Quiz 1

TOTAL POINTS 17

1. What does MRI stand for? 1 point

- (•) Magnetic Resonance Imaging
- ( ) Megahertz Reception Imaging
- ( ) Magnetic Reversed Imaging
- ( ) Microscale Refined Imaging

2. Which of the following is not an essential element for MR imaging? 1 point

- (•) Laser
- ( ) RF pulse
- ( ) Spin nuclei
- ( ) Magnet

3. Which statement is not correct? 1 point

- ( ) MRI is performed by placing the body in the strong magnetic field.
- ( ) RF coils receive radio frequency energy induced by the body.
- (•) Gradient coil can also generate radio frequency energy.
- ( ) Radio frequency energy transmitted to the body causes magnetic resonance.

4. Functional MRI is introduced earlier than the concept of k-space. 1 point

- (•) X
- ( ) O

5. Which statement about gradient coil is correct? 1 point

- [x] Varying magnetic field changes the precession speed of protons.
- [ ] Varying magnetic field can change the size of protons.
- [ ] The X gradient coil is to generate magnetic fields along the Y direction
- [ ] There are only two gradient coils: X and Y gradient coil.

6. Which statement is true? 1 point

- ○ High sensitivity to the object is important, so the reception of MR signals is often performed with gradient coil(s) close to the object.
- ○ A RF coil modulates the gradient field along spatial X, Y, and Z direction.
- ○ The proton spins that precess at a frequency different from the frequency induced in the transmission coil will receive energy and get excited, which is called magnetic resonance.
- ◉ When the RF energy is applied to cause magnetic resonance and then turned off, MR signals will be induced and detectable in the receiver RF coil.

7. The magnetic field causes protons to precess at a frequency proportional to the radio frequency energy. 1 point

- ○ O
- ◉ X

8. Which statement describes MRI magnet correctly? 1 point

- ○ There are no maintenance cost for a superconducting magnet.
- ○ Helium for MRI magnet exists in liquid state.
- ○ Magnet field strength of permanent magnet is limited to about 9.4T.
- ◉ MRIs with field strength greater than 3 Gauss are mostly for research purpose at this point.

9. MRI uses lower frequency range for imaging than optical imaging. 1 point

- ○ X
- ◉ O

10. Which statement is true? 1 point

- ◉ You are not allowed to carry your watch into the MR scanner.
- ○ It may not be safe for a person to perform MR scan more than 5 times in a year.
- ○ Varying magnetic field caused by gradient coils increases the specific absorption rate (SAR).
- ○ It is difficult to make a small MRI, so the price is also higher than that of larger MRIs.

11. Which statement is not true? 1 point

- ◉ MRI generates only small amounts of ionizing radiation.
- ○ MRI can provide anatomical, physiological, and functional information of our body in one single imaging system.
- ○ MRI and ultrasound are noninvasive medical imaging tools.
- ○ MRI can make images with many different contrasts.

12. Who discovered nuclear magnetic resonance? 1 point

- (●) Felix Bloch
- ( ) Seji Ogawa
- ( ) Paul C. Lauterbur
- ( ) Raymond Damadian

13. Which of the following nucleus is most widely used for MRI? 1 point

- (●) ^{19}F
- ( ) ^{1}H
- ( ) ^{23}Na
- ( ) ^{13}C

14. Which statement is not true? 1 point

- ( ) MRI with superconducting magnets are broadly used in hospitals.
- ( ) MRI price increases with field strength and bore size.
- ( ) Magnetic field strength of a 3T MRI is 60000 times as strong as the earth's magnetic field.
- (●) There are 3T human MRIs with permanent magnet.

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15. Which statement describes functions of RF coils correctly? 1 point

- (●) All above.
- ( ) Inducing magnetic resonance of protons
- ( ) Receiving signals from protons
- ( ) Transmitting the energy to protons

16. Which component is to get spatial information in MRI? 1 point

- [ ] Reception RF coil
- [ ] Transmission RF coil
- [x] Gradient coil
- [ ] Main magnet

17. Brian, who wears braces on his teeth, twisted his ankle. He wants to get MRI exam. 1 point

He will be surely safe to put his leg into the MRI scanner, as long as his head does not go inside the MRI bore.

- ( ) O
- (●) X