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Noninvasive and minimally invasive detection and monitoring of peripheral neuropathies.

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ABSTRACT

Peripheral neuropathies are diverse and require a multidimensional approach for detection and monitoring in a clinical and research setting. This review describes non- and minimally-invasive measures of distal predominantly sensory polyneuropathy (DSP), the most common form of neuropathy. A combination of clinical and electrophysiologic assessment with nerve-conduction studies (NCSs) suffices for the detection and characterization of most DSPs. NCS are insensitive to variants of DSP that predominantly affect small diameter sensory nerve fibers (SFNs) and cutaneous nerve terminals that subserve pain and thermal sensation. Skin biopsy with assessment of epidermal nerve fiber density permits objective detection and monitoring of SFNs. Conventional clinical and NCS measures have limitations as outcomes in experimental therapeutics in DSP. For clinical trials, biopsy evaluation of epidermal innervation and emerging noninvasive imaging approaches (in vivo confocal microscopy of corneal innervation and of Meissner corpuscles in the skin) hold promise as surrogate markers that are complementary to traditional DSP measures.