

## The importance of exercise in lung cancer treatment

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### Abstract

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There is emerging evidence that exercise can help in a variety of different ways for people with lung cancer. Exercise can be beneficial at any stage of the patient journey through increasing strength, endurance and decreasing emotional issues. A recovery fitness program is described and provides guidance on breathing, stretching, aerobic exercise and strength training. There are more people surviving lung cancer with services needing to cater for the varying requirements of each patient. Promoting physical activity is an important facet of health care management and collaboration between providers of services is required.

**Keywords:** Lung cancer exercise, physical activity lung cancer, relaxation breathing, stretching exercise, strength training for lung cancer survivors

### Introduction

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Exercise can be beneficial for those with lung cancer by increasing strength, endurance and decreasing emotional issues. Physical activity may also help tolerate cancer treatments and lower fatigue levels (1,2).

An exercise program may help with coping strategies with regard to the physical and emotional effects of having lung cancer. Health care professionals should consider recommending physical activity interventions at any stage of the lung cancer pathway (3). In addition, a preoperative exercise program prior to curative lung surgery should also be considered as there is developing evidence that it may improve outcomes (4,5).

The thought of exercise might be overwhelming to those with lung cancer but a well-designed exercise program may help individuals feel better physically and mentally and it may also decrease the risk of further disease (6). Being physically active appears to improve survival and quality of life (7).

The side effects of lung cancer surgery and treatments are detrimental to the health and the quality of life of lung cancer patients are at increased risk of osteoporosis, cardio-vascular disease, and many other health problems. Exercise can help to mitigate the side effects of cancer treatment and surgery (7).

In addition to the physical benefits of exercise, cancer patients who exercise also report improved mental and emotional well-being and after treatment experience less anxiety (8). Patients who exercise

during treatment and those who began to exercise afterwards report an increase in quality of life (9).

## **The recovery fitness cancer exercise program (10)**

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An exercise program must be gentle and progress slowly, especially if the patient had been sedentary prior to the diagnosis. For the inactive, it is a good time to begin using gentle exercises. All patients should receive medical clearance before beginning an exercise program and with consideration made to those whose immune system could be compromised due to chemotherapy. A lung cancer patient should start out working with a physical therapist, pulmonary rehabilitation specialist, or a cancer exercise specialist in a safe environment.

Many lung cancer patients experience shortness of breath and have difficulty breathing, which can prevent patients from undertaking exercise and cause them to be sedentary. Thus, it is important to start their exercise program with breathing exercises. Restoring breathing will help with endurance and quality of life and will enable lung cancer patients to more easily accomplish their activities of daily living.

There is an emotional toll that those with cancer face in addition to the physical one. A cancer diagnosis can cause depression, anger, anxiety, fear and stress. Proper breathing techniques and stretching can improve the psychological recovery.

Breathing exercises or pulmonary rehabilitation is important for patients with advanced lung cancer (11). These exercises can accomplish the goal of improving breathing capacity and quality of life. The effects of pulmonary rehabilitation have also been studied in patients with lung cancer prior to and following surgical resection and demonstrated significant improvements in the six-minute walk distance and lower extremity strength (12).

## **Exercise interventions**

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### **Breathing**

Relaxation breathing can help reduce stress and anxiety. When feeling stressed, taking shallow breaths may help. It is important to use full lung capacity and breathe slowly and deeply. There are numerous relaxation breathing methods that can be effective. For example, one can inhale through the nose for five seconds and fill the torso up with air, hold the breath for two seconds, and then exhale from the mouth for five seconds, pressing the navel in towards the spine. It is also helpful to imagine all tension and stress leaving the body with each exhalation. Relaxation breathing can be used immediately after surgery, as it allows the patient to focus all energy on healing.

The lung cancer patient should learn diaphragmatic breathing through pursed lips. Diaphragmatic breathing strengthens the diaphragm and the abdominal muscles. This will allow more air to move in and out of the lungs with less tiring of the chest muscles. When the diaphragm becomes weak, the patient compensates by using the shoulders and other muscles to help them breathe.

Breathing with pursed lips is beneficial and can be used with the diaphragmatic breathing. The hand is placed on the abdomen. The patient, sitting or standing up straight, should inhale through the nose while gently pushing the abdomen out. The patient's hand moves outward. This allows the diaphragm to lower enabling one to increase lung capacity. The patient should then exhale slowly using pursed lips while gently pushing inward and upward with the hand on the abdomen to help empty the lungs completely. The navel is pressed to the spine while exhaling all the air out. Then the patient slowly inhales, filling the lungs with air, and repeats the exercise.

Pursed-lip breathing should be practiced several times a day. In addition to strengthening the abdominal muscles, it will help regulate breathing if one becomes short of breath, particularly during an activity.

This type of breathing will also help the patient to get through an activity where one experiences shortness of breath.

## **Stretching**

Patients with shortness of breath and limited breathing capacity due to their cancer should perform upper body stretching exercises daily to increase lung capacity. A stretching program will restore mobility in the chest and back that allows for freer movement of the lungs and diaphragm. Stretching each part of the body will help to keep the chest muscles loose and encourage deep breathing. An additional benefit of light stretching is that it also improves a patient's range of motion and decreases body stiffness.

Stretching is one of the basic components of fitness. Elongating the muscle and fascia by stretching improves circulation, increases elasticity of the muscle, increases oxygen to the muscles, and helps the body to repair. It increases the circulation of blood to the muscles and prevents tight muscles, which have less blood flow, and reduces inflammation.

Stretching should be performed every day. It is important to commit to stretching regularly so that the patient can gradually improve range of motion, and flexibility. Stretching can also help improve patient's posture. Sitting down all day at a desk or driving can cause the shoulders to round forward and kyphosis, which can decrease lung capacity. It will help the patient to manage the stress and anxiety of the disease and break down residual scar tissue.

It is usually necessary to continue a stretching program in order to maintain that range of motion. After radiation, stretching is very important to help keep the body flexible. Radiation typically causes additional tightening. Radiation can impact the affected area for at least a year following the completion of treatment.

## **Aerobic exercise**

Aerobic exercise is recommended to improve fitness. It not only improves cardiac function, but also improves oxygen capacity. Examples of aerobic exercise include walking, dancing, or any activity that increases heart rate. Low intensity exercise, such as walking, is a safe way to begin. Those with lung cancer should participate in an activity that is enjoyable.

Aerobic exercise can be performed at convenient times and can be undertaken at home. Advice can be given to start walking around a room in the house and slowly increase the distance walked. This can be repeated, then rest, and then repeat again. This can be done several times a day. A pedometer can be useful to measure steps and to help set and attain goals. To increase activity, walk up stairs, park far from their destination, dance, or do whatever is enjoyable that involves movement can be recommended.

## **Strength training**

Lung cancer patients may benefit from strength training because it can strengthen muscles that were weakened from symptoms and anti-cancer treatments. Fatigue is a very common symptom for those with lung cancer and if sedentary this can affect muscle mass which will decrease.

Exercise is recommended every day. A good way to start to exercise is in small increments of ten minutes at a time depending on the person's fatigue level. It is wise to progress slowly, set goals, and be mindful of the effect it can have on their body and it may take time to improve the individuals' fitness level. At first, the patient might suffer from fatigue and low endurance and might only be able to exercise for a short period of time. Every day the sessions can be lengthened.

Because of breathing difficulties, any type of exercise that increases lung capacity is beneficial. High levels of fatigue will make it difficult for the patient to want to be active so encouragement is needed. By becoming stronger, it may be possible to return to work and take care of activities of daily living. Strength training can also help patients improve balance, posture, and increase bone strength.

## Evidence

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The safety, benefits, and application of increasing physical activity and exercise in lung cancer with the goal to improve lung cancer outcomes have been demonstrated. Physical activity should be considered as a therapeutic option for patients with lung cancer as exercise and physical activity have been shown to reduce symptoms, improve quality of life, increase exercise tolerance, and decrease length of hospitalization and post-surgery complications for lung cancer (3,7). In addition, another important finding was that exercise and physical activity are safe for those with lung cancer. The conclusion was that health care professionals should consider recommending physical activity early and encourage physical activity for patients at any stage of lung cancer and lung cancer survivors.

Physical exercise can provide significant improvements in both endurance and isometric muscle strength in patients with advanced non-small cell lung cancer undergoing radiotherapy and/or chemotherapy (1).

If the patient was active before the diagnosis, it is important to encourage patience. It is not realistic to resume to the previous levels of exercise. Strength and endurance will have decreased, no matter how fit the patient was prior to treatment. It is wise to use the same exercise progression (relaxation breathing, walking, stretching, and strength training) as the deconditioned patient, but the fit patient can progress at a faster pace.

A preoperative exercise program based on moderate to intense exercise for patients scheduled for lung surgery had beneficial effects on aerobic capacity, physical fitness, and quality of life (13). Also preoperative exercise may reduce post-operative complications and it also may improve outcomes after lung cancer surgery (3). A few studies found that people who had rehab before surgery had shorter hospital stays and better recovery (12,13).

Exercise before surgery has multiple benefits such as improved quality of life, increased pulmonary capacity, endurance, strength and less fatigue with fitness levels before surgery predicting the risk of surgical complications following surgery (12).

## Personal observations

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In my role for over 20 years as a cancer exercise specialist and the creator of the Recovery Fitness cancer exercise program, I have observed and recognize that physical activity improves quality of life for those with lung cancer and can mitigate the side effects of anti-cancer treatments. Additionally, it decreases cancer-related fatigue, which is one of the most distressing symptoms for many with lung cancer. Although much more research is needed, exercise represents an important component in the management of patients diagnosed with lung cancer.

## Conclusions

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The evidence supporting exercise programs shows that this intervention would be helpful for survivors of lung cancer. Encouragement should be made to clinical teams to develop services to promote this as a good practice model for rehabilitation. Collaboration should be made with organisations able to offer physical activity programs and to develop research strategies to gather evidence. Sharing of good practice through organisations such as the International Association of the Study of Lung Cancer should be promoted.

## Acknowledgements

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None.

## Footnotes

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*Conflicts of Interest:* The author has no conflicts of interest to declare.

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