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# Visualization of gray matter atrophy and anterior corticospinal tract signal hyperintensity in Amyotrophic Lateral Sclerosis using 7T MRI

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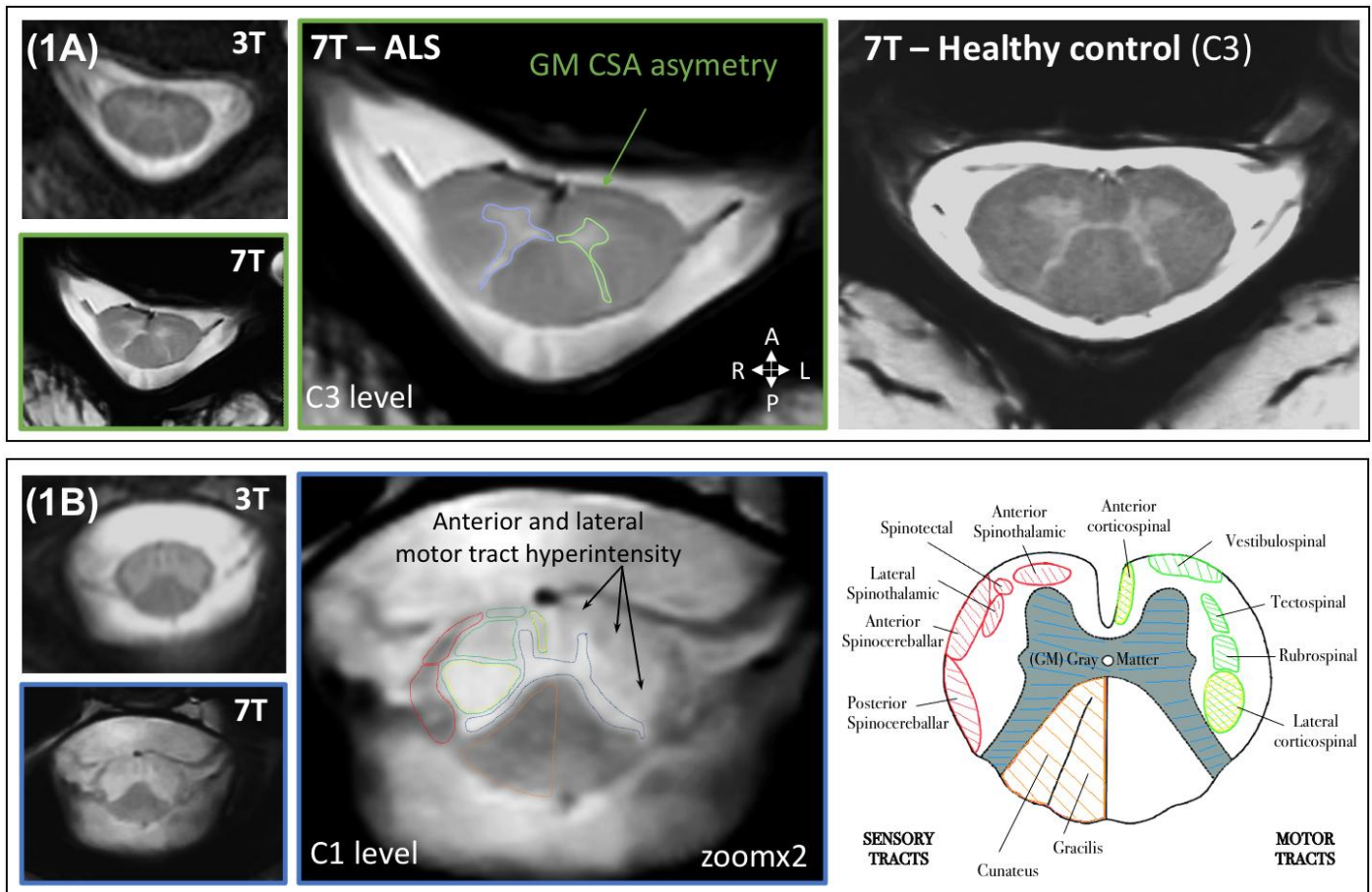
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Two ALS patients presenting with different phenotypic descriptions went for 7T MR examination: a man with left upper-limb amyotrophy due to lower motoneuron (LMN)-predominant ALS (ALSFRS=33/48, left ulMRC=15/25, right ulMRC=25/25, UMN=17/55), in whom anterior GM hemiatrophy could be seen (figA) and a woman with spastic tetraparesis due to upper motoneuron (UMN)-predominant ALS (ALSFRS=34/48, left and right ulMRC=21/25, UMN=55/55) exhibiting lateral corticospinal but also anterior tracts hyperintensities (figB), while posterior and lateral sensory tracts were preserved.

Consistent with respective clinical features, and in line with recent reports [1-2], these imaging findings open great perspectives for WM/GM impairment description in ALS at 7T.

**ALSFRS** : ALS Functional Rating Scale (normal value 48); **ulMRC** (muscle power grading): Upper Limb Medical Research Council scale (normal value = 25); **UMNs** (reflecting UMN involvement) : Upper Motor Neuron score (normal value 24/55, most severe score 55).



**Figure 1** – 7T ALS MRI - Multi-echo-gradient-echo  $T_2^*$ -weighted images (18 slices, 6minutes) acquired at 3T ( $0.5 \times 0.5 \times 5 \text{mm}^3$ , no gap) and 7T ( $0.27 \times 0.27 \times 2 \text{mm}^3$ ) in 2 patients: (A) LMN-predominant ALS presenting with a 10-to-20% left/right asymmetric GM atrophy; (B) UMN-predominant ALS presenting with bilateral motor tracts degeneration (CST and others) with sign of impairment of the anterior tracts.

## References

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2. Barry RL, Vannesjo SJ, By S, Gore JC, Smith SA. Spinal cord MRI at 7T. *Neuroimage* 2018; 168:437-451.