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**Chemotherapy Induced Peripheral Neuropathy: the Balance and Falls Culprit of Oncology Rehab**

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 Although the research is still up and coming in this area, it is clear that chemotherapy treatment can impact cancer survivor’s balance and fall risk for more than 5 years into the survivorship continuum.1 Falls among cancer survivors have been shown to occur twice as often compared to cancer free peers and community dwelling older adults.1 This staggering statistic should be a call-to-action for rehab professionals, since 50% of adult-onset cancer survivors report physical performance limitations secondary to side effects and long term sequelae of cancer treatment.1 Imbalance and gait dysfunction are common limitations linked to decreased physical function and quality of life.1 It sounds like there are limitations that need to be addressed in order to improve this population’s quality of life.

A common cause of decreased balance and increased falls in cancer survivors is chemotherapy induced peripheral neuropathy (CIPN). The latter is defined as any injury, inflammation, or degeneration of peripheral nerves due to administration of chemotherapy.2 This commonly occurs with treatment of myeloma, breast cancer, renal cell cancer, lung cancer, and colorectal cancer.3 CIPN is becoming more common because although there has been an increase in cancer treatment efficacy, there are side effects that come along with these treatments.3 Other factors that contribute to the uptick in CIPN include longer life expectancy for cancer survivors, improved survival rates, and the increased likelihood that one will be treated with multiple agents.3 Symptoms of CIPN include pain, sensory loss, proprioceptive deficits, distal weakness, decreased fine motor control, reduced balance, and gait impairments.3 Autonomic impairments may be present as well, including dry mouth, constipation, urinary retention, orthostatic hypotension, and irregular pulse.3 Longer neurons are often impacted by the neurotoxic effects first, leading to a stocking-glove distribution of sensory loss.3 In most cases, sensory involvement is the most prevalent3 , which impacts postural control. Permanent CIPN can occur, but more frequently recovery occurs over the course of months or years following chemotherapy treatment.3 Cancer survivors may experience “coasting”, which refers to an onset or worsening of symptoms after the end of chemotherapy.3 This phenomenon can cause cancer survivors’ balance to be impacted more than 5 years after treatment.

Falls are especially detrimental to cancer survivors due to comorbidities that increase the risk of fall-related injury, a secondary decline in physical activity, and subsequent functional decline.1 In order to prevent this unfortunate and preventable cascade, physical therapists must identify patients who are at risk of falling, especially among cancer survivors, to preserve their functional independence and quality of life.

So, what can we do as physical therapists about this prevalent issue facing cancer survivors? We can collect a thorough history and examination to narrow down the cause of a balance issue, use appropriate screening tools, educate, and utilize appropriate interventions. The treatment and prevention of imbalance, gait dysfunction, and falls are vital to functional independence, quality of life, and long-term health and survivorship,1 so it is imperative that we get to these patients as soon as possible.

Recommended evaluation procedures3

* Sensory evaluations: light touch, monofilament testing, tuning fork, pin prick, blood pressure cuff (pressure pain threshold), thermal perception
* Motor evaluation: MMTs, handheld dynamometry, grip testing, goniometry

Recommended outcome measures

* Highly recommended: Fullerton Advanced Balance (FAB) scale, gait speed4
* Recommended: Balance Evaluation Systems Test (BESTest), Timed Up and Go (TUG), 5 Times Sit to Stand (5TSTS)4
* For school-aged children: Ped-mTNS2
* Self-report measures: Patient Neurotoxicity Questionnaire, Functional Assessment of Cancer Therapy- General (FACT-G), EORTC quality of life questionnaire, total neuropathy scale, CIPN-10, NTX-123

Recommended treatments

* Lower limb closed kinetic chain exercise: showed decrease in tingling sensation, decrease in pain, and improved balance5
* Interactive sensor-based balance training including multidirectional weight shifting and biofeedback: showed increased tandem stance balance with eyes open5
* Strength and endurance training including moderate intensity walking: showed positive effects for balance, lower extremity strength, function, and quality of life5
* Pharmacological intervention: lower dose of chemotherapy, prolonged infusion rate per treatment, delivery of total dose over longer period of time, neuroprotectants

A challenge facing the treatment of balance impairments and resulting falls due to CIPN is a lack of patient education. It is important that cancer survivors are informed about the possibility of CIPN so they can consult their healthcare providers if issues arise, allowing for an adjustment of treatment if needed.3 Unexpected symptoms such as those caused by CIPN can cause undue anxiety and distress if patients are not expecting them.3 Education about CIPN allows for clinicians to inform their patients of fall reduction strategies, proper foot care, guarding against trauma in areas with reduced sensation, and orthostatic hypotension.3

Overall, we as physical therapists have what we need in our toolbox and within our scope of practice to be the change the oncology population needs to get ahead of balance and falls concerns due to CIPN. We are in a unique position with our education and skill set to perform a thorough neuromuscular and functional assessment to identify problems, set appropriate goals, and establish individualized interventions.3 Surveys have gathered that CIPN is frequently reported as one of the most bothersome side effects of cancer treatment with the greatest overall impact on quality of life, as well as some reporting that their symptoms are being ignored by medical personnel due to lack of objective findings.3 Getting ahead of chemotherapy related balance impairments means increased functional independence and quality of life for cancer survivors. Let’s keep an eye out for CIPN, it could be right under your nose in any setting.

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