Exercise during cancer treatment is an under-recognized, but important aspect of oncologic therapy.

While the cancer cachexia syndrome is well-recognized in cancer patients, it’s sister syndrome, sarcopenia, is often under-recognized and goes undiagnosed, though it is common among cancer patients as well. Sarcopenia is progressive loss of muscle mass, function and physical performance, often defined as an appendicular skeletal muscle mass of more than 2 standard deviations below the sex-specific mean of healthy individuals. It is a key element of the cancer cachexia syndrome.1-3

Weight loss is a recognized predictor of patient mortality in lung cancer patients, however, an impressive 40-60% of newly diagnosed patients with NSCLC are found to have sarcopenia5, and up to 84% of patients show at least some degree of reduced fat free mass.4 While more prevalent in hypermetabolic cancers than most other malignancies, sarcopenia has been found to be a predictor of treatment outcomes, mortality, morbidity, and physical disability in a variety of malignancies, including hormone-sensitive cancers such as breast and prostate cancers, colorectal malignancies, and renal cell carcinoma.5-8 Sarcopenia is an independent predictor of both immobility and mortality in advanced cancer.4,9 Both cachexia and sarcopenia are associated with physical decline, reduced quality of life, increased chemotherapy toxicity, increased fall risk, fractures, functional decline, increased hospital stay, nosocomial infections, and reduced survival.4,10-11 Deconditioning of cardiovascular and pulmonary systems is common during cancer treatment and associated with decreased levels of physical activity, and a decrease in cardiorespiratory fitness is associated with a 4% greater mortality rate.12 The presence of comorbid conditions, and functional disability are independent predictors for receiving less standard treatment in older cancer patients,13 and ECOG status and lower activity scores have been shown to be independent predictors of chemotherapy toxicity among older patients with lung cancer.14 Despite this, little is done to identify and treat the underlying causes of poor functional status and disability in these high risk patients.

One potential intervention for both patients with notable physical decline, and those at risk for lost functional status, is the implementation of personalized exercise prescriptions for oncology patients.Though the link between sarcopenia and specific outcomes has yet to be fully elucidated, exercise has been demonstrated to be a safe and beneficial treatment option for most cancer patients both during and after treatment.11,23

**Benefits of exercise during treatment:**

Engaging in regular physical activity during cancer treatment improves flexibility, reduces pain, improves strength and functional status, may reduce depression, and reduces fall risk. Patients who exercise regularly throughout treatment report a 40-50% reduction in fatigue compared to those who do not exercise. It can help reduce or prevent lymphedema following lymph node excision in breast cancer patients. Exercise also helps to control weight, which is of critical importance both for those at risk of weight loss, such as in lung, and head and neck cancers, and for those for whom weight gain can increase risk of recurrence, as in colorectal, breast and prostate cancers. It has also been associated with reduced cancer-specific and all-cause mortality in breast and colorectal cancer survivors, even with relatively modest gains in physical activity.12,15-18

**Addressing Concerns:**

*Exercise does not need to be avoided in patients for whom weight loss is contraindicated.* Exercise has been shown to be safe in a variety of cancer types, with benefits that far outweigh risks and does not appear to induce weight loss in these populations.11-22,16-17 This may be due to a variety of exercise-induced changes, including improved insulin sensitivity and a possible decrease in inflammatory markers, which have been implicated in the etiology of the cancer cachexia syndrome.19

*Exercise is not contraindicated in hormone-sensitive cancers.* In the past concern has been raised the intense physical activity in patients with prostate cancer may increase androgen levels. However, light-moderate exercise does not increase androgen levels in men with prostate cancer. In fact, light-moderate physical activity has been shown to decrease production of sex hormones overall.19-20 Moderate-intensity aerobic exercise has been shown to reduce circulating estrogens in postmenopausal women without cancer.20 Progressive, moderate-intensity, upper body resistance exercise is now regarded as safe for breast cancer survivors with or at risk for upper extremity lymphedema.12

*Significant and meaningful changes in lean body mass can occur during active cancer treatment.* Despite relatively poor results from a variety of interventions targeted at reversing the cancer cachexia syndrome, it appears that the adaptive capacity of the cardiorespiratory system to exercise training remains intact even during cancer treatment, as several studies have demonstrated improvements in aerobic fitness, muscle strength, overall physical fitness, symptoms and mood during treatment as a result of exercise training.12,16-18,20

*Those with advanced cancer may benefit from physical activity.* Moderate-intensity exercise is regarded as safe both during and after cancer treatment and the benefits of regular exercise for cancer survivors far outweigh the risks, even in advanced cancer.12 Quist et al. demonstrated improved aerobic fitness for patients with a variety of malignancies and all stages of disease,20 and Temel et al. showed that patients with advanced NSCLC may have reduced symptom burden with increased physical activity.16

**Recommendations:**

NCCN and the American Cancer Society recommend at least 30 minutes/day of light-moderate physical activity at least 5 days/week. Despite this, an estimated greater than two thirds of cancer patients are insufficiently active.15

Ideally, and exercise program should include:

* Aerobic exercise such as brisk walking, jogging, swimming, or cycling
* Strength training at least twice weekly
* Stretching and flexibility exercises

**Some additional points to consider:**

* All activity counts. Walking around the mall, yard work, working on cars, gardening, and vigorous housework are activities that patients may be inclined to engage in any way. Encourage veterans to continue these activities throughout treatment.
* Exercise can be broken up into smaller segments if veterans are not capable of or not interested in exercising for 30-minute stretches at a time. For example three 10-minute walks may be just as advantageous as a single 30-minute walk.
* If a patient is receiving radiation therapy, swimming pools should be avoided to limit exposure to bacteria that may cause infections. Chlorine may also irritate radiated skin.
* Refer patients for a physical therapy or kinesiotherapy consult when appropriate for individualized exercise recommendations and for those deemed to be at risk of injury during exercise.
* Patients may need as much as 8 weeks post-operatively to adequately recover from surgery before beginning an exercise program.20 Consult with an exercise specialist to determine what type of physical activity may be most appropriate for these patients.
* Patients with an ostomy or hernia may not be appropriate for certain types of strenuous exercise.
* Women with lymphedema should wear a well-fitting compression garment during exercise.
* Be aware of risk for fracture among those treated with hormonal therapy, a diagnosis of osteoporosis, or bony metastases.
* Avoid overtraining in immune-compromised patients.
* Exercise intensity can be reliably measured by a person’s perceived exertion, or by how well they can talk during physical activity.21 At light intensity, a person should be able to talk or even sing during exercise. During moderate intensity exercise, a person would be able to talk somewhat comfortably, but no longer able to sing. During high intensity exercise, talking in more than few word sentences is difficult.

Encourage physical activity among veterans diagnosed with a variety of malignancies. Oncologists’ 30-second exercise recommendation has been show to significantly increase exercise among cancer patients.15,22 Other tools that have been found to be effective at increasing physical activity in cancer survivors include printed materials, exercise education, an exercise diary, provision of pedometers, phone support, a written exercise prescription, and internet programs. The greatest improvement in exercise volume appears to be from a combination of physician recommendations and other methods.15 Encouraging regular light to moderate physical activity among veterans with cancer is a simple way to improve treatment outcomes and quality of life in our veterans.

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