

Abstract View**HIGH-RESOLUTION MRI MORPHOMETRY MAPS LONGITUDINAL ATROPHY IN ALS BRAINS**

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The main goal of this MRI study was to determine if longitudinal structural changes occurring in ALS could be mapped using high-resolution tensor-based serial morphometry. Eleven ALS Patients (54 ±12yrs), 5 presenting with upper-limb symptoms and 6 with lower-limb symptoms underwent two MRI scans (coronal 3D T1 MPRAGE with 1x1 mm in-plane resolution) with intervals of 9-18 months. Each subject's images were co-registered, small-scale changes between longitudinal MRIs were captured and local tissue volume changes over time were mapped. To allow comparisons between groups, each individual was registered to a common reference MRI.

Both the upper and lower limb group showed atrophy in different regions of motor cortex. Upper limb patients had tissue loss in lateral motor cortex while patients with lower limb onset had tissue loss in medial motor cortex. This distribution is consistent with the expected anatomical distribution of pathology in ALS. In addition, both groups had bilateral frontal lobe atrophy consistent with a previous cross-sectional study¹. These changes are qualitatively different from and quantitatively greater than those observed in normal aging. These results on a small number of subjects demonstrate that high-resolution tensor-based serial morphometry detects the development of atrophy in motor cortex and frontal lobe in ALS subjects over a period of 9-18 months. These early results suggest that structural change by MRI may be used to quantify disease progression and possibly as a surrogate marker for monitoring the effects of treatment in ALS.

1. C. M. Ellis et al., Neurology 57, 1571-8. (2001).

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