IS IMAGING A PROMISING BIOMARKER FOR ALS? YES!

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Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disease for which a precise cause has not yet been identified. Given the heterogeneous clinical presentation among patients with ALS, there is a high interest in the development of biomarkers to aid diagnosis and provide prognostic information. Standard CT or MRI evaluation does not demonstrate gross structural nervous system changes in ALS, so conventional neuroimaging techniques have contributed little to the establishment of needed biomarkers. Advanced neuroimaging techniques—such as structural MRI, diffusion tensor imaging, proton magnetic resonance spectroscopy, and positron emission tomography—allow for detailed interrogation of the nervous system beyond the gross structure. These advanced neuroimaging techniques have demonstrated loss of focal grey and white matter and reductions in white matter tract integrity, as well as changes in brain chemistry, neural networks, brain metabolism and brain receptors. The challenge is to translate these imaging discoveries into clinically relevant tests. New strategies will need to be adopted such as using a multi-modal imaging approach and the adoption of advanced statistical methods to analyze the resulting complex data sets. Given their potential for investigation of both brain structure and function, advanced neuroimaging methods offer important opportunities to improve diagnosis, guide prognosis, and direct future treatment strategies in ALS.