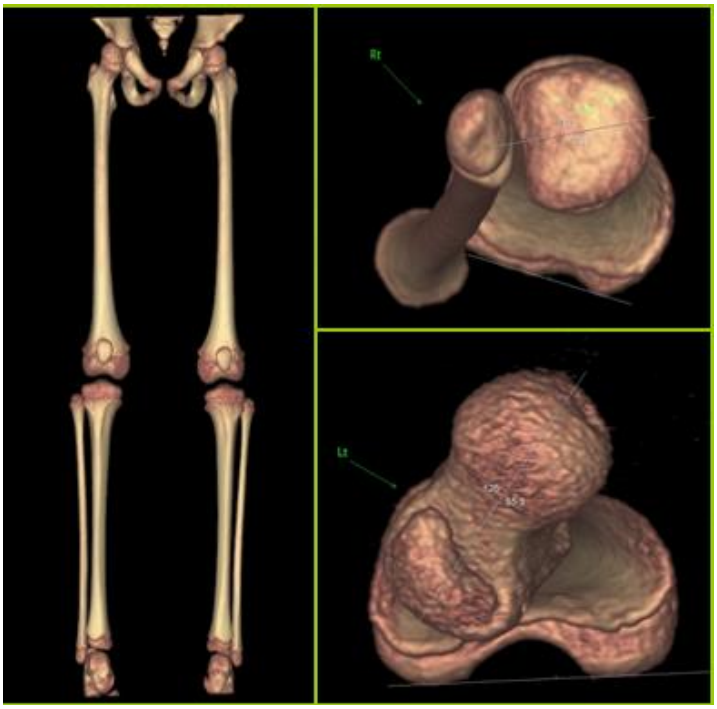
(A). subdural space

(B). epidual space

(C). subarachnoid space

(D). spinal cord

87.Which of the following explanations is incorrect?



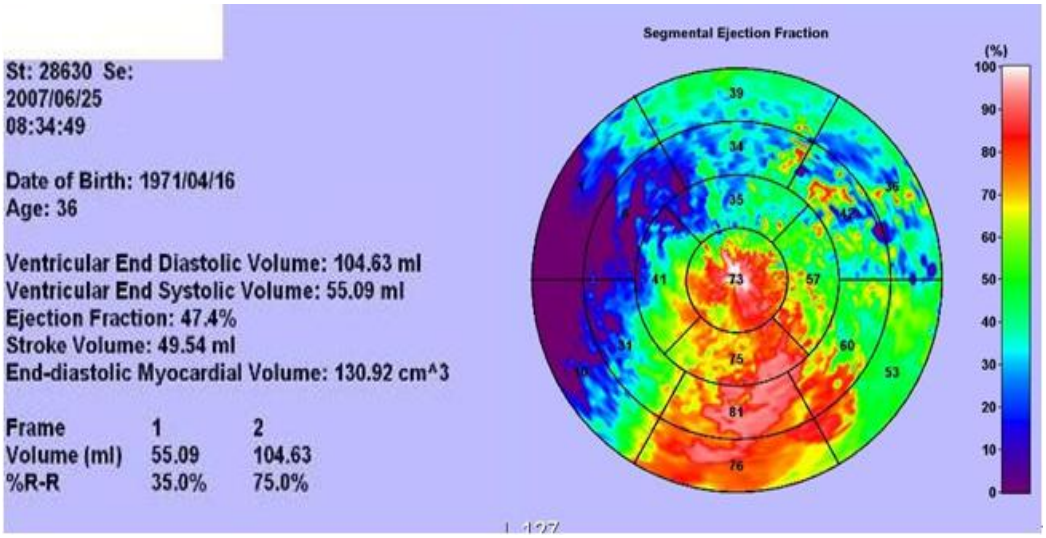
(A). To measure angle of abnormal legs

(B). To measure torsion of tibia

(C). To inject contrast

(D). To measure femoral anteversion

88.This is the result of measured left ventricle's function in phase of rest by using CT cardiac angiography. Choose the best answer which can not aware directly from the image below.?



(A). Ejection Fraction

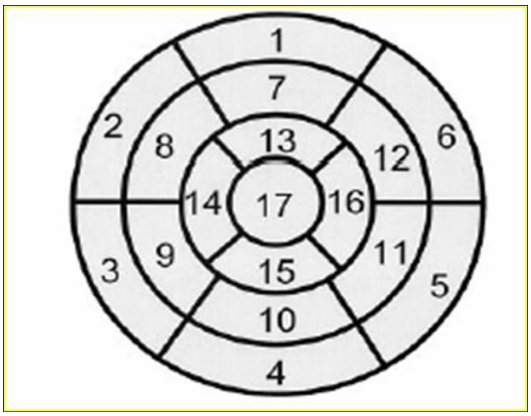
(B). End Diastolic Volume

(C). End Systolic Volume

(D). coronary artery anatomy

89.This is the Bull's eye view of cardiac, and is consist of 17 segments.

Choose the correct answer from 1 to 17 segments.



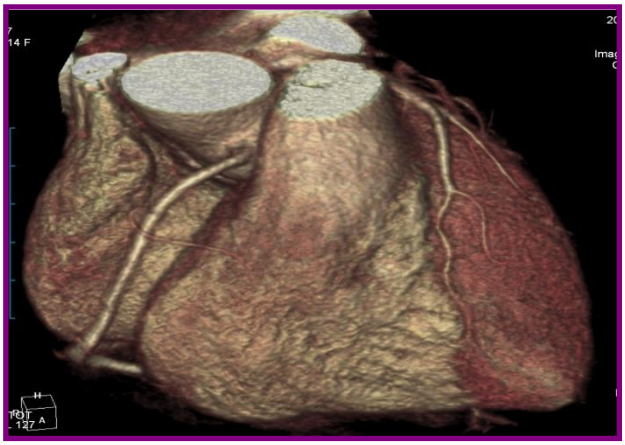
(A). 1,2,7,8,13,14 segments show Right coronary artery(RCA).

(B). 1,2,7,8,13,14 segments show Right coronary artery(RCA)

(C). 3,4,9,10,15 segments show Right coronary artery(RCA)

(D). 3,4,9,10,15,17 segments show Right coronary artery(RCA)

90.This is the image of ECG-gating cardiac CT that has been expended its limitation of application by developing technology of MDCT. Which of following statements is incorrect with examination of cardiac CT by ECT-gating?



(A) For examination of the patient who has acute chest pain in emergency room

(B) For pulmonary embolism W/U of the patient who has dyspnea symptom after operation

(C) For W/U about embolism source of the patient who has cerebral infarction

(D) For W/U about the mass which is found out in the lung

CT

Q1. When a patient is vomiting during CT examination, what do we have to do first?

(1). Keep going and finish the CT examination quickly

(2). Turn the patient's head for keeping the airway

(3). Check the pulse and breath of patient

(4). Call a doctor

Q2. When CT number of some tissue changed from +100HU to +200 HU after contrast medium injected 예문 예문, how much is the linear attenuation coefficient increased?

(1).1% (2).10% (3).50% (4).100%

Q3. Which one can maximize the resolution of soft tissue?

(1). Apply Low pass filter

(2). Widen the Window width

(3). Lower Window level

(4). Apply Bone Algorithm

Q4. What can decide the slide thickness in MDCT?

(1). Adjust beam width as same as single detector

(2). Adjust collimator with a lot of slits

(3). Adjust collimator in tube and detector

(4). Adjust the configuration of grouped detector row

Q5. Which of following statement about spiral CT is NOT correct?

(1). It is possible to acquire volume data.

(2). It uses the slip ring for the transmission of the power and the data.

(3). It can make more metal artifacts than conventional CT

(4). After the examination, if we need, we can choose some images on the Z-axis and reconstruct it.

Q6. Which of the following explanation is correct about the localizer image (scout image)?

(1). It is a reconstruction image.

(2). It is a digital projection radiographic image.

(3). It is necessary to get the image post processing.

(4). It is demanded higher quality than axial image.

Q7. What is the fundamental 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

Q8. Which of the following techniques in 3D reformation is the most similar to general Angiography?

(1). SSD (shaded surface display)

(2). MPR (multi-planar reformation)

(3). VRT (volume rendering technique)

(4). Virtual endoscopy

Q9. Which of the following threshold range has a great difference compare to others for the 3D reformation?

(1). Trachea (2). Colon (3). Stomach (4). Skull

Q10. Which of the following gives the most accurate information about calcification in a vessel?

(1). SSD (2). MPR (3). MIP (4). VRT

Q11. After set the range of CT number, and then place the cursor on the ROI and click on it, the pixels linked adjoining pixels within CT number range are removed. What is this?

(1). ROI (2). Growing (3). Editing (4). Sculpt

Q12. In CT image, the window width is 1,000 and the window level is -200, what is the range of pixel value?

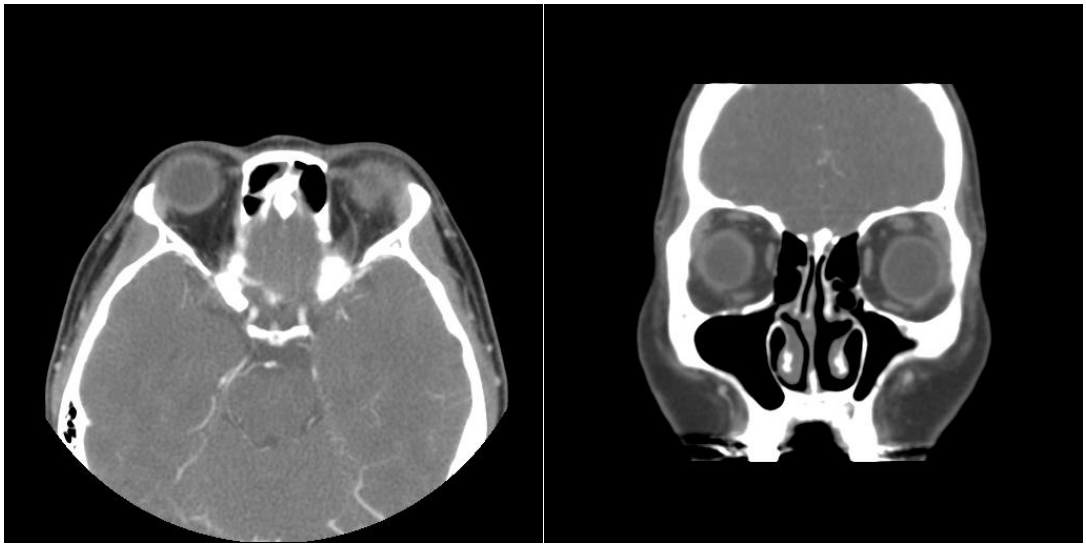
(1). -1800 ~ +1400

(2). -500 ~ +400

(3). -1,200 ~ +800

(4). -700 ~ +300

Q13. Which structure is NOT shown on the below orbit images?



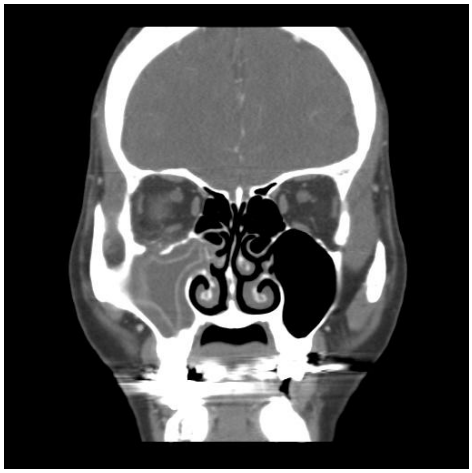
(1). Retrobulbar fat

(2). Rectus muscle

(3). Lens

(4). Vitreous

Q14. This is a PNS CT image. Which of the following explanation is correct?



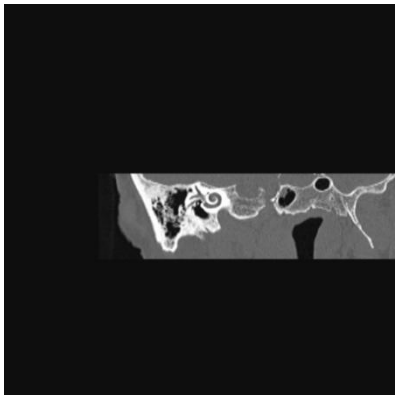
(1). Axial scan and coronal reformation

(2). Axial scan and sagittal reformation

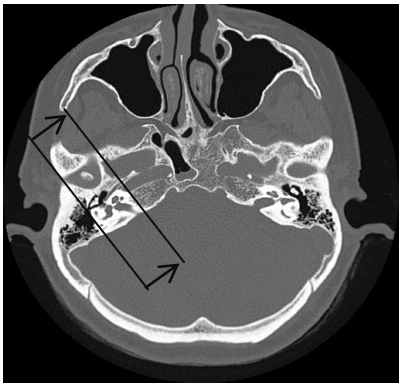
(3). Sagittal scan and coronal reformation

(4). Coronal scan and axial reformation

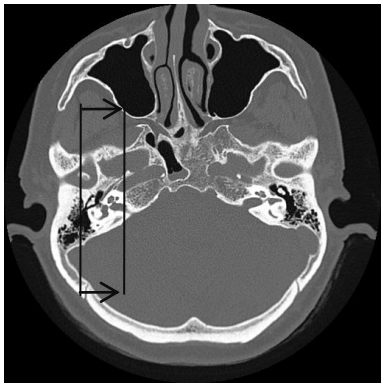
Q15. In temporal bone CT, how could this image reformat?



(1)

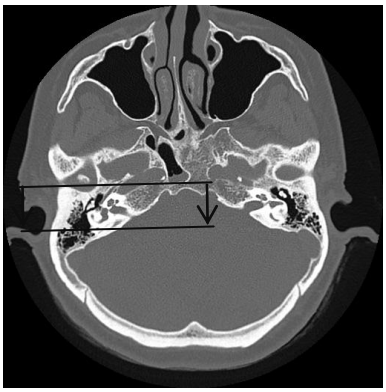


(2)



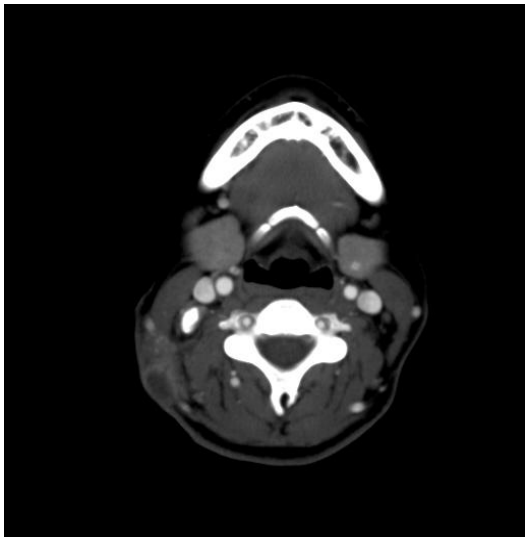
(3)

(4)

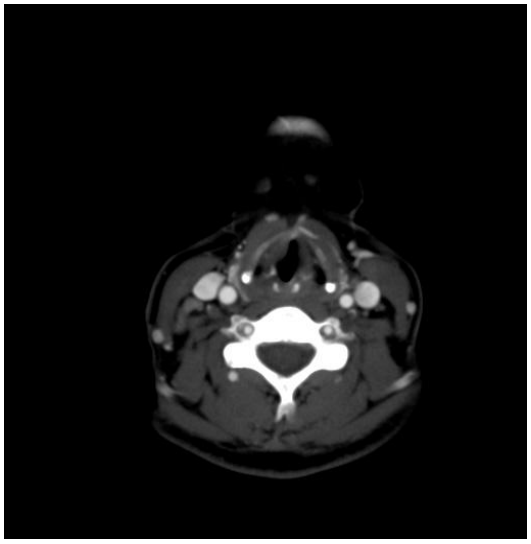


Q16. Which of the following images is shown Vocal core?

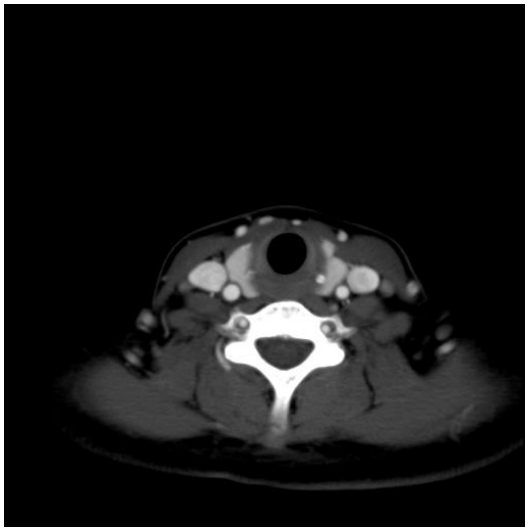
(1)



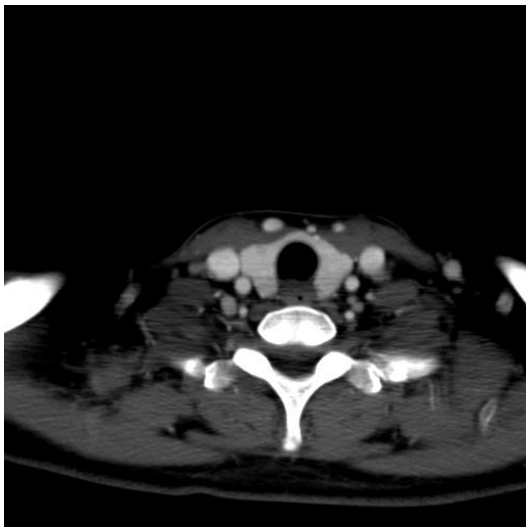
(2)



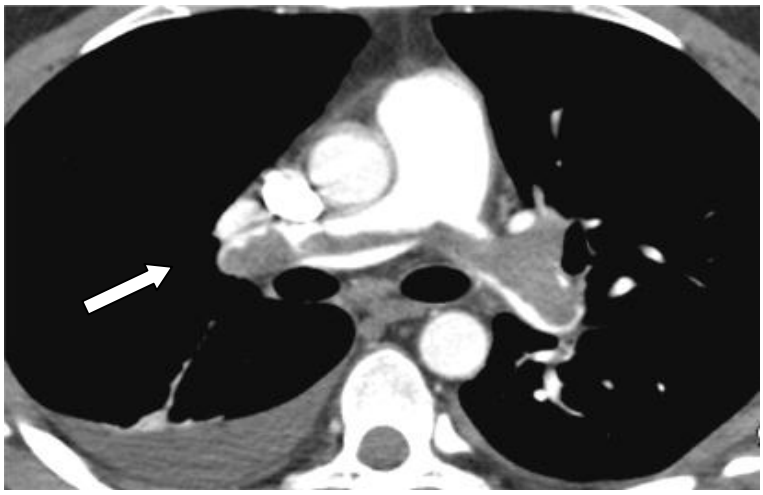
(3)



(4)



Q17. What is the arrow indicated on this image and what is this?



(1). Aorta - aneurysm

(2). Aorta - embolism

(3). Pulmonary artery - embolism

(4). Pulmonary vein - embolism

Q18. We got this scout image for the CT examination. Which of the following is true?

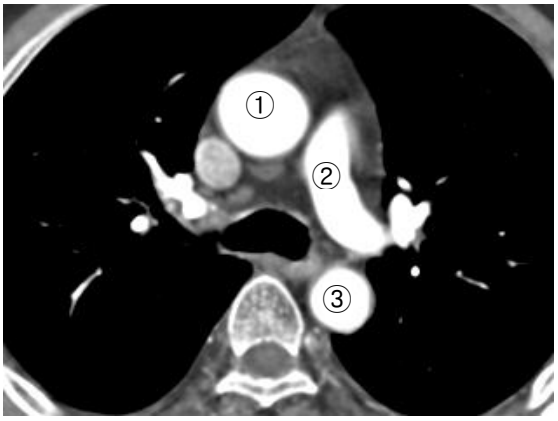
(1). Heart shadowing is enlarged.

(2). There is a high **radiolucent** lump **surrounding aortic arch.**

(3). **R/O aortic aneurysm**

(4). **R/O solid pattern in left upper lobe**

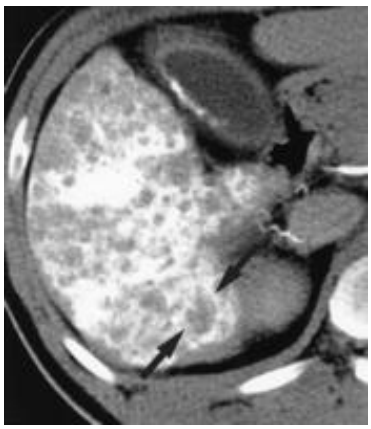
Q19. **Which of the following structure marked the number is enhanced lastly?**



(1). ①　　(2). ②　　(3). ③　　(4). ④

Q20. **Which of the following is correct combination about** CT hepatic arteriography (CTHA) and CT arterial portography (CTAP)?

(A)



(B)

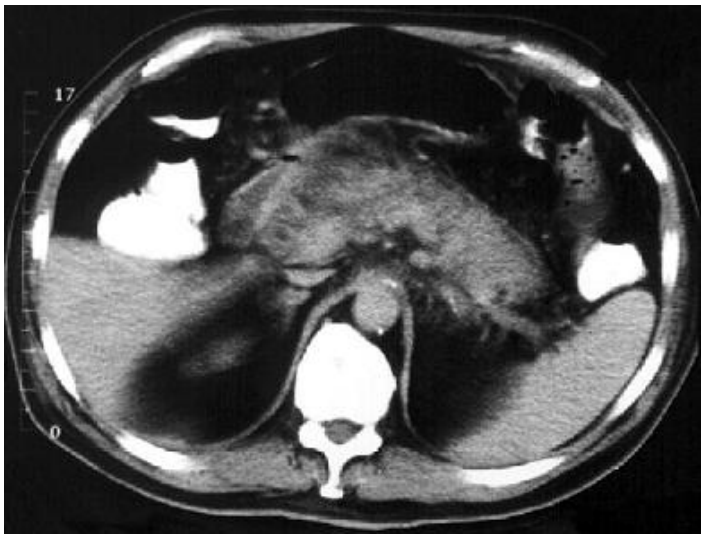
(1). Image A- CTAP / injection of contrast medium is in superior mesenteric vein

(2). Image A- CTAP / injection of contrast medium is in inferior vena cava.

(3). Image B - CTHA / injection of contrast medium is in hepatic artery.

(4). Image B- CTHA / injection of contrast medium is in pancreatic artery.

Q21. What disease could we guess from the below image?



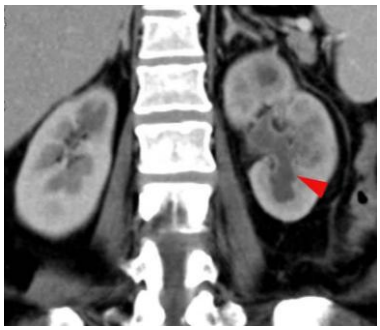
(1). Cholecystitis

(2). Pyelonephrosis

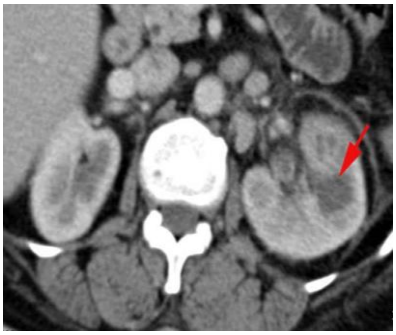
(3). Renal cell carcinoma

(4). Pancreatitis

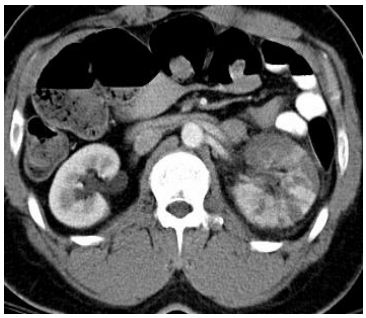
Q22. Which of the following explanation about the below image is NOT correct?



(A)



(B)



(C)

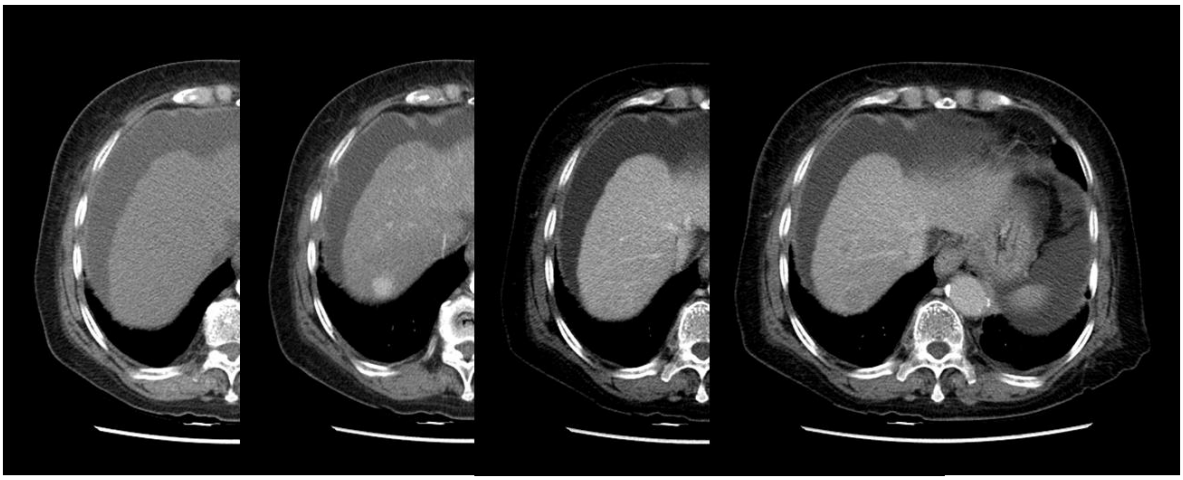
(1). Image A is a coronal MPR image.

(2). The arrow on the image B indicates a kidney.

(3). It is more common disease to male than female.

(4). It shows pyrexia and pyuria due to acute bacterial infection of renal pelvis and calyx.

Q23. Which of the following diseases on below images can be diagnosised?



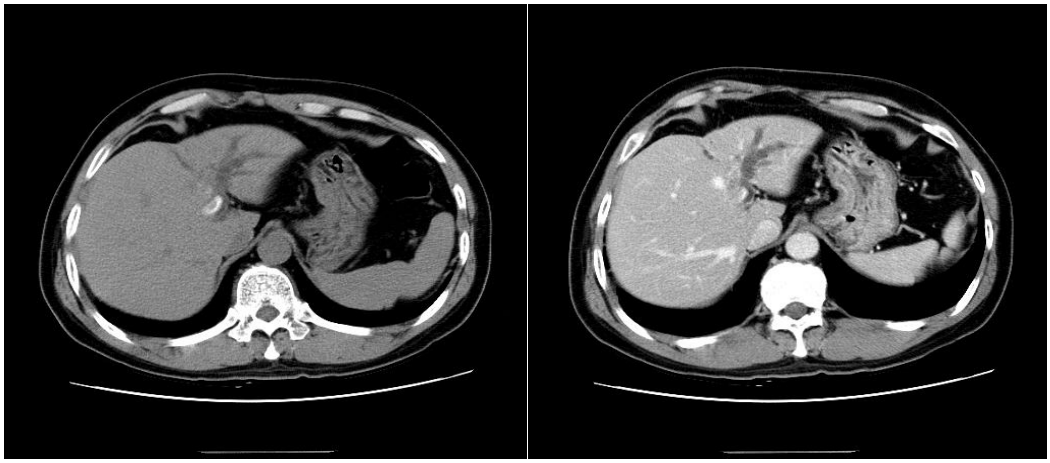
(1). Cyst

(2). HCC (Hepatic cell carcinoma)

(3). Metastatic cancer

(4). Hemangioma

Q24. Which of the following statement about below images is true?



(1). We cannot see stomach in the image

(2). We can check the hepatic vein dilatation

(3). We can check the hepatic duct dilatation.

(4). We can check lipiodol uptake in pre-contrast image.

Q25. This is a shoulder joint image. What is the arrow indicated?

(1). gleno-humeral joint

(2). acromio-clavicular joint

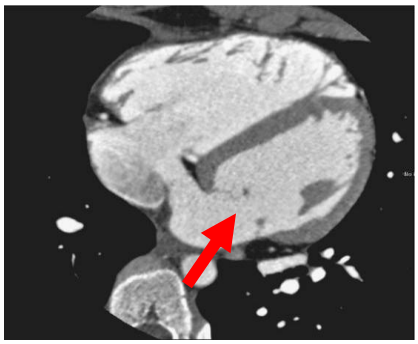
(3). steno-clavicular joint

(4). scapulo-thoracic articulation

Q26. These are carpal bone fracture images. Which bone is fractured?

(1). Scaphoid (2). Capitate (3). Trapezium (4). Trapezoid

Q27. This is a cardiac image with patient's symptom.



- Enlarge of right atrium, right ventricle, and pulmonary trunk
- Enlarge of pulmonary trunk and compression of bronchus
- Pulmonary trunk hypertension
- Systemic circulation of venous with little oxygen
- Cyanoderma

Which of the following disease is corresponded with above image and symptom?

(1). Atrial Septal Defect

(2). Tricuspid insufficiency

(3). Pulmonary stenosis

(4). Teralogy of Fallot

Q28. Which of the following applications of ECG-gating cardiac CT is NOT correct?

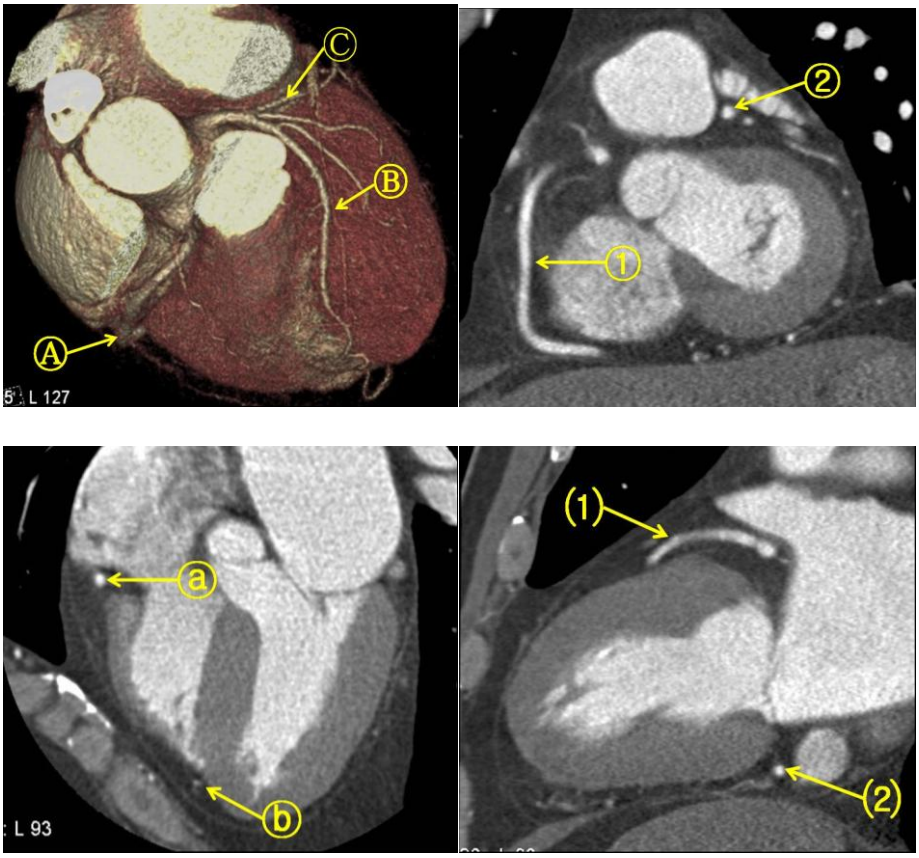
(1). Acute atypical chest pain patient who visit emergency room

(2). Pulmonary Embolism work up of the patient who has dyspnea after the operation.

(3). Embolism source work up of patient who has Cerebral infarction.

(4). Mass work up found in Lung Mediastinum

Q29.These are chamber view and volume rendering images in cardiac CT. Which of the following combination is correct?



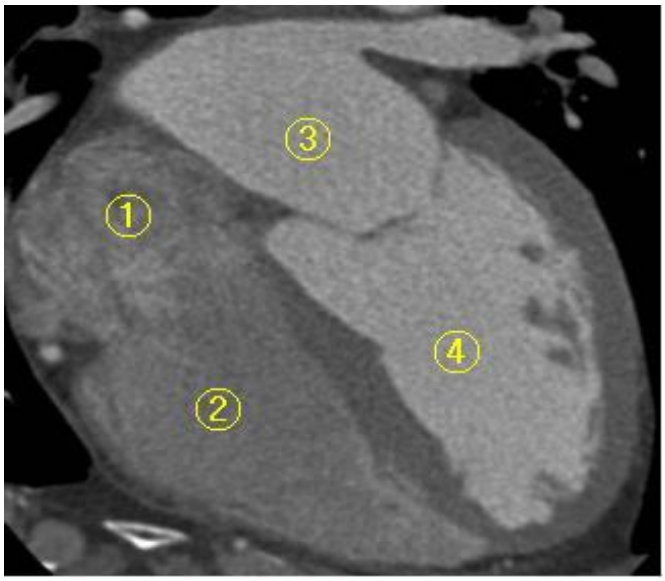
(1). RCA: Ⓐ - ①

(2). LAD: ② - (1)

(3). RCA: ⓐ - (2)

(4). LCX: Ⓒ - ⓑ

Q30.Which of the following anatomy is correct indicated on the cardiac MPR image?



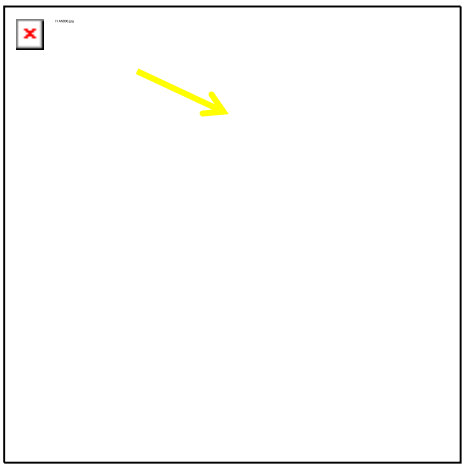
(1).① left atrium

(2).② right atrium

(3).③ rightventricle

(4).④ left ventricle

Q31.This is a cerebral artery 3D image. What is an arrow indicated on this image?



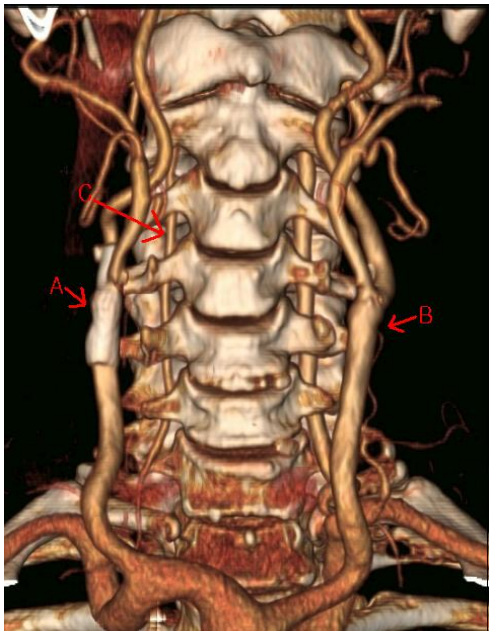
(1). Vertebral artery

(2). Middle cerebral artery

(3). Anterior cerebral artery

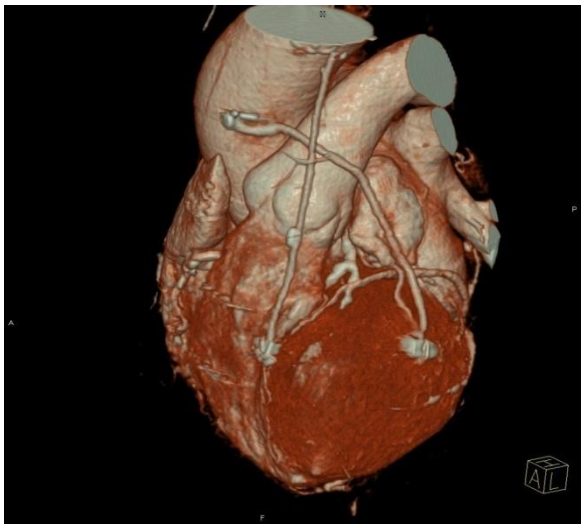
(4). Basilary artery

Q32.Which of the followings combination is correct on below image?



	A	B	C
(1).	Calcification	Right Common carotid artery	Right Vertebral Artery
(2).	Calcification	Left Common carotid artery	Jugular vein
(3).	Stent	Right Common carotid artery	Jugular vein
(4).	Stent	Left Common carotid artery	Right Vertebral Artery

Q33. This is a coronary CT image after CABG (Coronary artery bypass graft). Which of the following vessel is NOT used?



(1). Greater saphenous vein

(2). Internal thoracic artery

(3). Radial artery

(4). Hepatic vein

Q34. Which of the following relation is correct between slice thickness and noise?

(1). Thicker slice becomes noise decrease.

(2). Thicker slice becomes noise increase.

(3). Slice thickness is square proportional to noise.

(4). Slice thickness has no correlation with noise.

Q35. Which of the following is the best way to minimize the degrading of image quality by partial volume effects sustaining same SNR in CT examination?

(1). Thinner slice thickness

(2). Thicker slice thickness

(3). Higher technical factor

(4). Using smooth algorithm

Q36. What is the cause of linear artifacts in 3 and 4 generation CT equipments?

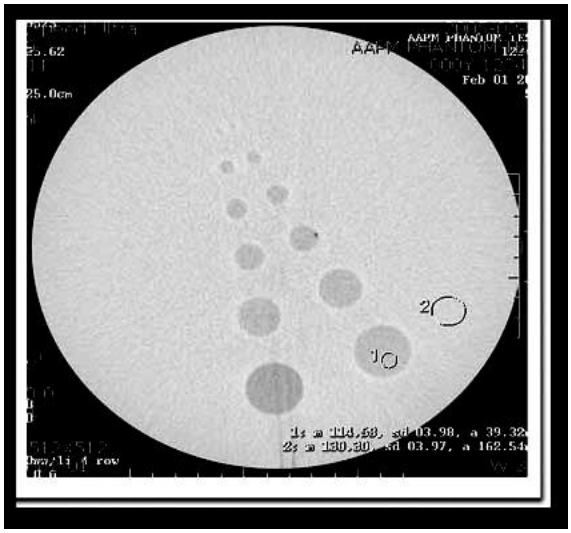
(1). Sample aliasing

(2). Detector channel error

(3). Patient motion

(4). Tube arching

Q37. What is the acceptable standard of contrast resolution in phantom image examination in Computed Tomography?



(1). 3.2 mm below

(2). 6.4 mm below

(3). 1.0 mm below

(4). 1.2 mm below

Q38. Which of the following is correct about qualification of resolution measurement phantom in CT imaging?

(1). Spatial resolution phantom: attenuation factor gap for measurement part has to be 10 % below.

(2). Spatial resolution phantom: attenuation factor gap for measurement part has to be 1 % below.

(3). Contrast resolution phantom: attenuation factor gap for measurement part has to be 10 % more.

(4). Contrast resolution phantom: attenuation factor gap for measurement part has to be 1 % below.

Q39. What is the cause of "Cupping artifact" in CT imaging?

(1). Declining of linearity

(2). Declining of contrast resolution

(3). Declining of uniformity

(4). Error of reformation algorithm

Q40. When is the duration for air calibration?

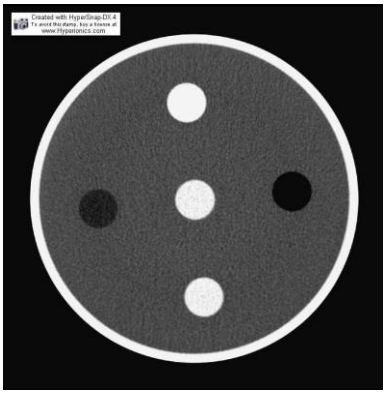
(1). Before taking examination in daily or every other morning.

(2). After two hours of last scan.

(3). Before taking exam in weekly morning.

(4). When tube is cold because of not scanning.

Q41. Which of the following statement is correct about below figure?



a. It is scanned image for uniformity of CT by scanning water part. b. It is measured by phantom made by AAPM c. This phantom image is used for evaluation of linearity of CT.

(1). a, b (2). a, c (3). b, c (4). a, b, c

a. expressed mGy unit	b. evaluated by single slice scan	c. evaluated by using TLD

Q42. Which of the following is a correct explanation about CTDI?

(1). a, b (2). a, c (3). b, c (4). a, b, c

Q43. What effects can be occurred in 2 seconds with 130mA compared 1 second with 260mA in CT examination?

(1). Heat production of X-ray tube is increased.

(2). Artifacts from motion are increased.

(3). X-ray beam hardening is increased.

(4). Noise on image is reduced.

Q44. Which of the following combination is correct about Cone beam effect?

a. It appears in single detector helical CT used cone beam geometry.
b. It is called the distortion effect of slice profile of image acquired in iso- and off-center.
c. The thinner slice thickness, the more images from one rotation of x-ray tube, the more cone beam artifacts appear.

(1). a, b (2). a, c (3). b, c (4). a, b, c

Q45. Which of the following explanation is NOT correct about CT dose?

(1). Patient dose should be cared over fixed threshold values.

(2). CT examination is regulated as an equipment to provide a patient high dose with interventional radiography and radio-therapy.

(3). High beam and filter are used for all exposure X-ray photos to contribute the image reformation.

Q46. Although CTDI is used for the dose index, it has a limitation to evaluate exposure dose to organs or tissues in human directly. Which of the following is NOT correct effect of radiation dose reducing by Dose modulation?

(1). Using low KVP

(2). At cardiac systolic phase

(3). In Z-direction of patient

(4). According to patient diameter

Q47. Which is WRONG about extravascular leakage of a contrast medium?

(1). A large vessels such as the cubital vein should preferably be selected to reduce the risk.

(2). A metallic needle (i.e., a winged needle) poses a higher risk of extravascular leakage than a plastic indwelling needle.

(3). Injection of a contrast medium should immediately be stopped when the medium is found to be leaking out of the vessel.

(4). It never leads to a serious health disorder.

Q48. Which of following is the most used material for IV-injected CT contrast medium?

(1). iron (2). iodine (3). barium (4). gadolinium

Q49. An advantage of scintillation detectors over xenon gas detectors is:

(1). Greater detection efficiency.

(2). Better packing efficiency.

(3). Less expense.

(4). Less complicated electronics.

Q50. Which of the following has less image noise ?

(1). 180° spiral CT

(2). 360° spiral CT

(3). conventional CT

(4). Z- axis reconstructed conventional CT

Q51. Which is WRONG?

(1). Helical scanning is better than non-helical scanning to obtain a breath-held image of a wide region.

(2). ECG-synchronized, non-helical CT scanning of the heart is good to reduce exposure to radiation.

(3). Helical scanning is good to obtain a three-dimensional.

(4). Non-helical scanning and one-pitch beam helical scanning share the same X-ray trajectory.

Q52. Choose the correct method used to reduce the partial volume artifacts in the spiral CT?

(1). Increase the pitch

(2). Change the reconstruction plan

(3). Decrease the slice thickness

(4). Shorten the scan time

Q53. A disadvantage of slip-ring technology is that:

(1). The tube can rotate in only one direction.

(2). Scan times can be very short.

(3). The reconstruction algorithm is more complicated

(4). High-voltage cables must be rewound after each scan series.

Q54. What is fundamental reason of cone beam distortion in MDCT?

(1). The expansion of fan beam

(2). The decrease of cone beam width

(3). The reduction in both number of detector elements and effectiveness of detection

(4). X-ray focus and detector row is not vertical to the axis.

Q55. Which is WRONG?

(1). The 360-degree interpolation reconstruction method in single-slice helical scan CT uses data obtained during two rotations.

(2). For single-slice helical scan CT, the 180-degree opposite beam interpolation reconstruction method uses a wider range of view data than the 360-degree interpolation reconstruction method.

(3). For illustration of interpolation in helical scanning, contour plots (scan diagrams) are often used.

(4). Scan diagrams in multislice helical scan CT depict multiple spiral trajectories

Q56. Which of the following is an <u>incorrect</u> Multi Slice CT?

(1). Multiple sectional images can be acquired at the same time.

(2). Isotropic images can be acquired.

(3). Cone beam X-ray is used.

(4). Heart image cannot be acquired.

Q57. What is an approximate pixel size when FOV is 200 mm and matrix is 512?

(1). 0.20 mm (2). 0.39 mm (3). 0. 5mm (4). 1.0 mm

Q58. Which of following algorithm is used in CT images for facial bone reconstruction operation?

(1). MIP (maximum intensity projection)

(2). MPR (multiple plane reconstruction)

(3). SSD (surface shaded display)

(4). mIP (minimum intensity projection)

Q59. 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.

Q60. 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

Q61. Select the correct CT number range. The width is 100 and the level is 10?

(1). +100~-100HU

(2). +110~-90

(3). +90 ~ +10HU

(4). +60~-40HU

Q62. After injection of contrast medium, the CT number for a region of the brain changes from 10HU to 20HU. This represents what increase in the linear attenuation coefficient.

(1). 0.1% (2). 0.5% (3). 1% (4). 5%

Q63. Lung has an attenuation coefficient of 0.137 cm-1 and, thus, a Hounsfield number of approximately:

(1). -300 (2). 30 (3). -30 (4). 300

Q64. If a CT display is set at a window width of 200 and a window center of 200, which range of CT numbers will be displayed as black?

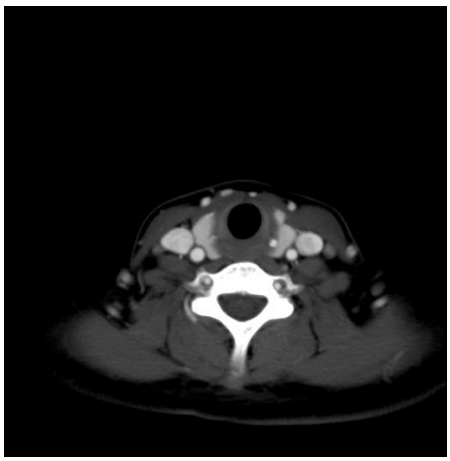
(1). Greater than 100

(2). Less than 100

(3). Greater than 200

(4). Less than 0

Q65. Which of the following is <u>not</u> shown on the image below?



(1). Trachea

(2). Common carotid artery

(3). Thyroid gland

(4). Pharynx

Q66. What is the major clinical applications of perfusion CT?

(1). nodules

(2). acute stroke

(3). cyst

(4). liver disease

Q67. Which of the following window level/ window widths would be most appropriate for imaging brain?

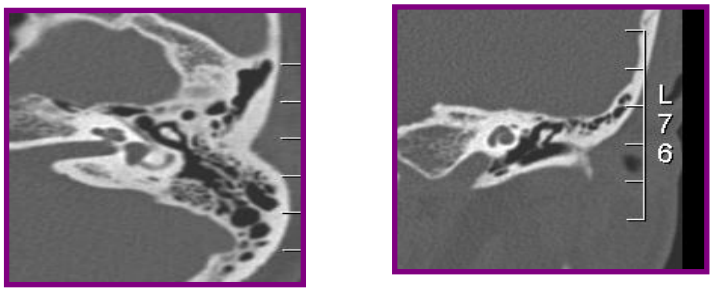
(1). WL 0 WW 50

(2). WL 40 WW 100

(3). WL 300 WW 1000

(4). WL 500 WW 2000

Q68. These are the images of temporal bone CT. Which of the following explanations of examination method & image display is correct?



(1). bone algorithm, 1-2mm slice thickness, wide window width

(2). standard algorithm, 3-5mm slice thickness, narrow window width

(3). standard algorithm, 3-5mm slice thickness, wide window width

(4). bone algorithm, 1-2mm slice thickness, narrow window width

Q69. Which is WRONG?

(1). Venous thrombosis of the lower extremity is the most common cause of pulmonary thrombosis.

(2). An undershoot artifact may arise from an extremely high frequency used for a lung observation.

(3). Chest CT scanning is generally performed during exhalation.

(4). High-resolution CT (HRCT) imaging (reconstruction) is recommended for evaluation of relationship between pulmonary nodules and existing structures.

Q70. What problem can occur during the CT Guided lung biopsy?

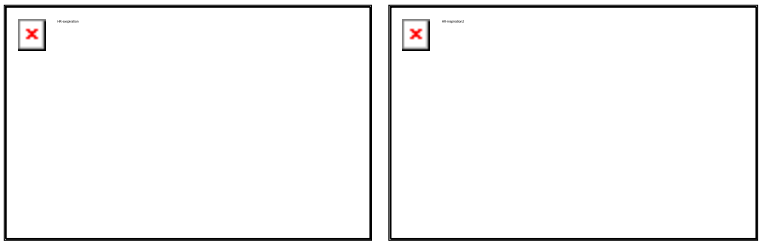
(1). Lung metastasis

(2). Pleural effusion

(3). Pneumothorax

(4). Pneumonia

Q71. Which of the following factors that make differences at same position is appropriate?



(1). window setting

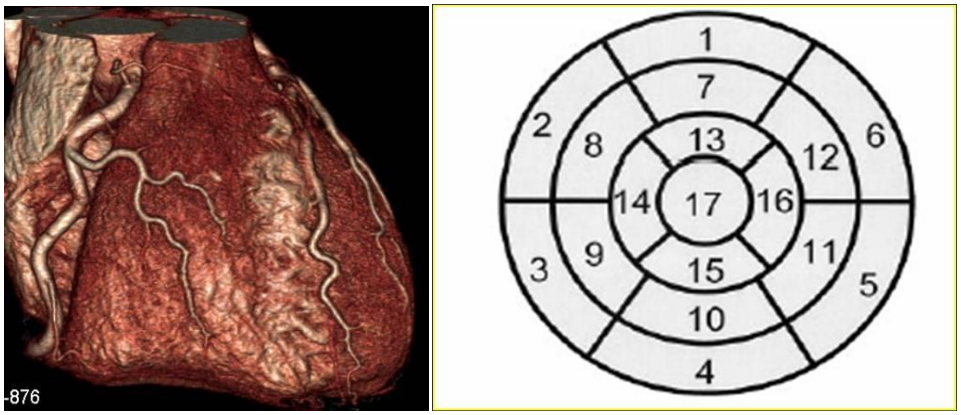
(2). slice thickness

(3). breath

(4). kVp

Q72. This is the Bull's eye view of cardiac, and is consist of 17 segments.

Choose the correct answer from 1 to 17 segments.



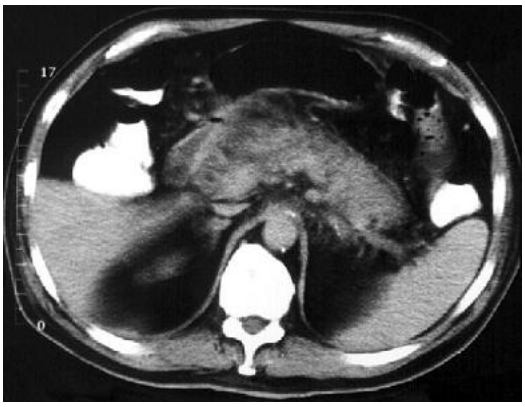
(1). 1,2,7,8,13,14 segments show Right coronary artery(RCA).

(2). 1,2,7,8,13,14 segments show Right coronary artery(RCA)

(3). 3,4,9,10,15 segments show Right coronary artery(RCA)

(4). 3,4,9,10,15,17 segments show Right coronary artery(RCA)

Q73. Which of the following diseases could guess from the image below?



(1). Cholecystitis

(2). Pyelonephrosis

(3). Renal cell carcinoma

(4). pancreatitis

Q74. Which of the following statements is correct?

(1). This is image after contrast enhancement.

(2). The purpose of this image is for evaluating kidney.

(3). The kidney stone is suspected.

(4). The cancer is suspected at renal calyx.

Q75. Which contrast enhanced image will be acquired after 20 seconds when 120ml of contrast is injected with the velocity of 4ml/s by auto injector for Liver CT examination at spiral CT?

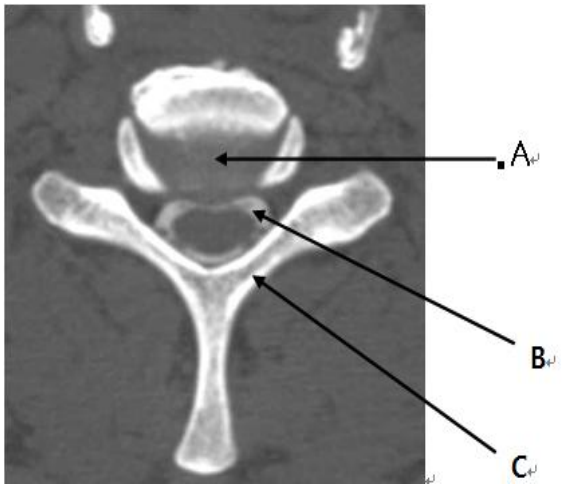
(1). early arterial phase

(2). late arterial phase

(3). portal phase

(4). delayed phase

Q76.Which of the following explanations is incorrect concerning the image below?



(1). This is the CT myerography image.

(2). The anatomical terminology of A is intervertebral disc.

(3). The anatomical terminology of B is subarachnoid space.

(4). The anatomical terminology of C is pedicle.

Q77. Which of the following explanations is incorrect?

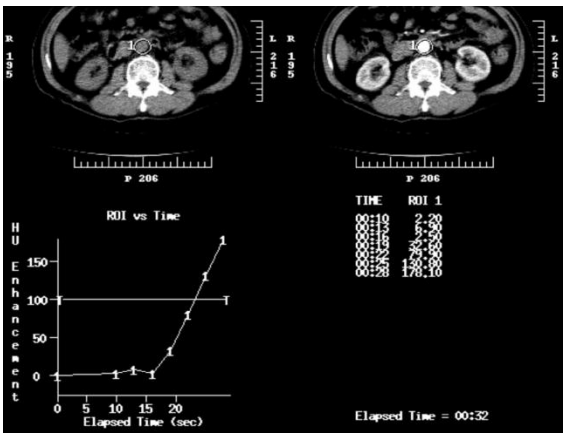
(1). To measure angle of abnormal legs

(2). To measure torsion of tibia

(3). To inject contrast

(4). To measure femoral anteversion

Q78. Which of the following explanations of the Auto bolus tracking method is incorrect?



(1). After setting ROI at abdominal aorta, get appropriate peak time by dynamic scan at regular intervals.

(2). To monitor contrast enhancement through the time-density characteristic curve

(3). This is the software which is used for image acquisition with optimal condition of appropriate contrast enhancement.

(4). To set mA and kVp following the examination condition equally for high spatial resolution in the case of dynamic scan.

Q79. Which of the following combinations is <u>not</u> appropriate?

(1). Volume rendering – Threshold

(2). Surface modeling – Geometric modeling

(3). Modeling – 3D geometry definition

(4). Shading – Brightness value

Q80. Which is UNABLE to be calculated in head CT perfusion imaging?

(1). Mean transit time (MTT)

(2). Standard uptake value (SUV)

(3). Cerebral blood flow (CBF)

(4). Cerebral blood volume (CBV)

Q81. Which is LEAST appropriate about a change that occurs with an increase only in the contrast medium injection rate?

(1). An increase in peak contrast medium concentration in the aorta

(2). An increase in the gradient of the concentration-time curve of a contrast medium in the aorta up to the peak

(3). A decrease in time to reach the peak in concentration of the contrast medium in the aorta

(4). No change in the amount of iodine injection rate.

Q82. Which of the following statements is incorrect?

(1). SD (standard deviation) is used to compare noise levels between equipment.

(2). Spatial resolution can be expressed as an objective physical quantity with a modulation transfer function (MTF).

(3). The product of contrast threshold and diameter %·mm is the index of low contrast resolution.

(4). Slice thickness is expressed by the half width of the slice sensitivity profile obtained from the center of rotation.

Q83. Which of following is most common unit for CT spatial resolution?

(1). lp/cm (2). lp/mm (3). LUX (4). cd/m2

Q84. Which of following CT scan parameters has highest SNR?

(1). high kVp, low mA, large pitch

(2). low kVp, low mA, small pitch

(3). high kVp, high mA, small pitch

(4). high kVp, high mA, large pitch

Q85. Spatial resolution in CT is approximately 1 Lp/cm. what is the smallest sized object that can be imaged?

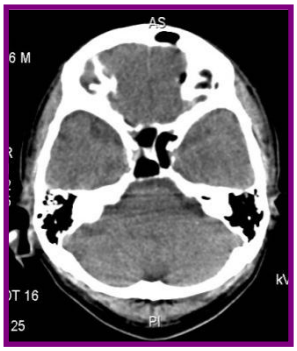
(1). 0.1mm

(2). 0.2mm

(3). 0.3mm

(4). 0.5mm

Q86. Which of the following is shown on the artifact image below?



(1). photon starvation artifact

(2). beam hardening artifact

(3). respiratory artifact

(4). moving artifact

Q87. Which of the following methods in Automatic exposure control(AEC) is incorrect?

(1). To set standard deviation

(2). To set reference image

(3). To set reference mAs

(4). To set kVp exposure

Q88. Which is NOT an appropriate explanation of the X-ray compensating filter?

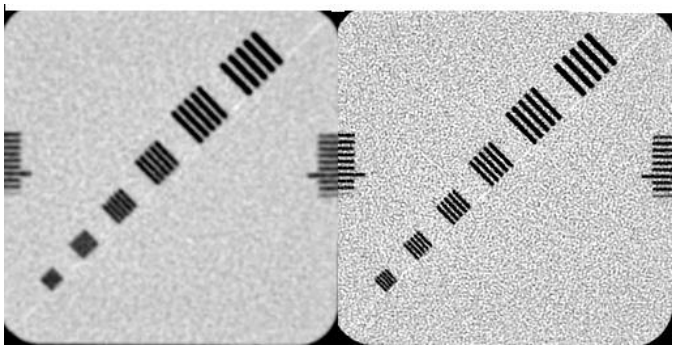
(1). It is an arch-shaped filter installed to provide uniform radiation intensity.

(2). Because of the shape of the filter, the effective X-ray energy is higher in the central area than in the peripheral area.

(3). Because of the shape of the filter, the incoming X-ray radiation dose is lower in the peripheral area than in the central area.

(4). The filter eliminates soft X-ray radiation.

Q89. Observe and identify the image below.



(1). Measurement of plane thickness

(2). Measurement of reconstruction algorithm

(3). Measurement of CT number

(4). Measurement of uniformity

Q90. The intensity of x-ray energy emerging from a CT x-ray tube:

(1). Is proportional to the mA setting of the generator

(2). Is inversely proportional to the mA setting of the generator.

(3). Increases with the generator's kVp setting.

(4). Both a and c.

CT

1. Which of the following is NOT true about treatment for hypotension with bradycardia after contrast medium injection?

(1) Elevate the patient’s feet

(2) Supply O2 for 6~10L/min

(3) Medicate anti-histamine

(4) Drop the colloid fluid for maintenance of blood pressure

2. Which of following is correct reason for higher viscosity of contrast medium?

(A) Iodine concentration is high. (B) Particle size is big.
(C) Keeping temperature is high.

(1) A,B
(2) B,C
(3) A,C
(4) A,B,C

3. How long times take for brain damage occurred delayed O2 supply because of cardiac arrest?
(1) 1~3minutes
(2) 4~6minutes
(3) 8~10minutes
(4) 15minutes

4. Which of the following is NOT true about vital sign?
(1) Body temperature of normal adults is 36.5℃.
(2) Normal adults respire 25~30 times for a minute.
(3) Normal adults have 60 to 80 pulse rate for a minute.
(4) End-systolic blood pressure of normal adults is 110~140mmHg, and end-diastolic blood pressure is 80~100mmHg

5. Which of following technique is correct for O2 supply to emphysema or COPD patients?
(1) Supply O2 2~3L/min
(2) Supply O2 6~10L/min
(3) Supply O2 above 10L/min
(4) Intubation rather than O2 supply

6. Which of following case cannot use intravenous Iodine contrast medium for CT?
(1) Right after colon endoscope
(2) Above 80 years old patient
(3) Obesity patient
(4) Creatinin is above 2.0mg/dl

7. Which of the following affect linear attenuation coefficient of material?
(A) density of material (B) atomic number of material
(C) photon energy passing material

(1) A, B
(2) A,C
(3) B,C
(4) A,B,C

8. Which of following is main purpose for using thin slice thickness?
(A) increase spatial resolution (B) decrease noise
(C) decrease partial volume effect (D) increase contrast resolution

(1) A,B
(2) A,C
(3) B,C
(4) A,B,C

9. Which of following is correct when mean is 2HU and standard deviation is 0 in CT number measurement of ROI?
(A) All pixel value is equal in ROI
(B) Water and other materials are contained in ROI
(C) Guess for fat in ROI
(D) Noise is low

(1) A,B
(2) A,D
(3) B,C
(4) B,D

10. Which of following is NOT correct about detector of CT?
(1) Single slice CT has 1 row detector arranged Z-axis and 1 DAS system.
(2) Multi slice CT has multi row detector arranged Z-axis and multi DAS system.

(3) Maximum slice number acquired by 1 rotation of multi slice CT is equal to number of detector elements of Z-axis
(4) Types of detector of multi slice CT are matrix, adaptive and hybrid.

11. Which of following is NOT correct?
(1) Types of rotation of CT are belt drive type and direct drive type.
(2) Mechanical intensity is important for higher speed of rotation of X-ray tube.
(3) Cone angle is small when focal spot-detector distance and focal spot-isocenter distance are short.
(4) There are CT which has 2 X-ray tubes.

12. Which of following CT number is correct when linear attenuation coefficient of some material is 1.3 times than water?
(1) 3HU
(2) 13HU
(3) 30HU
(4) 300HU

13. Which of following is not correct about window setting of CT image?
(1) Wide window width is used for bone or lung field.
(2) Narrow window width is used for brain
(3) Contrast resolution is increased when window width is wide
(4) CT number range is increased when window width is wide

14. Convolution processing for CT image reconstruction using filtered back projection is?
(1) Change linear attenuation coefficient to remove unnecessity area of image.
(2) Increase measured sample value at detector to remove aliasing artifact
(3) Change attenuation profile to enhance of edge
(4) Prevent the artifact of partial volume effect and beam hardening effect

15. Which of following affect the time for CT image reconstruction?
(A) reconstruction algorithm
(B) matrix size

(C) A/D conversion ratio of detected signal

(1) A,B
(2) A,C
(3) B,C
(4) A,B,C

16. Which of following is the image processing process for conversion of measured data at DAS to raw data?
(1) Pre-processing
(2) Convolution
(3) Back projection
(4) Post-processing

17. Which of following is not correct for increment of spatial resolution?
(1) Use small focal spot
(2) Increment of sampling view number
(3) Apply high frequency algorithm
(4) Decrease matrix number of image

18. Which of following is correct about cone beam effect?
(A) occurs at single detector helical CT selecting con beam geometry
(B) distortion of image slice profile in iso-center and off-center
(C) cone beam artifact is severely occurred when acquired thin slice thickness or image number is high per 1 rotation of X-ray tube

(1) A,B
(2) A,C
(3) B,C
(4) A,B,C

19. Which of following is the main reason for cone beam distortion of MDCT ?

(1) Enlargement of fan beam

(2) Reduction of cone beam width

(3) Decrease of detector element and detection efficiency of element

(4) X-ray focal spot and detector row are not perpendicular to isocenter

20. Which of following algorithm is used in CT images for facial bone reconstruction?

(1) minIP (Minimum Intensity Projection)

(2) MPR(multi-planar reformation)

(3) VRT(volume rendering technique)

(4) MIP (Maximum Intensity Projection)

21. Which of following organ has different reconstruction method for 3D?

(1) Trachea

(2) Colon

(3) Stomach

(4) Skull

22. Cerebrospinal fluid is produced at ?

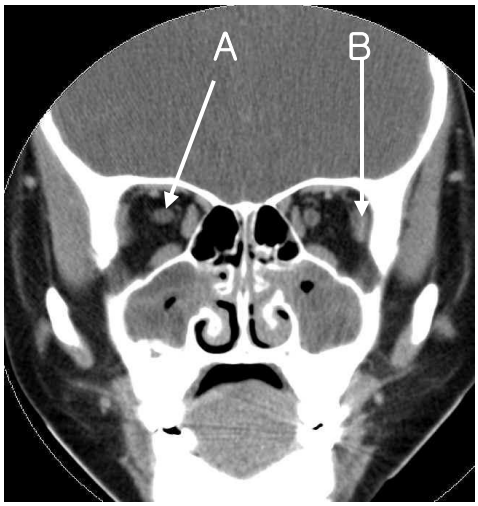
(1) Choroid plexus

(2) Hypothalamus

(3) Pons

(4) Caudate nucleus

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



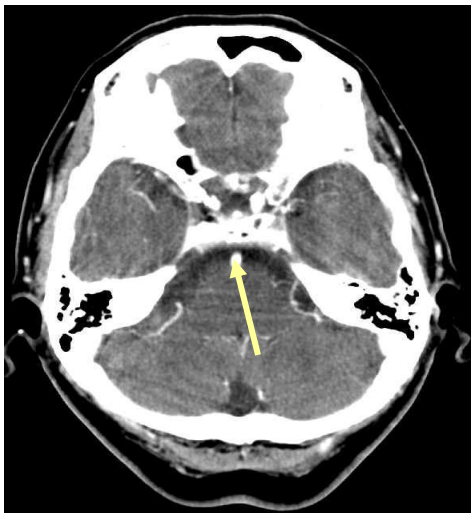
(1)A:optic vein B:lateral rectus muscle

(2)A:optic vein B:superior rectus muscle

(3)A:optic nerve B:lateral rectus muscle

(4)A:optic nerve B:superiot rectus muscle

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



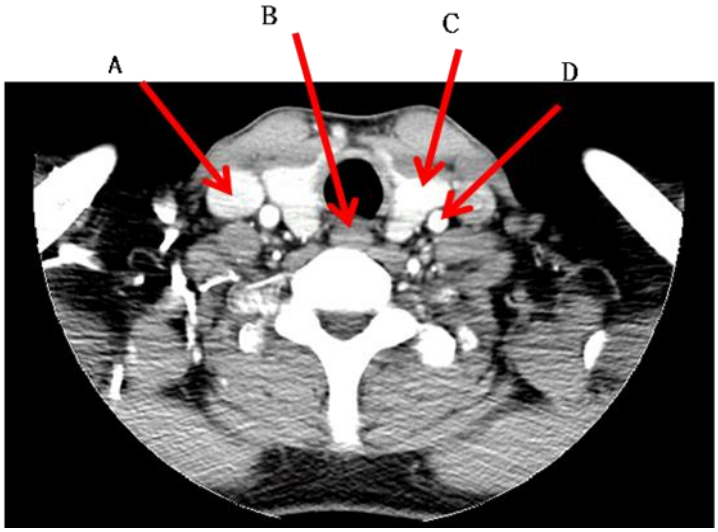
(1) Vertebral artery

(2) Posterior cerebral artery

(3) Basilar artery

(4) Internal carotid artery

25. Which of following is correct about this image?



(A) Jugular vein (B) esophagus (C) salivary gland (D) common carotid artery

(1) A,B,C

(2) (2) A,B,D

(3) (3) A,C,D

(4) (4) B,C,D

26. Which is the purpose of gazing at one spot during orbit CT scan?
(1) To reduce the radiation hazard on orbit
(2) To set the position of orbit to isocenter
(3) To reduce the moving artifact
(4) To prevent the hazard due to positioning laser beam

27. Which of following is used for improvement of spatial resolution of temporal bone CT for acoustic neuroma patient?
(A) high spatial frequency algorithm
(B) thin slice thickness
(C) large SFOV

(1) A,B
(2) A,C
(3) B,C
(4) A,B,C

28. Which of following is adjust scan range of chest CT for lung cancer patient?
(1) From neck to lower adrenal gland
(2) From sternal notch to lower kidney
(3) From clavicle to lower kidney
(4) From sternal notch to cardiac

29. Which of following is adjust scan method of high resolution lung CT for lung parenchyma?
A. use high spatial frequency algorithm(bone)
B. use 1-2mm section thickness
C. use larger scan field of view than chest routine CT
(1) A,B
(2) A,C
(3) B,C

(4) A,B,C

30. Where is the level of carina?

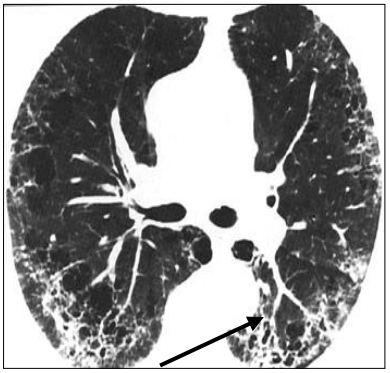
(1) C7-T1

(2) T2-T3

(3) T4-T5

(4) T6-T7

31. What is the pathological disease marked with an arrow?



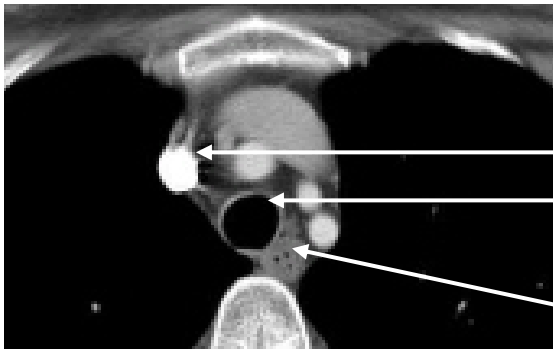
(1) A: pneumothorax B: emphysema

(2) A: pneumothorax B: fibrosis

(3) A: bronchiectasis B: emphysema

(4) A: bronchiectasis B: fibrosis

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



A: right brachiocephalic vein

B: main bronchus

C: esophagus

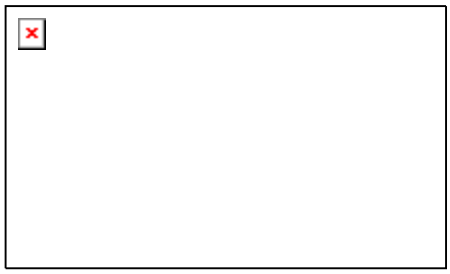
(1) A,B

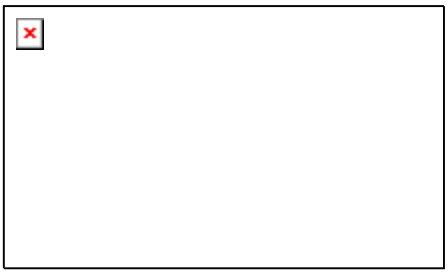
(2) A,C

(3) B,C

(4) A,B,C

33 Which of following scan parameter make difference on images?





(1) kVp

(2) reconstruction algorithm

(3) mAs

(4) slice thickness

34. What is the name of the disease that serous fluid is accumulated in peritoneal cavity?

(1) Abscess

(2) Ascites

(3) Flora

(4) Aquiparous

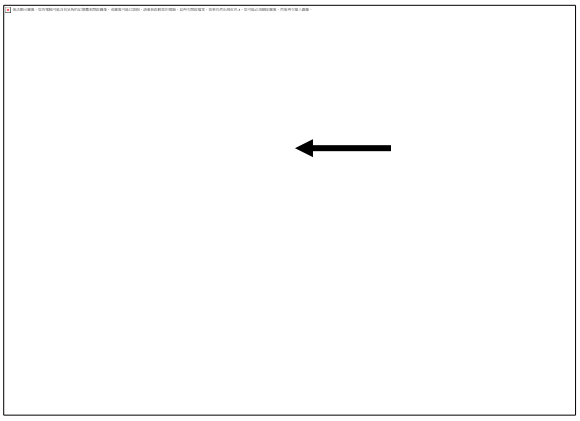
35. Where is the selected vessel for contrast injection in CT hepatic arteriography(CTHA) and CT arterial portography(CTAP)?

A. inferior vena cava	B. hepatic artery
C. superior mesenteric artery	D. antecubital vein

(1) A,B
(2) B,C
(3) C,D
(4) A,D

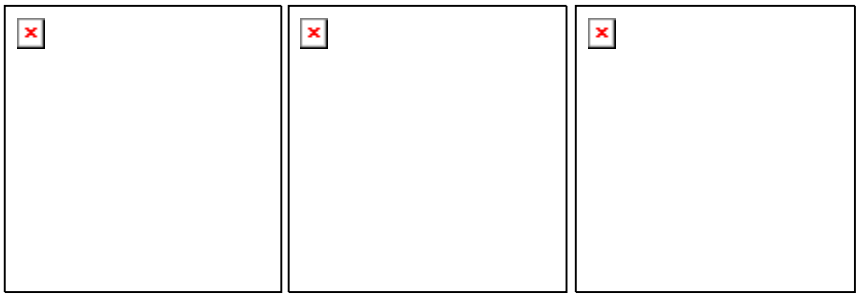
36. Which of following is adjust volume for pediatric abdomen CT?
(1) 0.5cc/kg
(2) 1-2cc/kg
(3) 2-3cc/kg
(4) 3-4cc/kg

37. What is the structure marked with an arrow?



(1) Portal vein
(2) Left hepatic artery
(3) Left hepatic vein
(4) Common hepatic artery

38. what is the disease of below image?



pre-contrast arterial portal

가) 전이암 나) 간세포암 다) 간경변 라) 간 혈관종

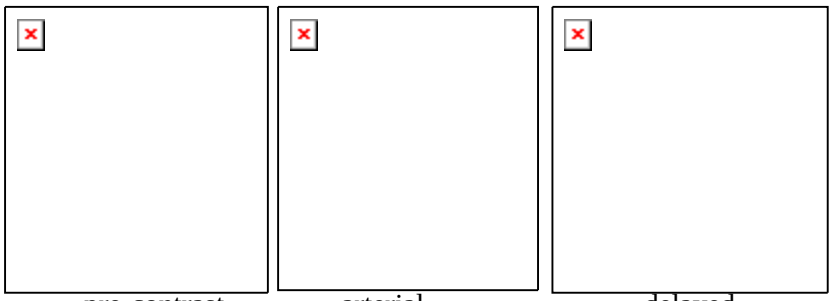
(1) Metastasis

(2) HCC

(3) Cirrhosis

(4) Hemangioma

39. what is the disease of below image?



pre-contrast arterial delayed

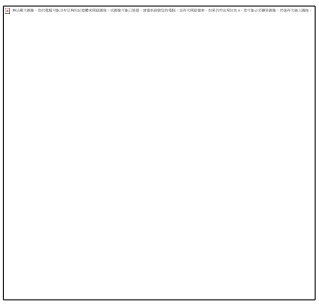
(1) Metastasis

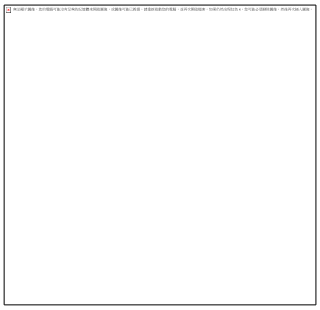
(2) (2) HCC

(3) (3) Cirrhosis

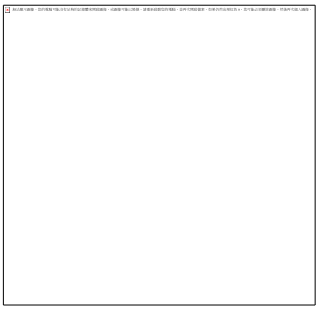
(4) (4) Hemangioma

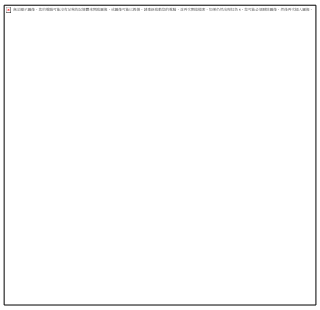
40. where is the level of the scan line on topogram?





(1) (2)

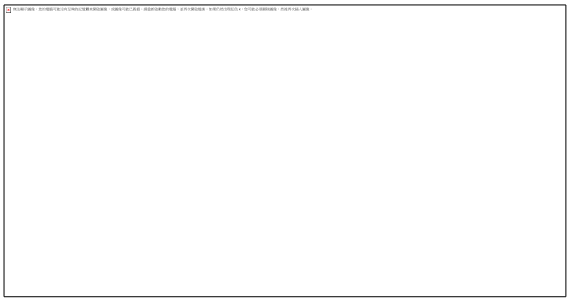




(3) (4)

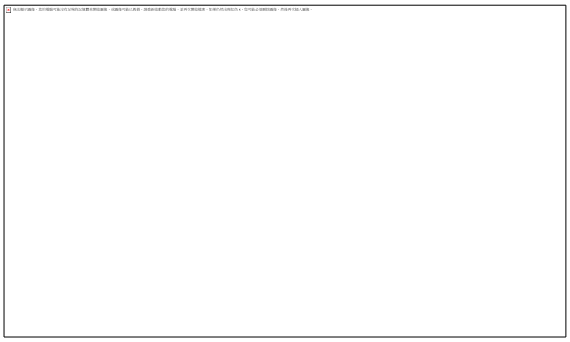
41. Where is the path injecting contrast for T-spine myelography CT?
   (1) Subdural space
   (2) Epidural space
   (3) Subarachnoid space
   (4) Spinal cord

42. Which of following structure has fracture?



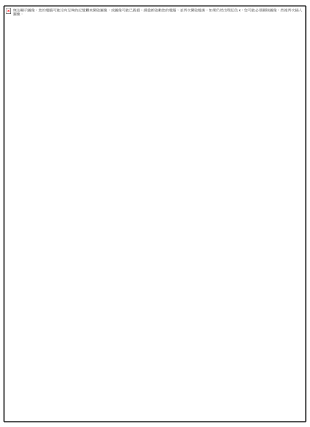
(1) Cuboid
(2) Navicular
(3) Calcaneus
(4) Talus

43. Which of following structure has fracture?



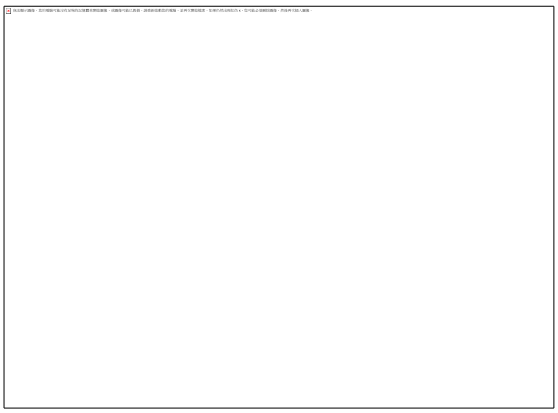
(1) Scaphoid
(2) Capitate
(3) Trapezium
(4) Trapezoid

44. What is the structure marked with an arrow?



(1) C1(atlas)
(2) C2(axis)
(3) C4
(4) C6

45. Which of following is not correct about the image?



(1) CT myerography
(2) A : intervertebral disc
(3) B : subarachnoid space
(4) C : pedicle

46. Which of following is correct about the image?

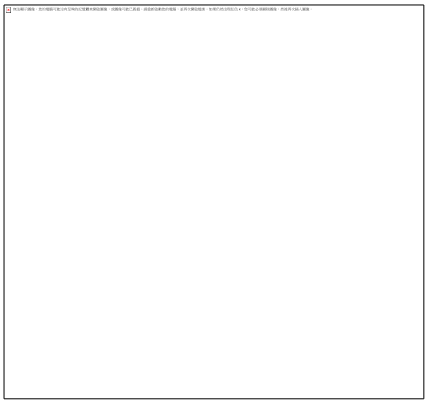
(1) TLD system for radiation dosimetry

(2) For measurement CTDI

(3) System components are consists TLD for CT, monitor and cable

(4) There are 5 or 9 holes to insert TLD at center and peripheral of phantom.

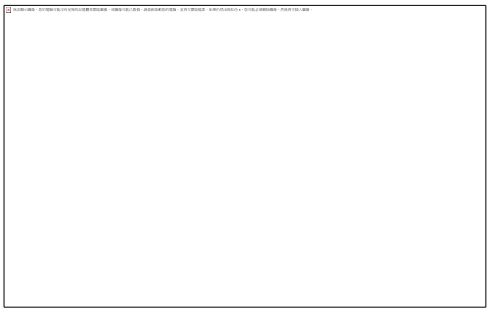
47. Which of following is correct about this Cardiac MPR (4 chamber) image?



(1) ① – left atrium
(2) ② – right atrium
(3) ③ – right ventricle
(4) ④ – left ventricle

48. What is the often complicating disease on CT guided aspiration biopsy for mediastium?
(1) Pneumonia
(2) Fever
(3) Pneumothorax
(4) Allergy

49. Which of following is correct about the image?

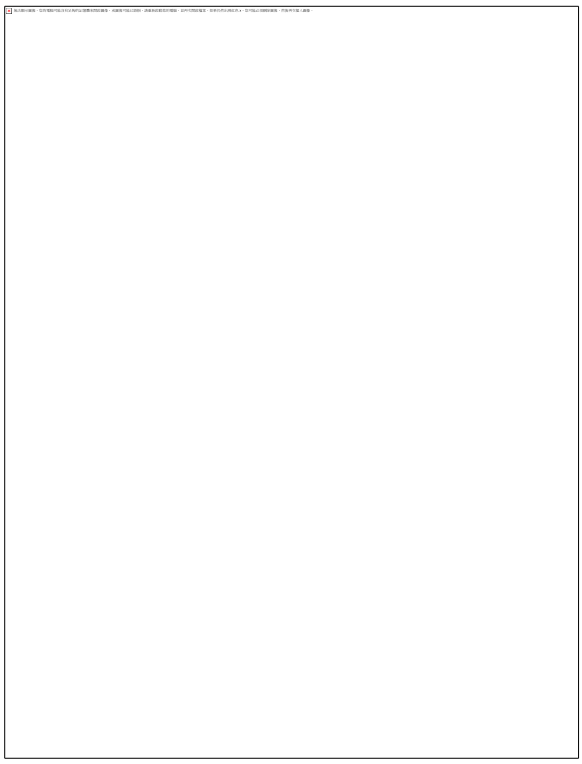


(1) CTDI measurement
(2) MSAD measurement
(3) Packing factor measurement
(4) Dose length product measurement

50. What is the name of the vessel marked with an arrow?

(1) Vertebral artery
(2) Middle cerebral artery
(3) Anterior cerebral artery
(4) Basilar artery

51. What is the correct combination of structure name?



(1) A : Calcification

B : Right Common carotid artery

C : Right Vertebral Artery

(2) A : Calcification

B : Left Common carotid artery

C : Jugular vein

(3) A : Stent

B : Jugular vein

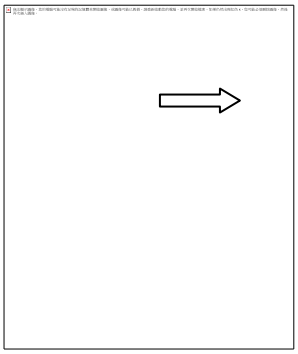
C : Right Common carotid artery

(4) A : Stent

B : Left Common carotid artery

C : Right Vertebral Artery

52. What is the name of the structure marked with an arrow?



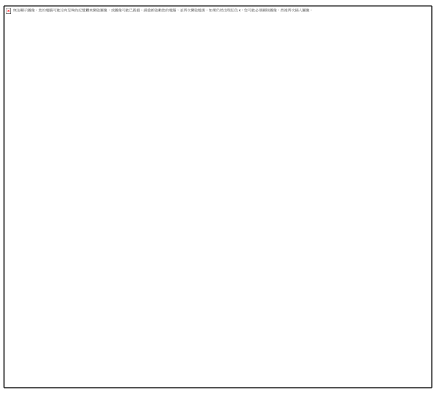
(1) IVC filter

(2) Gelform

(3) Graft

(4) Balloon catheter

53. Which of following is correct about the image?



A. for diagnosis stenosis or obstruction of air way

B. recommended dual breath-hold scan

C. edit with threshold method or scalpel method

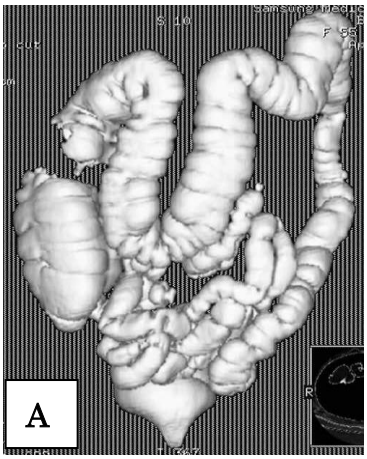
(1) A,B

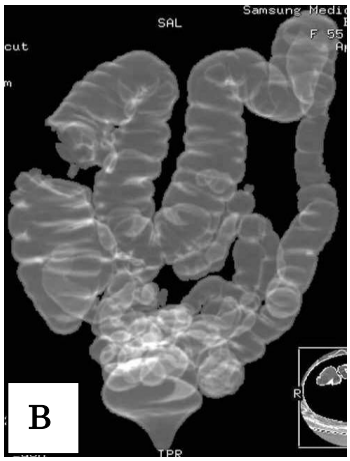
(2) A,C

(3) B,C

(4) A,B,C

54.Which of following is correct about the image?





A. non-invasive exam

B. double contrast image by injection barium and air though rectum

C. A : SSD mode, B : transparent mode

D. mass is shown at splenic flexure area

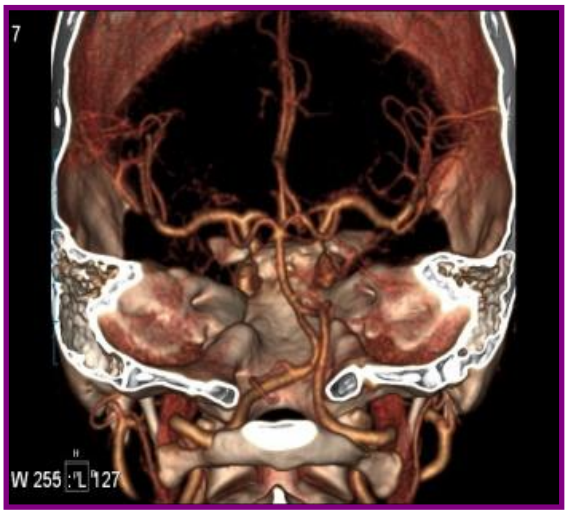
(1) A,B

(2)A,C

(3)A,B,C

(4)B,C,D

55. Which of following is NOT correct about the image??



(1) To show intracranial vessels

(2) Volume Rendering image

(3) Non-contrast is available

(4) Basilar artery is shown

56. What is the SI unit of effective dose?

(1) mR

(2) mGy

(3) mSv

(4) rad

57 Which of following is affected by thin slice thickness?

A. spatial resolution	B. quantum mottle
C. Partial Volume averaging	D. CT number

(1) A,B

(2) A,C

(3) A,B,C.

(4) A,B,C,D

58 Which of following can be affected by “Cupping” artifact?

(1) Decrease linearity

(2) Decrease contrast resolution

(3) Decrease uniformity

(4) Error of reconstruction algorithm

59 Which of following cause increase of radiation dose of patient?

A. thin slice thickness B. Lower pitch C. Overlapping slice D. large

(1) A,B

(2) C,D

(3) A,B,C

(4) A,B,C,D

60. What is the main source of radiation exposure of CT?

(1) Leakage X-ray from tube

(2) Scatter ray from gantry

(3) Scatter ray from patient

(4) Scatter ray from CT room wall

61 Which of following is the character related linear attenuation coefficient and CT number? 2

(1) Detectability

(2) Linearity

(3) Spatial resolution

(4) Definition

62 What is the subject contrast of white matter and gray matter when CT number of white matter is 42 HU, gray matter is 46 HU?

(1)0.1%

(2)0.4%

(3)1%

(4)4%

63. Which of following can be affected by linear attenuation coefficient?

A. contrast	B. spatial resolution
C. CT number	D. noise

(1)A,B

(2)A,C

(3)A,B,C

(4)A,B,C,D

64 Which of following is related multi slice CT?

A. RF coil B. Cone beam

C. radio wave shielding D. DAS(data acquisition system)

(1) A,B,C

(2) A,C

(3) B,D

(4) A,B,C,D

65 What is the DLP when $CTDI_W$ is 10mGy, 100mm beam collimation, 1.2 beam pitch, 5mm slice thickness for abdomen CT?

(1) 125mGy.cm

(2) 150mGy.cm

(3) 180mGy.cm

(4) 200mGy.cm

66 Which of following is correct combination about CT ?

A. partial volume effect — slice thickness

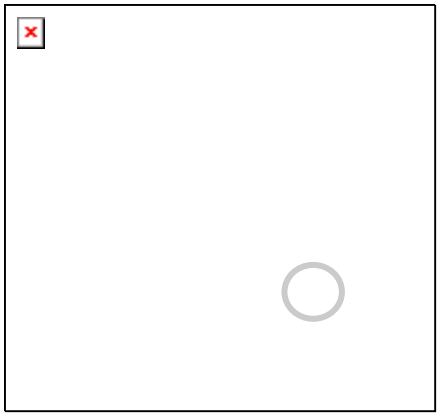
B. Beam hardening — cupping artifact

C. Helical scan — large capacity X-ray tube

D. Translate/Rotate — high speed scan

(1) A,B,C
(2) A,B
(3) B,D
(4) A,B,C,D

67 . Which of following can be measured by the phantom image?



(1) Spatial resolution
(2) High-frequency resolution
(3) Contrast resolution
(4) Noise

68. Which of following is NOT correct about automatic exposure control(AEC) for CT?
(1) Patient size dose modulation

(2) Temporal dose modulation

(3) Noise index dose modulation

(4) Tube-rotational dose modulation

69. What is the reason of motion artifacts?

A. involuntary motion of patient	B. Gantry rotation time
C. breathing of patient	D. slice thickness

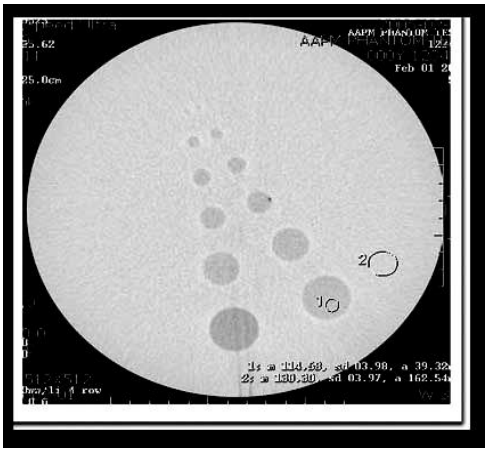
(1) A,B

(2) A,C

(3) A,B,C

(4) A,B,C,D

70. Which of following can be measured by the phantom image?



](1) Spatial resolution

(2) Contrast resolution

(3) Uniformity

(4) Linearity

71. Which of following can be measured by the phantom image?

A. spatial resolution
B. contrast resolution
C. MTF
D. CTF

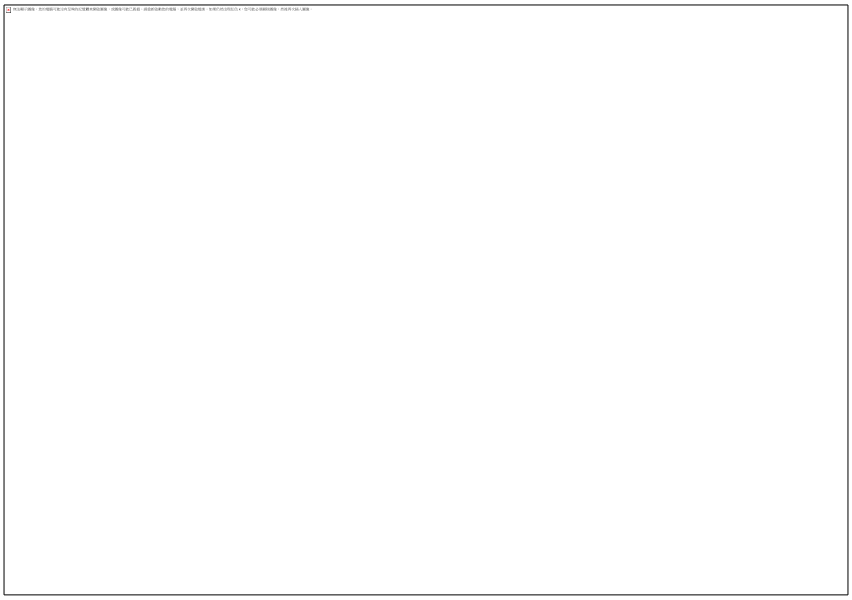
(1) A,B
(2) A,C
(3) B,D
(4) A,D

72. Which of following occurred by increasing matrix number?

A. decreasing noise B. decreasing pixel size
C. increasing contrast resolution D. increasing spatial resolution

(1) A,C
(2) B,D
(3) A,B,C
(4) B,C,D

73. Which of following can be measured by the pattern image ?



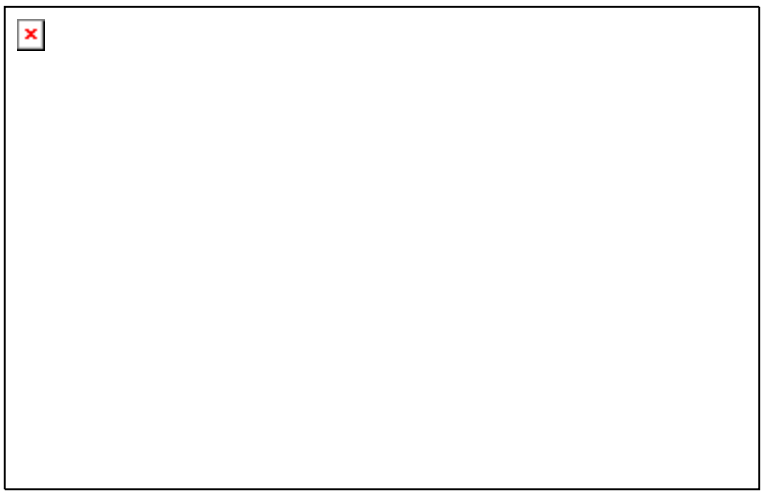
(1) Linearity test of AAPM phantom

(2) Reading monitor test

(3) Clinical image test

(4) Accuracy test of CT number

74. Which of following is correct combination of anatomical structure and disease?



(1) Aorta - aneurysm

(2) Aorta - embolism

(3) Pulmonary artery - embolism

(4) Pulmonary vein - embolism

75. Which of following is correct about the scout image?

(1) Shown large heart shadow

(2) Shown high radiation penetration mass around aortic arch

(3) Suspected aortic aneurysm

(4) Suspected solid mass at left upper lobe

76. Which of the following gives the most accurate information about calcification in a vessel?

(1) SSD

(2) MPR

(3) MIP

(4) VRT

77. In CT image, the window width is 1,000 and the window level is -200, what is the range of pixel value?

(1) -1800 ~ +1400

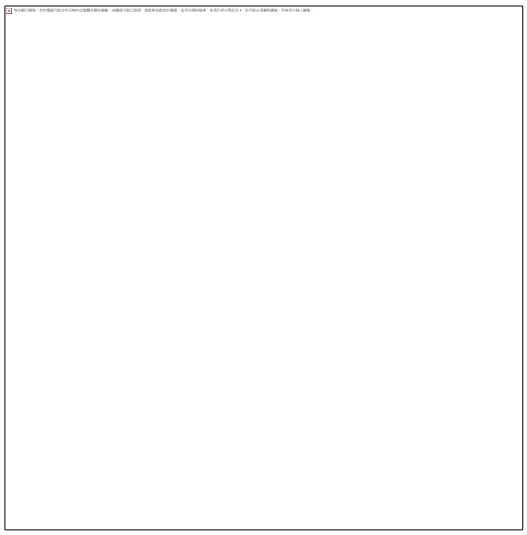
(2) -500 ~ +400

(3) -1,200 ~ +800

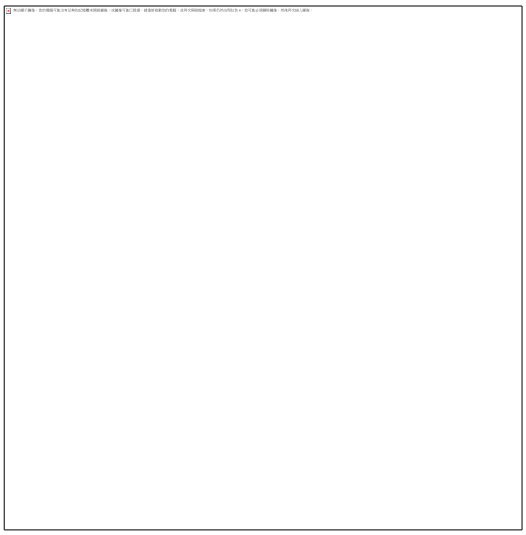
(4) -700 ~ +300

78. Which of the following images is shown Vocal core?

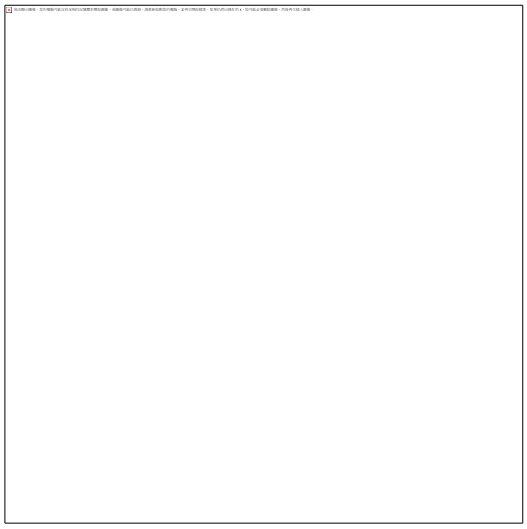
(1)



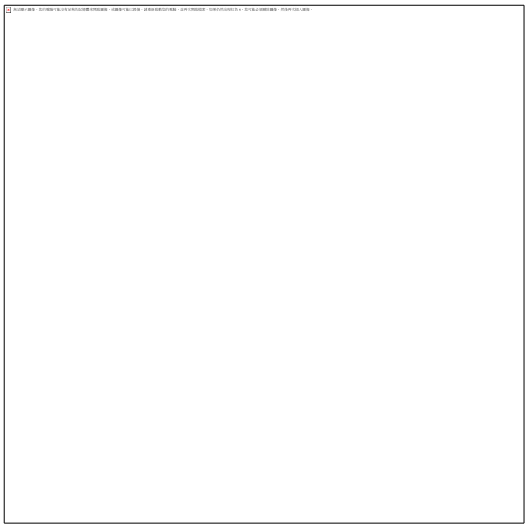
(2)



(3)

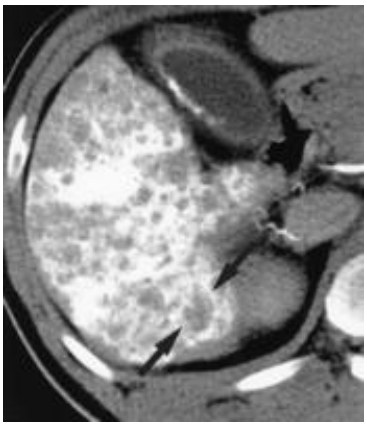


(4)



79. **Which of the following is correct combination about** CT hepatic arteriography (CTHA) and CT arterial portography (CTAP)?

(A)



(B)

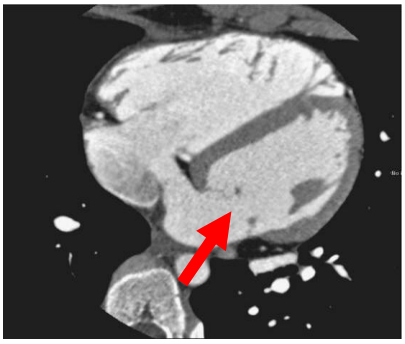
(1) Image A- CTAP / injection of contrast medium is in superior mesenteric vein

(2) Image A- CTAP / injection of contrast medium is in inferior vena cava.

(3) Image B - CTHA / injection of contrast medium is in hepatic artery.

(4) Image B- CTHA / injection of contrast medium is in pancreatic artery.

80. This is a cardiac image with patient's symptom.



- Enlarge of right atrium, right ventricle, and pulmonary trunk
- Enlarge of pulmonary trunk and compression of bronchus
- Pulmonary trunk hypertension
- Systemic circulation of venous with little oxygen
- Cyanoderma

Which of the following disease is corresponded with above image and symptom?

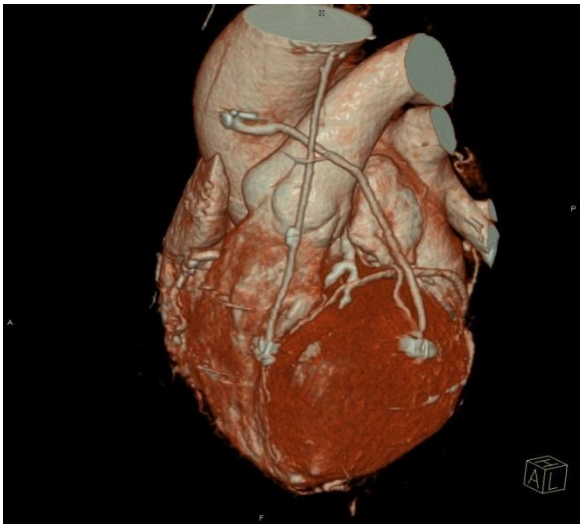
(1) Atrial Septal Defect

(2) Tricuspid insufficiency

(3) Pulmonary stenosis

(4) Teralogy of Fallot

81. This is a coronary CT image after CABG (Coronary artery bypass graft). Which of the following vessel is NOT used?



(1) Greater saphenous vein

(2) Internal thoracic artery

(3) Radial artery

(4) Hepatic vein

82. What is an approximate pixel size when FOV is 200 mm and matrix is 512?

(1) 0.20 mm

(2) 0.39 mm

(3) 0. 5mm

(4) 1.0 mm

83. Which of the following combinations is <u>not</u> appropriate?

(1) Volume rendering – Threshold

(2) Surface modeling – Geometric modeling

(3) Modeling – 3D geometry definition

(4) Shading – Brightness value

84. Which of following CT scan parameters has highest SNR?

(1) high kVp, low mA, large pitch

(2) low kVp, low mA, small pitch

(3) high kVp, high mA, small pitch

(4) high kVp, high mA, large pitch

85. CT perfusion technique is usually used in:

(1) Brain tumor

(2) Aneurysm

(3) Aortic dissection

(4) Stroke

86. Which of the following factors will not affect the cone beam distortion of MDCT?

(1) cone angle

(2) slice thickness

(3) number of slice when x-ray tube is rotated once

(4)SFOV

87. 4D image can be created in volume rendering technology of CT field. What is the fourth dimension?

(1) length

(2) time

(3) opacity

(4) brightness

88. Which following statement about MTF (modulation transfer function)is true?

(1) MTF=0 means the imaging system has produced the object exactly

(2) MTF=1 indicates no transfer of object to image

(3) MTF describe contrast resolution

(4) MTF describe spatial resolution

89. Which of the following explanations is a correct spatial resolution?

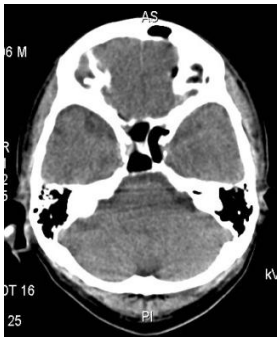
(1) PSF (point spread function)

(2) LSF (line spread function)

(3) CTF (contrast transfer function)

(4) MTF (modulation transfer function)

90. Which of the following is shown on the artifact image below?



(1) photon starvation artifact

(2) beam hardening artifact

(3) respiratory artifact

(4) moving artifact

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 is the correct direction for storage of contrast media?
(A) maintain the temperature similar to body temperature
(B) be more careful of heat than shading the light
(C) viscosity increases with the temperature of the heating cabinet
(D) Using the heating cabinet helps extension of storage term

1) 1
2) 1,2
3) 1,2,3
4) 1,4

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 lactacidemia when the renal function is low
4) occurrence of arrhythmia when using the contrast media

Q7. Which of the following is the not-correct answer for contrast media?

1) Amipaque was used first as the non-ionic contrast media
2) Hypertonic have more side effects than hypotonic
3) It is good to have the osmotic concentration similar to blood
4) The osmotic concentration can be lower by increasing the number of iodine atoms to the number of dissolved atoms

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. Choose the right example about respiration.

1) Respiration times per minute is 26~30 times for adults.
2) Respiration controlled by lung function and the respiratory center of myelencephalon

3) Respiration times per minute is defined as 1/2 of respiration times measured for 2 minutes
4) There are 2 respiration types; internal respiration that exchange the carbon dioxide with the alveoli and external respitaion that exchange the carbon dioxide between blood and the somatic cells

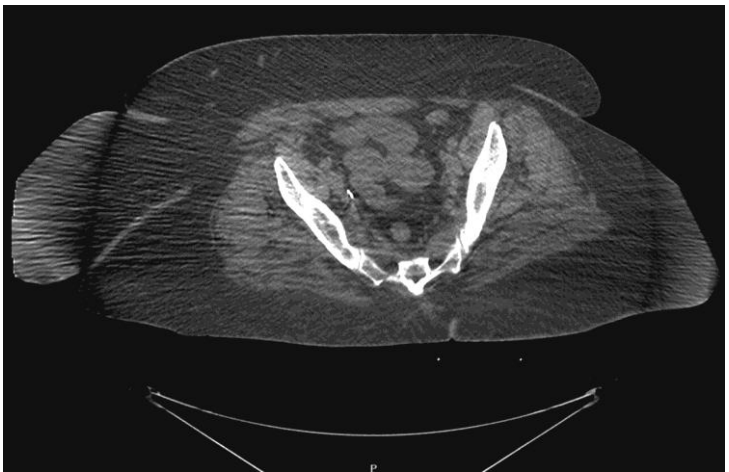
Q10. Which of the following is the not-correct example about CPR?

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?

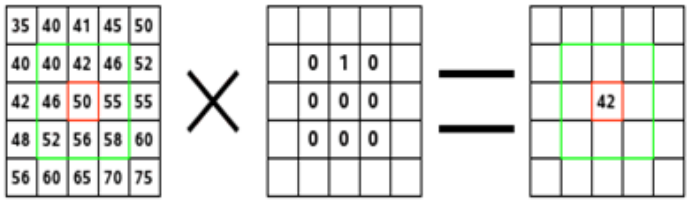


1) truncation artifact
2) ring artifact
3) view insufficiency artifact
4) motion artifact

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 √2
2) The SNR will increase by a factor of 2
3) The SNR will decrease by a factor of √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. What is the contrast percentage for 1 HU (Hounsfield unit) difference?

1) 0.5%
2) 0.2%
3) 0.1%
4) 0.05%

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

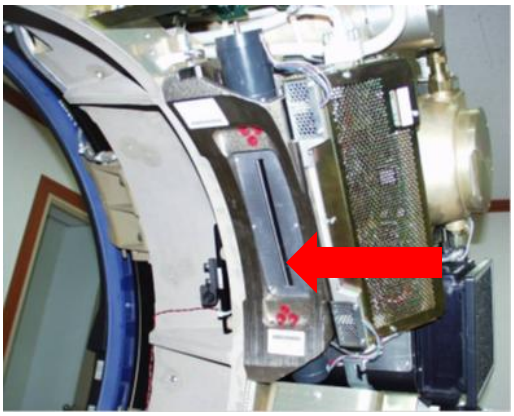
1) Solid-state detectors are formed from a scintillant such as cadmium tungstate and a silicon photodiode.
2) Should have negligible afterglow
3) Separation of detectors to prevent light crossover increases

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 is the reason for filtered back projection for image reformation?
1) limitation of rotation angle of x-ray exposure
2) geometric error of x-ray beam
3) long exposure time of x-ray
4) low-energy x-ray filter

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. Iterative image processing is designed to:
1) Decrease image processing speed
2) Increase spatial resolution

3) Reduce the apparent noise in an image and allow reduction in acquisition exposure/dose
4) Increase contrast resolution

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) 211=2048 (2K).
2) 212=4096 (4K).
3) 216=65536 (256K).
4) 210=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. 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

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)

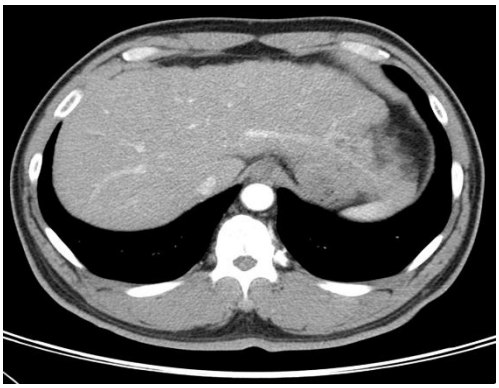
Q33. What is the structure of the section marked with an arrow?

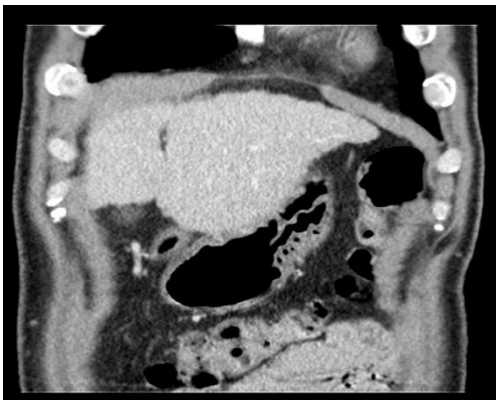
1) ileum
2) duodenum
3) jejunum
4) colon

Q34. An 80-year-old man presents with intermittent headaches and mild confusion. An unenhanced axial CT of the head was performed. What is the structure highlighted on this select axial CT image of the head?

1) acute intraventricular hemorrhage
2) large demyelination plaque in the corpus callosum body
3) normal third ventricle
4) cavum septum pellucidum & cavum vergae

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

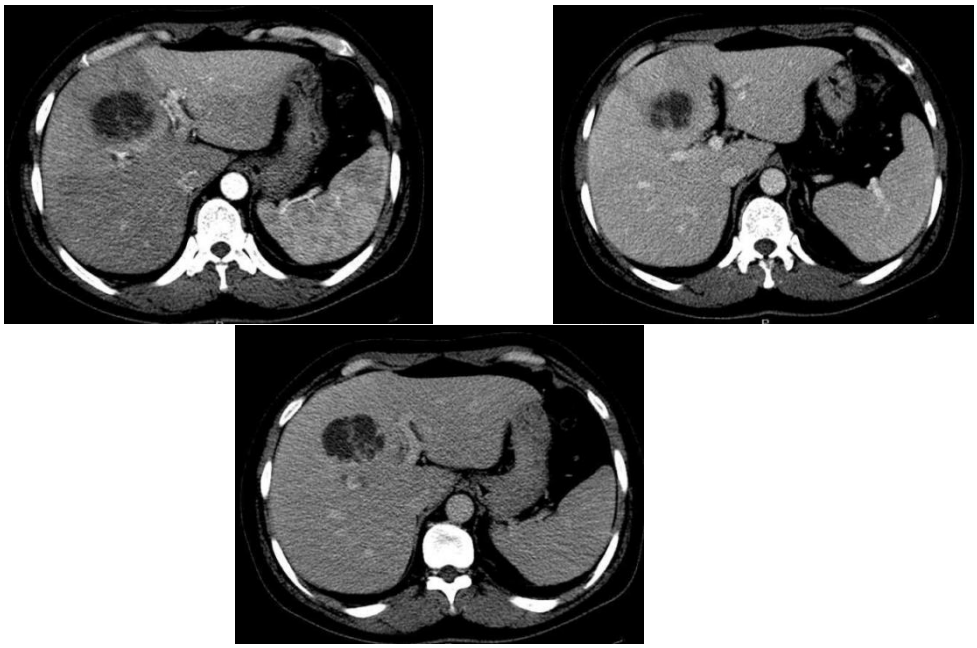




1) fatty liver
2) liver cirrhosis
3) hepatocellular carcinoma

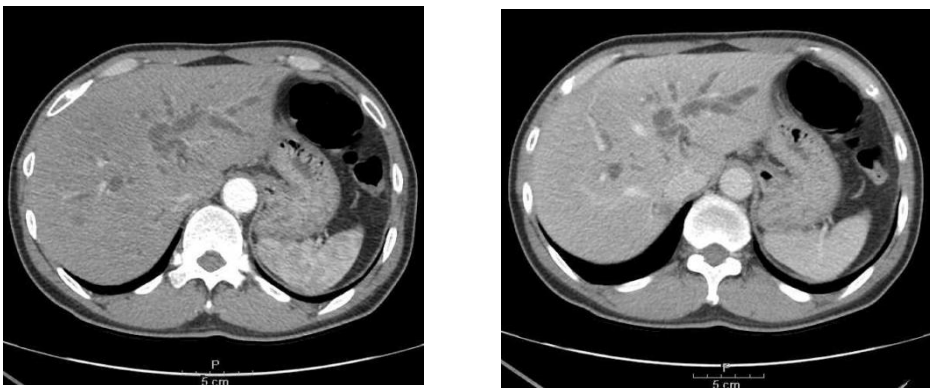
4) focal nodular hyperplasia

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. Which of the following is correct about below images of biliary & GB CT?

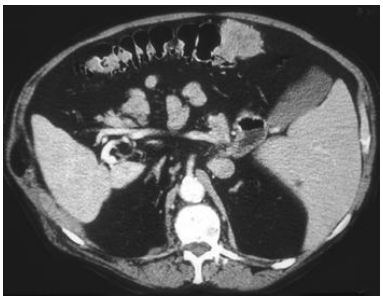
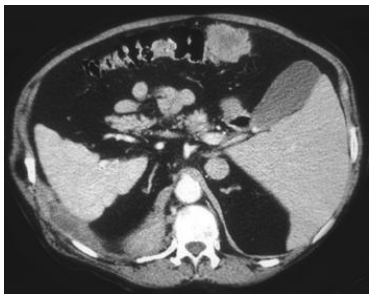


1) dilatational cystic duct

2) dilatational common bile duct
3) dilatational intrahepatic bile duct
4) used MinIP for observation of dilatational bile duct

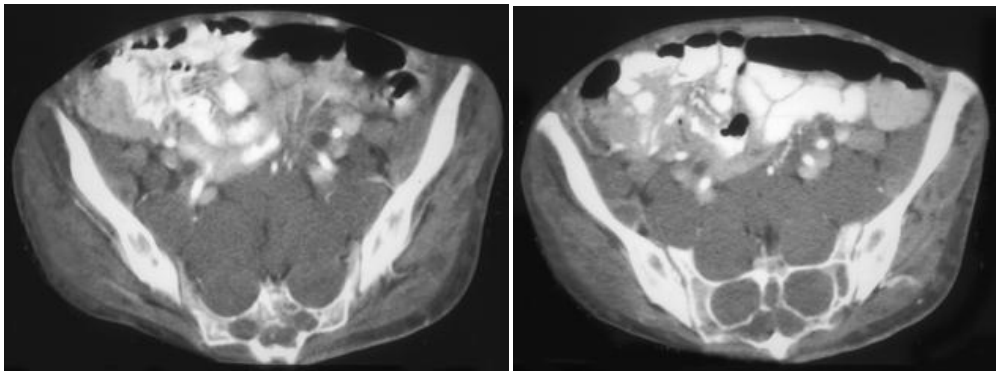
Q38. In this patient with small cell lung cancer the finding seen on staging CT represents:

1) metastases to the colon
2) a pseudomass
3) stool in the bowel
4) lymphoma

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

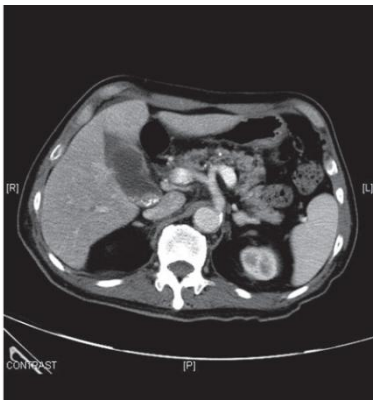
1) lymphoma
2) neurofibromatosis
3) ovarian cysts
4) ovarian cancer

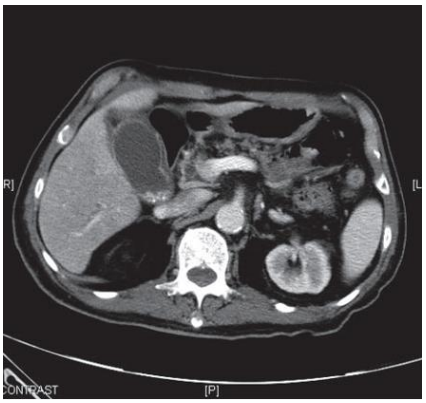


Q40. A 75-year-old man, with a history of diabetes mellitus, hypertension and cerebral vascular accident presented to the emergency department because of hypotension and right upper quadrant pain. Urgent abdominal CT with intravenous contrast was performed. Which of the following EXCLUDE CT finding?

1) The gallbladder is distended.
2) Gallstones in the gallbladder fundus.

3) The gallbladder wallis thickened and smooth with pericholecystitic fluid.
4) The diagnosis would be acute calculus cholecystitis.





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.

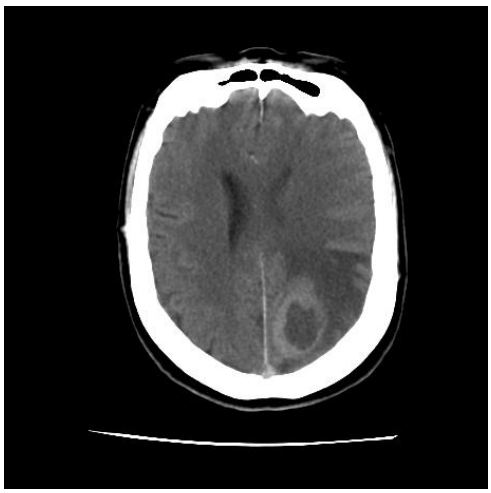
Q44. Which imaging finding on CT is uncommon for acute cerebral infarction within 24 hrs after ictus?

1) dense MCA sign

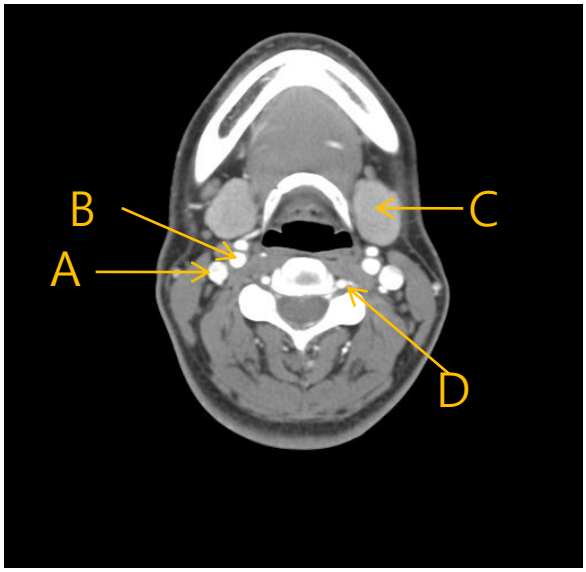
2) hemorrhagic transformation
3) grey-white interface loss
4) frank hypodensity of basal ganglia

Q45. The following CT scan demonstrates a ring enhancing lesion with surrounding edema. Which of the following is the most UNLIKELY diagnosis?

1) Brain metastasis
2) Primary brain tumor
3) TB
4) Posterior circulation infarct



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



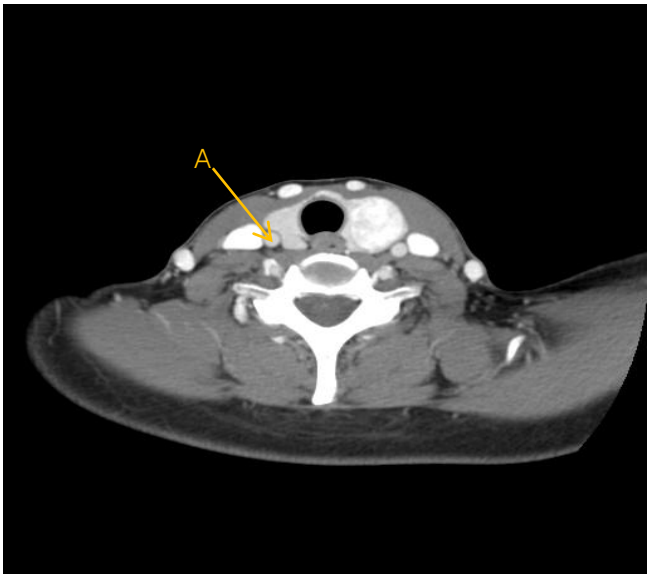
1) A : external carotid artery
2) B : internal jugular vein
3) C : thyroid
4) D : vertebral artery

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

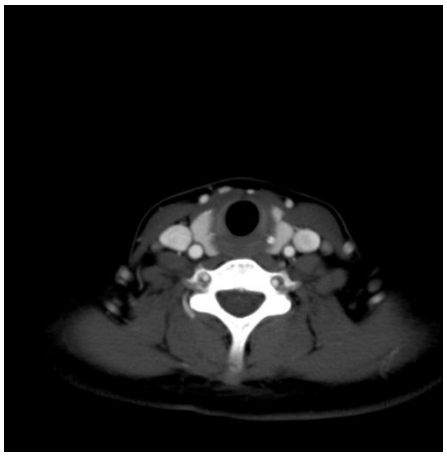
Q48. Which of the following is correct about below image?

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



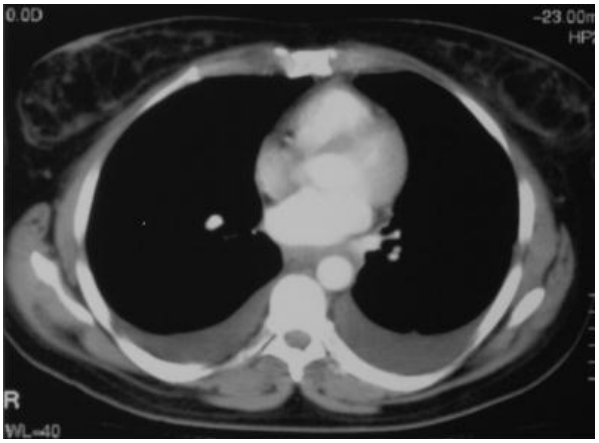
Q50. What is the primary reason to have a patient phonate the letter "e"

during a CT exam of the larynx:

1) it closes the pyriform sinuses
2) it demonstrates vocal cord mobility
3) it distends the laryngeal ventricles
4) it provides definition of the epiglottis

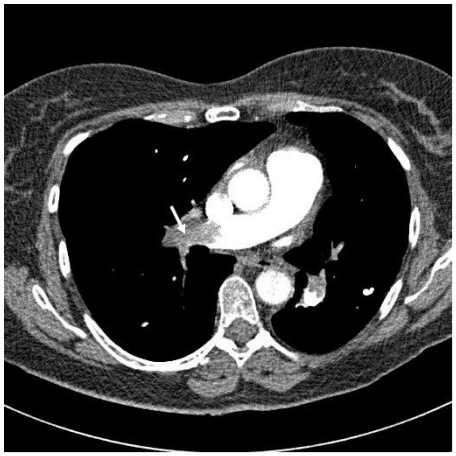
Q51. This 45 year-old women was admitted with abdominal pain and became short of breath. CT chest was performed.

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

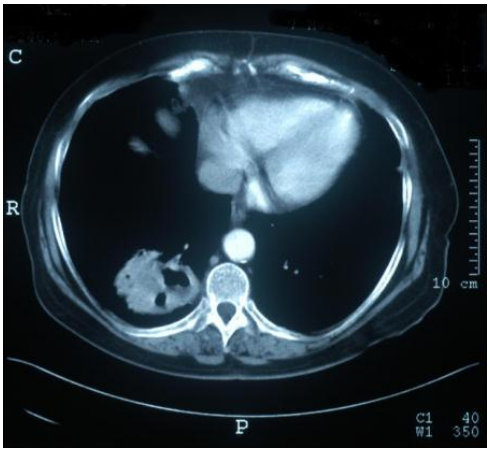


Q53. An area of recent contusion in a CT lung would make the lung

appear

1) Less dense
2) More dense
3) More interstitial lung markings
4) The same

Q54. This is a CT scan of the chest of a 49 year old lady with hemoptysis. She is a life-long smoker. What is the most likely diagnosis?



1) Lung abscess
2) Tuberculosis
3) Lung cancer
4) Chronic obstructive pulmonary disorder

Q55. A CT scan of a chest performed in arterial phase on an accident victim shows a mottled appearance in the spleen. What is the supposed cause?

1) It is ruptured or bruised.
2) It is infarcted.
3) No comment can be made, as this is a normal appearance seen in arterial phase
4) It contains tumor

Q56. Arrange the chest CT protocol in ascending order of patient dose.
(A) chest low dose CT (spiral mode)
(B) chest pre&post CT – AEC mode
(C) high resolution CT – sequence mode + spiral mode
(D) chest pre&post CT – non AEC mode

1) A,C,B,D
2) C,A,B,D
3) C,B,A,D
4) B,A,C,D

Q57. Choose the correct methods for chest CT of pediatric & young women.
(A) use radiation shielding material
(B) use AEC mode for adults
(C) hange the tube voltage high and tube current low for fertile women
(D) non AEC mode for pediatric

1) A,B,D
2) B,C
3) A,C,D
4) A,B,C,D

Q58. Choose the disease shown at below images.

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

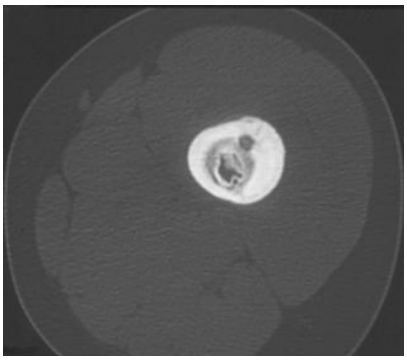
Q59. The 39-year-old man complained of slowly progressive ongoing low back pain. No specific traumatic event was identified. He was otherwise healthy with normal lab values. The lumbar CT scan abnormality as identified by the arrow most likely corresponds to:

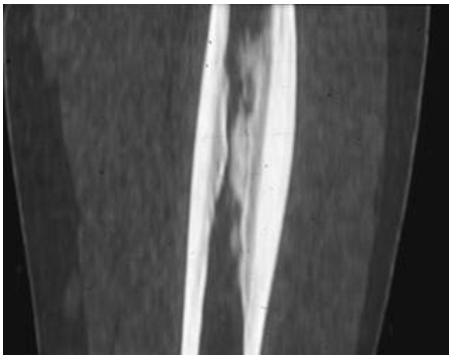
1) an acute L4 body fracture
2) a lumbar chordoma

3) L4 body spondylolysis
4) vacuum phenomenon in the facet joint

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

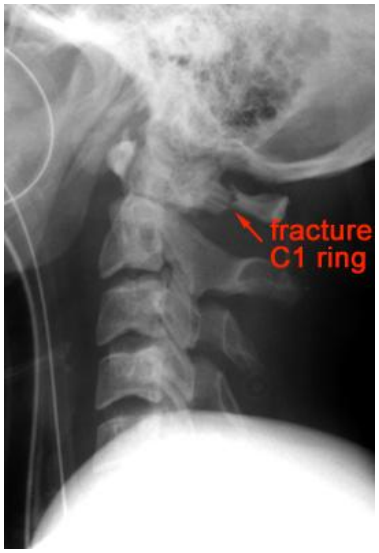
1) bone infarct
2) osteoidosteoma
3) osteosarcoma
4) osteoarthritis

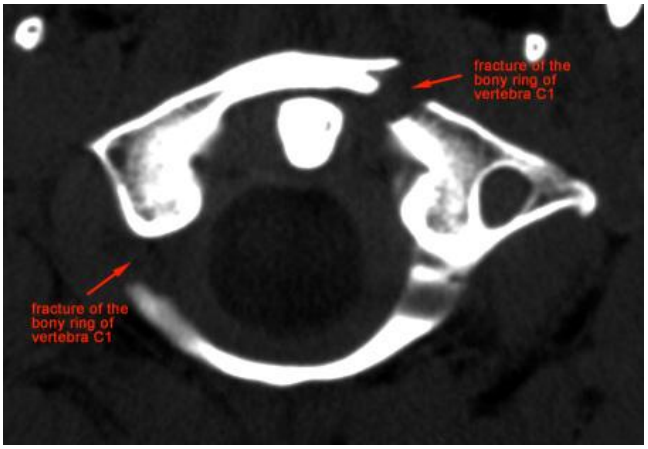




Q61. After seeing this lateral view, the radiologist obtains a CT. This is a:

1) Hangman's fracture.
2) Jefferson fracture.
3) Odontoid fracture.
4) Teardrop fracture.





Q62. Choose the correct examples about

below images
(A) fat CT image
(B) set threshold -200 ~ - 50
(C) use bone algorithm
(D)C ontrast media doesn't affect the exam

1) A,B
2) B,C
3) C,D
4) A,D

Q63. Which of the following is correct about below images?

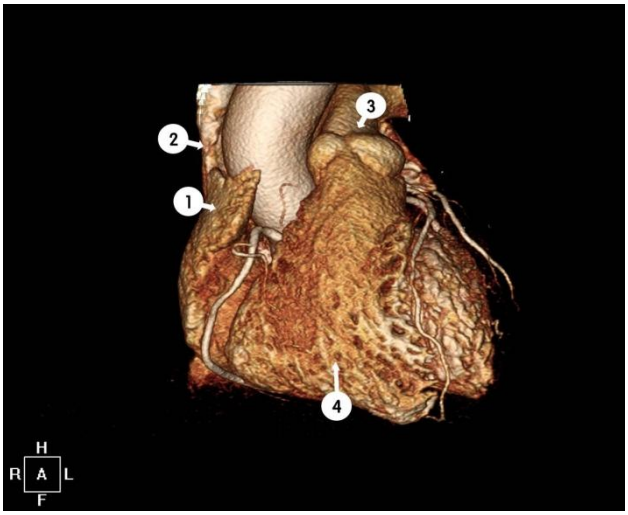
1) use ß-blocker for dilatation of vessel
2) use volume rendering for calcium scoring
3) Short temporal resolution is good for image quality
4) give a nitroglycerin to lower heart rate

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

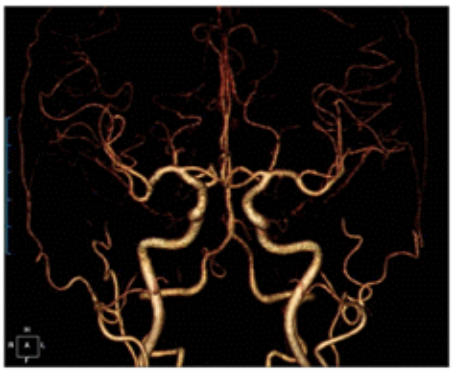


Q66. Which of the following diseases mainly occurs in smokers shown in below picture?

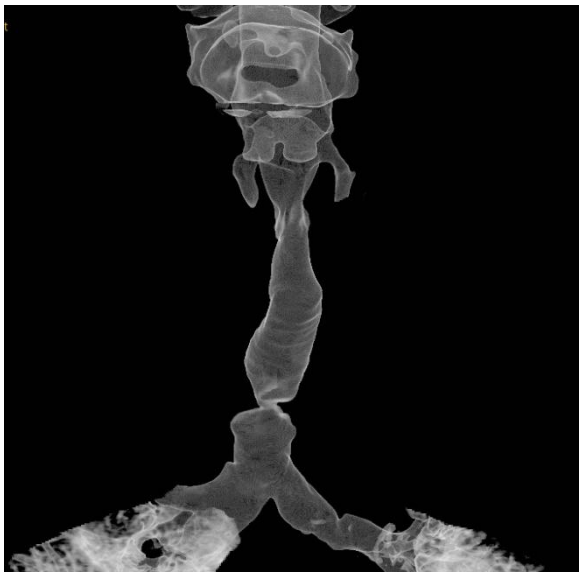
1) DVT
2) Varicose Vein
3) AVF
4) Burger's Disease

Q67. Which of the following is correct about below image?

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?

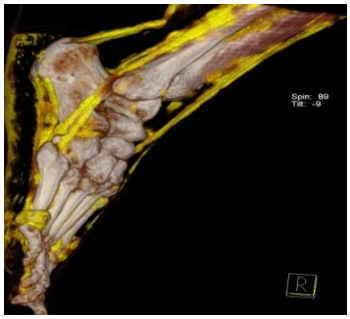


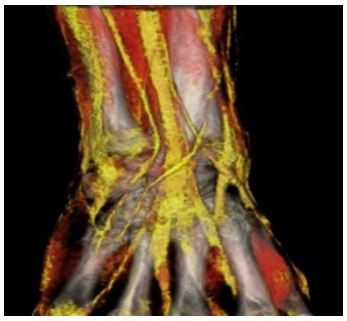
1) Distal part of the trachea is narrowed
2) Both inspiration and expiration scan are required
3) The patient should keep making voice 'e~' to observe the esophagus
4) It is reconstructed by SSD method with threshold of -650~ -230

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

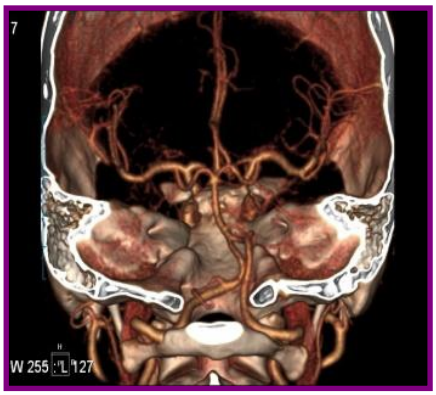




Q70. Choose the image below.

the INCORRECT statement for

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. Which of the following is the radiation risk can occur in the fetal period?

1) death
2) malformation
3) mental development disorder
4) all of the above

Q73. Which of the following is the dose in range of the deterministic effect?

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

Q74. The below formula is used to calculate the DLP. Which of the following is the correct about DLP?

DLP = $\sum_i \mathrm{CTDIw} \times \mathrm{T} \times \mathrm{N}$

1) T : slice thickness
2) CTDIw : computed tomography dose indes
3) N : the number of slices for spiral CT
4) N : the number of rotations for conventional CT

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. Which of the following factor need to know when calculate the effective dose from CT scan?

1) Total mAs, body region
2) Body region, kVp, mAs, length of scan
3) $CTDI_{vol}(w)$, mAs
4) DLP, body region

Q78. Comparing two CT examination protocols (A and B), the only difference between them is a longer scan range (longer "z" axis) for examination B. Which radiation dose quantities are different?

1) $CTDI_w$ and DLP.

2) $CTDI_w$ and CTDIvol.
3) $CTDI_{vol}$ and effective dose.
4) Effective dose and DLP.

Q79. The $CTDI_w$ of a CT scanner is measured as 10 mGy. For CT cardiac angiography examinations, a small pitch of 0.2 is used. What $CTDI_{vol}$ value will be displayed at the user interface? $CTDI_w$ is displayed at the user interface allowing the user to optimize and compare acquisition protocols.

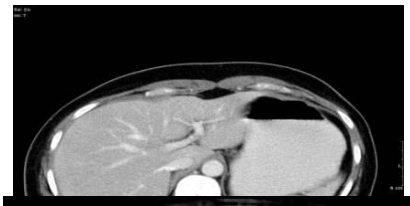
1) 20 mSv
2) 20 mGy.
3) 50 mGy.
4) 200 mGy

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 the reason for change of image quality in sequential CT and spiral CT?

1) Window width
2) Reconstruction algorithm
3) Scanner geometry
4) Z-interpolation processing

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 “air calibration (or blank scan)” of CT scanners for?

1) To calibrate the CT numbers
2) To reduce the image noise.
3) To assure the kVp.
4) To check the gantry rotational speed

Q88. About the CT cupping artifact, which one of the following is correct?

1) The cupping artifact will not happen in air calibration.
2) The cupping artifact will not happen in uniformed water phantom scan.
3) The cupping artifact will not happen if the X-ray beam filter is removed.
4) The cupping artifact will not happen if the 180° interpolation is used

Q89. The main limiting factor for the contrast resolution of CT is:

1) The cupping artifact will not happen in air calibration.
2) Noise.
3) Voxel size.
4) Focal spot size.

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

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