

Nerve excitability properties in Charcot–Marie–Tooth disease type 1A

宋家瑩

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摘要

Abstract

Charcot-Marie-Tooth disease type 1A (CMT1A) is commonly considered a prototype of a hereditary demyelinating polyneuropathy. Apart from the myelin involvement, there has been little information on axonal membrane properties in this condition. Taking advantage of the uniform nature of the disease process, we undertook the *in vivo* assessment of multiple axonal excitability properties at the median nerve in nine CMT1A patients with PMP22 (peripheral myelin protein 22) gene duplication and 53 controls. The thresholds of CMT1A patients were much higher than normal, and threshold electrotonus (TE) exhibited a consistent pattern of abnormalities: early steep changes (fanning out) of both hyperpolarizing and depolarizing responses were followed by increased inward rectification to hyperpolarizing currents and unusually fast accommodation to depolarizing currents. Strength-duration time constants and the shapes of recovery cycles were normal, although refractoriness and superexcitability were reduced relative to controls. The high thresholds and early fanning out of electrotonus indicated altered cable properties, such that a greater proportion than normal of applied currents reached internodal rather than nodal axolemma. The rapid accommodation to depolarizing currents suggested activation of fast K⁺ channels, which are normally sequestered from the nodal membrane. The excitability abnormalities are therefore consistent with a demyelinating pathology and exposure or spread of K⁺ channels from under the myelin. It remains to be seen whether the TE abnormalities in CMT1A, which resemble previous recordings from normal immature rats, can be distinguished from those in acquired demyelinating neuropathies.