monitoring progression of disease. In ALS, quantitative MUP and IP analysis can help in recognizing mild chronic denervation, particularly in muscles that are not frequently examined, or with normal bulk and strength. The unstable MUP is another important EMG feature of ALS, which can be quantified and has been referred to as 'jiggle'. Reproducibility of the quantitative 'jiggle' measurements and the relationship with disease progression should be addressed in the future. Motor Unit Number Estimation (MUNE) is another important quantitative EMG technique which will be covered by other workshop of ICCN 2010. In the present session, another EMG technique called 'motor unit number index (MUNIX)' will be addressed in more detail. Like MUNE, the MUNIX refers to a method that measures the approximate number of motor units, but it is fundamentally different in that it uses the surface EMG IP recorded during voluntary contraction. We recently investigated the reproducibility of the MUNIX in 62 normal controls and 22 ALS patients. The correlation between inter- and intra-operator results for MUNIX was excellent in both normal controls and ALS patients. Coefficients of variation (%) for inter- and intra-operator MUNIX measurements were 17.5 and 15.3, respectively, in normal controls, and 23.7 and 24.0, respectively, in ALS patients. The test-retest variability seems to be greater in ALS patients compared to normal controls, which needs to be confirmed in future studies, and the sources of variability should be identified and corrected for clinical use.

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Spinal motor neuron activity in ALS

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F-wave persistence is often decreased or F-wave is sometimes not elicited in amyotrophic lateral sclerosis (ALS). We researched how and what amount do motor unit number and motor neuron excitability insert on this F-wave change. Seventeen patient with ALS was examined both F-wave and motor unit number estimate (MUNE). M- and F-wave were recorded from median innervated thenar muscles. For F-wave analysis, 20 consecutive supramaximal electrical stimulation of 0.5 Hz were given to the median nerve at wrist. M-wave amplitude, F-wave amplitude, F-wave persistence and the number of F-wave with different waveforms were counted. MUNE was done by multiple point stimulation method. Eighty percent of patients with normal M-wave amplitude showed low MUNE and 40% of them have decreased F-wave persistence. When MUNE is between 50 and 100, F-wave persistence is normal but it tends to lineally correlate to MUNE. When MUNE is less than 50, F-wave persistence is below normal limit and sometimes F-wave is disappeared. The results indicate low persistence of F-wave is primarily resulted by decreased MUNE and some excitability changes could see through when MUNE is less than 50. Another analysis of motor neuron function with MUNE by F-wave is conduction velocity (CV) and size of the single MUP (SMUP). SMUPs derived from F-wave in ALS were collected by our new application. Those CV was slower and have higher firing rate but not bigger than SMUPs compared with normal controls. We showed the spinal motor neuron function in ALS could detect by some quantitative EMG methods.