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MRI QUANTIFICATION OF FAT GRADIENTS IN CALF MUSCLES IN CMT1A

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Background CMT1A is a length-dependent neuropathy presenting with distal weakness. MRI has demonstrated distally accentuated fatty atrophy of lower limb muscles. This study aimed to quantify fat fraction (FF) along muscle length.

Methods We performed lower limb 3T MRI in five patients with CMT1A, and five volunteers using the 3-point Dixon fat-water separation method. FF was measured across 10 slices of the right calf, separated by 2 cm, in tibialis anterior (TA), medial gastrocnemius (MG) and peroneus longus (PL). A gradient was defined as a minimum average absolute change of 0.5%/cm over three adjacent slices.

Results Mean muscle FF was greater in CMT1A patients than volunteers (16.2%/21.7%/35.2 versus 1.4%/2.2%/5.3% in TA/MG/PL). In CMT1A, there was a distal FF gradient in TA and PL (+3.1%/cm and +3.3%/cm). This wasn't present in volunteers; although a reverse gradient with higher FF proximally was seen in 90% of TA and PL muscles (−1.1%/cm and −0.9%/cm).

Conclusion We demonstrate a clear distal FF gradient in TA/PL muscles in CMT1A. These findings have significant implications for slice selection when analysing serial imaging: a 1cm difference in slice analysed may result in a difference of up to 8.9% in FF.