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Early Detection of Diabetic Peripheral Neuropathy through Sural Nerve Conduction Testing

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Introduction

Nerve Conduction Studies (NCS) are non-invasive electrophysiological tests that measure how fast and how well electrical signals travel through peripheral nerves. NCS can detect both sensory and motor nerve dysfunction, providing objective evidence of neuropathy. In DPN, sensory nerves are affected earlier than motor nerves. Among them, the sural nerve—which supplies sensation to the lower lateral leg and foot is particularly vulnerable. Therefore, testing the sural nerve's conduction velocity and amplitude offers a sensitive method for detecting early or subclinical neuropathy, even before symptoms appear. The sural nerve is a pure sensory nerve, meaning it carries only sensory information and not motor signals. It is relatively superficial and easily accessible for conduction studies. Importantly, the sural nerve is often one of the first to show abnormalities in diabetic neuropathy due to its length and peripheral location [1].

Description

DPN develops gradually due to prolonged exposure to hyperglycemia, which causes both metabolic and vascular damage to peripheral nerves. Key mechanisms include, oxidative stress from excess glucose metabolism, Advanced Glycation End-Products (AGEs) damaging nerve proteins and microvasculature, Inflammation and impaired blood supply to nerves, Mitochondrial dysfunction and apoptosis in nerve cells. These processes lead to axon loss and demyelination, particularly in long peripheral nerves. The sural nerve, being distal and purely sensory, is highly vulnerable and often among the first to exhibit dysfunction in diabetic patients [2].

Nerve Conduction Studies (NCS) measure the speed and strength of electrical signals traveling through peripheral nerves. For diabetic neuropathy, sensory nerves—especially in the lower extremities—are tested first, as they tend to be affected before motor nerves. Sensory Nerve Action Potential (SNAP) Amplitude, reflects the number of functioning sensory fibers. Decreased amplitude suggests axonal loss. Conduction Velocity (CV), reflects the integrity of myelin sheaths. Slowing indicates demyelination. These parameters help distinguish between normal, subclinical, and established neuropathy.

The pancreatic islets are highly integrated micro-organs where cells communicate closely through paracrine signaling. β-cells secrete insulin, which diffuses locally to suppress glucagon release from α-cells. This intra-islet communication is essential for tight regulation of glucose levels. Chronic hyperglycemia may disrupt this local crosstalk by impairing insulin signaling at the α-cell membrane. Studies show that insulin receptors are present on α-cells, and activation of these receptors under normal conditions reduces glucagon secretion. When hyperglycemia is sustained, this signaling pathway may be downregulated due to receptor desensitization or post-receptor defects. As a result, insulin's paracrine inhibition on α-cells is weakened, and glucagon secretion becomes dysregulated. Traditionally, NCS required referral to neurophysiology labs. However, newer portable devices (e.g., NC-stat DPNCheck) now enable point-of-care sural nerve testing in primary care and endocrinology settings. These devices offer fast, reproducible measurements, minimal training requirements, Immediate results [4].

Despite its usefulness, sural NCS is not without limitations: Small fiber neuropathy (affecting pain and temperature) may go undetected in early stages.Results can be influenced by age, skin temperature, and technical variability. Not all clinics have access to trained personnel or devices.Patient discomfort from electrical stimuli, though minimal, can occur. For comprehensive assessment, sural NCS can be combined with quantitative sensory testing, skin biopsies, or corneal confocal microscopy in research settings [3].

Conclusion

Sural nerve conduction testing is a powerful, objective, and increasingly accessible tool for the early detection of diabetic peripheral neuropathy. By identifying nerve dysfunction before symptoms develop, it offers clinicians a crucial opportunity to intervene early, reduce complications, and improve long-term outcomes for people with diabetes. Incorporating sural NCS into routine diabetes care can bridge the gap between silent nerve damage and visible complications, enabling proactive, personalized, and preventive medicine in the fight against diabetic neuropathy.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Grassi, Lucia, Giuseppantonio Maisetta, Semih Esin and Giovanna Batoni. "Combination strategies to enhance the efficacy of antimicrobial peptides against bacterial biofilms." *Front Microbiol* 8 (2017): 2409.

2. Fuertes, Gustavo, Diana Giménez, Santi Esteban-Martín and Orlando L. Sánchez-Munoz, et al. "A lipocentric view of peptide-induced pores." *Eur Biophys J* 40 (2011): 399-415.
Google Scholar Cross Ref Indexed at

3. Relucenti, Michela, Giuseppe Familiari, Orlando Donfrancesco and Maurizio Taurino, et al. "Microscopy methods for biofilm imaging: Focus on SEM and VP-SEM pros and cons." *Biol* 10 (2021): 51.

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