Quantitative muscle ultrasound in children with spastic cerebral palsy

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OBJECTIVES
The purpose of this study was to apply quantitative ultrasound to characterise tissue composition of the affected and unaffected medial gastrocnemius in children with spastic hemiplegia cerebral palsy (SHCP), and compare to that of typically developing (TD) children. Quantitative ultrasound characterises muscle images in terms of echo intensity (i.e. whiteness) and spatial structure (i.e. connected homogenous regions). Increased echo intensity is suggestive of altered tissue composition such as increased non-contractile tissue (i.e. fat and fibrous tissue) in pathological muscle.

METHODS
Scans were digitised, and muscle images characterised using a customised Matlab program (The Mathworks Inc., USA) to determine mean echo intensity values and the number of spatially connected homogenous regions (i.e. blobs).

RESULTS
As illustrated below, mean grey scale echo intensity was highest in the affected medial gastrocnemius compared to the unaffected and TD gastrocnemius, p<0.01. Similarly, the number of blobs was greater in the affected medial gastrocnemius compared to the unaffected and TD gastrocnemius, p<0.01.

DISCUSSION
Higher echo intensity and a greater number of blobs in the affected medial gastrocnemius suggest structural alterations to the skeletal muscle tissue. Quantitative ultrasound may provide a complimentary tool for assessing and monitoring the progression of structural alterations in muscles of children with spastic cerebral palsy.

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