

## 2010 MSG Abstract

### Reproducibility and Reliability of Quantitative MRI Measures for Neuromuscular Disease

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**Introduction:** Reliable objective measures of neuromuscular disease progression are needed for trials of therapeutic agents. Quantitative MRI of muscle appears promising, however reproducibility and normal values must be established.

**Methods:** Lower limb 3T MRI (Siemens TIM Trio) (3 point Dixon fat-water, magnetisation transfer ratio (MTR) with B1 transmit field mapping) was performed in 19 healthy volunteers, and repeated after an approximately 2 week interval in 15. Mean fat percentage and MTR were calculated in 24 muscles.

**Results:** Mean fat percentage was 1.89% in calf muscles and 1.49% in thigh muscles. Inter-scan reproducibility was good with mean inter-scan differences of 0.54% (intra-class correlation coefficient (ICC) =0.61) in thigh muscles and 0.55% (ICC=0.80) in calf muscles. Imaging artefact prevented measurement in 7.4% of muscles.

MTRs differed between left and right limbs in 8 of 12 muscles assessed ( $p < 0.001$ ). This was most marked in vastus medialis in the thigh (mean MTR right 20.3 percentage units (p.u.), left 40.3p.u.) and tibialis anterior in the calf (right 26.7p.u., left 40.5p.u.). These spatial MTR differences were associated predictably with the spatial B1 variation. Despite these artefacts, inter-scan measurement repeatability was excellent, with mean inter-scan differences of 1.28p.u. (ICC=0.96) in the thigh and 1.31p.u. (ICC=0.90) in the calf.

**Conclusions:** MRI fat measurements in lower limb muscles are reliable and a potential marker of neuromuscular disease progression. MTR measurements were reproducible but are limited by B1 variation, albeit in a predictable manner. A study employing these techniques in patients with Charcot-Marie-Tooth disease and inclusion body myositis is underway.

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