

© 2012 by the Oncology Nursing Society. Unauthorized reproduction, in part or in whole, is strictly prohibited. For permission to photocopy, post online, reprint, adapt, or otherwise reuse any or all content from this article, e-mail [pubpermissions@ons.org](mailto:pubpermissions@ons.org). To purchase high-quality reprints, e-mail [reprints@ons.org](mailto:reprints@ons.org).

# Strength and Balance Training for Adults With Peripheral Neuropathy and High Risk of Fall: Current Evidence and Implications for Future Research

Cindy Toftagen, PhD, ARNP, AOCNP<sup>®</sup>, Constance Visovsky, PhD, RN, ACNP, and Donna L. Berry, PhD, RN, AOCN<sup>®</sup>, FAAN

**C**hemotherapy-induced peripheral neuropathy (CIPN) is an under-addressed problem in oncology. Neurotoxic chemotherapy drugs are now used on the majority of patients who receive chemotherapy for cancer treatment in the United States (American Cancer Society, 2012). Numbness, muscle weakness, and loss of balance affecting the lower extremities are common manifestations of CIPN and lead to falls and other injuries (Hile, Fitzgerald, & Studenski, 2010; Toftagen, Overcash, & Kip, 2011; Wampler et al., 2007). Primary treatment for CIPN includes dose reduction or discontinuation of the offending chemotherapeutic agent. Treatment of painful neuropathic symptoms with medications also has been a focus in clinical practice (Quasthoff & Hartung, 2002; Uceyler, Rogausch, Toyka, & Sommer, 2007). Medications often are useful for treating neuropathic pain; however, they have not demonstrated any benefit for improving strength, gait, or balance (Kaley & Deangelis, 2009; Smith, Cohen, Pett, & Beck, 2010; Smith, Torrance, Bennett, & Lee, 2007). Little attention has been given to the deleterious effects of CIPN on physical performance in either research or clinical practice. With CIPN becoming a growing problem among patients undergoing cancer treatment and cancer survivors, new methods of treating CIPN and its negative influence on physical performance must be discovered (Visovsky, 2003; Visovsky, Collins, Abbott, Aschenbrenner, & Hart, 2007).

A conceptual model developed by author Constance Visovsky (see Figure 1) illustrates the relationships between CIPN; exercise, including strength and balance training; and clinical outcomes. Neurotoxic chemotherapeutic agents induce sensory and motor

**Purpose/Objectives:** To evaluate the evidence for strength- and balance-training programs in patients at high risk for falls, discuss how results of existing studies might guide clinical practice, and discuss directions for additional research.

**Data Sources:** A search of PubMed and CINAHL<sup>®</sup> databases was conducted in June 2011 using the terms *strength*, *balance training*, *falls*, *elderly*, and *neuropathy*. Only clinical trials conducted using specific strength- or balance-training exercises that included community-dwelling adults and examined falls, fall risk, balance, and/or strength as outcome measures were included in this review.

**Data Synthesis:** One matched case-control study and two randomized, controlled studies evaluating strength and balance training in patients with diabetes-related peripheral neuropathy were identified. Eleven studies evaluating strength and balance programs in community-dwelling adults at high risk for falls were identified.

**Conclusions:** The findings from the reviewed studies provide substantial evidence to support the use of strength and balance training for older adults at risk for falls, and detail early evidence to support strength and balance training for individuals with peripheral neuropathy.

**Implications for Nursing:** The evidence demonstrates that strength and balance training is safe and effective at reducing falls and improving lower extremity strength and balance in adults aged 50 years and older at high risk for falls, including patients with diabetic peripheral neuropathy. Future studies should evaluate the effects of strength and balance training in patients with cancer, particularly individuals with chemotherapy-induced peripheral neuropathy.

neuropathy by activating mitochondrial and vascular dysfunction (Bennett, 2010; Flatters & Bennett, 2006; Siau, Xiao, & Bennett, 2006; Xiao & Bennett, 2007). Those metabolic and vascular dysfunctions lead to