

What is Small Fiber Neuropathy?

Small Fiber Neuropathy (SFN) is a disorder in which the small diameter sensory myelinated and unmyelinated (C fiber) nerves of the peripheral nervous system are damaged. The peripheral nervous system is a network of nerves carrying sensory information from the body to the brain and spinal cord. Specifically, SFN affects the function of:

- Small somatic fibers responsible for sensory perception of heat and pain
- Small autonomic fibers involved in regulating autonomic and enteric functions, such as blood pressure and bladder function

The majority of small fiber neuropathies progress up the extremities in a length-dependent fashion. The loss of function across the lower extremities is usually distributed like a stocking. As the condition advances, a glove-like loss of sensation in the upper extremities can occur. The disorder is more common in individuals over the age of 65, and more often in males.

Causes

The pathology of SFN is poorly understood. There are multiple diseases which cause SFN, including:

- Diabetes mellitus (the most common cause)
- Amyloid neuropathy caused by mutations in transthyretin (TTR) amyloidosis, apoprotein A1, and gelsolin
- Inherited sensory and autonomic neuropathies
- Toxins or trauma exposure
- Fabry disease
- Celiac disease
- Vitamin B12 deficiency
- HIV
- Autoimmune disorders such as Sjögren syndrome, sarcoidosis, paraproteinemia, and paraneoplastic syndrome
- Inflammatory bowel disease
- Lupus
- Psoriasis
- Impaired glucose tolerance

Symptoms

The symptoms of small fiber neuropathy vary widely in severity and type. Many patients report a gradual onset of sensory symptoms in their extremities, such as slight disturbances of sensation in the feet. Patients often report that symptoms worsen during periods of rest and at night. Other frequently reported sensory symptoms include:

- A feeling of coldness
- Tingling and prickling sensations
- Numbness
- Pins and needles
- A persistent burning pain
- A transient electric shock-like pain

- Allodynia
- Hyperesthesia

Autonomic or enteric symptoms may also present, including:

- Dry eyes and mouth
- Postural lightheadedness
- Abnormal sweating
- Erectile dysfunction
- Nausea and vomiting
- Diarrhea or constipation
- Early satiety
- Difficulty with urinary frequency, nocturia, or voiding.

Unlike other peripheral neuropathies, SFN only affects small diameter fibers. Therefore it does not cause difficulties with balance, coordination, or muscle weaknesses.

Diagnosis

A diagnosis of SFN is primarily determined by taking a history and performing a physical examination of the patient (which is frequently completely or almost normal). The history could include a detailed review of the symptoms, rate of progression, and assessment of symptoms relating to autonomic fiber involvement. Length-dependent sensory loss, accompanied by clinical features like loss of heat sensitivity and pinprick sensation, confirmed by nerve studies, make the diagnosis sure.

Diagnostic testing may include:

Neurophysiological testing such as nerve conduction studies, quantitative sensory tests and electromyography. These tests can provide differential diagnosis from large fiber peripheral neuropathies.

Quantitative Sudomotor Axon Reflex Tests (QSART), can be used to test the amount of sweat produced when the skin is stimulated with a mild electric shock. Sweating is considered an autonomic function, and many individuals with SFN have abnormally low sweat production.

Skin biopsies are an invasive technique where a physician removes several small 3mm skin samples from particular sites of interest across the body. Several samples may be taken from the extremity where symptoms are reported, and from regions further up the limb where there are no symptoms. The samples will then be compared to evaluate whether there is a length-dependent pattern in nerve fiber density, as often seen in SFN. Cardiovascular reflex testing and sympathetic skin response are useful in detecting autonomic fiber dysfunction.

Treatment

The treatment of SFN depends on the presence and type of any underlying etiology. For instance, if SFN is caused by diabetes or prediabetes, then the most effective treatment

plan would focus on controlling blood sugar levels, exercising regularly, and maintaining a healthy weight to reduce insulin resistance.

In some conditions, such as HIV, the management of the underlying disease does not alter the progression of SFN. In these instances, and in cases where physicians are unable to identify any potentially treatable cause, the treatment focuses on symptom management. Pain-related symptoms are treated with medications such as:

- Antidepressants
- Anticonvulsants
- Corticosteroids
- Analgesics
- Topical therapies
- Opioids

Non-pharmacological options are also considered important for pain management. However, their effectiveness has not been validated by clinical trials. These include:

- Wearing cool or warm socks, soft socks, and foot tents.
- Acupuncture
- Physical therapy
- Massage

Sources

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