

# The Total Neuropathy Score: A Tool for Measuring Chemotherapy-Induced Peripheral Neuropathy

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**Purpose/Objectives:** To describe the psychometric properties, clinical significance, and utility of the Total Neuropathy Score (TNS), a composite measurement tool used to assess chemotherapy-induced peripheral neuropathy (CIPN).

**Data Sources:** Published articles and abstracts and pertinent article references.

**Data Synthesis:** CIPN has been quantified inadequately because of the lack of an optimal measurement tool. The TNS is the most comprehensive composite tool to have been tested in oncology settings. The tool assesses neuropathy signs and symptoms and incorporates nerve conduction study results but inadequately assesses neuropathy-related pain severity. Seven studies have reported on the TNS's psychometric properties.

**Conclusions:** Initial but limited evidence supports the TNS's psychometric properties. The tool is too burdensome and inadequately assesses pain severity. Further revision and testing of the tool are recommended.

**Implications for Nursing:** TNS simplification and further psychometric testing could lead to future use by oncology nurses.

Chemotherapy-induced peripheral neuropathy (CIPN) is a common and distressing side effect of neurotoxic chemotherapy. It is estimated to occur in 20%–100% of patients with cancer and is a direct result of sensory, motor, and autonomic nerve injury (Armstrong, Almadrones, & Gilbert, 2005; Sweeney, 2002; Visovsky, 2003). Common characteristics of CIPN include uncomfortable and often painful sensations described as burning, numbness, stabbing, pricking, tingling, sharpness, shooting, or electric-shock-like. In most cases, neuropathy signs and symptoms first become apparent in the toes (Hausheer, Schilsky, Bain, Berghorn, & Lieberman, 2006). In this regard, it is a length-dependent phenomenon, meaning that the longest peripheral nerves are affected first (Hausheer et al.). With high cumulative chemotherapy doses, nerve fibers die back from the tips. Therefore, symptoms progress proximally from the toes to the feet, ankles, and then calves. Extension to the fingers, hands, wrists, and then arms indicates severe neuropathy and usually occurs after CIPN has been well-established in the lower extremities (Stillman & Cata, 2006). Less commonly, the autonomic nervous system may be affected, resulting in orthostatic hypotension, constipation, and difficulty with urination (Stillman & Cata). Extreme proximal extension may lead to functional disability. For example, simple daily activities such as walking, driving, or dressing can become extremely difficult and sometimes painful. Such distressing complications can continue to worsen for many months beyond treatment completion, a phenomenon referred to as coasting (Markman,

## Key Points . . .

- ▶ Comprehensive assessment of chemotherapy-induced peripheral neuropathy should be part of everyday nursing practice.
- ▶ Current approaches to assessment are inadequate and have contributed to the dearth of knowledge regarding true prevalence and long-term negative sequelae.
- ▶ Future research efforts aimed toward improvement of current measurement approaches are critically important.

2006; Stillman & Cata). As a result, numerous patients receiving neurotoxic chemotherapeutic agents suffer with prolonged adverse effects on functional status and quality of life (QOL) (“Effects of Vinorelbine,” 1999; Ostchega, Donohue, & Fox, 1988; Wampler et al., 2006). Moreover, severe symptoms can necessitate chemotherapy dose reductions, negatively affecting cancer treatment efficacy (Hausheer et al.).

Several chemotherapeutic agents are classified as neurotoxins, the following of which are known to cause peripheral neuropathy: cisplatin, carboplatin, paclitaxel, docetaxel, etoposide, vinblastine, vincristine, oxaliplatin, thalidomide, procarbazine, cytarabine, and bortezomib (Armstrong et al., 2005; Hausheer et al., 2006; Hilken & van den Bent, 1997; Quasthoff & Hartung, 2002; Stillman & Cata, 2006; Verstappen, Heimans, Hoekman, & Postma, 2003). In addition to administration of a neurotoxin, several other risk factors are known to increase risk of neuropathy (see Figure 1).

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