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A study of excitability recovery cycle of motor human axons by the double shock technique on the median nerve : study in basal conditions, after a voluntary contraction effort, during and after a period of ischemia

12/ Nerve and muscle excitability

Florence Manto ¹, François Wang ¹, Maelle Tyberghein ¹

¹CHU Liege - Liege (Belgium)

Objectives

Conventional electrophysiology does not study axonal excitability. We propose a method studying the excitability recovery cycle that can be carried out on a classic electrodiagnostic machine

Content

The study is carried out on eighteen healthy volunteers and two patients with demyelinating neuropathy. Two stimuli are applied with an interstimulus interval varying from 1 ms to 200 ms, the first stimulus (conditioning) being supramaximal, the second (test) corresponding to i40, meaning inducing a motor response = 40% of the maximum amplitude. The variation of the response to the second stimulus allows us to study the excitability cycle. This procedure is performed in basal conditions, during and after ischemia and after a voluntary contraction effort. The technique is reproducible and allows to highlight the different periods of excitability recovery cycle (absolute and relative refractory periods, super-normal and late sub-normal periods) and to establish standards. Cycle changes during ischemia (increased refractory period and decreased supernormal period) and after ischemia (decreased refractory period and increased supernormal period) are similar to those reported in the literature. However, we found little modification in post effort. The study carried out in a patient with Charcot-Marie-Tooth 1A disease and a patient with Guillain-Barré

syndrome highlights changes in the excitability cycle compare to healthy volunteers. Studies on nerve excitability using the double shock technique are promising and allow us to understand the axonal excitability cycle according to different modalities (basal conditions, after effort, during and after ischemia). It is a reliable, fast and easy-to-use tool helping to understand peripheral neuropathies.

Key words

excitability recovery cycle
double shock