NERVE CONDUCTION STUDIES IN ACUTE AND CHRONIC IMMUNE-MEDIATED NEUROPATHIES

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Immune-mediated neuropathies include acute and chronic inflammatory polyradiculoneuropathies (AIDP and CIDP) and multifocal motor neuropathy with conduction block (MMN). These neuropathies can be considered to primarily affect the myelin or the node of Ranvier, but also with secondary axonal loss. While the clinical features differ in terms of time course and pattern of sensory loss and weakness, nerve conduction studies are important in the diagnosis. AIDP and CIDP are different disorders but share nerve conduction abnormalities, while MMN is unique with focal conduction block.

Most nerve conduction studies of peripheral neuropathies rely on assessment of motor nerves, and less on sensory nerves. Nerve conduction studies assess the approximate number of axons by the amplitude of the response (CMAP, SNAP), and the integrity of myelin by distal latency, segmental conduction velocity, and F-wave latency. However, timing values reflect only the integrity of the few fastest conducting nerve fibers. Conduction velocities of the remaining fibers can be estimated by the duration of the response (CMAP negative peak duration), longer duration if slower conducting fibers are further slowed due to myelin pathology. For AIDP and CIDP there will be slowing of many fibers, but in primary axonal neuropathies there can be apparent slowing of conduction velocity and prolongation of distal latency due to loss of fastest conduction fibers with the slower fibers conducting normally. Thus, there is a challenge in determining whether a nerve is " conducting slower than expected for the degree of axonal loss." These issues will be considered in detail. A number of sets of motor nerve conduction criteria have been put forward to distinguish AIDP and CIDP from other types of neuropathy. Sensitivity and specificity for primary demyelinating polyneuropathies varies among the criteria, and limitations are discussed.

Sensory nerves in primary demyelinating polyneuropathies are frequently severely affected, and responses are absent. However, when responses are present, there are patterns of nerve responses that are supportive of the diagnosis.

MMN is a rare and unique neuropathy characterized clinically by focal weakness but no sensory loss, and electrically by focal conduction block of motor nerve fibers away from common entrapment sites. MMN is frequently considered in the diagnosis of amyotrophic lateral sclerosis (ALS) as MMN is treatable. Focal conduction block in MMN is challenging to measure due to inadvertent under and over stimulation, and the fact that proximal nerves may be involved which are difficult to activate. Conduction block in MMN is felt to reflect pathology at nodes of Ranvier, but there can also be demyelination. Thus, it can be difficult to distinguish focal conduction block in MMN from apparent block due to multifocal demyelination in CIDP.