



Nutrition: Food as Medicine

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Outline

- General Nutrition Overview
 - Macronutrients – Carbohydrates, Protein, and Fat
 - Vitamins/Minerals
 - Phytochemicals
 - Fluid
- Nutrition and Cancer Risk
- Nutrition During Cancer Treatment
- Nutrition to Manage Treatment Symptoms
 - Nausea
 - Diarrhea/Constipation
 - Decreased Appetite
 - Mucositis
 - Dry Mouth
 - Taste changes
 - Food Safety
 - Dehydration

A top-down view of a variety of fresh and healthy ingredients. In the top left, a bowl of uncooked grains. Next to it are several slices of orange. To the right are stacks of green artichokes and fresh basil leaves. In the center, there are two types of pasta: a brown whole-wheat fusilli and a white regular fusilli. On the right side, a bowl of granola with nuts and dried fruit sits above a pile of blueberries. At the bottom, there are sliced strawberries, a whole grapefruit, a bunch of red grapes, a halved papaya, and some round slices of apple. The background is dark, making the colors of the food stand out.

Nutrition General Overview



Carbohydrates

Body's preferred source of energy.

Broken down into glucose which fuels our brain, muscles, and other vital organs.

Simple and Complex Carbohydrates

Simple Carbohydrates (aka simple sugars)

- Require little digestion and are quickly absorbed by our bodies
- Provide limited nutrients
- Less than 40 grams (10 teaspoons) per day

Complex Carbohydrates

- Slowly digested and absorbed
- Occur naturally in foods (fruit, milk, beans, whole grains, and starchy vegetables)
- Contain **fiber** and a variety of beneficial vitamins, minerals, and phytonutrients

Fiber

A diet rich in high-fiber foods can reduce your overall calorie intake and help you maintain a healthy weight, which is vital to reducing cancer risk.

Best sources: unprocessed plant foods

Vegetables, fruits, whole grains, nuts, seeds, and beans

Benefits

- Promotes satiety
- Increases intakes of nutrient dense foods
- Regulates bowel movements
- Lowers cholesterol
- Stabilizes blood sugar levels
- Feeds beneficial gut bacteria

Goal: 21-38 grams per day

Increase slowly to prevent discomfort
(5 extra grams per day)

Choose foods with at least **2.5 grams** of fiber



Protein

Made from 20+ building blocks called amino acids

Many functions in the body:

- Cell growth, repair and maintenance
 - Muscle
- Fluid and electrolyte balance
- Antibodies
- Energy

Most people are able to meet protein needs with diet alone

- No need to supplement with powders or shakes

Protein needs **increase** during cancer treatment

- May have trouble meeting needs
- Especially with nausea, taste changes, decreased appetite, etc.





protein

SOURCES & AMOUNTS

plant-based:

3/4 cup tofu.....	19g
1/2 cup cooked soybeans....	15g
1/2 cup cooked lentils.....	9g
2 tbsp. peanut butter.....	7g
1/2 cup cooked beans.....	7g
1 oz. nuts	6g
1/4 cup hummus.....	5g
2 tbsp. seeds.....	4g
1/2 cup cooked quinoa.....	4g
1 cup almond milk.....	1g

animal-based:

3 oz. chicken.....	23g
3 oz. pork.....	22g
3 oz. beef.....	21g
3 oz. shrimp.....	19g
1 cup greek yogurt...	19g
3 oz. salmon.....	17g
1 cup milk.....	8g
1 egg.....	7g
1 oz. cheese.....	7g

Fat

Can be part of a healthy diet

Functions:

- Gives our bodies energy
- Provides structure to cells
- Cushions organs to prevent damage
- Help absorb nutrients (Vitamin A, D, E, and K)



Four Major Types

Saturated fats (solid)

- Fatty meats, poultry skin, cream, butter, cheese, etc.
- Raise bad LDL cholesterol
- Can increase risk of heart disease and stroke
- Limit to 5-6% of calories (13 grams/day)

Trans fats (solid)

- Fried foods, baked goods, stick margarines
- Raise bad LDL and lowers good HDL cholesterol
- Increase risk of heart disease, stroke, and diabetes
- Limit or avoid

Monounsaturated fats (liquid)

- Oils - olive, canola, peanut, safflower, sesame
- Lower bad LDL cholesterol
- Replace saturated and trans fats with these

Polyunsaturated fats (liquid)

- Fish, walnuts, sunflower seeds, tofu, oils – soybean
- Omega 3 & Omega 6
- Replace saturated and trans fats with these

Vitamins and Minerals

Two main types of *micronutrients* required for survival and health.

Vitamins

Aid in energy production, wound healing, bone formation, immunity, and eye/skin health

13 essential vitamins

- Fat Soluble: Vitamins A, D, E, K
- Water Soluble: B vitamins and Vitamin C

Are broken down by heat, air, or acid

- Can be inactivated through cooking, storage, air/light exposure
- Want to eat food in a variety of ways

Minerals

Perform a wide variety of functions in our bodies

- Help maintain cardiovascular and bone health

Major Minerals: used by our bodies in large amounts

- Calcium, Chloride, Magnesium, Phosphorus, Potassium, Sodium, Sulfur

Trace Minerals: required in small amounts

- Chromium, Copper, Fluoride, Iodine, Iron, Manganese, Molybdenum, Selenium, Zinc

A well-balanced diet usually provides our bodies with plenty of vitamins/minerals

Most healthy people do not need to take a vitamins

Supplements

60-80% of people with cancer have taken supplements before, during, or after treatment.

Supplements do not come without risk

- May interact with a person's cancer treatment
 - Make treatment less effective or more toxic
 - St. John's Wort - reduces the effectiveness of Imatinib (Gleevec®)
- Are not regulated
 - Cannot guarantee the ingredients are accurate
 - Look for independent testing (NSF or USP)

Prioritize whole food sources

- Naturally contain substances that promote good health

Supplements may be needed with deficiencies

- Will be managed by healthcare team



Phytonutrients



Beneficial compounds naturally found in food

Provide a plant with color, aroma, and flavor

The colors, fragrances, and taste of the plant hint at the phytochemicals it contains.

Natural cancer fighters

Stimulate the immune system

Slow the growth rate of cancer cells

Prevent DNA damage that can lead to cancer

- Work as antioxidants

Stick to food sources

Phytochemicals in supplement form may not be as easily absorbed as those from food

Water

All cells in our body need water to function

- Important for proper metabolism of food and medications
- Dehydration occurs with inadequate fluids or high losses with diarrhea or vomiting
 - My impact energy levels and electrolytes
- Important to replace lost fluids

Fluid Needs: One-Size does NOT fit all

- Fluid needs vary from person to person
 - Activity level
 - Environment
- **Typically recommend 8, 8 oz glasses per day (~2L)**
- Drink mostly water and unsweetened drinks
 - Fruit and herb infused water
 - Unsweetened tea or coffee



A top-down view of 20 small white bowls arranged in a 4x5 grid on a light-colored wooden surface. Each bowl contains a different type of healthy food: dark seeds, sliced mango, broccoli, red quinoa, lentils, almonds, kiwi slices, chickpeas, peeled hard-boiled eggs, blueberries, orange slices, strawberries, lentils, kidney beans, spinach, kidney beans, flax seeds, and purple grapes.

Nutrition

**And Cancer
Risk**

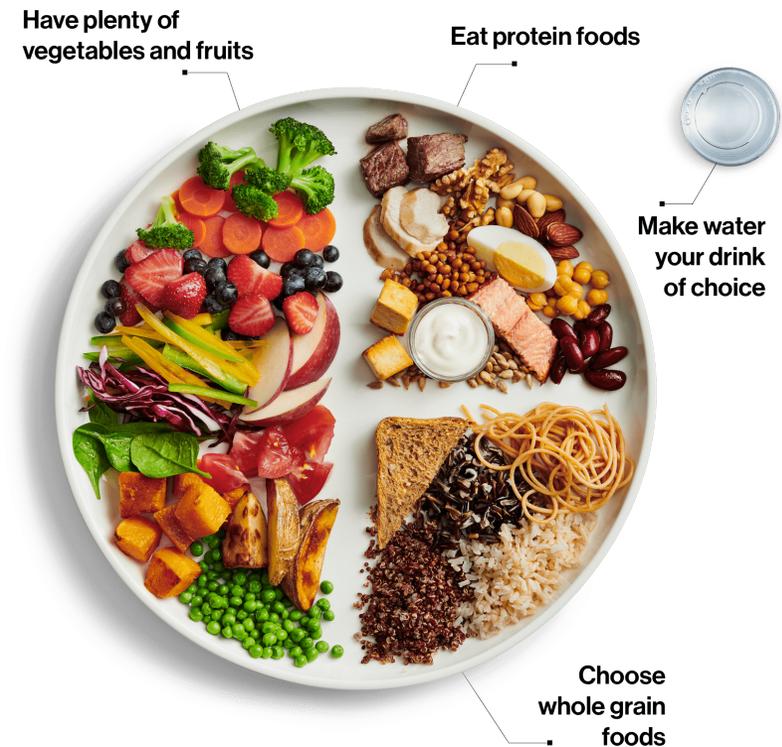
How Does Nutrition Impact Cancer?

Science has shown that healthy eating is associated with decreased cancer risk.

Not a “diet” - but an eating pattern.

- Eat a variety of vegetables, fruits, whole grains and beans
- Favor brightly colored or strongly flavored vegetables and fruits
- Focus on moderation of less nutrition options
 - Added sugar
 - Processed meats
 - Alcohol

Plant-Based Eating





Plant-Based Eating Pattern

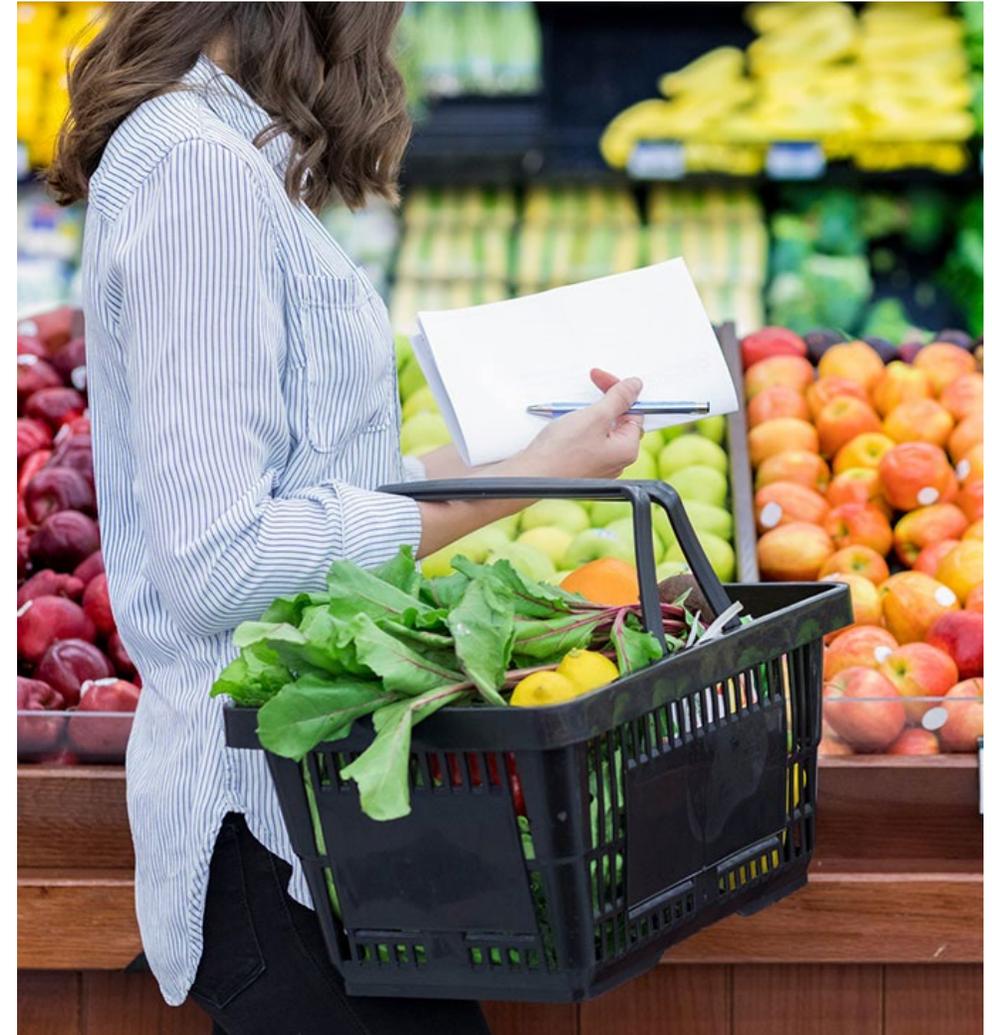
Plant-Based \neq Plant ONLY

Eat More Vegetables, fruits, whole-grain products, beans, lean meats, eggs, nuts and seeds

Eat Less Red meat (<18 oz/week), processed meats, saturated fat, added sugar (<40 grams)

General Rules of Plant-Based Eating

- Max health benefits from eating a diet high in:
 - Fruits & Vegetables
 - Variety **AND** color
 - Differing cooking methods
 - Fresh or frozen
 - Canned in natural juice or low sodium
 - Whole grains
 - Avoid “enriched”
 - Beans and legumes
 - Low sodium
 - Nuts and seeds
- Be conscious of portion sizes of:
 - Animal proteins
 - Added sugar



Plant-Based Eating

How to follow at breakfast

- More fruits, vegetables, and whole grains
 - Add color
 - Eat whole fruit vs drinking fruit juice
- Less processed meats and sugar sweetened foods



Plant-Based Eating

How to follow at lunch or on-the-go



Plant-Based Eating

How to follow at dinner

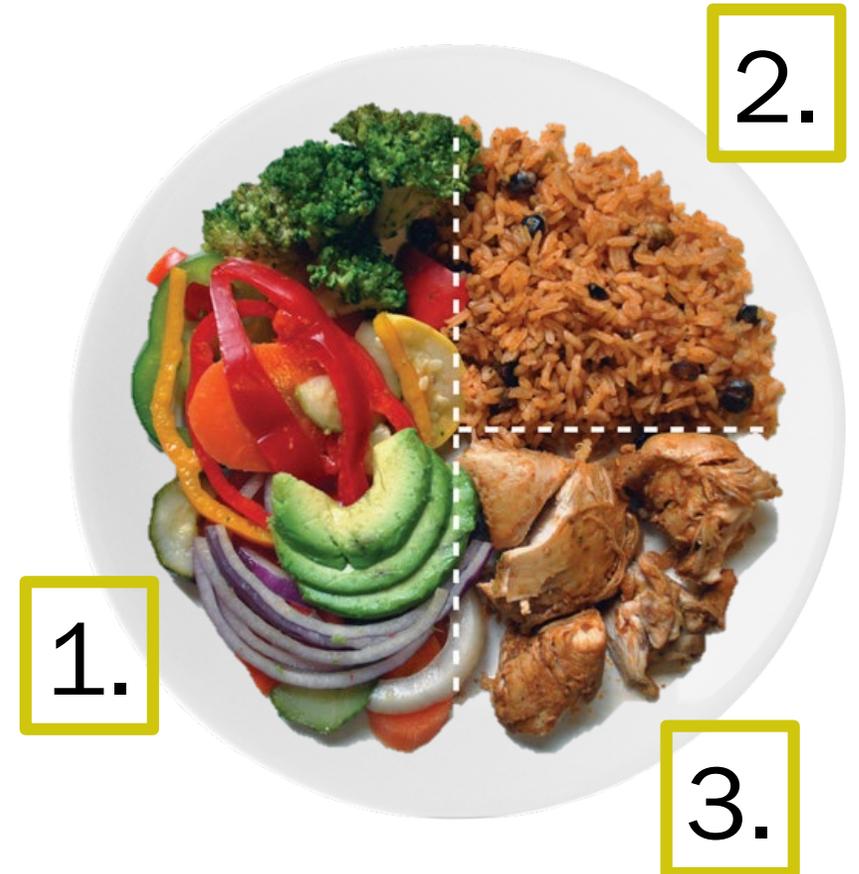
PLATE METHOD

Picture a line running down middle of plate

1. Fill the largest section with non-starchy vegetables or fruits

Split the remaining half in two

2. In one small section, put grains and starchy foods
3. In the other small section, put lean protein



Nutrition During Treatment

Eat as healthy as possible while balancing side effects of treatment and previous diet restrictions

Continue Healthy Eating

Well-rounded diet

- Calories: to maintain weight
- Protein: to help rebuild or maintain tissue
- Nutrients: vitamins, minerals
- Fluid
- Food safety

Nutrition-Related Side Effects

Severity Varies

Negative symptoms from cancer treatment

May reduce the amount of nutrients you are able to take in

Common symptoms:

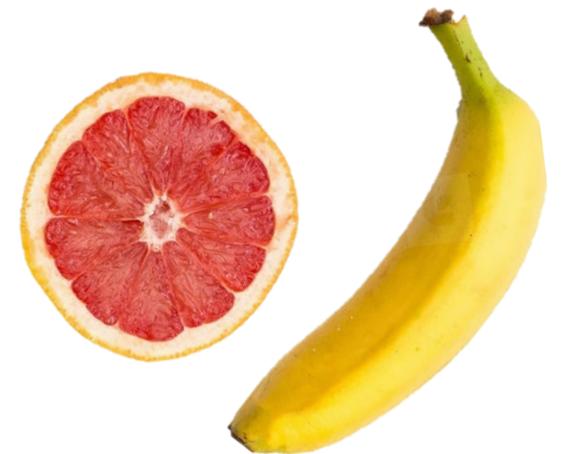
- Poor appetite
- Nausea or vomiting
- Constipation or diarrhea
- Mucositis
- Taste Changes

Previous Diet Restrictions

Balance is key

Try to maintain previous nutrition restrictions

- Diabetes
- Kidney Disease
- Heart Disease
- Medications



Key Nutrients During Cancer Treatment

Cancer treatment can place a lot of nutritional demand on your body.

A main goal is to try to maintain your weight.

Calorie Dense Foods

Carbohydrates and fat provide our bodies with the bulk of calories to maintain weight

- Good carbohydrates: fruits, starchy vegetables (corn potatoes, potatoes), whole grains (rice, quinoa, oatmeal, etc.), pastas, cereals, beans, dairy (yogurt, kefir, and milk)
- Good fats: oils (olive, soybean, etc.), nuts, seeds, avocado, full fat dairy, coconut

Protein Rich Foods

Helps repair body tissue and maintain a healthy immune system

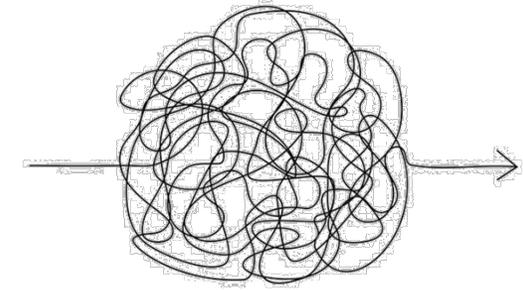
Individuals with cancer typically need extra protein during treatment

- Good sources: lean meat, fish, poultry, dairy (cheese, Greek yogurt, milk, etc.), eggs, nuts, beans, lentils, soy foods (tofu, soymilk, tempeh, edamame)
- Protein powders or supplemental beverages

Sugar

Does sugar feed cancer?

- All carbohydrate foods are metabolized into “sugar”
 - Glucose
- All cells in our bodies use glucose for fuel
 - Tumor cells can make and use their own glucose
- It is believed that cancer cell growth is more related to **high insulin levels** vs. sugar intake alone
 - Insulin levels rise quickly following a large intakes of simple carbohydrates or added sugars



More complicated than it seems

Tips to prevent high insulin levels:

1. Choose less simple carbohydrates and more complex carbohydrates
 - Whole grains, fruits (with skins/seeds), non-starchy vegetables
2. Pair carbohydrate foods with fat and protein
3. Go on a short walk after eating

Unintentional Weight Loss

Weight loss – especially extreme or rapid may lead to malnutrition

Malnutrition: physical state of unbalanced nutrition

- Increased risk of losing *muscle mass and strength*
- Malnutrition (or even a 5% weight loss) places individuals at risk of:
 - Treatment delays
 - Delayed tissue healing
 - Slow recovery between chemotherapy cycles
 - Increased fatigue
 - Decreased ability to fight infection

Cancer treatment is not the time to lose weight.
Focus on maintaining!



A collage of healthy ingredients including sliced bananas, cucumbers, a lemon slice, spinach, almonds, and a glass of green smoothie.

Nutrition

**To Manage
Treatment Symptoms**

Nausea

Feeling nauseous can impact your appetite and lead to weight loss.

If you vomit, you can become dehydrated.

Best treatment depends on the cause:

- Chemotherapy/Radiation: may require a scheduled anti-nausea medication
- Anxiety/Fatigue: psycho-social counseling or physical/mental relaxation techniques
- Medications/Supplements: may need to take with food instead of an empty stomach



Nutrition tips for managing nausea

- Eat 6-8x/day instead of 3 large meals
- Sip on calorie containing beverages
- Drink clear liquids after vomiting
- Eat bland, dry foods
- Avoid your favorite foods
- Suck on tart hard candies or peppermints
- Sip on herbal teas between meals
- Avoid strong odors:
 - Eat cool or room temperature foods
 - Eat in well-ventilated rooms
 - Sit in a different room while meals are prepared

Gastrointestinal Disturbances

Most common side effect of radiation/chemotherapy treatments

Diarrhea

Adequate hydration (cold or room temperature)

Small/frequent meals

Limit lactose

Avoid greasy, fried, or spicy food

High *soluble* fiber

Constipation

Adequate hydration (warm or hot temperature)

Small, frequent meals

High *soluble & insoluble* fiber





Managing Diarrhea and Constipation

Choose the right type of fiber

Soluble Fiber

Absorbs water and becomes sticky & gel-like
Slows transit time
Helps form bowel movements

Bananas	White Rice	White Toast	Applesauce
Oatmeal	Mashed Potatoes	Nut Butters	Canned fruits
Farina	Pancakes	Chia Seeds	Melons

Supplements: Metamucil, Banatrol, Benefiber, Nana Flakes

Insoluble Fiber

Does not absorb water
Increases transit time
Helps promote bowel movements

Leafy Greens	Popcorn	Fruit Skins	Whole Nuts
Seeds	Raw Vegetables	Dried Fruit	Barley
Beans	Multigrain Bread	Whole Potatoes	Flaxseed

Supplements: Flaxseed, Wheat Bran

Decreased Appetite

Loss of appetite is common during cancer treatment and can lead to weight loss and undernutrition. This can slow the body's ability to heal and interfere with proper functioning of the body.

Eat 5 or 6 small meals (or snacks) per day.

Large meals may be overwhelming

Aim to eat every 1-2 hours

Stock up on high calorie foods and beverages.

Smoothies, supplemental beverages, avocados, high fat dairy, etc.

Eat the largest meal when you are the most hungry.

Typically in the morning

Try to be as physically active as possible.

To help stimulate your appetite

Eat the high protein foods on your plate first.

Poultry, fish, eggs, beans, nuts, dairy, etc.

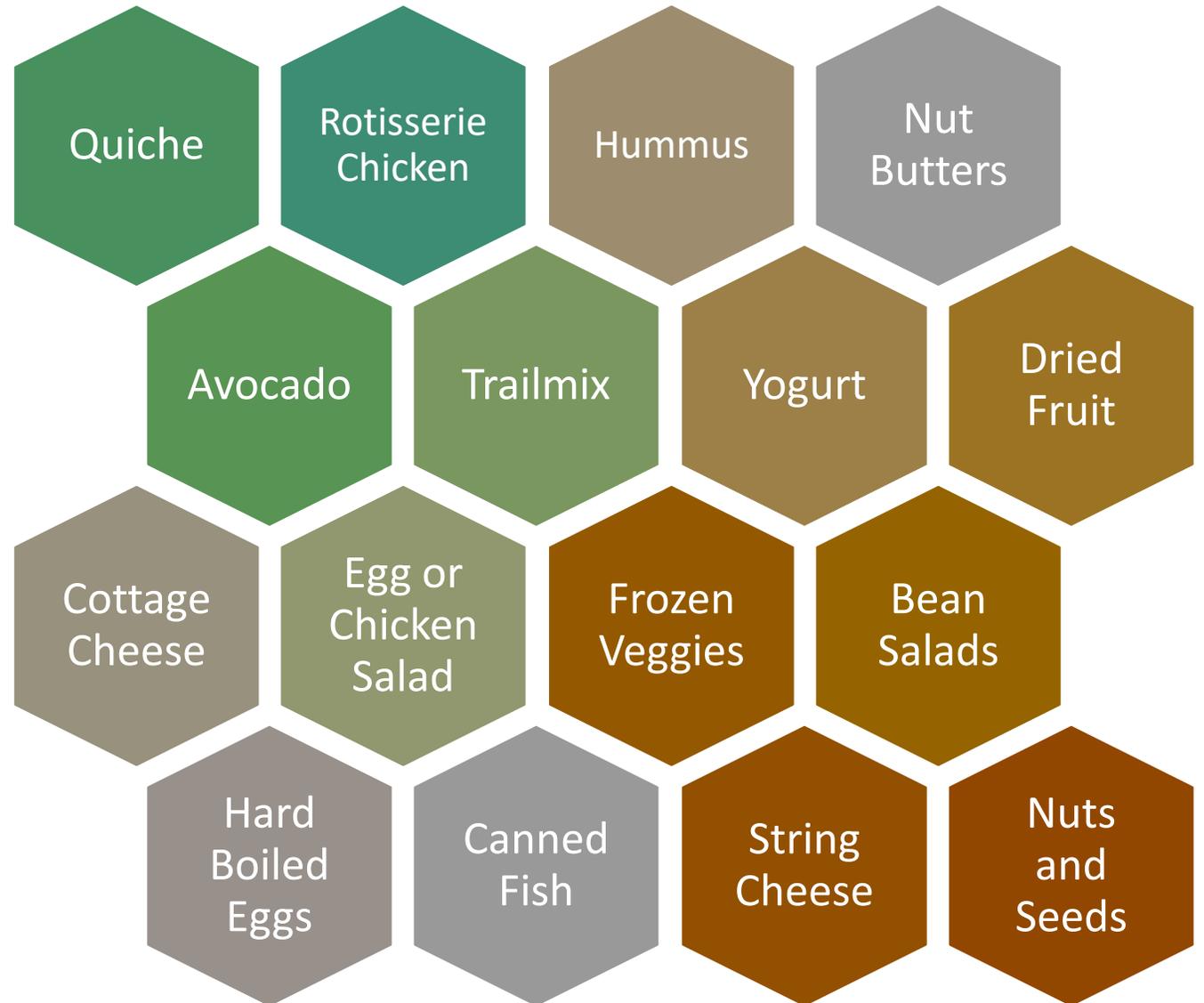
Speak up to friends and loved ones.

They can help prepare or purchase food

Convenient Foods

Have nutritious and easy-to-prepare options on hand when you are not in the mood for cooking

1. Keep foods in the front of your fridge/pantry
2. Set non-perishables out on the counter
3. Add calories to your favorite snacks
 - Apples + *peanut butter*
 - Carrots and bell peppers + *hummus*
 - Multigrain toast + *avocado*
 - Peaches + *cottage cheese*
4. Keep extra smoothies or milkshakes in the freezer





Smoothie Formula

½ cup liquid



½ cup fruit (frozen or fresh)



1 cup vegetables (frozen or fresh)



protein source

Mucositis

Sores in the mouth or on the gums or tongue

Can lead to soreness or pain with eating or swallowing

Food choices to manage a sore mouth:

- Choose soft, bland foods
- Choose cold or room temperature foods
 - Hot foods may cause more irritation
- Soothe mouth with cold foods and drinks
 - Frozen fruit (grapes, banana, melon balls)
 - Frozen fruit pops and ice chips
- Moisten foods with broth, soup, sauces, gravy, or butter
- Eat high-protein, high-calorie foods to speed healing
- Use a straw to direct the beverage away from sores

Recommended Foods

Cooked Cereal	Smoothie	Yogurt	Pudding
Soft Meat	Cream Soup	Avocado	Bananas
Apple Sauce	Mashed Potatoes	Pasta	Scrambled Eggs
Casserole	Hummus	Ground Meats	Steamed Veggies

Avoid foods that are likely to irritate your mouth

- Acidic foods (citrus fruits, tomatoes)
- Irritating spices or seasonings (pepper, chili powder, salsa, hot sauce, horseradish)
- Rough, dry or coarse foods (granola, hard toast, crunchy snack foods)

Dry Mouth (Xerostomia)

- Drink 8-10 cups of fluid daily
 - Keeps mouth moist and helps thin saliva
- Limit caffeine and alcoholic beverages
- Carry a water bottle with you – sip from it often
- Eat soft, bland foods
- Moisten food with broth, soup, sauces, gravy or butter
- Try tart foods and drinks to increase saliva production
 - Lemonade or cranberry juice
 - Sugar free lemonheads
 - Lemon water
 - Citrus popsicles
- Chew sugar-free gum



Taste Changes

Cancer treatment can cause changes in your sense of taste and smell

In general, focus on keeping your mouth clean and healthy

Mouth rinse before eating : $\frac{3}{4}$ tsp salt + 1 tsp baking soda + 1 quart water

Metallic

- Choose tart flavors (lemon wedges, lemonade, vinegar, pickled foods)
- Add sweeteners or a little sugar to foods (maple syrup, honey, dates)
- Choose plastic silverware
- Limit foods from cans
- Avoid cooking with cast-iron skillets

Too salty

- Choose tart flavors (lemon wedges, lemonade, vinegar, pickled foods)
- Add sweeteners or a little sugar to foods (maple syrup, honey, dates)
- Choose low sodium soups, crackers, etc.
- Prepare more meals at home and limit take-out

Too sweet

- Choose tart flavors (lemon wedges, lemonade, vinegar, pickled foods)
- Season foods with additional herbs and spices
- Dilute oral nutrition supplements with milk/milk alternatives

Like cardboard

- Choose tart flavors (lemon wedges, lemonade, vinegar, pickled foods)
- Blend fruits into shakes, ice cream, or yogurt
- Season foods with herbs, spices and other seasonings
- Add sweeteners or a little sugar to foods (maple syrup, honey, dates)
- Add a small amount of salt to foods

Food Safety

Cancer and treatments can weaken your immune system.
Leaves you at higher risk of food poisoning.

Tips to reduce risk:

- Wash hands before and after making food
- Wash fresh fruits and vegetables with warm water
- Have separate cutting boards
 - Meat, poultry fish
 - Raw fruits and vegetables
 - Ready to eat foods – bread and cheese
- Avoid raw, rare, and undercooked foods
- Refrigerate leftover food within 2 hrs of cooking
- Check the “use by” or “best by” date on food
- Do not use dented, rusted or leaking cans
- Eating out:
 - Avoid buffets, salad bars, and food trucks
 - Avoid eating condiments, salsa or dips in public bowls



Dehydration

Lose more fluid than you take in

Common during cancer treatment due to:

- Decreased intakes (sore mouth, nausea, poor appetite)
- Vomiting, diarrhea, or excessive sweating
- Increased urination (diabetes or water pills)

Symptoms:

Thirst	Dry Mouth	Dry Lips/Skin
Headache	Dark Colored Urine	Constipation
Rapid Heart Rate	Confusion	Dizziness

Tips to prevent dehydration:

1. Drink frequently (1-2 hours)
2. Aim for 8-12 cups per day
 - More with diarrhea or vomiting
3. Keep a water bottle with you
4. Keep a glass of water next to couch or bed
5. Choose other beverages besides water
 - Diluted fruit juices, flavored waters, decaffeinated coffee/tea, sports drinks, milk, milk alternatives, etc.
6. Eat foods high in fluids
 - Bouillon, soups, gelatin, fruit ices, popsicles, sherbet, milkshakes, smoothies, or supplemental beverages
7. Limit drinks with caffeine (2 per day)

Infused Water

IDEAS

Try These Refreshing Combinations



Lemon → Cucumber → Mint



Strawberries → Basil → Cucumber



Raspberries → Lime → Mint



Watermelon → Raspberries → Basil



Blueberries → Lemon → Lavender



Green Apple → Raspberries → Rosemary



Pineapple → Cucumber → Mint



Orange → Cinnamon → Clove



Mango → Pineapple → Mint

Helpful tips:

- Steep loose herbs and flowers in a tea infuser.
- Crush herbs or fresh ginger to release flavors.
- Keep it simple! Think of flavor combinations you like in other recipes and build from there.



Red Flags of Junk Science

1. Recommendations that promise a quick fix or “cure all”.
2. Claims that sound “too good to be true”.
3. Extreme warnings of danger from a single food or diet pattern.
4. Recommendations made to help sell a certain product.
5. Lists of “good” and “bad” foods.
6. Bold marketing terms such as “breakthrough”, “miracle” or “discovery”.
7. Claims of information “that your doctor doesn’t know”.

Credible Sources:

The American Cancer Society (cancer.org)

-American Institute for Cancer Research (AICR.org)

-The Academy of Nutrition and Dietetics, Oncology Nutrition (oncologynutrition.org)

-Memorial Sloan Kettering Cancer Center (mskcc.org)





Physical Activity

**And Cancer
Risk**

Physical Activity and Cancer Risk

In the last 2 decades, it has become clear that exercise plays a key role in cancer prevention.

Physical inactivity is a well-established risk factor for several types of cancer.

- Positive relationship between physical inactivity and risk for both Hodgkin and non-Hodgkin Lymphoma
- Similar findings in 13 other cancers



A photograph of two women walking outdoors in a park-like setting. The woman on the left is older, with grey hair, wearing a grey hoodie over a pink shirt, and is smiling broadly. The woman on the right is younger, with dark curly hair, wearing a pink long-sleeved shirt, and is looking towards the older woman. They appear to be in conversation. The background is a blurred green landscape with trees.

Physical Activity

**During Cancer
Treatment**

Benefits of Physical Activity During Cancer Treatment



Physical Activity Recommendations During Cancer Treatment

During cancer treatment, you should be as physically active as your abilities and condition allow.

Weekly Goal:

- 150 minutes of moderate intensity activity (30 minutes, 5 days)
- Limit sedentary time
- Start slow and advance as able
- **Any activity is better than nothing!**



Find activities you enjoy!





Thank you!

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