Quiz 5

TOTAL POINTS 16

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1. Which shows the highest signal intensity in T1 -weighted image?

   1 point

   - ◉ T1 = 200 ms, T2 = 100 ms
   - ◯ T1 = 1000 ms, T2 = 500 ms
   - ◯ T1 = 1000 ms, T2 = 100 ms
   - ◯ T1 = 300 ms, T2 = 50 ms

2. Tissue with short T1 shows (A) signal intensity on T1 -weighted image and tissue with short T2 shows (B) signal intensity on T2 -weighted image. (A , B)

   1 point

   - ◉ high,   low
   - ◯ high,   high
   - ◯ low,   low
   - ◯ low,   high

3. When FOV increases, the maximum k-space range also increases.

   1 point

   - ◯ True
   - ◉ False

4. The step size in k-space is inversely related to resolution in image.

   1 point

   - ◯ True
   - ◉ False

5. Which is an essential element to correct magnetic field inhomogeneity in spin echo imaging?

   1 point

   - ◉ 180° RF pulse
   - ◯ Phase encoding gradient
   - ◯ 90° RF pulse
   - ◯ Slice select gradient

6. Which of the follows is an intrinsic tissue-specific factor to determine contrast?

   1 point

   - ◉ Proton density
   - ◯ TE
   - ◯ Flip angle
   - ◯ TR

7. Which statement is correct? **1 point**

○ Scan time is not related to TR.

○ Tissue with high proton density shows low signal intensity in proton density-weighted images.

○ To reduce T1 contrast, TR should be minimized.

● T2 -weighted images are sensitive to TE.

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8. In gradient echo imaging, what is optimal flip angle (Ernst angle) for a tissue with T1=1sec when TR = 100 msec? **1 point**

○ 15°

● 25°

○ 45°

○ 35°

9. Select the best TE value that maximizes T2 contrast between two tissues with T2 values of 60 msec and 100 msec. **1 point**

● 80 msec

○ 30 msec

○ As short as possible

○ 150 msec

10. Select the best TR value that maximizes proton density contrast between two tissues with T1 values of 800 msec and 1000 msec. **1 point**

● 600 msec

○ 900 msec

○ 1200 msec

○ 3000 msec

11. Select the best TE value that maximizes T1 contrast between two tissues with T1 values of 800 msec and 1000 msec and T2 values of 60 msec and 100 msec. **1 point**

○ As short as possible

○ 80 msec

● 900 msec

○ 3000 msec

12. Brain lesion that contains magnetically various components shows low signal intensity in gradient echo imaging. **1 point**

● True

○ False

13. Which statement is true? **1 point**

○ When sampling rate and number of points are constant, high frequency encoding gradient makes resolution poor.

● When FOV increases, the frequency encoding gradient strength also increases for a fixed sampling rate.

○ The larger FOV, the better resolution

○ When FOV increases, sampling rate also increases for a fixed frequency encoding gradient.

14. The readout prephase gradient is used to generate gradient echo in gradient echo imaging, therefore it is not required in spin echo imaging. (1 point)

○ True

◉ False

15. K-space region is sampled at interval of Δ Kx within the range of $[-Kx_{max} / 2, Kx_{max} / 2]$ along the horizontal direction. A new k-space region is sampled at interval of $\Delta Kx_{max} / 2$ within range of $[-Kx_{max} / 2, Kx_{max} / 2]$. How are the fied of view (FOV) and the resolution affected in the new image compared to the first image? (1 point)

○ Increasing FOV, decreasing resolution.

○ No change in FOV, increasing resolution

○ Decreasing FOV, increasing resolution.

◉ Increasing FOV, no change in resolution

16. Which is the appropriate way of obtaining high resolution images? (1 point)

◉ High frequency encoding gradient (assuming that sampling rate and number of points remain constant)

○ Increasing sampling rate (assuming that frequency encoding gradient and number of points remain constant)

○ Increasing FOV

○ Decreasing matrix size (i.e., the number of the points)

Answer of Q.10:   1200 msec

Answer of Q.13   When FOV increases, sampling rate also increases for a fixed encoding gradient.