

Peripheral neuropathies: causes, clinical features, and modern approaches to treatment

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Abstract

Peripheral neuropathies are a heterogeneous group of disorders caused by damage to peripheral nerves and can involve sensory, motor, and autonomic fibers. Common etiologies include metabolic disease (especially diabetes), nutritional deficiencies (notably vitamin B12), toxins and medications (e.g., chemotherapy), infections, hereditary neuropathies, compression/entrapment syndromes, and immune-mediated conditions such as Guillain–Barré syndrome and chronic inflammatory demyelinating polyneuropathy (CIDP). Clinical features vary by fiber type and pattern of involvement but often include distal symmetric numbness, tingling, burning neuropathic pain, weakness, reduced reflexes, gait imbalance, and autonomic symptoms (orthostatic intolerance, sweating or gastrointestinal disturbances).

Keywords

Peripheral neuropathy; polyneuropathy; mononeuropathy; small-fiber neuropathy; diabetic neuropathy; CIDP; Guillain–Barré syndrome; entrapment neuropathy; carpal tunnel syndrome; radiculopathy; neuropathic pain; paresthesia; nerve conduction studies;

Modern diagnostic strategies combine careful neurological examination with targeted tests such as nerve conduction studies and electromyography to distinguish axonal from demyelinating processes and to localize focal lesions; small-fiber neuropathy may require skin biopsy or autonomic testing when routine studies are normal. Treatment is based on identifying and addressing the underlying cause, using disease-specific therapy for immune neuropathies (e.g., IVIG, plasma

exchange, corticosteroids in selected cases), and controlling symptoms with evidence-based neuropathic pain medications (e.g., duloxetine, pregabalin/gabapentin) alongside rehabilitation, foot care, and fall-prevention measures. A multidisciplinary, etiology-driven approach improves functional outcomes and quality of life while reducing complications. Peripheral neuropathy is a broad term for damage or dysfunction of nerves outside the brain and spinal cord. Depending on how many nerves are affected and where, clinicians classify it into patterns such as polyneuropathy and mononeuropathy.

Polyneuropathy usually means many nerves are affected in a fairly symmetric way, often starting in the feet and moving upward (“stocking–glove” pattern). The most common example is diabetic neuropathy, in which long-term high blood glucose and metabolic changes injure peripheral nerves and the small blood vessels that supply them. Symptoms often include numbness, tingling, burning pain, reduced vibration sensation, and loss of ankle reflexes; later, weakness and balance problems can appear. In contrast, mononeuropathy affects a single nerve, commonly due to compression or trauma. A classic form is entrapment neuropathy, where a nerve is compressed in a tight anatomical space. The most well-known example is carpal tunnel syndrome, compression of the median nerve at the wrist, causing numbness and tingling in the thumb, index, middle, and part of the ring finger, often worse at night, sometimes with hand weakness and thenar muscle wasting in advanced cases.

Conclusion.

Peripheral neuropathies are a diverse group of disorders caused by metabolic disease (especially diabetes), nutritional deficiencies, toxins and medications (e.g., chemotherapy), infections, hereditary conditions, compression/entrapment, and immune-mediated processes such as Guillain–Barré syndrome and CIDP. Clinical presentation depends on fiber type and distribution, most commonly producing symmetric distal sensory symptoms (numbness, tingling, burning pain), weakness, reduced reflexes, gait instability, and sometimes autonomic dysfunction. Modern management is based on (1) identifying and treating the underlying cause, (2) confirming neuropathy type with targeted diagnostics such as nerve conduction studies/EMG and, for small-fiber disease, skin biopsy or autonomic testing, and (3) symptom control using evidence-based neuropathic pain therapies (e.g., duloxetine, pregabalin/gabapentin), rehabilitation, and fall-prevention strategies.