Chapter

8

# Nutrition in the Patient with Lung Cancer

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## Introduction

Nutrition is important in cancer prevention, treatment, and survivorship. Food provides the building blocks needed by cells for protection, repair, and healing. The benefits of good nutrition during cancer treatment include improved quality of life and decreased frequency of side effects, complications, and treatment breaks.

Lung cancer treatment can create a burden of healing that can overwhelm even a healthy patient's nutritional reserve. The cancer can affect appetite, digestion, and use of nutrients. Treatment regimens such as surgery, chemotherapy, and radiation can cause side effects that interfere with adequate nutritional intake. A patient's nutritional status can deteriorate during the course of treatment. Decisions about treatment modality or chemotherapy medication may be determined based on general health performance status scores.[1] Weight loss and decreased ability to eat adequately influence those performance scores and treatment options.[2]

Many people begin lung cancer treatment already experiencing some decreased appetite (anorexia) and meal portion size. Anorexia may be noted as disinterest in usual favorite foods, a decrease in the enjoyable taste experienced with foods or beverages, and an early sense of fullness when eating (early satiety).

Among patients with advanced non-small cell lung cancer, 61% have been found to be malnourished. The effect of anorexia and early satiety is evidenced by decreased oral intake and increased weight loss. Malnutrition is associated with worse outcomes in patients treated for cancer, because nutritional deficiencies can decrease response to therapy, quality of life, and even survival.[3] Taking action to improve nutritional status may improve strength, energy level, and protect quality of life.

The goal of nutrition in treatment is to keep the healing process moving as efficiently as possible. In this chapter, we review the factors in effect during lung cancer and treatment; the goals of nutrition and healing; the common barriers to eating and effective strategies to manage these barriers; and resources to use during treatment and into survivorship.

## *Protecting Lean Body Mass*

During recovery from cancer treatment, it is important to maintain muscle or "lean body mass" and preserve nutrition status. This will help maintain optimal health, quality of life, and allow you to participate in your usual activities. Muscle wasting can result in debilitation, decreased functional status, and decreased quality of life.[4] Maintenance of good nutrition status during treatment may even improve response to cancer treatment.[5]

For some people, the first sign of illness may be an unexpected or involuntary weight loss. Some people may have reacted to this weight loss and decreased interest in food with a happy exclamation, "Oh good - I've been trying to lose weight!" or "My doctor told me I should lose 20 pounds," and patients may allow the weight loss to continue, believing that the process must eventually stop. However, weight loss with a diagnosis of lung cancer is different than intentional weight loss from dieting.

Involuntary weight loss may occur in 50% people with lung cancer, and even a weight loss of 5% may have an effect on health outcomes. Some involuntary muscle loss occurs when people feel ill, and cannot eat enough to maintain their weight. As skeletal muscle is lost, patients experience fatigue, lack of energy for daily activities, decreased ability to move with balance and safety, and decreased ability to cough and clear pulmonary secretions. As smooth muscle is lost, a person may have delayed stomach emptying and feel satiated or feel full; there may be decreased digestion associated with increased nausea as well as a loss of cardiovascular function associated with lightheadedness or dizziness.[6]

Cancer cachexia is a syndrome that results in a progressive loss of muscle mass and leads to progressive functional impairment. It is associated with a lack of appetite and negative energy and protein balance. The best way to modify the effect of cachexia is to treat the cancer, and adequate nutrition is, once again, imperative to tolerate and continue the treatment. It is important to identify these symptoms early, called "pre-cachexia", and act to treat the factors that are barriers to eating. [7] Medications, such as appetite stimulants, may be helpful in managing cancer cachexia, and this option may be discussed with the physician.[8]

Nutritional counseling which focuses on food choice and behaviors related to meals and snacks has been found to be effective in addressing lung cancer malnutrition and cachexia. Medical Nutrition Therapy, a technique used by Registered Dietitians, may help patients to increase protein and calorie intake, improve weight status, and protect quality of life in lung cancer patients undergoing treatment. [9-10] Many cancer centers have specially trained Registered Dietitians who are dedicated to the nutritional care of cancer patients. If the

cancer center does not have an oncology dietitian, a referral may be obtained from the doctor or the Commission on Dietetic Registration to find a board certified specialist in oncology nutrition – who has the credential "C.S.O.".

## Nutrition and Healing

Each time a patient receives a treatment for cancer - surgery, chemotherapy, or radiation therapy – the body responds to the treatment with a process of healing. Healing requires nutrients, extra calories, and additional protein. People receiving treatment for lung cancer may use more calories than when they were not sick, this state of increased demand for calories and protein is termed "hyper-metabolic."

The primary nutritional goal is to prevent or stabilize weight loss, and a secondary goal to regain lost weight. The importance of increasing calories is slightly greater than increasing grams of protein; if weight loss continues despite high protein intake, the protein will be utilized for calories and will not be available for structural repair. Therefore, caloric content should be considered in addition to protein intake. It is useful to have a general expectation of the amount of calories and protein per day needed, and this may be estimated by the oncology dietitian (Table 1).

**Table 1. Caloric and Protein Requirements during Healing in Patients Treated for Lung Cancer***

| Body Weight | Calories needed | Protein needed |
|---|---|---|
| (pounds) | (cal/day) | (gm/day) |
| 110 | 1500 – 1750 | 60 to 75 |
| 130 | 1750 – 2060 | 70 to 90 |
| 150 | 2050 – 2375 | 80 to 100 |
| 170 | 2300 – 2670 | 90 to 115 |
| 190 | 2575 – 3010 | 100 to 130 |
| 210 | 2850 – 3325 | 115 to 140 |

*Values estimated with the following equations[11]

Calorie range per day during healing = [30 x body weight (kg) to 35 x body weight (kg)]

Protein grams range per day during healing = [(1.2 to 1.5) x body weight (kg)]

One pound = approximately 2.21 kg

For overweight patients, the normal or ideal weight for the patient's height is used in the calculations. Refer to a BMI chart to estimate a normal weight for height.

Higher protein intake may be contraindicated in patients with kidney or liver disease.

Weight variation of several pounds in a short period of time is likely due to hydration or fluid shifts.

Add an average of 250 extra calories per day to gain a pound in 2 weeks or 500 extra calories per day to gain a pound in 1 week.

*Hydration and Fluid Balance*

Hydration or adequate fluid intake is important to feel well during treatment. Hydration is cumulative, and it can take several days to become dehydrated or to achieve adequate hydration. Fluid needs may be increased due to chemotherapy, fever, perspiration, diarrhea, use of oxygen, or the presence of chronic obstructive pulmonary disease (COPD). An early symptom of dehydration is fatigue or lack of energy. Mild chronic dehydration may also increase fatigue and contribute to constipation. A fluid deficit of 1% body weight may decrease metabolic function by 5%.[12] Symptoms of dehydration include: Thirst, dry mouth, decreased urine output, concentrated or darker colored urine, decreased skin turgor, headache and dizziness.

Patients may consider tracking daily fluid intake to ensure adequate hydration. It helps to measure favorite cups and mugs to make it easier to estimate the volume of fluid consumed. It is best to drink fluids throughout the day, drinking half of their fluid requirements during the first half of the day. Some patients prefer to plan their fluid intake by the hour, and drink 1 cup per hour, during the day. Most liquids may be included as part of daily hydration, including milk, juice, smoothies, milkshakes, and soda. Caffeinated beverages may be included as part of daily fluid intake if caffeine consumption is less than 300 mg per day (the equivalent of 2 cups of coffee); caffeine may cause the stomach to empty faster and therefore may be dehydrating.

Many foods such as fruits, soups, gelatin, ice cream, and frozen desserts include absorbable fluid. Fluids intended for rehydration, called "sport drinks," have a small amount of carbohydrates and electrolytes to help them absorb more effectively. Choices of fluids may be based on taste preference and variety to ensure adequacy. Daily fluid requirements may be estimated using the chart below (Table 2).

**Table 2. Fluid Requirements During Healing in Patients Treated for Lung Cancer***

| **Body weight** | **Fluid needed** | |
|---|---|---|
| **(pounds)** | **(fluids ounces/day)** | **(cups/day)** |
| 110 | 50 | 6 ¼ |
| 130 | 65 | 8 ¼ |
| 150 | 75 | 9 1/2 |
| 170 | 85 | 10 ½ |
| 190 | 95 | 11 ½ |
| 210 | 105 | 13 |
| *Fluid per day = [body weight (pounds) / 2.21] = average ounces.<br>You may need additional fluid if you are experiencing diarrhea, fever, or other increased fluid loss. | | |

*Strategies to Help Lung Cancer Patients Eat Enough Food*

Information found on the television, in magazines and on the internet regarding "good nutrition" is most commonly focused on helping people reduce their risk for various diseases. However, the nutrition focus during lung cancer treatment is different, with the goal of getting enough calories and protein. Oncology specialists recommend that "all calories are good calories," and the aim is to make eating as tolerable and interesting as possible, and remove any unnecessary diet restrictions.

**Be Flexible**

Cultural traditions and expectations regarding "what makes a meal" may need to be modified, such as changing expectations of eating three large meals a day, to planning six small meals instead. If simple foods are tolerated better, the patient may consider using non-traditional meal choices; such as pancakes for lunch and scrambled eggs at the evening meal. Although some worry about not eating enough at meals if they are snacking more often, snacking has been found to increase total intake without affecting meal intake, especially if snacks are timed approximately two hours before the next meal.[13]

A good quality snack may be created by combining any two of the following food groups: Breads /starches; Meats/nuts/beans/eggs; Milk/ dairy products; Fruits/vegetables (Table 3).

This technique provides a combination of carbohydrates, proteins, and fats. The goal for a good quality snack (or small meal) is about 250 calories and about 6 grams of protein. Some patients prefer to drink their calories when solid foods are difficult to eat. Beverages that contain calories and protein can be used as a snack by itself, or as a meal replacement.

**Table 3. Examples of Good Quality Snacks**

| |
|---|
| Trail mix with nuts and dried fruit |
| Egg custard made with milk and eggs |
| Cheese and crackers |
| Chicken salad on a piece of toast |
| Yogurt (full fat) with fruit topping |
| Apple slices dipped in peanut butter |
| Cookies and milk |
| Smoothie made with orange sherbet and milk |

*Making Every Bite Count*

Many foods and beverages are available in a full fat or high calorie option (for example choosing whole milk instead of skim milk). Some can be enhanced to maximize nutrient density by adding protein powders or calorie enhancers (for example adding Cream to a milkshake instead of milk). Using more fat in dishes may be

helpful for those who experience dyspnea (shortness of breath) because fat requires less oxygen in the digestion process, thus higher fat meals may minimize oxygen requirements. As appetite may decrease with cancer treatment, using more fat is an effective way to maximize caloric intake. Some people who have followed a low cholesterol diet must rediscover fat-containing foods. Monounsaturated fats or "heart healthy" fats may be emphasized, such as olive, nut, or fish oils, to achieve a higher caloric density. Some physicians will allow all fat containing foods during cancer treatment to aid in the taste and palatability of dishes.

Each teaspoon of oil, butter, or margarine contains 45 to 50 calories. By adding one teaspoon of fat to each meal and snack, caloric intake is increased by approximately 250 calories daily without having to eat a larger volume of food. Another strategy is to add one tablespoon of heavy cream to any milk-containing food or beverage, thus increasing the calorie content of that food by approximately 50 calories. These additions are almost invisible to the person who is trying to maximize caloric intake.

### *Diabetic Concerns*

Many people who follow a diabetic diet which limits carbohydrate intake. Diabetic diets are often liberalized during cancer treatment to allow more carbohydrate content when appetite is decreased and meal size is reduced. Carbohydrate counting or substitution may help increase caloric intake. This may be a difficult idea for patients who may have followed their doctor's advice for many years to avoid simple sugars and carbohydrate-rich foods. Many doctors also liberalize the blood glucose goals of patients during cancer treatment, and may consider using medication to manage blood glucose—not food restriction.

A common strategy for people with diabetes to maximize their oral intake is to have both low carbohydrate and regular carbohydrate foods available. If eating is minimal, the regular carbohydrate containing food item may be used. If consumption is close to usual portion sizes and frequency, the lower carbohydrate versions are used. An example with yogurt: choose a full carbohydrate version when it is the only food eaten for lunch, but choose a low sugar yogurt if it follows a sandwich and bowl of soup.

Be aware of the symptoms of low blood glucose in patients who take diabetic medications, as decreased oral intake while continuing to take diabetic medications may cause low blood sugar or hypoglycemic episodes. These symptoms may include lack of concentration, clammy sweats, shaking or tremors, changes in vision, lightheadedness, or dizziness. If any of these symptoms occur, the blood glucose level should be checked and if low, carbohydrates should be provided. Strategies to prevent hypoglycemic episodes include eating and drinking small amounts more frequently during the day; planning an evening snack before going to sleep; and discussing modifications of medication with the diabetes physician. Diabetic patients may also consider carrying glucose tablets or hard candy, and keeping some juice at home to drink if blood sugar drops.

Steroids may cause hyperglycemia. If blood sugars are elevated after steroids are provided, the preferred treatment is diabetic medication, and not food restriction.

### *Vitamins and Mineral Supplements*

Vitamin, mineral, and other antioxidant supplements have been studied for many years. Several studies have examined the use of supplemental antioxidants in patients with advanced non-small cell lung cancer receiving chemotherapy. Most studies have not shown protective benefit of antioxidants during treatment, nor reduction in cytotoxic side effects.[14] The VITAL Study (Vitamins and Lifestyle Study) determined that people at risk for developing lung cancer, particularly smokers, should not use beta carotene supplements, retinol or lutein supplements for disease prevention. The study found the longer people took the supplements, the more they increased their risk for lung cancer.[15] Another study, focusing on the mineral selenium, found that people deficient in selenium benefited by supplementation, however; increased rate of lung cancer occurred in people taking selenium who were not deficient.[16] Use of antioxidant nutrient supplementation (i.e. Vitamin C, Vitamin E, Selenium and others) are not recommended during radiation therapy or during alkylating chemotherapies. The Academy of Nutrition and Dietetics (formerly American Dietetic Association) Evidence Analysis library has graded and compared the nutrition research and is not currently recommending the use of any high-dose oral antioxidants at this time for cancer prevention nor during cancer treatment.[17]

Studies are currently underway to evaluate the impact of omega-3 fatty acids (fish oils) and physical activity as an intervention useful for interrupting the pre-cachexia syndrome, through their anti-inflammatory effects. Omega-3 oils can be found in fish such as salmon, halibut, fresh tuna, as well as flax seed and walnuts.[18,19]

The best approach for nutrient supplementation should be individualized to each person's background, genetic profile, lab tests, and cancer risk. Blood tests can be done to assess current levels of nutrients and potential advisability of supplementation. Recommendations about supplements may be discussed with the physician or oncology dietitian.[16]

### *Managing Side Effects and Complications*

Early identification and active intervention for side effects is important to protect quality of life. A large component of cancer treatment is geared to managing symptoms and side effects. Effective use of medication may facilitate symptom control and side effect management. The patient may speak with the health care team members about medications that may help control symptoms. Nutritional intervention may focus on lifestyle changes and behavior modification to address symptoms or side effects.

*Anorexia and Early Satiety*

Some patients with lung cancer may have anorexia (loss of appetite), but maintaining adequate food and fluid intake are important for health maintenance and healing. How does a patient eat if there is no appetite or hunger? Anorexia may be very difficult to address because the patient may not feel hungry, even though the body shows signs of hunger including weakness, fatigue, exhaustion, excessive sleeping, and inability to concentrate.

Anorexia may be described as a "searching for foods that interest the taste buds" or "not being able to find something that sounds good." Other people describe the feeling as "just not ever hungry". Early satiety is often described as "feeling full after only a few bites". The disinterest in meals can result in a stressful cycle of forced eating, and in severe cases, people may state that they "would rather spit food out than swallow it" or "the food balls up in the mouth, and they just can't swallow it."

This starvation mode can be interrupted in a purposeful way. One well tolerated approach is to transition from several large meals each day to smaller, more frequent meals and snacks. By eating and drinking frequently, creating scheduled snacking times (even small amounts), can provide fuel adequate to improve weakness and fatigue. The anorectic patient should consciously think about eating to provide vital nourishment to the muscles and immune system, and should not expect appetite or hunger to drive eating. In other words "don't wait to feel hungry—eat because it is time to eat". If the anorexia is severe, appetite stimulant medications may be considered.

If the patient plans to eat and drink every 2 to 3 hours during the day, portion size may be much smaller. For those who cannot eat much, it is adequate to snack on very small portions every 30 to 60 minutes, for example: 2 ounces of a milkshake taken each hour provides at least 1500 calories over a day. These small amounts are not overwhelming and they may add up during the day to provide sufficient calories, protein, and fluid. Some patients use a kitchen timer, cell phone alarm, or watch to remind them to eat. Avoid asking the patient "Are you hungry?" or "What do you want to eat?" Instead, try asking "What could you eat (or drink) right now?"

A frustrating feature of anorexia is the inability to think of foods that are enjoyable. When the anorexic patient thinks of something that may be enjoyable, interest in the food disappears before the food is available. Appetite is quickly "switched off like a light," and smelling the item during cooking can make it impossible to take a single bite of the dish. This frustration may be managed by reminding patients and families that food preparation is a team effort. The goal of the family is to help provide food options, and the patient tries to approach eating and drinking. The patient makes the ultimate decision about eating or drinking.

Anorectic patients may be unable to eat a food repeatedly or tolerate leftovers. Therefore, it is advisable to rotate through items and make small batches. Food may be served to the

patient frequently, almost as a "surprise". Consider keeping a record of foods and beverages that taste good or sometimes are tolerable, which may depend on the day of the treatment cycle, fatigue, or other factors. If the food does not taste good, the patient should just try another type of food. Creating a list of tolerable foods reassures the patient that some foods are acceptable and appealing, and may help stimulate ideas for other food choices. Many people experiencing anorexia for solid food still feel thirst, and can use nutritious beverages to provide calories, protein as well as fluid.

### *Taste Changes*

Taste alterations may be the side effect of the cancer itself, the chemotherapy regimen, infection, or certain medications. Most taste changes develop and dissipate depending on the timing of the treatments. Taste changes may limit appetite but may be managed as follows: (1) "cardboard" taste may be improved by adding more flavor; (2) metallic taste is managed by using bland flavors; (3) salty taste is controlled by choosing low salt foods; and (4) sickly sweet taste is improved by choosing low sugar foods. Specific suggestions may be helpful in managing taste changes (Table 4).

**Table 4. Specific Suggestions for Managing Taste Changes in Patients with Lung Cancer**

| | |
|---|---|
| 1. | Identify flavors that come through as "true" or accurate; consider similar foods to develop a greater number of tolerated food items. |
| 2. | If tart or sour flavors are appealing, use a small glass of fruit juice or lemonade to drink when eating, to refresh the taste buds. Add a small dish of fruit at each meal. |
| 3. | Limit excessively sweet taste by using homemade foods and beverages that are made with less sugar, or add milk or plain yogurt to high calorie beverages to decrease sweetness. Water down juices or pour over ice to reduce the sweetness of juices. |
| 4. | Limit excessively salty taste by choosing low salt foods or cook homemade meals without salt. |
| 5. | Marinate foods with tangy or vinegar flavors. Use strong flavored sauces or toppings such as barbeque sauce or salad dressings. |
| 6. | If red meat is unappealing, use alternative protein source such as chicken, fish, meat salads, eggs, beans, nuts, or cheese. |
| 7. | Try a pickle or pickled vegetable at meals to excite the taste buds. Add flavor with brown sugar, maple syrup, honey, cinnamon, jams, berries, and dried fruits. |
| 8. | Season tasteless foods with ketchup, hot sauce, Tabasco, vinegars, mustards, hot peppers spices and herbs. Use gravies and sauces to enhance flavors. |
| 9. | Drink beverages and soups with a straw, perhaps from cup with a lid, so the patient does not see, smell, or taste much of the liquid. |
| 10. | Use cold plates and cold foods to reduce exposure to food odor. |
| 11. | Add a slice of lemon, orange or cucumber to flavor water. |
| 12. | Examine the mouth for red or white patches that may indicate an infection, and report any signs of thrush to the doctor. |
| 13. | Clean the mouth and tongue after each meal. |
| 14. | Use sugar-free mints, candies, and gums to refresh the mouth. |
| 15. | Metallic taste may be reduced with plastic cutlery. |

### *Nausea and Vomiting*

Nausea and vomiting are common side effects of many chemotherapy regimens. Most cancer centers use medication routinely to minimize nausea or vomiting. It may be helpful to maintain a record each day of a treatment cycle that nausea occurs, including the time of day and factors that influence the nausea. Distinguish and note whether what triggers or effects the nausea or queasiness. This may help the health care team identify whether nausea is anticipatory, acute, delayed, or breakthrough. Each of these types of nausea may be treated differently with medication and behavioral strategies. (Table 5)

**Table 5. Specific Suggestions for Managing Nausea and Vomiting in Patients with Lung Cancer**

| | |
|---|---|
| 1. | Eat and drink small volumes at frequent intervals throughout the day. Imagine "trickling" the food and beverages through the digestive tract. For some people, nausea is worse when the stomach is empty or when they become hungry. |
| 2. | Identify good times of day to eat, and eat more calories and protein foods at those times. |
| 3. | Choose foods that are easy to digest and move quickly out of the stomach. |
| 4. | Bland, starchy foods digest quickly: potatoes, toast, noodles, rice, dry cereal, pretzels, or crackers. |
| 5. | Clear liquids digest rapidly: broth based soups, juice, soda, gelatin, Popsicles. |
| 6. | Sour and tart flavors help decrease nausea. Use lemon with food, or put an orange or lemon slice in a cup of ice water. Some people like pickles or pickled foods with their meal. |
| 7. | Use cold plates to decrease exposure to odors. Avoid being around cooking odors. |
| 8. | Foods and beverages made with ginger are a natural way to soothe the stomach: ginger tea, ginger snaps, ginger ale, ginger candies. |
| 9. | Avoid foods that are greasy, fried, pungent, or strongly spiced. |
| 10. | Review medication use with your medical provider: Optimize use of anti-nausea medications, and address reflux, and constipation. |

### *Other*

Mucositis is a painful inflammation and ulceration of the mucous membranes of the mouth and digestive tract that may be a complication of chemotherapy or radiation therapy. Oral mucositis ("mouth sores") may cause difficulties with eating, including chewing solid food and drinking hot or acidic beverages. Radiation esophagitis is an inflammation of the esophagus after radiation therapy that may cause painful swallowing. Nutritional modifications may be helpful in minimizing symptoms and nutritional deficiencies resulting from these conditions (Table 6). Fatigue and food safety are additional issues that warrant special considerations. (Table 7 and 8)

**Table 6. Specific Suggestions for Managing Mucositis and Radiation Esophagitis in Patients with Lung Cancer**

| | |
|---|---|
| 1. | Eat small, frequent meals throughout the day. Schedule eating and drinking at least every 2 to 3 hours. |
| 2. | Keep a record of the amount of fluid intake to avoid dehydration, especially if there is pain with swallowing. |
| 3. | Choose soft, moist, foods that are easy to eat. Cut food into small portions and chew carefully. |
| 4. | Chop, puree, or blend food into a soft or drinkable texture. |
| 5. | Use high calorie beverages to maximize calorie intake between or after meals. |
| 6. | Before eating, moisten food with gravy, bland sauces, or soups. |
| 7. | Room temperature foods and liquids may cause less pain than those that are hot or cold. |
| 8. | Avoid dry, scratchy, greasy, spicy, or acidic foods. |
| 9. | Drink liquids with a large lumen straw to avoid contact with mouth ulcers. |
| 10. | If swallowing causes pain, take pills with a spoonful of yogurt, apple sauce, or pudding. |
| 11. | Talk with the doctor about medications that may numb or coat the mouth or esophagus. If food is caught in the esophagus, or a lump-like sensation is present after swallowing, reflux medication may be helpful. |

**Table 7. Specific Suggestions for Managing Fatigue in Patients with Lung Cancer**

| | |
|---|---|
| 1. | Convenience foods or frozen meals are adequate if fatigue hinders meal preparation. Pick up a prepared meal at the grocery store, for example: a baked chicken, rolls, and potato salad. |
| 2. | Schedule meals and snacks at frequent intervals to maximize the energy provided from food. Plan your larger meals for the time of day you have the most energy. |
| 3. | Choose foods that are easy to chew and swallow. Soft and moist foods require less effort to eat. |
| 4. | Use single serving containers, plastic cutlery, and paper plates to decrease cleanup. Organize your kitchen to keep common or tempting foods in easy reach. |
| 5. | Select meals that are easy to prepare. All food is helpful, and there are no rules about what to eat during different parts of the day. A patient may have three meals a day made from breakfast foods (breakfast, oatmeal and juice; lunch, scrambled eggs and toast; dinner, pancakes with a glass of milk) |
| 6. | Alternate beverages that have calories with water for fluids. A small glass of juice or milk with a meal will add to the nutritional value of the meal. |
| 7. | If you are not able to eat much because you are fatigued: Use oral nutritional drinks as snacks or even as meal replacements. Many people find drinking is easier than eating. |
| 8. | Keep a list of groceries and allow others to shop or prepare food for you. Give family and friends specific information of how to assist you: include preferences for brands and flavors. |
| 9. | Balance rest with activity, talk with your doctor about a gentle exercise plan to prevent muscle loss. |

**Example menu:**

Breakfast: Instant oatmeal made with whole milk, juice, coffee with cream
Snack: ¼ cup of Trail Mix, 6 oz. Yogurt
Lunch: 8 oz. can of Cream Soup, Peanut butter and Jelly sandwich, potato chips, Instant Ice Tea
Snack: Ice Cream Bar
Dinner: Baked chicken (already prepared at grocery store), Salad mix (bagged), Instant mashed potato, gravy (out of jar), green beans (canned), glass of chocolate milk
Snack: Graham crackers, Vanilla pudding (single serve container)

**Table 8. Food Safety Suggestions for Patients with Lung Cancer ***

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|---|---|
| 1. | Safety practices are especially important when the immune system is weakened, such as during chemotherapy or periods of neutropenia. |
| 2. | Wash hands before food preparation and before eating. |
| 3. | Food preparation surfaces should be cleaned thoroughly with dish soap and water and allowed to air dry. |
| 4. | Promptly refrigerate leftovers. Do not let food sit on the counter to cool down before refrigeration. |
| 5. | Break up large batches of food into smaller containers so they cool quicker in the refrigerator. |
| 6. | Discard leftovers stored at room temperature more than 2 hours, and discard leftovers that are more than 2 days old. When in doubt, throw it out. |
| 7. | Keep cold food at 40ºF (4.5ºC) or cooler. |
| 8. | Thaw frozen foods in the refrigerator; do not thaw foods on the counter at room temperature. |
| 9. | If you thaw food in the microwave, cook it immediately to 185 ºF (85ºC). |
| 10. | Avoid eating pink or undercooked meat. Cook raw meat to an internal temperature of 185 ºF (85ºC). |
| 11. | Avoid cross contaminating foods and food contact surfaces with raw meats. |
| 12. | Use separate cutting boards for meat and produce. Use clean utensils and food platters. |
| 13. | Wash raw fruits and vegetables. Ask the doctor if you should use only cooked or canned fruits and vegetables. |
| 14. | Wash can lids before opening. |

* Based on general guidelines from the United States Food and Drug Administration[20]

*Resources for Treatment and Survivorship*

The National Cancer Institute (NCI) offers a comprehensive, free resource to patients undergoing cancer treatment regarding nutrition: Eating Hints: Before, During and After Cancer Treatment.[21] A free copy can be ordered at 1-800-4-CANCER (1-800-422-6237). It can be accessed online for free at: http://www.cancer.gov/cancertopics/coping/eatinghints/page1
It is also available in Spanish. Other resources are available on the Internet site of the National Cancer Institute www.cancer.gov.

The American Cancer Society (ACS) offers a booklet: Nutrition for the Person with Cancer During Treatment: A Guide for Patients and Families.[22] A free copy can be ordered at 1-800-227-2345. It is also available online at: http://www.cancer.org/acs/groups/cid/documents/webcontent/002903-pdf.pdf. It is also available in Spanish as well as other languages. Other resources are available on the Internet site of the American Cancer Society www.cancer.org.

The American Institute for Cancer Research (AICR) offers a comprehensive guide for nutrition and cancer prevention information. The 2nd Expert Report (Food, Nutrition, Physical Activity, and the Prevention of Cancer) includes reviews of thousands of nutrition and cancer studies, to help develop public policy and personal prevention recommendations.[23] In addition, the AICR routinely updates recommendations for each cancer type, reviewing the most recent research and then combining it with previously reviewed data. The website http://www.aicr.org also offers updates on new research as it occurs, recipes and links to reputable resources.

The American Cancer Society offers a report and Internet link that provides recommendations for cancer survivorship, American Cancer Society guidelines on nutrition and physical activity for cancer prevention: Reducing the risk of cancer with healthy food choices and physical activity.[24] and an overview of common nutritional concerns, Nutrition and Physical Activity During and After Cancer Treatment: Answers to Common Questions.[25]

Another good resource can be found at www.cookforyourlife.org.[26] An educational website that offers ideas and recipes for patients in cancer treatment as well as healthy recipes to assist survivors implement cancer prevention diet recommendations. It includes videos offering food preparation tips and cooking technique demonstrations.

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