

NERVE CONDUCTION STUDIES

Can determine focal or continuous abnormalities in the length of mixed, motor or sensory nerve.

Latency = time between onset of stimulus & response in ms

Velocity = distance between stimulating & recording electrode divided by time

Latency & velocity indicate quality of conduction

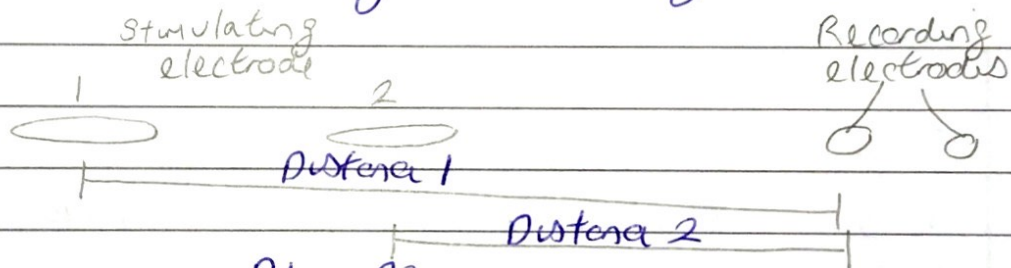
Amplitude = size of response in millivolts (mV) = Quantity of axons
> 5 mV normal

Motor nerve conduction studies

Electrical stimulation of nerve (skin) & recording the distal motor unit action potential (via skin or needle).

Amplitude = Number of functioning motor units

In order to measure velocity 2 stimulating electrodes are required



$$\text{Velocity} = \frac{D1 - D2}{L1 - L2}$$

Why latency measured differently

Sensory nerve conduction studies

Sensory nerve action potentials are measured by stimulating sensory fibres & recording nerve action potentials.

Proximal recording electrode = normal direction = Orthodromic

Reverse = Antidromic

Upper limb nerves faster 50 m/s vs 40 m/s lower limb

Reduction in velocity at low temp 1 m/s per 1°C

Velocity related to myelination = slower in very old & young

Conduction faster proximally

Certain nerves faster than others

F response / wave (echo)

When stimulating motor nerve part of the impulse conducts proximally to the anterior horn cells & causes a backfire. ^{@ axon} leads to an additional muscle depolarisation that does not cross any synapses.

Prolonged F response latency useful in detecting early proximal nerve lesions eg Ax nerve roots are intact in brachial plexus injury or Guillain-Barré syndrome

H reflex (deep tendon reflex)

Submax stimulation of Aα afferent fibres from muscle stretch receptors enter dorsal horn & synapse with α motor neurons. Can be difficult to record. Absent or delayed poly & radiculopathies & > 60 yrs

Carpal tunnel syndrome (NCS)

Sensory latencies more sensitive than motor

Test UN & RN for compression

Sensory potentials may be absent in severe cases ∴ use motor to show delayed conduction

NCS abnormal in 60% pts with CTS

Indications for surgery based on NCS

- Prolonged distal motor latencies

- Derecruitment of APB

- Absence of median digital sensory NAP

EMG involves insertion of a needle electrode into a muscle & recording the resting electrical activity & activity after voluntary contraction.