

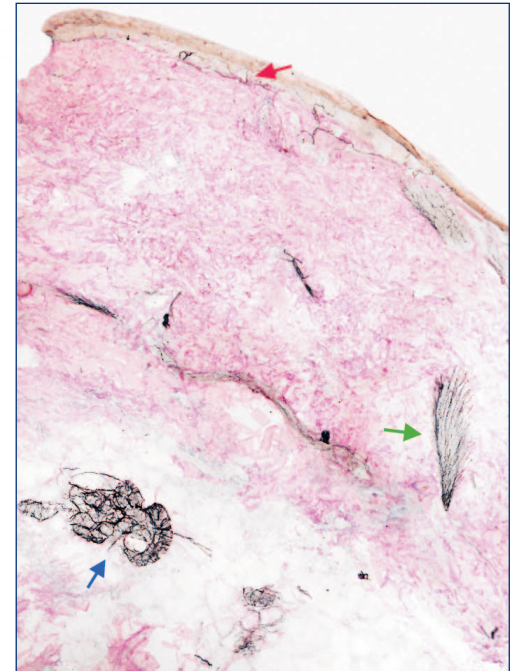
Sweat Gland Nerve Fiber Density (SGNFD)

Sweat glands in the skin are innervated by small autonomic nerve fibers, also called sudomotor fibers that are part of the autonomic nervous system (Cheshire and Freeman, 2003; Low et al, 2006). Both the ENFD and SGNFD can be reduced in generalized small fiber neuropathies (Gibbons et al, 2009), but the SGNFD can be preferentially reduced in some autonomic neuropathies (Sommer et al, 2002; Gibbons et al, 2009). Both the SGNFD and ENFD tests have been reported to be more sensitive than the Quantitative Sudomotor Axon Reflex Test (QSART) in the evaluation of autonomic or sensory neuropathies (Novak et al, 2001; Hilz et al, 2004).

Gibbons et al (2009, 2010) reported that quantification of sweat gland nerve fiber density “provides a reliable structural measure of sweat gland innervation that complements the investigation of small fiber neuropathies,” and that “results correlate well with physical exam findings.” Determination of SGNFD can also help distinguish between central and peripheral causes of dysautonomia, as Donadio et al (2011) reported that sweat gland innervation is reduced in patients with autonomic neuropathy, but normal in those with Multiple System Atrophy. Once the diagnosis of autonomic neuropathy is made, further studies can be taken to identify an underlying cause such as amyloidosis or diabetes, so that therapy can be directed at the cause of the neuropathy, in addition to the symptoms.

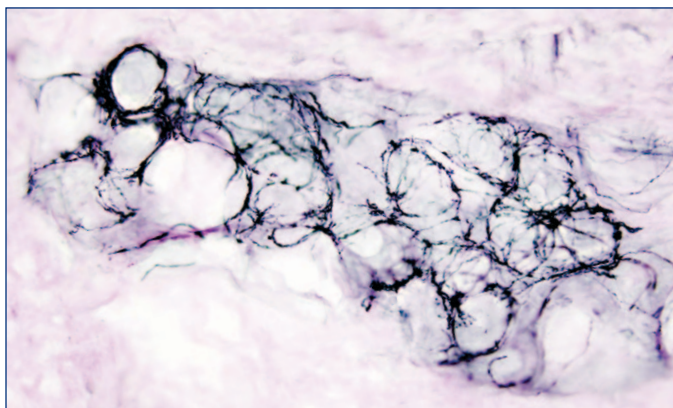
Physicians can request the test separately, or in samples where the Epidermal Nerve Fiber density (ENFD) is found to be normal, to increase the sensitivity of testing for small fiber neuropathy. Sweat glands are not numerous, however, and are mostly present in the deep dermis, so that skin biopsies should be at least 4 mm in depth, or the full length of the punch biopsy needle, to provide the best yield for analysis.

**More information on SGNFD, including a complete list of references can be found on our website.*

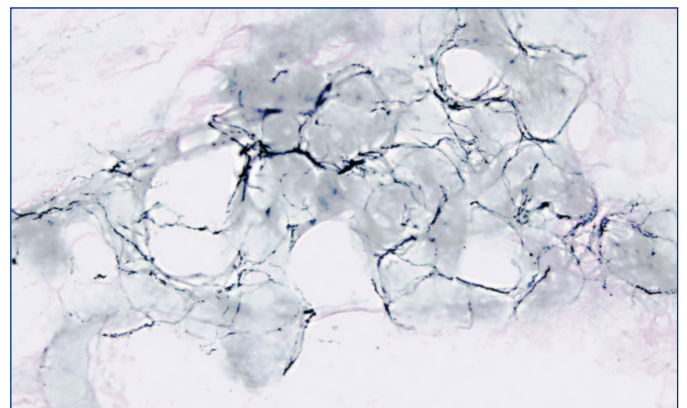


Skin biopsy

A 50 µm thick section of a 3 mm dia. punch skin biopsy from the thigh, greater than 4 mm deep, immunohistochemically stained for the axonal protein, PGP9.5 (black fibers), to detect and quantify sweat gland innervation (blue arrow) and intraepidermal nerve fibers (red arrow). Also visible in this biopsy are nerves that control an arrector pili muscle, which contracts in response to emotion or cold (green arrow).



Normal SGNFD



Reduced SGNFD