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

Cindy Tofthagen, PhD, ARNP, AOCNP®, Constance Visovsky, PhD, RN, ACNP, and Donna L. Berry, PhD, RN, AOCN®, FAAN

Chemotherapy-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; Tofthagen, Overcash, & Kip, 2011; Wampler et al., 2007). Primary treatment for CIPN includes dose reduction or discontinuation of the offending chemotherapy 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 a clinical or research setting. 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 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...