

FYS-KJM 4740

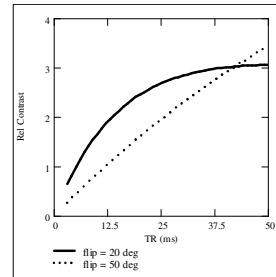
MR-teori og medisinsk diagnostikk

Kap 7  
Magnetisation preparation

Spoiled GRE:  $TR \ll T_1$

Contrast;  $C = SI_2 - SI_1 \approx TR \cdot (T_1^2 - T_1^1) / (T_1^1 T_1^2)$

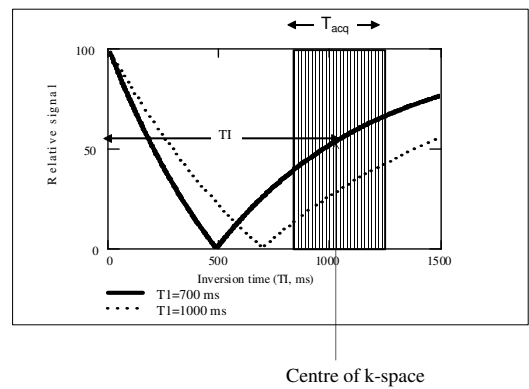
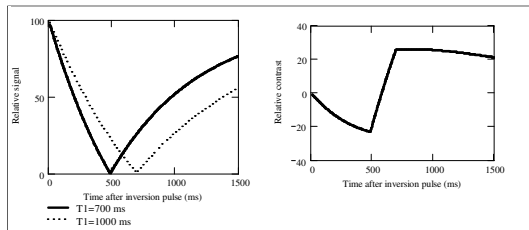
Low contrast at very short TRs!



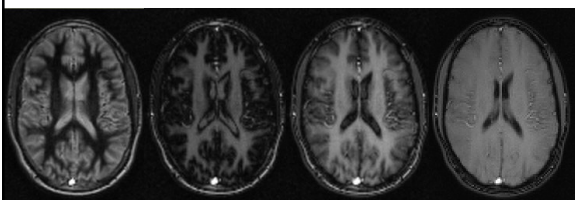
Use of magnetization preparation pulse:

$M_z(t) = M_0 [1 - 2 \exp(-t/T_1)]$

$SI(T_1) \propto M_0 |1 - 2 \exp(-t/T_1)|$

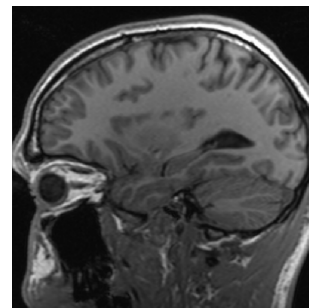


Use of 180 deg preparation pulse

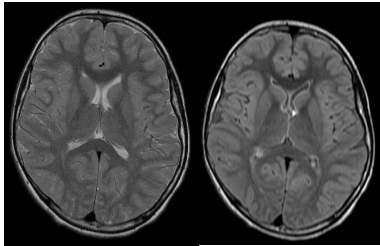


TI=400 ms    TI=700 ms    TI=900 ms    TI=1500 ms

Magnetization Prepared Rapid Gradient Echo (MPRAGE)



Selective tissue suppression

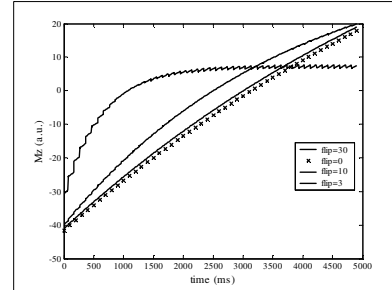


Inversion time (TI) to suppress tissue with relaxation time  $T_1$ :

$$1 - 2\exp(-TI/T_1) = 0 \quad TI = T_1 \ln(2) = 0.69T_1$$

Influence of excitation pulses on the magnetization curve

$$\frac{TR}{T_{1,app}} = \frac{TR}{T_1} - \ln[\cos(\alpha)]$$



The 'Look-Locker' sequence

