ELEC-E8738 Applications of MRI Exam 14.12.2015

Suorita 5 tehtävää tehtävistä 1-6! Answer 5 questions from the questions 1-6!

1. Phase-contrast magnetic resonance angiography (MRA) is used for the assessment of blood flow velocities. Describe the phase-contrast MRA method. Which factors affect the accuracy of this method and how? (5p)

2. High intensity focused ultrasound (HIFU) causes heating of the target monitored during the therapy. Describe an MR based method for temperature monitoring! 5(p)

3. Diffusion is a three dimensional process. Molecular mobility in tissues may be anisotropic, as in brain white matter. Describe, how the degree of diffusion anisotropy can be measured! (5p)

4. In functional MRI (fMRI) brain activation is imaged. Describe the fMRI technique! (5p)

5. A spoiled gradient echo sequence uses gradient rephasing to produce a gradient echo. Steady-state is maintained so that residual magnetization is left over from previous repetitions. This residual magnetization is removed by gradient spoiling or RF spoiling. Describe the two ways to achieve spoiling! Why is the residual magnetization spoiled? (5p)

6. Chemical shift refers to shift in resonance frequency of nuclear spins in different chemical environments. In the case of an imaged object containing fat and water, describe the chemical shift effect along the phase-encoding direction! (5p)

Magnetogyric ratio of ^1H is 267.522×10^6 rad s^{-1} T^{-1}

Max 25 p