Final Exam RAD 465 2014/1435

Student Name: _____

Student Number: _____

King Saud University

College of Applied Medical Science

Radiology Science Department

Final Exam second semester 2014/1435

RAD 465 (Level 9)

Date of the exam Tuesday (28/7/1435-27/5/2014)

Clinical Applications of Magnetic Resonance Imaging

Please answer all sections (You have two questions)

The exam will be for 2 Hour (8:00-10:00)

Please write your name and student number in each page (you have 9 pages including coversheet)

Marking:

Questions	1	2	Total
Score	Out of 16	Out of 24	Out of 40
Comments			

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Q1 Multiple Choice Questions based on the MRI clinical applications (MCQs) (16 marks) (48 minutes):

Circle the most correct answer

1) The best sequences used to produce T1 weighted image with fat saturation post injection of the gadolinium is:
    a) FLAIR (based on inversion recovery technique)
    b) SPIR (based on chemical saturation technique)
    c) STAIR based on inversion technique (inversion recovery technique)
    d) FSE (Fast spin echo)

2) Late Hemorrhage after 10-20 days is best shown by:
    a) T1 weighted image
    b) T2 weighted image
    c) T2* weighted image
    d) By CT scan

3) To plan an axial plane of the brain from sagittal view the slice should be:
    a) Parallel to the AC-PC line
    b) Perpendicular to the AC-PC line
    c) 45° rotation away from the AC-PC line
    d) 90° rotation away from the AC-PC line

4) 30 years old Patient with knowing tumor in the brain which statement is most correct:
    a) There is no need to inject the patient with contrast media during the examination
    b) T2* WI is essential for the diagnosis of the this patient with tumor
    c) T1 sagittal, coronal and axial should be taken post contrast
    d) This patient is better to be examined with ultrasound

5) In the MRI cervical spine examination to achieve great positioning of the patient the laser light should be in the level of :
    a) Nose
    b) Sternal notch
    c) Shoulder
    d) Adams Apple

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6) In the routine C-spine protocol the most important planes for the diagnosis are:
   a) Sagittal and axial
   b) Sagittal and coronal
   c) Coronal and axial
   d) All the 3 planes are essential in routine c-spin protocol

7) In the patient positioning for MRI lumber spin examination:
   a) The patient can be positioned with head first only
   b) The patient can be positioned with feet first only
   c) Either position head or feet first is acceptable
   d) We have to exam the patient with both positions

8) In the MRI knee examination the following sequences is preferable to demonstrate bone bruises and fractures:
   a) Short TE sequences such as PD or T1 weighted images
   b) STIR or PD fat suppressed in the coronal or sagittal planes
   c) T2*-weighted image
   d) T2 weighted image

9) In the MRI knee examination the following sequences is preferable for meniscaland ligamentous imaging:
   a) Short TE sequences such as PD or T1 weighted images
   b) STIR or PD fat suppressed in the coronal or sagittal planes
   c) T2*-weighted image
   d) T2 weighted image

10) The big challenging in the MRI shoulder imaging that achieve high resolution images because:
    a) The natural position of the shoulder in the body is far medial
    b) The natural position of the shoulder in the body is far lateral
    c) The natural position of the shoulder in the upper part of the body
    d) None of the above

11) In the MRI knee examination the following sequences is the best one to show the ACL tears:
    a) Short TE sequences such as PD or T1 weighted images

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   b) STIR or PD fat suppressed in the coronal or sagittal planes
   c) T2*-weighted image
   d) T2 weighted image

12) In the MRI knee examination the following sequences is preferable for meniscal pathology diagnosis:
   a) Short TE sequences such as PD or T1 weighted images
   b) STIR or PD fat suppressed in the coronal or sagittal planes
   c) T2*-weighted image
   d) T2 weighted image

13) To plan an sagittal plane of the knee from axial view the slice should be:
   a) Perpendicular to line which joins between the femoral condyles
   b) Parallel to the line which joins between the femoral condyles
   c) From the distal part of femur to the medial part of tibia and fibula
   d) Both b and c are correct

14) The technique which is used to reduce the motion artifact in the MRI abdominal examination and usable only with long TR is:
   a) ROPE (respiratory order phase encoding)
   b) Respiratory triggering
   c) Respiratory gating
   d) Breath hold technique

15) The best sequences used to achieve fat saturation over a large area of FOV is:
   a) Chemical saturation technique
   b) FLAIR
   c) STAIR
   d) Gradient echo sequence

16) Which one of the following has a high sensitivity and specificity to detect the stroke with in first 6 hours from its onset:
   a) T2* weighted image
   b) FLAIR
   c) CT scan
   d) DWI

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Q2 Multiple Choice Questions (MCQs) based on the physic of the MRI (24 marks) (72 minutes):

Circle the most correct answer:

1) In the gradient pulse sequences, which parameter is/are control the amount of recovery in longitudinal plane:
   a) TE and the RF angle
   b) TR and the RF angle
   c) TE only
   d) TR only

2) The main problem with conventional spine pulse sequence is:
   a) Low SNR
   b) Low resolution
   c) More prone to the artifact
   d) Long scan time

3) The multi echo spin echo has long TR therefore, it is useful with _____:
   a) PD
   b) T1 weighted image
   c) T2 weighted image
   d) a and c

4) in the FSE (fast spin echo) the scan time decrease by:
   a) reduce the NEX in the scan
   b) reduce the TR
   c) reduce NPE step in each TR
   d) none of the above

5) In the FSE the slice selection gradient and phase encoding gradient:
   a) Excite the same slice but with different phase encoding gradient value
   b) Excite different slice with different phase encoding gradient value
   c) Excite the same slice with same phase encoding gradient value
   d) Excite the different slice with same phase encoding gradient value

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6) **ETL in FSE refers to the echo train length and it is equal:**
   a) **Number of the 90 pulses**
   b) **Number 180 pulses**
   c) **Number of the slice selection gradient during the scan**
   d) **None of the above**

7) **The disadvantage of the FSE:**
   a) **new hardware required**
   b) **double ear protection is necessary**
   c) **higher SAR**
   d) **All of the above are correct**

8) **In the inversion recovery sequences the contrast is effected by:**
   a) **TE and TR only**
   b) **B value**
   c) **IT**
   d) **a, b, and c**

9) **Inversion recovery sequence produces:**
   a) **Strong T1 weighted image contrast**
   b) **Strong T2 weighted image contrast**
   c) **T2* weighted image contrast**
   d) **Strong T2* weighted image contrast**

10) **In the T1 weighted image the gray matter appears:**
   a) **White**
   b) **Black**
   c) **Dark gray**
   d) **Light gray**

11) **To produce image with PD contrast the parameters which should be selected are:**
   a) **long TR long TE**
   b) **short TR short TE**
   c) **long TR short TE**
   d) **short TE long TE**

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12) **In the PD weighted image, the contrast mainly depend on:**
   a) recovery to the longitudinal plane
   b) decay in the transverse plane
   c) the intensity of the protons in the tissue
   d) none of the above

13) **In the gradient pulse sequences, the image contrast where the short flip angle is used:**
   a) T1 weighted image
   b) T2*weighted image
   c) PD weighted image
   d) T2* and PD
   e) T1 and PD

14) **The disadvantage of the spatial saturation is:**
   a) Higher specific absorption rate
   b) Lower SNR
   c) Less resolution
   d) all of the above

15) **Which one of the following consider as an example of spatial saturation:**
   a) Reduce the motion artefact come from swallowing by saturation bands box
   b) Pre-saturation bands to reduce the signal from flowing blood
   c) Flow void due to saturation of previous slice by coupling the downstream migration of spins
   d) All of the above

16) **The spatial saturation technique can be done:**
   a) Inside the FOV only
   b) Outside the FOV only
   c) Both a and b
   d) None of the above

17) **In which following technique we can reduce the scan time by filling all the K-space line at once:**
   a) FSE
   b) Multi-slice technique

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    c) EPI (echo planer imaging)
    d) All of the above

18) The DWI (diffusion weighted image) is pulse sequences sensitive to _____:
    a) Blood motion
    b) microscopic movement of water
    c) heart motion
    d) flowing blood motion

19) The tissue with restricted diffusion appears _____ in the b-value image (DWI):
    a) dark
    b) bright
    c) very dark
    d) none of the above

20) By increase the b- value:
    a) The area under the effect of the DWI gradients increase
    b) The area under the effect of the DWI gradients decrease
    c) Remain the same

21) The main source of the signal in the MRA is :
    a) Stationary spin
    b) Microscopic movement of water
    c) Flowing blood
    d) None of the above

22) The most recently MRA technique is _____:
    a) Time of Flight MR Angiography (TOF-MRA).
    b) Phase contrast MR Angiography (PC-MRA).
    c) Contrast medium enhanced angiography (CE-MRA).
    d) All of them are old techniques

23) The MRA technique which take longest scan time is:
    a) Time of Flight MR Angiography (TOF-MRA).
    b) Phase contrast MR Angiography (PC-MRA).
    c) Contrast medium enhanced angiography (CE-MRA).

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    d) **All of them are have same imaging time.**

24) **The MRA technique which has less flow and respiratory artefact is:**
    a) **Time of Flight MR Angiography (TOF-MRA).**
    b) **Phase contrast MR Angiography (PC-MRA).**
    c) **Contrast medium enhanced angiography (CE-MRA).**
    d) **All of them are have equal effect of the artefact.**

Good luck
Ruba khushaim