

## CHAPTER 12: NUTRITION AND LUNG CANCER

### INTRODUCTION

Lung cancer and its treatments place great energy demands on the body. Food is the body's energy source. Adequate nutrition while living with lung cancer is very important, but can be challenging as some *symptoms* of lung cancer and side effects of treatment can interfere with eating and nutrition. This chapter reviews the basic principles of nutrition and gives tips on healthy eating for people living with lung cancer. The information can help you plan a diet that ensures your body is getting the energy and nutrients it needs.

### FOOD AND ENERGY

The human body is always active. Even while you sleep, your body is working. The heart is beating, the lungs are breathing, the kidneys are filtering blood, old cells are being broken down, and new cells are being made. All body activities require energy much like a car needs gas to run. Food is the body's energy source. The food we eat is broken down by the *digestive system* into its simplest forms that are used to fuel the body's activities.

All foods are composed of different amounts of three types of nutrients: proteins, fats, and sugars. The digestive system breaks down all foods into these three basic nutrients. Foods also contain vitamins and minerals. Sugars are the main source of energy for the body. In times of great demand, the body can also utilize fats and proteins for energy.

The energy supplied by food is expressed in *calories*. Calories are a measure of the energy supplied by a specific food. The higher the number of calories in a food, the more energy it supplies to the body. The body requires a certain number of calories each day to carry out its functions. Most adults require 2,000-2,500 calories each day to maintain their body weight. The exact number of calories needed each day varies from one person to another.

Your daily calorie requirement depends on many factors including:

- body size
- daily activity level
- rate of *metabolism*
- amount of tissue loss and growth
- presence of infection

Metabolism is the term used to describe the total activities of the body, which includes fueling body functions, breaking down tissues, and building up new ones. People have different natural rates of metabolism. People with a low metabolic rate require fewer calories than do people with a fast metabolic rate. Your natural metabolic rate is similar to the fuel efficiency of a car. Fuel-efficient cars can go longer distances on a gallon of gas than less fuel-efficient cars. Similarly, people with a slow metabolism use the energy from their food very efficiently. They require fewer calories than do people with faster metabolic rates. The faster your metabolic rate, the more calories you require.

Regardless of your normal metabolic rate, having cancer and receiving treatment tend to increase the number of calories needed each day to maintain your body weight. It can be a challenge to keep up with the increased need for calories, especially if you are dealing with symptoms and side effects such as nausea, shortness of breath, mouth sores, altered taste, and/or decreased appetite. For these and other reasons, weight loss is common among people with lung cancer. Unintentional weight loss occurs when your body is not getting sufficient calories to keep up with energy demands. Weight loss indicates the body is in a *negative energy balance*. This means the body is using more energy than is being taken in. The body cannot function optimally when there is a negative energy balance.

## **COMPONENTS OF A HEALTHY DIET**

A healthy diet is one that provides the necessary calories and nutrients required to promote and maintain health. The United States Departments of Agriculture (USDA) and Health and Human Services (HHS) released a new food pyramid in 2005 as a guide to help adults eat a healthy, nutritious diet (see Figure 1). The new graphic is called “My Pyramid.”

The pyramid is divided into six food groups:

- **Grains** including bread, cereal, rice, and pasta (orange)
- **Fruits** (red)
- **Vegetables** (green)
- **Dairy** including milk, yogurt, and cheese (blue)
- **Meat & Beans including** meat, poultry, fish, beans, eggs, and nuts (purple)
- **Oils** including fats, oils, and sweets (yellow)

**Figure 1: USDA Food Guide Pyramid\***



\* United States Departments of Agriculture and Health and Human Services

### **Grains**

Grains include foods such as bread, cereal, rice, and pasta group. The foods in this group are called starches or *complex carbohydrates*. Complex carbohydrates are broken down into sugars by the digestive system.

Grains are divided into whole grains and refined grains. Refined grains have been milled and much of the fiber content removed. Whole grains have high fiber content. The USDA recommends that at least half of the grains you eat be of the whole grain variety.

Table 1 shows examples of foods from this group and the amount of each that equals one serving.

**Table 1: Foods and Servings from the Grains Group**

<b>Food</b>	<b>Serving Size</b>
bagel	½ bagel
bread	1 slice
cooked oatmeal or grits	½ cup
cooked pasta	½ cup
cooked rice	½ cup
dinner roll	1 (small, approx. 2 inches across)
dry cereal	1 ounce (see package for the amount in cups)
English muffin	½ muffin
graham crackers	2 squares
saltine crackers	5 crackers
tortilla	1 (6 inches across)

Many people are surprised when they see the amount of food that equals one serving. Servings are usually much smaller amounts than expected.

Few of us weigh our food or measure it before eating. However, you can learn to judge the approximate number of servings by comparing the amount of food you are eating to common items. For example, a baseball is about the same size as one cup of food. Similarly, a half cup of food is about the size of a half baseball. Thinking in these terms, you can begin to judge the number of servings you are eating of various foods.

You will get the most nutrient value from the foods in this group if you follow this simple rule of thumb – the browner, the better. White flour is made from wheat that has been bleached. The bleaching process removes many of the natural nutrients. When buying bread, get whole wheat, multi-grain, rye, or another dark bread instead of white bread. Brown rice contains more nutrients than white rice. Similarly, whole wheat, rye, or other whole grain crackers are more nutritious than white crackers.

### **Fruits and Vegetables**

Fruits and vegetables provide vitamins, minerals, sugars, and fiber. The USDA previously recommended numbers of daily servings are 2-4 servings of fruits and 3-5 servings of

vegetables. However, the new food pyramid makes recommendations based on your age, sex, and activity level (see [www.mypyramid.gov](http://www.mypyramid.gov)).

A serving of fruit is:

- one cup of fresh cut fruit
- a medium-sized, round fruit such as an apple, orange, or peach (about the size of a baseball)
- ½ cup of canned or cooked fruit
- ¼ cup of dried fruit
- ¾ cup (6 ounces) of fruit juice

A serving of vegetables is:

- ½ cup of chopped raw vegetables
- ½ cup cooked vegetables
- 1 cup chopped leafy vegetables such as lettuce or fresh spinach
- ¾ cup (6 ounces) of vegetable juice

Two words to keep in mind to get the most nutrient value from fruits and vegetables are raw and colorful. Raw fruits and vegetables have more nutrients than cooked or canned produce. If raw fruits or vegetables are not available, frozen varieties have more nutrients than canned products. When planning meals and shopping for fruits and vegetables, think colorful. Eating a variety of different colored fruits and vegetables means you are getting a wide variety of nutrients.

### **Proteins: Meats, Beans, and Dairy Products**

Protein in comes from two main sources, dairy products (milk, yogurt, and cheese) and the non-dairy protein (meat, poultry, fish, beans, eggs, and nuts). Proteins are the building blocks for all body tissues.

Table 2 shows foods in the dairy group and their serving sizes.

**Table 2: Foods and Servings from the Dairy Group**

<b>Food</b>	<b>Serving Size</b>
cheese	1½ - 2 ounces (4 squares the size of dice)
cottage cheese	2 cups (16 ounces)
milk	1 cup (8 ounces)
yogurt	1 cup (8 ounces)

The non-dairy protein includes meat, poultry, fish, beans, eggs, and nuts. The beans in this group include kidney, navy, lima, and other dried beans. Green and yellow beans are not included because they are vegetables. Table 3 shows foods in the non-dairy protein group and their serving sizes.

**Table 3: Foods and Servings from the Non-Dairy Protein Group**

<b>Food</b>	<b>Serving Size</b>
beans (cooked)	½ cup
eggs	2 eggs
meat, poultry, and seafood	4 ozs. before cooking, 3 ozs. after cooking (about the size of a deck of cards)
nuts	⅓ cup (a small handful)
peanut butter	4 tablespoons
soy milk	1 cup (8 ounces)
tofu	4 ounces

Your nutrient value from this group is maximized when you choose a variety of different foods. Lean meats are healthier than fatty meats such as sausage and bacon. Unsalted nuts are healthier than salted varieties. Eggs are a very good, inexpensive source of protein.

### **Oils and Fats**

This food group includes cooking oils, fats in other foods, butter, margarine, and fats from snack foods. There are no recommended servings per day for foods in this group. The recommendation for disease-free adults is to include these foods sparingly in your diet. The reason for this recommendation is these foods often have little nutrient value but are usually high in calories. Particularly when you are having difficulty keeping up with your body's nutritional needs, these foods can detract from your nutrition rather than helping. Snack foods satisfy hunger because they are high in calories, but they often do not provide your body with needed nutrients.

While most adults should limit their intake of foods from this group, people with cancer may be encouraged to increase their fat intake. Fats can help people with cancer keep up with their increased calorie needs. Fats provide a high number of calories in a small quantity of food. Try to make food choices that provide both calories and nutrients. If you are hungry

for something sweet, rather than eating candy you might try fruit, yogurt, pudding, or a milk shake. Roasted nuts, trail mix, dried fruits, and granola are good alternatives to snack foods such as potato chips, corn chips, or pretzels. The old saying, “You are what you eat” is true. Try to make sure every bite of food you eat provides your body with the nutrients and energy it needs.

### **Customizing Your Diet to Meet Your Needs**

Each person with lung cancer is unique. Your diet should be customized to meet your special needs and circumstances. Factors to be considered when planning your diet include:

- your cancer treatment plan
- your current height and weight
- recent unintentional weight loss
- other illnesses such as diabetes, kidney problems, heart disease, and high blood pressure

People with cancer are often advised to increase their protein and fat intake. Proteins are important during treatment because they provide the building blocks for restoring normal tissues that have been injured as a side effect of therapy. Proteins are also essential for healing after surgery. If you have kidney disease, your protein intake may need to be closely monitored. Including more fats in your food preparation and selections can greatly increase your calorie intake without substantially increasing the amount of food you eat in a day. On the other hand, your fat intake may need to be limited if you have heart disease.

Your doctor will advise you about your diet. He or she may also refer you to a dietician or nutritionist to help with your dietary questions and needs. Dieticians and nutritionists are health care professionals who are experts on the relationships between nutrition, health, and disease. They advise people about their food intake to help promote good health and healing. A dietician can tell you how many calories you need each day and how to distribute those calories across the different food groups. Your diet may need to be adjusted several times during the course of your illness depending on where you are with your treatments and what symptoms you are experiencing.

Nutrition is very important. Doctors are good but it's your body that has to do all the work. So when I was diagnosed, I immediately went to a nutritionist. I told him I needed to [build] up my immune system as much as possible. I took Vitamin C, E, and a whole bunch of things.\* During chemotherapy, my blood levels never dropped and my doctors were amazed I did so well. They said it was like I never went through chemo. Right before surgery, my nutritionist gave me a booster shot. I came out of it just flying. I was out of the hospital within four days even [after they] had removed two sections of my rib.

–Joan, diagnosed with stage IIIB NSCLC in 1999 at age 60

**\*NOTE: It is important not to begin taking any vitamins or other supplements without first discussing it with your doctors.**

## MANAGING NAUSEA & VOMITING

Nausea and, much less commonly, vomiting can be associated with chemotherapy treatments for lung cancer. Health care providers refer to the nausea and vomiting that may be associated with chemotherapy as CINV (chemotherapy-induced nausea and vomiting). Many people have the idea that all chemotherapy causes severe nausea and vomiting. This is simply untrue. Not all chemotherapy drugs cause nausea and/or vomiting. Further, there are many highly effective drugs to prevent and control CINV. Nonetheless, you may experience occasional nausea and/or vomiting due to chemotherapy or other causes during the course of your illness. Persistent nausea and vomiting can substantially interfere with your ability to eat well.

*Chapter 10: Supportive Care* discusses medications used to treat nausea and vomiting. Following are some self-help techniques that may also help you manage nausea and vomiting, regardless of the cause.

- Have someone else prepare your meals and bring them to you.  
Cooking odors can lead to nausea. If friends or family would like to help you, ask them to bring prepared meals to your home. This is especially helpful on days when you are most likely to experience treatment-related nausea. Ask your doctor or nurse when this is most likely to occur as some nausea and vomiting is delayed for a few days after treatment.
- Prepare meals ahead of time.  
You can prepare meals ahead of time if someone else is not bringing your meals. Freeze single serving portions that can be easily reheated.



- Do not eat for two hours before or after a chemotherapy treatment.  
An empty stomach reduces the risk of nausea and vomiting.
- Consuming ginger may help prevent nausea.  
Ginger has been used to prevent nausea in many cultures for centuries. Studies have shown that ginger can help prevent nausea in some people, but it is not effective for everyone.<sup>14</sup> Ginger is available in many forms including capsules, syrups, and teas. Talk with your cancer doctor or nurse if you are interested in trying this preventive technique. Ginger is unlikely to help if you are already nauseous or vomiting.
- Acupuncture and acupressure at specific wrist points may help reduce nausea and vomiting.  
According to traditional Chinese medicine, there is a point on the inside of the wrist (p6) that is related to nausea and vomiting. Stimulating this point has been shown in clinical trials to help prevent nausea and vomiting and improve the effectiveness of anti-nausea drugs in some people.<sup>5-8</sup> While not effective for everyone, some people have experienced significant relief from this treatment. There are different ways to stimulate the p6 point including traditional acupuncture therapy, self-administered acupressure, and wristbands such as ReliefBands<sup>®</sup> and BioBands<sup>®</sup>. Talk with your cancer doctor or nurse if you are interested in trying acupuncture or acupressure. He or she can refer you to a qualified acupuncturist or put you in touch with someone who can help you find out more about these techniques.
- Eat small amounts throughout the day rather than three large meals.  
Filling and stretching your stomach increases the likelihood of nausea and vomiting.
- Eat sitting up. Do not lie down immediately after eating.  
A reclining position or lying down can cause food to back up into the *esophagus* (the tube between the mouth and the stomach). This back up can stimulate vomiting.
- Eat slowly and chew your food well.

Eating slowly helps decrease the amount of air swallowed with your food. A large amount of air stretches the stomach, which can trigger nausea and vomiting. Chewing your food well helps it move more quickly from the stomach into the intestines, which also decreases the risk of nausea and vomiting.

- Eat easily digested, low fat foods.

The more quickly foods pass from the stomach into the intestines, the less likely they are to cause nausea and vomiting. High-fat foods stay in the stomach for many hours, which can provoke nausea and vomiting. Fibrous foods such as raw vegetables and seeds are also slow to digest. Uncooked fruits such as apples, oranges, grapefruits, and pineapples should probably be avoided during your most difficult days. Examples of low-fat, easily digested foods include baked crackers, pretzels, toast (unbuttered), soft breads, oatmeal, Cream of Wheat<sup>®</sup>, baked or boiled potatoes (without butter or sour cream), plain noodles, white rice, skinless chicken or turkey (white meat), mild soups, applesauce, canned peaches or pears, gelatin (Jell-O<sup>®</sup>), and freezer pops (Popsicles<sup>®</sup>).

- Do not try to eat if you are feeling nauseous.

Eating will not make chemotherapy-induced nausea go away. It may actually cause vomiting. Wait until the nausea passes before trying to eat.

- Avoid strong odors.

Any strong odor can stimulate nausea and vomiting. Avoid cooking odors and eating fragrant foods such as garlic, onions, peppers, horseradish, eggs, fish, broccoli, cabbage, cauliflower, and brussels sprouts. Perfumes and colognes can also be bothersome. Some people even find the fragrances added to soaps and detergents unpleasant. If this is a problem for you, try fragrance-free products. Do not be afraid to ask others spending time with you not to wear perfume or cologne.

- Avoid greasy foods.

Greasy foods are hard to digest and stay in the stomach for extended periods, sometimes up to 12 hours. Foods to avoid include deep-fried foods, potato

chips, butter, salad dressing, peanut butter, nuts, milk, cheese, hamburger, bacon, sausage, and luncheon meats.

- Avoid carbonated drinks.

Carbonated drinks such as soda pop, club soda, and carbonated water release gas that causes the stomach to stretch. This stretching may trigger nausea and vomiting.

- Take small amounts of cold or frozen liquids to calm your stomach.

Small amounts of ice water, ice chips, iced tea, frozen ices, and sorbets can help calm an upset stomach. Mint teas can also be soothing.

- Keep your mouth clean.

Keeping your teeth brushed and flossed can help get rid of bad tastes in your mouth that can lead to nausea and vomiting.

Cool yourself down if you are nauseous. Open the windows, turn on a fan, or go outside. Place an ice pack or cold cloth on your neck and/or forehead. Take slow, deep breaths. If you vomit, rinse your mouth with water and brush your teeth to get the taste out of your mouth. Do not eat or drink anything for at least 30 minutes to give your stomach a chance to settle down. If the nausea has passed after 30 minutes, try a small sip or two of water or a spoonful of ice chips. Wait 15 minutes before trying a little more water or ice chips. Continue this pattern of small amounts with breaks in between gradually increasing the amount you take in each time. If you are not nauseous after two hours, try eating one or two crackers. Stick with eating very small amounts. It is much better to take in small amounts for a few days than to try eating larger amounts and not keeping anything down.

**The main thing for me was to be able to conjure up enough patience to try to eat. When you're nauseated, the last thing you want to do is try to eat. Even if I just tried to drink water, it would come right back up. I found that Popsicles™ were wonderful. They would just melt in your mouth. You didn't need to chew and the cool liquid tasted good and went down slowly. –Sue, diagnosed with stage III NSCLC in 1997 at age 48**

## MANAGING TASTE CHANGES AND LACK OF APPETITE (Anorexia)

Appetite and taste are closely related. The taste of food makes eating an enjoyable experience. When taste is diminished or other problems make eating difficult, the pleasure of eating and your appetite are often also reduced.

There are four basic taste sensations: sweet, sour, bitter, and salty. We sense the taste of foods with taste buds on the tongue. Taste and smell interact with one another. The smell of food enhances your sensation of taste.

Taste and appetite can be affected by cancer treatments in different ways.

- Chemotherapy drugs affect all rapidly dividing tissues of the body including the taste buds. Chemotherapy can lead to a temporary decrease in the number and activity of the taste buds. This results in altered or decreased taste sensation.
- Chemotherapy and *radiotherapy* to the head can affect the salivary glands causing decreased saliva (spit) production. A dry mouth decreases taste sensations and can make chewing and swallowing difficult.
- Chemotherapy and radiotherapy to the head can cause an overgrowth of yeast in the mouth and throat, a condition called *thrush*. Thrush can alter taste sensations and cause inflammation making it difficult to eat and swallow.

**I used to just love Haagen-Dazs™ chocolate chip ice cream. Boy, did chemo cure me of that. About the only thing I found that tasted good was Campbell's™ chicken noodle soup. Everything else just tasted like pond scum.**

**–Judith, diagnosed with stage IIIB NSCLC in 2001 at age 60**

Following are some self-help techniques that may help you manage taste changes and lack of appetite.

- Suck on a mint, lemon drop, or other hard candy during chemotherapy treatment to help relieve unpleasant tastes in your mouth.

Platinum-based chemotherapy drugs such as carboplatin (Paraplatin®) and cisplatin (Platinol®) and some other chemotherapy drugs used to treat lung cancer can cause an unpleasant taste in your mouth. The memory of this taste can interfere with appetite and eating.

- Avoid bitter foods.  
Some people on chemotherapy become very sensitive to bitter tastes. Beef and other red meats you once enjoyed may suddenly taste bad or spoiled to you. Non-bitter foods such as white chicken or turkey, mild fish, eggs, mild cheeses, peanut butter, and beans are good sources of protein if you cannot tolerate red meats.
- Use herbs and spices to enhance the taste of foods.  
Temporary decreases in the number of taste buds can reduce your ability to taste food. This can be at least partially overcome by adding more herbs and spices to your food. Be careful to avoid hot spices such as ground chili, curry, and pepper that can irritate your mouth. Large quantities of salt can also be irritating.
- Try eating pleasantly fragrant foods.  
Foods that have a pleasant smell can enhance your perception of taste because the sense of smell contributes to taste. Depending on what appeals to you, consider adding onions, garlic, basil, rosemary, thyme, vanilla, almond flavoring, wine, or other pleasant smelling ingredients to your foods.
- If you are sensitive to food odors, try eating cold or room temperature foods.  
While on treatment, some people find food odors unpleasant. Cold or room temperature foods may be easier to eat than warm foods because they emit less fragrance.
- Make your food visually appealing.  
Any good chef will tell you that part of the overall appeal of food is the visual presentation. Foods that look good are often more appetizing. Colorful foods arranged in a pleasing way on a plate may help increase your appetite.
- If you have a metallic taste in your mouth, try using plastic eating utensils.  
Some people who have a metallic aftertaste from chemotherapy find it very unpleasant to put a metal eating utensil in their mouth. Plastic utensils are an easy way to avoid this unpleasantness.
- Keep your mouth clean.  
Keeping your teeth brushed and flossed can help get rid of bad tastes in your mouth.

The mineral zinc is needed for normal taste bud function. Abnormally low levels of zinc are associated with decreased taste sensation. If a zinc deficiency is affecting your taste sensation, supplemental zinc may improve your ability to taste.<sup>9</sup> Talk with your doctor if you are interested in trying a zinc supplement. You should not begin taking any supplements without first discussing it with your doctor.

## MANAGING WEIGHT LOSS

Unintentional weight loss is a common symptom of lung cancer. Someone with lung cancer may lose weight for any of several reasons that often change over the course of the disease. Factors that contribute to unintentional weight loss can be disease- or treatment-related and include:

- substances produced by the cancer
- the body's reaction to the cancer
- persistent coughing
- difficulty swallowing
- pain
- difficult, labored breathing
- mouth sores
- altered taste sensation
- nausea and/or vomiting
- diarrhea

Weight loss can be a troubling and persistent problem for people with lung cancer. In its most extreme form, weight loss can lead to a condition called *cachexia*. The hallmark of cancer cachexia is substantial weight loss that involves not only fat but also *lean body mass*, that is, the non-fatty tissues of the body such as muscle and bone. Cachexia is usually accompanied by loss of appetite (*anorexia*) and weakness. *Chapter 10: Supportive Care* has additional information about disease- and treatment-related weight loss.

Following are some suggestions that may help you avoid or decrease unintentional weight loss. A dietician or nutritionist should be consulted if you have ongoing weight loss.

- Eat early in the day.  
Your appetite is usually greatest at the beginning of the day. Take advantage of your appetite by making breakfast your largest meal of the day.
- Eat whenever you are hungry.  
Many of us were taught as children to eat at mealtimes and avoid between meal snacks. While this may be reasonable advice for people who are trying not to gain weight, it is not helpful for those dealing with weight loss. If you are having a problem with weight loss, eat whenever you are hungry. Do not wait for your usual mealtime.
- Eat small amounts throughout the day.  
It is often easier to eat several small meals throughout the day rather than three large meals. For example, try planning five or six small meals (eating every 2 to 2½ hours). Small meals can be less overwhelming than large meals and often result in consuming more food over the day than you would with larger meals. If you are hungry, eat small snacks between meals.
- Eat calorie-rich foods.  
Most of us are used to limiting the amount of high-calorie foods we eat. When you are losing weight, this limitation no longer applies. Try to be sure everything you eat or drink supplies your body with both calories and nutrients. You can add calories to your normal meals by adding gravies, using cooking oils liberally, substituting heavy cream for milk or water in recipes, and spreading butter on bread and rolls or melting it over vegetables. Although you want to eat calorie-rich food, avoid high-calorie foods such as candy that fill you up but do not provide many nutrients.
- Try liquid or pureed meals.  
Liquid meals may be easier and more appealing than solid foods if you are struggling to eat. Use a blender to make milk shakes and frozen fruit drinks. The protein content of these drinks can be greatly increased by adding powdered protein mix that can be purchased at most health food and nutrition stores. Vegetable drinks are usually not helpful for people losing weight because most vegetables are low in calories.

Some people find blending the contents of their meals and eating them as a thick soup is more appealing than solid food. For example, if you are having chicken and gravy, take the chicken off the bone and put it in the blender with the gravy to make a thick chicken soup. You can do this with almost any food. You may also want to try baby foods. They have the consistency of foods pureed in the blender without the extra preparation time.

- Plan your own meals.

You know better than anyone else does what foods appeal to you. Many people receiving cancer treatment find their tastes and food preferences are different than they had been in the past. You may be hungry for foods you rarely ate in the past. On the other hand, you may find you can no longer tolerate foods you used to enjoy. Do not be alarmed by these changes; they are quite common. Eat whatever you are hungry for now. If others want to help by preparing meals for you, be sure to ask for foods you want to eat.

- Avoid low-calorie foods and beverages.

When trying to maintain your weight, everything you eat should provide the both calories and nutrition. Low-calorie or non-nutritious foods and drinks should be avoided. Examples of foods and beverages to keep to a minimum and some possible substitutions are shown in Table 4.

**Table 4: Low-Calorie Foods and Possible Substitutions**

<b>Low-Calorie Foods</b>	<b>Possible Substitutions</b>
Coffee <sup>†</sup>	latte, mocha, coffee-flavored milkshake
tea, soda pop	fruit juice, milkshake, fruit shake, whole milk, soy milk
skim milk	whole milk
broth-based soups	stews, creamed soups
plain cooked vegetables	vegetables with cheese or hollandaise sauce
plain raw vegetables	vegetables with peanut butter, cheese spread, blue cheese, or another salad dressing
vegetable salad	pasta salad or potato salad

<sup>†</sup> Large quantities of caffeine should be avoided because caffeine increases your metabolic rate leading to increased use of calories.



- Limit the amount of low-calorie liquids you drink at mealtime.  
Once your stomach sends the message to your brain that it is full, your appetite is turned off. This occurs whether your stomach is full of food or liquid. Limit the amount you drink with meals to increase the amount of high-calorie foods you consume. Sip on a high-calorie beverage after your meal or as a between meal snack.
- Eat in a pleasant environment.  
A pleasant environment can decrease the stress and pressure that can accompany mealtimes. A flower in a vase on the table, pretty tableware, enjoyable music, a lighted candle, eating outside on a sunny day, and dining with people whose company you enjoy are ways to increase the pleasure of mealtimes.
- Try some light exercise before meals.  
Exercise increases your appetite. Talk with your doctor or nutritionist about doing some light exercise such as walking or gentle calisthenics before meals.
- Supplement your diet with high-calorie drinks.  
Ready-to-drink, high-calorie protein beverages (Boost Plus<sup>®</sup>, Ensure Plus<sup>®</sup>, Resource Plus<sup>®</sup>, ProSure<sup>®</sup>, Sustacal Plus<sup>®</sup>, and others) can be a good source of calories and nutrition. These drinks come in many different flavors. You can drink them plain, over ice, or blended with fruit or ice cream. Special formulations are available for people who are diabetic or have kidney problems. Carnation Instant Breakfast<sup>®</sup> and Nestle Sweet<sup>®</sup> are less expensive drink mixes that can also be used to make nutritious drinks. Adding protein powder will further boost the nutritional value of these drinks.
- Take snacks with you when you are away from home.  
It is important to eat whenever you are hungry, regardless of where you are. Examples of high-calorie, nutritious snacks you may want to take with you when you're going to be away from home for several hours include trail mix, granola bars, dried fruits, nuts, and nutrition or energy bars (PowerBar<sup>®</sup>, Clif Bars<sup>®</sup>, Balance<sup>®</sup> Bars, Luna<sup>®</sup> Bars, and many others).

**I was thin to begin with, so I wanted to make sure not to lose weight. I ate whenever I was hungry and indulged in everything fat-filled. I remember when the radiation made it so I couldn't even swallow my own spit, but I found I could eat watermelon, which was wonderful.**

**-Toni, diagnosed with limited SCLC in 1992 at age 39**

Simple changes in food preparation can help you significantly increase your total calorie intake. For example:

- Use cream instead of milk on your cereal. Consider topping your cereal with nuts, coconut, and/or dried fruit.
- Substitute cream for milk or water in your recipes.
- Add extra cooking oil when preparing your meals.
- Use gravies and sauces in your meals.
- Add mayonnaise and cheese to your sandwiches.
- Use butter, cream cheese, or nut butters on your bread and rolls.
- Top desserts, pancakes, and waffles with whipped cream.
- Add honey or sugar to beverages.
- Avoid 'light' products that have reduced fat or sugar content.
- Add shredded cheese to casseroles, vegetables, and pasta dishes.
- Add powdered milk or eggs, or cream to casseroles, mashed potatoes, and soups.
- Dip fruits in whipped cream, honey, melted caramel, or another dipping sauce.

*Chapter 10: Supportive Care* has information about medicines and supplements that are sometimes used to increase appetite and prevent or reverse weight loss.

## **MANAGING DIARRHEA**

Diarrhea is a common problem for people on chemotherapy. It interferes with good nutrition because food moves too rapidly through the intestines to be properly digested and absorbed. Chemotherapy drugs cause diarrhea by injuring the rapidly dividing cells

that line the intestines. These drugs can also cause cramping belly pain, which decreases appetite.

The foods and beverages you eat can either aggravate diarrhea or help avoid it. Foods to avoid or limit if you have diarrhea include:

- raw fruits and vegetables

Fibrous vegetables and fruits that contain natural laxatives can cause or significantly worsen existing diarrhea. All raw fruits and vegetables can have a laxative effect, but foods to be sure to avoid include celery, lettuce, cabbage, broccoli, brussel sprouts, spinach, cauliflower, asparagus, kale, corn, rutabagas, prunes, pears, peaches, pineapples, and rhubarb.

- nuts and seeds

pepitas, sunflower, pumpkin, and sesame seeds)

- large quantities of fruit juices and sports drinks (Gatorade<sup>®</sup>, Powerade<sup>®</sup>, and others)

These beverages can aggravate diarrhea because of their high sugar content. Apple, pear, and prune juice should be avoided because they act as natural laxatives. It is usually best to limit the amount of other fruit juices and sports drinks in your diet. If you want a small amount of one of these beverages, drinking it along with food or diluting it with water can help decrease the risk of diarrhea.

- dairy products (if you have an intolerance)

Some people on chemotherapy develop a problem digesting milk products. This is caused by a temporary lack of the enzyme *lactase* that digests milk sugar. Dairy products can cause belly cramps, gas, and diarrhea in people with a lactase deficiency. These symptoms can be avoided by eliminating dairy products (milk, cheese, yogurt, ice cream, etc.) from your diet. However, dairy products are a good source of protein and a dairy-free diet can be a substantial change for many people. Rather than eliminating dairy products from your diet, you can take supplemental lactase when you eat dairy products. These products are

available over-the-counter and include brand name products such as Lactaid<sup>®</sup>, Dairy Ease<sup>®</sup>, Dairy Relief<sup>®</sup>, Lacteeze<sup>®</sup>, and others.

- fats  
Limit your fats (butter, cooking oils, margarine, etc.) until the diarrhea is under control.
- large quantities of sugar  
Any food with a high concentration of sugar can worsen diarrhea.
- caffeinated coffee, tea, colas, and carbonated beverages  
Caffeinated and carbonated drinks can stimulate the bowel, making diarrhea worse.
- alcohol  
Alcohol can irritate the lining of the bowel and increase the action of the bowel leading to worsening diarrhea.
- foods containing sorbitol  
*Sorbitol* is a natural sugar found in certain fruits such as prunes, pears, peaches, and apples. Sorbitol is a natural laxative and can significantly worsen diarrhea. It is also often used as a sweetener in reduced calorie chewing gum and candies. Generally, people with cancer should not consume reduced calorie products unless specifically advised to do so by their doctor or nutritionist.
- extremely hot or cold foods  
Extremes of temperature can increase the activity and cramping of the intestines. Slightly warm or room temperature foods are usually easier to digest than very hot or cold foods.

Foods to eat that can help slow or prevent diarrhea include:

- baked or boiled potatoes, and potato soup
- bean soups
- boiled carrots
- white rice, rice or oat porridge, and barley
- bread, bagels, and English muffins
- saltine crackers and pretzels

- dry cereals (not bran cereal)
- plain boiled pasta
- bananas (slightly green) and applesauce
- soy bean products such as tofu and soy milk
- non-fat or low-fat yogurt with active cultures
- tomato juice or mixed vegetable juice; add powdered soy to increase your protein intake
- baked chicken or turkey without the skin
- baked lean beef
- hard boiled eggs
- the spice nutmeg decreases the activity of the intestine; sprinkle it on your foods

Depending on the chemotherapy drugs you are taking, the severity of your diarrhea, and how the diarrhea responds to dietary changes, your doctor may prescribe medicines to help control your diarrhea.

## **MANAGING CONSTIPATION**

Constipation is a common side effect of opioid pain medications (those related to morphine). Constipation can also be caused by lack of eating, decreased fluid intake, and lack of activity. Constipation interferes with good nutrition because fullness in the belly decreases or eliminates appetite.

The foods and beverages you eat can either aggravate constipation or help avoid it. One of the most important things you can do to avoid or recover from constipation is drink plenty of fluids – at least 8-10 glasses per day. Fruit juices and water are your best choices.

Other foods that help reverse or avoid constipation include:

- raw fruits and vegetables, especially those with skins and seeds such as plums, cherries, grapes, figs, strawberries, raspberries, blueberries, oranges, grapefruits,

carrots, corn, broccoli, cabbage, cauliflower, brussel sprouts, zucchini, lettuce, spinach, bok choy, and kale

- dried fruits, especially prunes, apricots, dates, and raisins
- fruit juices, especially prune and pear juice
- whole grain breads
- bran and whole grain cereals (Shredded Wheat<sup>®</sup>, All-Bran<sup>®</sup>, Bran Flakes<sup>®</sup>, and many others)
- brown rice
- whole grain pasta
- nuts and seeds (pepitas, sunflower, pumpkin, and sesame seeds)
- beans such as chick peas, lentils, kidney, navy, black, and limas beans

Foods to avoid when your bowels are inactive because they can cause or worsen constipation include:

- cheese, milk, and other dairy products
- large amounts of meat
- eggs
- high fat foods
- applesauce
- bananas
- white rice
- white breads
- chocolate

Warm or hot fluids are helpful, especially in the morning and at the beginning of meals.

Exercise is also important to keep the bowels moving. Talk with your doctor about a gentle exercise program if you are not currently getting regular exercise.

When you feel the urge to move your bowels, go to the bathroom right away. Waiting to go can cause excessive water to be absorbed from the bowel contents leading to constipation.

Prevention of constipation is usually the best treatment strategy. Your doctor may put you on a regimen of stool softeners and/or laxatives to prevent constipation if you have had problems with constipation or are taking opioid pain medications. If constipation develops and does not resolve with dietary changes and other treatments, an enema may be needed. Contact your doctor if you are having a problem with constipation. The longer the problem persists, the more difficult it can be to treat.

## **MANAGING MOUTH & SWALLOWING PROBLEMS**

Chemotherapy and radiotherapy to the head or chest can irritate the lining of the mouth, throat, and esophagus. This irritation can make eating and swallowing difficult, interfering with good nutrition. Irritation of the mouth lining is called *stomatitis* or *mucositis*; irritation of the esophagus is called *esophagitis*. *Chapter 10: Supportive Care* has additional information about the development and symptoms of stomatitis and esophagitis.

Good mouth care is very important if you have mouth soreness. Tips for good mouth care include:

- Brush your teeth at least four times per day. Floss at least twice per day.
- Use toothpaste with fluoride to help protect your teeth. If commercial toothpaste burns your mouth, use a solution of ½ teaspoon of salt and 2 tablespoons of baking soda in 8 ounces of warm water instead of toothpaste.
- Use a soft or extra-soft toothbrush to avoid small abrasions of the mouth and gums. Children's toothbrushes are usually extra-soft.
- Apply fluoride gel to your teeth at bedtime.
- Rinse your mouth with a solution of ½ teaspoon of salt and 2 tablespoons of baking soda in 8 ounces of warm water at least 4–6 times per day. Follow the solution with a clear water rinse.
- Be sure to brush your teeth and rinse your mouth after eating foods or liquids with high sugar content.
- Keep your lips moist with lip balm or petroleum jelly. Do not share these items with other people as they can spread infections.

Following are some suggestions that can help make eating easier when you have a sore mouth and/or throat. Call your cancer care provider right away if the pain from these problems becomes so severe that you are unable to eat or drink.

- Avoid spicy foods that may increase the burning sensation in your mouth or throat. Spices such as ground pepper, chili, curry, mustard, and others can be particularly irritating.
- Avoid carbonated beverages, orange juice, grapefruit juice, and acidic foods such as citrus fruits, vinegar, salad dressings, pickled foods, ketchup, steak sauce, barbeque sauce, and Worcestershire sauce.
- Avoid salty foods that can dry your mouth and lips.
- Avoid very hot liquids or foods that could burn your mouth, tongue, or throat.
- Avoid alcohol in beverages, foods, or other products such as mouthwash or fluoride rinses. Alcohol will cause burning and may increase the severity of mouth sores and throat irritation.
- Avoid eating foods with sharp edges that may scratch your mouth or throat such as potato chips, hard breads, crackers, and granola.
- Eat foods that are soft, moist, and easy to chew. Yogurt, oatmeal, grits, rice, pasta, potatoes, yams, applesauce, pudding, cooked carrots, peas, cheeses, eggs, soups, stews, and casseroles are a few examples.
- Use a blender to puree foods to make them easier to swallow. This is especially helpful for vegetables. Baby foods can be good alternative to solid foods.
- Use a straw to drink liquids and pureed foods. Using a straw bypasses much of the mouth and tongue avoiding further irritation.

## **FOOD SAFETY**

Lung cancer and its treatments are often associated with an increased susceptibility to infections. The immune systems of people with cancer often do not function as effectively as they normally would. This is especially true for people who are on chemotherapy drugs that reduce the number of white blood cells in the circulation. Because cancer can reduce the immune system's ability to fight infections, you need to take measures to decrease your risk of exposure to infectious agents.



Eating is one route by which infectious particles can enter the body. Simple food safety measures can significantly reduce your risk of infections from food.

- Wash your hands thoroughly with soap and water before and after handling food. Rub your hands together with soap for at least 15 seconds. Use a nailbrush to clean thoroughly under your nails especially if you have long fingernails.
- Keep uncooked meat, fish, and poultry separate from your ready-to-eat foods in the refrigerator. Be sure to wash your hands with soap and water before handling or eating ready-to-eat foods, especially if you have touched uncooked meat.
- Thoroughly wash any utensils used on uncooked meat, fish, or poultry before using them on other foods. Use dish soap in hot water and a thorough hot rinse, or a dishwasher to clean dirty utensils. Cutting boards must also be thoroughly cleaned between uses. Glass or acrylic cutting boards are easier to keep clean than wood cutting boards.
- If you are barbecuing or pan-frying meat, use a clean utensil to remove the cooked meat. Reusing the same utensil used to put the uncooked meat into the pan or over the coals may contaminate the cooked meat with bacteria from the uncooked meat.
- Cook meat, fish, and poultry thoroughly. A meat thermometer is helpful when cooking large pieces of meat to be sure the inside reaches the proper cooking temperature.
- Do not eat raw fish (sushi) or shellfish such as oysters.
- Refrigerate cold foods from the store as soon as possible.
- Keep your refrigerator temperature at or below 40° F.
- Check the expiration date on all food items. Never eat something after its expiration date.
- Do not eat uncooked dough or batter that contains eggs.
- Do not put raw eggs into salad dressings or blended drinks that will not be cooked before eating.

- Avoid eating uncooked foods you have not prepared yourself such as sushi and foods from restaurant salad bars. Food from street vendors should also be avoided.
- If you are getting ice cream from a vendor, hard ice cream is less likely to be contaminated with disease-causing bacteria than soft-serve ice cream.
- Do not keep cooked foods at room temperature for more than two hours before refrigerating. If the food has been out for more than two hours, throw it away.
- Do not eat any food with mold on it, even if it appears to be in just one area that can be cut off. Throw it away.
- Wash fresh fruits and vegetables thoroughly before eating.  
 Many people wonder if soaps or commercially available products are needed to wash fresh fruits and vegetables. The United States Department of Agriculture, Environmental Protection Agency, and Food and Drug Administration are the three federal agencies involved in food safety activities. All three recommend washing fresh fruits and vegetables in plain water without soap or other products. Turn the tap water on and allow running water to pour over the item while rubbing the outside gently with your fingers. Remove stems that may be present and thoroughly rinse the stem area. Dry the item with a clean, dry towel. Use a vegetable brush to wash the outside of items with tough skins such as carrots, potatoes, and yams. Remember to keep your vegetable brush clean by regularly rinsing it with boiling water or running it through your dishwasher. Be sure to wash melons even though you do not eat the outside. Bacteria from the outside of the melon can contaminate the inside when you cut through the fruit. Lettuce, spinach, and other leafy vegetables can be rinsed using a salad spinner that removes excess rinse water. Wash your spinner between uses.
- Once you have cut a piece of fruit or a vegetable, store the unused portion in the refrigerator.
- Avoid eating uncooked alfalfa or bean sprouts. It is difficult to clean these vegetables thoroughly.
- Do not eat unpasteurized dairy products.

## NUTRITION, SUPPLEMENTS, AND LUNG CANCER TREATMENT OUTCOMES

Many people with lung cancer wonder if there are certain foods, herbs, vitamins, minerals, or other nutritional supplements that will increase their chance of recovery from lung cancer. Numerous products and nutrition books are available recommending different supplements and dietary plans to people with cancer. These numerous products and recommendations leave many people wondering what to do.

The human body is complex. Determining the effectiveness of various practices, supplements, and medicines on specific diseases is also complex. Clinical trials are carefully designed scientific studies that are carried out in a very specific way to answer questions about the safety and effectiveness of medical treatments. Reports about the effects of medical treatments outside clinical trials are called *anecdotes*. Anecdotes report the use of treatments and the course of an illness, but an anecdotal report cannot determine if the course of the illness is related to the treatment. Only a clinical trial can determine if a specific treatment is related to a specific outcome. Treatments that have not been studied in clinical trials may or may not be effective – we simply have no way to know for sure. *Chapter 8: Clinical Trials* has additional information about clinical trial design and participation.

Studies have shown that many different dietary factors and supplements may have a protective effect in terms of preventing lung cancer (see Table 5).<sup>10-23</sup> However, there is no evidence from scientifically designed clinical trials to show that specific dietary habits or nutritional supplements influence prognosis or treatment outcome once lung cancer has developed.

**Table 5: Dietary Factors and Nutritional Supplements That May Help Prevent Lung Cancer**

<b>Dietary Factors</b>
beta-carotene <sup>18</sup> and carotenoids <sup>20, 23</sup>
carrots <sup>13</sup>
dark green leafy vegetables <sup>12</sup>
diets rich in fruits and vegetables <sup>10, 19, 21</sup>
flavonoids <sup>15, 17</sup>
folate <sup>16, 23</sup>
glutathione <sup>18</sup>
margarine <sup>13</sup>
plant sterols <sup>22</sup>
selenium <sup>11</sup>
soy <sup>14</sup>
vitamin C <sup>16, 23</sup>

**KEEPING YOUR NUTRITION IN PERSPECTIVE**

There is no question that adequate nutrition is important for good health. Your body must get sufficient calories and nutrients to function properly. However, nutrition sometimes becomes a source of anxiety for people with lung cancer. Having lung cancer can leave people feeling helpless at times. Some find focusing on their nutrition helps relieve the sense of helplessness by giving them something to actively work on. The same can be true for family members. They want to help you get better and may start making food to encourage you to eat. In some cases, the whole family can become preoccupied with your eating habits and nutrition. While good nutrition is important, an intense preoccupation with eating can become burdensome and stressful. The anxiety associated with the pressure to eat can backfire.

**I had lots of pressure to eat. The more everyone tried to get me to eat, the worse I felt about eating. John [her husband] kept cooking all these meals and I just couldn't handle the smell of them. I wouldn't eat them – then he would get discouraged, and I just kept feeling worse. Finally, I just had to tell him to stop. As long as I would drink Ensure™, that was okay. But it was hard with everyone being so concerned about me eating. Once people stopped pushing me to eat all the time, it got better.**

**–Joanne, diagnosed with stage IIIA NSCLC in 2001 at age 52**

Do your best to eat nutritious foods that support your body functions. At the same time, do not be too hard on yourself if you struggle at times with your eating. Many factors influence your appetite and ability to eat a healthy diet during the course of lung cancer. Like most other experiences in life, you will probably have good days and not-so-good days when it comes to eating. Just do the best you can. Based on everything we know to date, nothing you eat or do not eat is going to determine the long-term outcome of your illness. Remember, nutrition is just one part of your overall cancer treatment plan.

## **SUMMARY**

Food is your body's source of energy and building materials. Good nutrition is needed for your body to function properly. Lung cancer and its treatments increase the energy and nutritional demands of your body but can also interfere with eating. Many different food options and self-help tips can make it easier to get good nutrition when you have eating difficulties. Medications can also be used to treat symptoms, making good nutrition easier and more pleasant.

Discuss eating and nutrition problems with your cancer care team. A dietician or nutritionist can help you customize an eating plan that meets your specific needs.

Do your best to eat a nutritious diet without becoming burdened by an intense preoccupation with food.

Eating is one of the pleasures we all share. We hope the information provided in this chapter helps you enjoy healthy eating.