

Issues in Nutrition, Weight, and Cancer – An Overview for Clinicians

a report by

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With the successes in cancer diagnosis and treatment accomplished over the past 70 years, there is a growing population of cancer survivors. Quality of survivorship is as important as the duration of survivorship – whether one is addressing acute (e.g. having enough energy to go out and get the morning paper), intermediate (e.g. getting back to work or usual activity), or chronic time frames (e.g. chronic sequelae of body composition loss and fatigue years after completion of therapy as in lymphoma). It is postulated that patients who maintain better nutritional status and body composition during and after primary therapy, are better and more willing candidates for therapy should the cancer recur.

Significant increases or decreases in a patient's weight and body composition are undesirable for anyone going through cancer treatment. This understanding allows a consistent and integrated philosophical approach to cancer care, whether one is addressing a post-menopausal woman with breast cancer at risk for significant weight gain and associated adverse oncologic outcomes, or patients with cancers associated with progressive weight loss and cachexia.

A multimodality approach that combines nutrition, physical activity (aerobic and resistance exercises), and pharmacologic intervention as necessary is a cornerstone for addressing appropriate body composition and metabolic balance. This integrated approach is important from time of diagnosis through treatment and in long-term survival.

This article is part of the 'food for thought' as the Association of Community Cancer Centers (ACCC) celebrates its 30th anniversary, and clearly supports the mission statement and vision that form the foundation of the association – to preserve and protect the entire continuum of quality cancer care. Since the ACCC's inception, the association has set standards of integrated quality oncology care.

Physical Activity and Survivorship

"Life is a metabolic dance between anabolic and catabolic processes."¹ Optimal cancer rehabilitation

techniques should focus both on the reduction of unnecessary catabolism (such as unnecessary activity restrictions or corticosteroids) and support of anabolism to optimize daily functioning and quality of survivorship.

Family members and clinicians frequently advise patients to rest and to reduce the amount and intensity of their activities.¹ These recommendations, however, may exacerbate the fatigue that affects the survivor. Interestingly, living alone may contribute to improved functionality and continued independence, while physical inactivity contributes to disuse muscle atrophy, which in turn may contribute to loss of cardiorespiratory fitness and to fatigue.

Catabolic losses of weight that occur as the result of cytokine-mediated changes in metabolism or chronic use of corticosteroids also contribute significantly to loss of muscle mass during cancer treatment. The combined losses of weight and lean tissue may be synergistic and if not reversed with cancer rehabilitation may progress over time.

Musculoskeletal structure and function are dependent on physical activity with an appropriate nutritional and hormonal milieu supporting anabolism. In healthy volunteers, complete bed rest for as short as a week is associated with a 1% to 4% loss of muscle mass,²⁻⁴ which can be exacerbated by fever, corticosteroids, and proinflammatory cytokines.

Accelerated loss of bone mineral density (BMD), with ensuing complications of pain and risk for compression and other pathological or traumatic fractures, becomes more important with increased survivorship. Inactivity, combined with direct complications of chemotherapy and changes in the survivor's hormonal milieu (e.g. orchiectomy, contraindications to hormone replacement therapy, or corticosteroid use) all contribute to risk for progressive bone demineralization and osteoporosis. Resistance exercise is an important therapeutic intervention for preventing or reversing loss of muscle mass and bone density and their complications.⁵⁻¹¹

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Studies of physical exercise in cancer initially focused on aerobic exercise in women with breast cancer.¹² More recently, resistance exercise has been added to the regimens with impact on cardiorespiratory fitness, body composition with increased lean tissue and decrease in fat mass, and improved strength and functionality. There are increasing data supporting the importance of physical exercise in cancer survivors with a variety of cancer types, with demonstrated improvement in:

- functional capacity;
- perceived and measured fatigue;
- requirements for medications treating nausea or pain;
- self-esteem, mood, sense of control, overall sense of well-being, reduced depression and anxiety; and
- immunologic function as assessed by natural killer cell activity.^{13–19}

Specific physical aspects of cancer rehabilitation can include one or more of the following:

- deficit-related physical and occupational therapy;
- individual or group exercise programs;
- institutional, gym, home-based, or nature-based programs;
- aerobic (walking, cycling, swimming, dancing), stretching, and resistance exercise (elasticized resistance bands, light-to-moderate weight lifting).

Corticosteroids – Chronic Musculoskeletal Sequelae

Corticosteroids have a number of physiologic effects that contribute to broad use in patients receiving cancer therapy and in treatment of survivor comorbidities. Anti-emetic, anti-inflammatory, and anti-neoplastic roles are common, and are used in terminal care for its central effects to improve the sense of well-being and for short-term improvements in appetite.

It is important to consider the effects of glucocorticosteroids on both lean tissue and skeleton. The development of muscle weakness and atrophy is a well-known complication and is the most common form of drug-induced myopathy.^{20–22} The clinical presentation of steroid-induced muscle weakness is characterized by insidious onset. Proximal extremity muscles are affected first, with the lower extremities demonstrating the earliest signs of weakness. Distal musculature is relatively spared. The patient first notes difficulty climbing stairs and rising from low chairs due to hip girdle and thigh weakness, but by the time this occurs, marked muscle atrophy is evident. In

addition to effects on muscle, glucocorticoids contribute significantly to bone demineralization and risk for progressive osteoporosis.

In the published literature, exercise is increasingly included as integral to any intervention addressing prevention or treatment of musculoskeletal complications of corticosteroids, regardless of the underlying condition. Prevention and treatment of corticosteroid-induced osteoporosis is based on general measures such as calcium and vitamin D supplementation, adequate protein intake, regular physical exercise, hormonal replacement therapy, and specific therapies used in primary osteoporosis. Bisphosphonates, which are potent bone resorption inhibitors, increase BMD and decrease fracture rate.

Synergy of Nutrition and Exercise in Survivorship

Support of whole-body anabolism is based on an integrated approach of nutrition, exercise, and support of an appropriate hormonal milieu. The most important aspects of a synergistic multimodality approach are:

- awareness;
- assessment; and
- appropriate intervention.

Lack of awareness regarding the impact of nutrition and body compositional changes on acute and chronic aspects of survivorship and lack of awareness of cost-effective interventional options are the two greatest impediments for success. The importance of inadequate protein intake on chemotherapy toxicity, and loss of muscle mass and function due to chronic sequelae of malnutrition and body compositional change, have long been under-appreciated in the armamentarium of the oncologist and are only now beginning to play a role as issues of survivorship are addressed.

Evolution of standardized assessment, as well as recent research in multimodality intervention, offer new insights that are immediately applicable to the oncology team. Clinical studies of exercise, specialty nutraceuticals containing omega-3 fatty acids²³ (ProSure[®], Resource Support[®]) or β -hydroxy β -methylbutyrate (HMB) with glutamine and arginine²⁴ (Juven[®]), anticatabolic agents such as thalidomide²⁵ (Thalomid[®]), and now anabolic agents such as oxandrolone^{26–28} (Oxandrin[®]), demonstrate increases in total weight or slowing of progressive weight loss, increases in lean tissue weight, and associated functional and quality of life improvements. ■

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