



# Physical interventions for patients suffering from chemotherapy-induced polyneuropathy

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Most cancer survivors are able to benefit from cancer rehabilitation, including interventions to improve physical performance, nutrition, mental health, and pain control [1–6]. Successful cancer rehabilitation efforts enable many patients to increase their participation at work, improve active daily living and to return to work [2, 5], and risk of cancer mortality and recurrence have been shown to be lowered. Cancer rehabilitation normally includes informational support, psychosocial oncology interventions, nutrition counseling, and physical therapies and modalities like regular physical activity and (medical) exercise. Self-management interventions for patients are also important and necessary in order to improve patients' adherence to cancer rehabilitation initiatives [1–5].

In their work “Effects of Exercise during Chemotherapy on Chemotherapy-Induced Peripheral Neuropathy: A Multicenter, Randomized Controlled Trial,” Kleckner and colleagues. Aimed to examine the effects of this special exercise (Exercise for Cancer Patients/EXCAP®®, a home-based, 6-week progressive walking and resistance exercise program) on chemotherapy-induced peripheral neuropathy symptoms and conclude that the exercise appears to mitigate these symptoms and therefore recommend prescribing exercise for patients receiving taxane-, platinum-, or vinca-alkaloid-based chemotherapy [6]. This work, which is the result of a secondary analysis of a nationwide phase III randomized controlled trial of exercise to counteract fatigue, is innovative and extends the knowledge base of this field [6]. Data included in the

secondary analysis comprised 355 patients, predominantly women diagnosed with breast cancer. As such, the potential impact of the home-based program examined by these authors may (or may not) be limited to this patient population.

Medical exercise to improve endurance capacity and/or muscular strength and sensorimotor functions has many beneficial effects for healthy people and for cancer patients [4, 7–9]. In our opinion, before starting any exercise program, contraindication potential must be assessed (e.g., psychosocial assessment, cardiotoxicity assessment, such as by echocardiography, pulmonary function testing, musculoskeletal strength, and flexibility testing) and patients are to be excluded if clinically determined to be at increased risk of harm. Every exercise intervention should be planned on the basis of such assessments and performed under regular medical supervision in order to minimize or to avoid side effects and (possibly life-threatening) complications [2, 4, 7–9]. In addition, self-management interventions should be incorporated into the protocol—patients are able to help themselves to mitigate the symptoms and sequelae of cancer and its necessary treatment and certainly can be educated to incorporate appropriate self-monitoring and report any sequelae before these are exacerbated and thereby risk adherence to treatment and rehabilitation.

Chemotherapy-induced peripheral neuropathy symptoms include (1) chronic pain and severe dysesthesia (with disturbed sleep quality) as well as (2) sensorimotor dysfunction with coordination deficits of upper and lower limbs. Furthermore, due to risk and due to fear of falls many patients withdraw from performing physical activities. This risk-avoidance behavior can precipitate chemotherapy-induced peripheral neuropathy problems and can thereby lead to further decrease in physical performance, but also as well as contribute to mental health (depression, fear, and anxiety) and quality of life problems.

Different physical modalities (but also medications) are often used as therapeutic measures for the treatment of polyneuropathy [2, 10]. To counteract chemotherapy-induced

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peripheral neuropathy symptoms, the field of Physical Medicine offers different modalities which are individually prescribed depending on the needs and objectives of the patients. These modalities can include electrical therapy (such as low-frequency transcutaneous electrical nerve stimulation, galvanic baths, and the so called “Hochtontherapie” which is a special middle frequency therapy), but also balneological modalities like CO<sub>2</sub>-baths to mitigate chronic pain, severe dysesthesia, and peripheral dystrophy, respectively. To improve sensorimotor functions of upper and lower limbs, medical exercise (of endurance, of strength, of flexibility, and of sensorimotor functions) is performed as well as physiotherapy, immersion (water) therapy, special massages (lymphatic massage), and occupational therapy (for the upper limbs) [2, 10]. Many of these physical treatment approaches currently lack strong scientific evidence [2, 10]. The absence of rigorous intervention research in this space is due to the fact that physical modalities normally are applied in a multimodal setting (and therefore lack research focusing on the single modalities). Further, physical modalities typically are not able to be studied in a placebo-controlled study design due to the fact that the different physical forces lead to sensory and motoric reactions in subjects and patients. Nevertheless, these modalities are part of a very traditional, experienced based medicine approach and have shown good results when applied in a multimodal setting for many years. Finally, these physical modalities normally show fewer side-effects than medication-based approaches [9, 10].

The paper by Kleckner and colleagues allows us to underscore the need for more research on this important topic in order for cancer clinicians and programs to be well positioned to provide the right guidance to patients that will advance their rehabilitation during and post-treatment. These studies need to look at different patient populations, including disparate cancer diagnoses and treatment types (surgery, radiation, systemic therapy). Given the restrictions and challenges to design effective research protocols to test these exercise and exercise-related modalities combined with patient education and self-management/monitoring modalities noted above, we therefore encourage creating an international research group and funding of international, multi-centre, multi-disciplinary research studies.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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