

**AbstractID: 6000 Title: MRI Relaxometry BMD Measurements using Conventional Phase Symmetrized Rapid Increased Flip Spin Echo and Standard Gradient Echo and its correlation with DXA**

**Purpose:** Recently, several special MRI protocols have been developed for BMD measurements for deriving  $R2(=1/T2)$ ,  $R2'(=1/T2')$  and  $R2''(=R2'-R2)$  applied in several cross sectional studies. But, due to high slew rate gradients with high amplitudes in small periods, such protocols can be used only in system with high slew rate (22 mT/m.s or greater). However, our main aim in this study was to develop optimized versions of standard GE and conventional SE protocols using in existing MRI systems for BMD measurements, as most systems do not support such newly high slew rate protocols.

**Method and Materials:** This study was performed by 1.5T-MRI system(Picker Vista-Q800, slew rate=13mT/m.s), SNR phantom (1.25g/l CuSO<sub>4</sub>, T<sub>2</sub>=200ms) for calibration, a body RF-Coil, cross sectional study with 12 normal, 12 osteopenia, 12 osteoporosis volunteers done with a Lunar DXA system-(DPX-MD). To determine  $R2'$  and  $R2$ , simple standard-GE and conventional phase-symmetrized-rapid-increased-flip-SE(PRISE) protocols with different TE/TR were applied. Then in coronal section of femoral-neck, relaxation rates were compared with BMD from DXA. The optimized conditions of the protocols for  $R2'$  measurement standard-GE protocol with TE=13.42/18/26.8ms, TR=800ms and ST=8mm(CV( $R2'$ )=2.96%) and for  $R2$  measurement PRISE protocol with TE=36/54/63/72ms, TR=800ms and ST=8mm(CV( $R2$ )=3%), receiver bandwidth of 21.2 kHz for PRISE, 31.75kHz for GE, Matrix=190x256, FOV=45cm leading to good SNR.

**Results:** The overall Pearson's correlation coefficient of  $R2'$ ,  $R2'$  and  $R2$  vs. BMD were calculated as 0.62(p<0.003), 0.62(p<0.003) and 0.03(p<0.9), respectively. Based on the  $R2'$  and  $R2'$  parameters, significant difference between normal and abnormal groups (osteopenia and osteoporosis) were found. However, there was no significant difference between osteopenia and osteoporosis groups using the relaxation parameters.

**Conclusion:**  $R2'$  and  $R2'$  showed a significant positive correlation with BMD. Therefore, in accordance with DXA values, the results showed standard-GE and conventional-SE(PRISE) could be proper protocols for BMD-measurements in femoral-neck even in low slew rates systems.