

# Updating Your Peripheral Neuropathy “Know-How”

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Peripheral neuropathy (PN) is characterized as any injury, inflammation, or degeneration of the peripheral nerve fibers (Armstrong, 2000). Loss of motor and sensory nerve function results from an insult to the peripheral nerve fibers. As many as two million Americans may be unaware that they have PN (Mayo Clinic, 2000). When a patient receives certain chemotherapy agents, such as cisplatin, vinca alkaloids, and taxanes, chemotherapy-induced PN (CIPN) may occur. Patients with preexisting PN may experience exacerbated PN when these chemotherapeutic agents are administered. The neurologic side effects of CIPN range from interference with normal daily function to life-threatening neurologic damage. Oncology nurses can effect the detection and treatment of CIPN; therefore, oncology nurses must be aware of the potential impact of CIPN, the pathophysiology of the peripheral nervous system, how chemotherapy can induce PN, and what interventions are used to manage CIPN.

## Pathophysiology of Peripheral Nerves

The peripheral nervous system functions to communicate signals between the central nervous system and the periphery of the body. With the exception of cranial nerves (CNs) I and II, the CNs are part of the peripheral nervous system (Seidel, Ball, Dains,

Peripheral neuropathy is a condition that can be caused or exacerbated by the administration of certain chemotherapeutic agents. The effects of chemotherapy-induced peripheral neuropathy (CIPN) are dose limiting and might lead to permanent, debilitating disabilities. Oncology nurses should be aware of the impact of CIPN. Nurses should be cognizant of the pathophysiology, preexisting conditions contributing to an increased risk of CIPN, causative agents, and interventions used in managing CIPN. Awareness that the peripheral nervous system is divided into small fibers, large fibers, and the autonomic nervous system is important in the assessment, detection, and treatment of CIPN. Presenting symptoms are related to the specific fibers that are damaged. Because of the different mechanisms of action, CIPN symptoms vary depending on the chemotherapeutic agents used. This article provides a general overview of CIPN, including pathophysiology, causes, risk factors, assessment, and current treatment. Oncology nurses must be alert for the manifestations of CIPN. Early intervention and patient education can have a positive effect on the quality of life for patients with this disorder.

**Key Words:** peripheral nervous system diseases, nerve fibers, cisplatin, vinca alkaloids

& Benedict, 1999). Anatomically, the peripheral nerves arise from the spinal cord or CNs. Peripheral nerve fibers made of axons and dendrites are arranged in nerve bundles called fascicles. Fascicles are covered by the epineurium, perineurium, and endoneurium. These three layers of covering serve several important functions. They provide structural support, blood supply, and interstitial electrolyte storage compartments to the human body. Electrolytes are essential for nerve impulse conduction. The peripheral nerves

conduct impulses to the skin and muscles of the limbs from the spinal nerve roots and follow a dermatome pattern. The CNs arise from the brain stem and innervate specific anatomic structures (Sugerman, 2001).

The peripheral nerve fibers are categorized as either motor or sensory in function. The axons are covered with Schwann cells, which produce and maintain the myelin sheath.

The distinction between motor or sensory fibers comes from whether the fiber is myelinated or unmyelinated. Motor fibers are larger, myelinated fibers ranging in diameter from 2–20  $\mu\text{m}$  and conduct action potentials at a high rate of speed. Motor fibers are responsible for vibration sense, strength, movement, and proprioception (Vallat & Vallat-Decouvelaere, 2001). Sensory fibers are the smaller, unmyelinated fibers with an average diameter of 2  $\mu\text{m}$ . Sensory fibers conduct action potentials at a velocity slower than motor fibers. Four to six times more sensory fibers exist than motor fibers. Sensory fibers are responsible

for the transduction of pain and temperature signals (Vallat & Vallat-Decouvelaere). In

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