

Children with Cancer: Enhancing Nutrition

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Agenda

- Overview of nutrition in childhood cancer
 - Common nutritional challenges & strategies to address them
 - Nutrition therapy options
 - Nutrition myths & nutrition facts
 - Creative tips for fostering good nutrition during treatment
 - Questions & Answers



Nutrition Overview in Children with Cancer



Why is nutrition important in children with cancer?

- Continued growth and development
 - Improved tolerance and response to treatment
 - Improved recovery
 - Decreased complications and infections
 - Decreased length of stay in hospital
 - Reduced cost of care
 - Improved quality of life



Bauer, Jürgens & Frühwald, 2011
Ladas, Sacks, Brophy & Rogers, 2006
Co-Reyes, Li, Huh & Chandra, 2012



Common Barriers to Optimal Nutrition

- Reduced oral intake:

- Anorexia, fatigue, decreased appetite, early satiety

Effects of cancer treatment:

- Mucositis, taste changes, nausea/vomiting, dysphagia, diarrhea, etc.

Psychosocial factors:

- Depression, loss of control, change to routine, food aversion



Nutrition Focus in Children with Cancer

- To meet energy, macronutrient, and micronutrient requirements to support growth, development, and recovery
 - Focus on high protein, high energy foods
 - Varied diet based on Canada's Food Guide
 - Ensure adequate delivery of micronutrients affected by treatment
 - Managing and overcoming nutritional challenges and symptoms



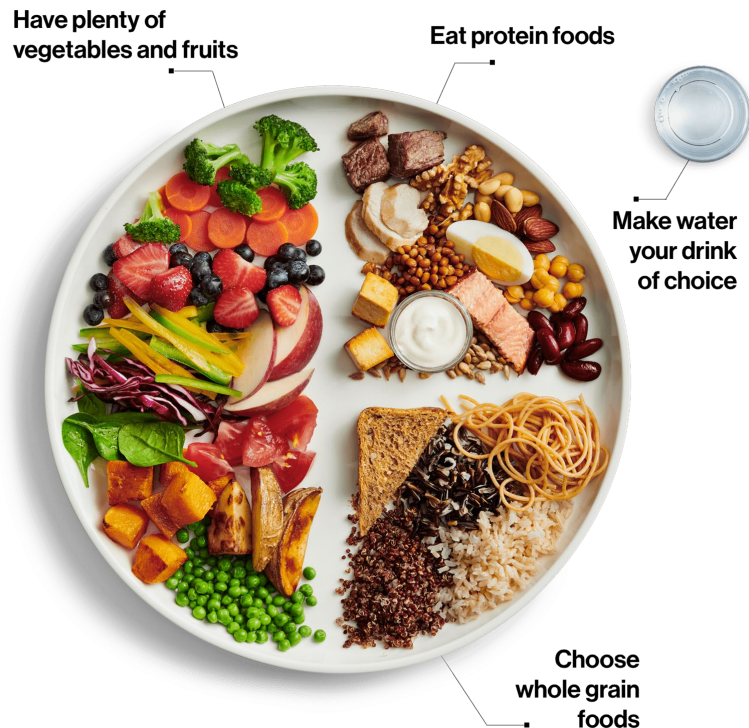
Basics of Nutrition

● Macronutrients - Balanced Plate

- Protein
- Carbohydrates
- Fat

Micronutrients (vitamins, minerals)

- Calcium/Vitamin D
- Potassium/magnesium/phosphate
- Carnitine





Macronutrients - Balanced Plate

Protein

- Grow, build, and repair tissues & protect lean body mass
Meat, poultry, fish, eggs, dairy, legumes (beans, chickpeas, lentils), soy

Carbohydrates

Primary energy source
Fruits, vegetables, whole grains

Fat

Store energy, protect organs, make hormones, absorb fat-soluble vitamins
Fatty fish, avocado, nuts/seeds, vegetable oils



Micronutrients

Micronutrients (vitamins, minerals)

- Calcium & Vitamin D
 - bone health
- Potassium, magnesium & phosphate
 - body may use more of these minerals during treatment



Calcium

Functions

- Building block for strong bones and teeth
Helps with nerve and muscle function, including your heart beat

Sources

Dairy products (milk, cheese, yogurt, kefir), calcium-fortified plant-based alternatives (ex. Soy milk, coconut yogurt)*, canned sardines and salmon (with bones), tofu prepared with calcium, sesame seeds and tahini

Note: not all plant-based products have calcium added





Vitamin D

Functions

- Supports bone health - important for both the absorption and transport of calcium
- Keeps your immune system healthy

Sources

Sunshine

Fortified milk and plant-based beverages, fortified margarine, fatty fish (salmon, trout, snapper), eggs, organ meat, fish liver oil



Potassium

Functions

- Helps to control blood pressure
Needed for nerve and muscles function, including heart contraction

Sources

Bananas, oranges, grapes, white/sweet potato, spinach, tomatoes, avocado, milk, yogurt, legumes, nuts and seeds (ex. Pistachios, almonds, pumpkin seeds), chocolate, and molasses





Magnesium

Functions

- Helps your body use energy from food and make new proteins
Important part of bones and teeth and helps keep muscles and nerves healthy

Sources

Green leafy veggies (spinach, swiss chard), high fibre grains (bran, wheat germ, quinoa, whole wheat bread, brown rice etc), legumes, nuts and seeds (walnuts, hazelnuts, pumpkin and sunflower seeds), milk and dairy products





Phosphate

Function

- Works with calcium and other nutrients to build healthy bones and teeth
Helps your body use energy and supports growth

Sources

Edamame, tempeh, potatoes, mushrooms, whole wheat, oatmeal, quinoa, cheese, yogurt, milk, soy milk, meat and organ meat, fish, lentils, chickpeas, beans), tofu, egg, pumpkin seeds, sunflower seeds, cashews, tahini, chocolate





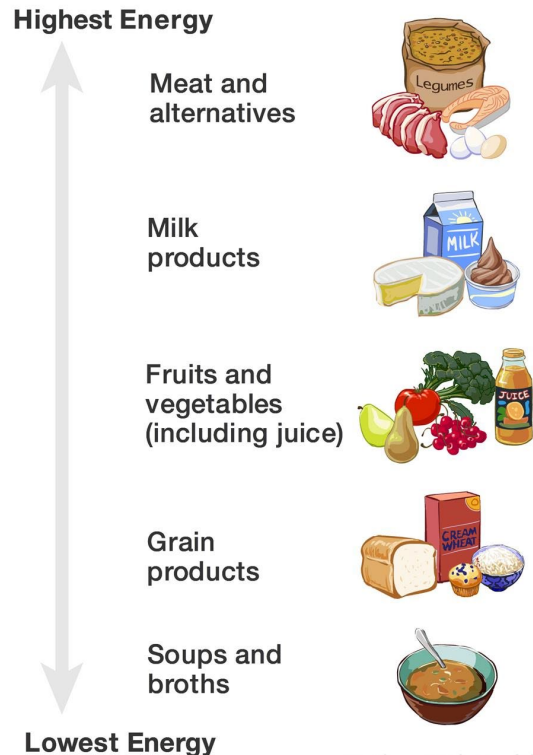
High Energy, High Protein Diet

Purpose

- Support growth & healthy body weight
High energy and high protein foods are high in calories and protein in a smaller volume

Strategies

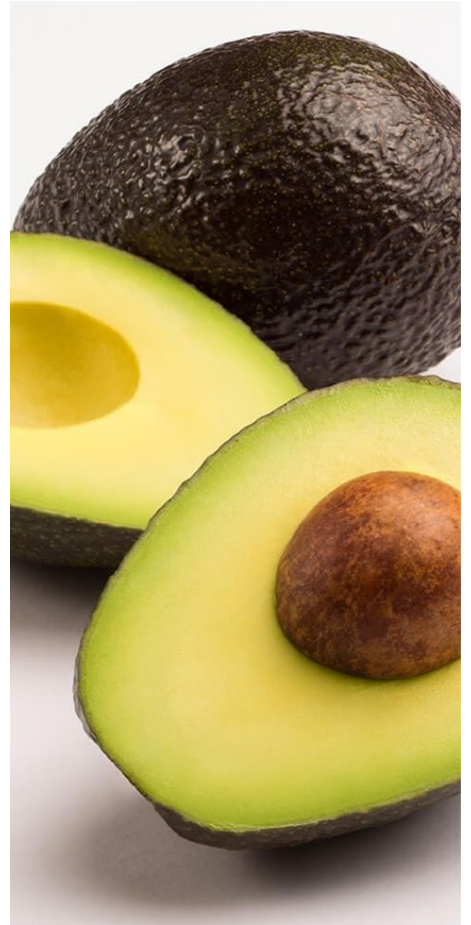
Provide highest energy foods first
Include a protein and a fat source at every meal and snack





Add a **fat** and **protein** source to a **carbohydrate** to every meal and snack, examples:

Ideas of High Protein & High Energy Food Sources to add to meals	
Fat Sources	Protein Sources
<ul style="list-style-type: none">- Oils (ex. olive, avocado, sunflower, coconut)- Butter or ghee- Full-fat yogurt and cheese- Sour cream- Whole milk and whipping cream- Full-fat coconut milk- Avocado- Olives- Nut butters (ex. peanut, almond, cashew)- Seed buts (ex. tahini, pumpkin seed butter)- Hemp hearts- Nuts and seeds* and ground nuts/seeds	<p>Animal-based</p> <ul style="list-style-type: none">- Meat - not lean (chicken, turkey, pork etc.)- Fatty fish (salmon, trout, arctic char etc)- Seafood (shrimp, scallops, calamari etc)- Yogurt, cottage cheese and cheese <p>Plant-based</p> <ul style="list-style-type: none">- Tofu, tempeh & edamame beans- Beans, chickpeas and lentils and legume-pasta- Hummus or white bean dip- Nuts and seeds*
*Children >4 years old	





What about “bad” foods?

- All foods fit!

In general, there are no specific foods that need to be eliminated for children with cancer

Some suggestions may be made by your child’s dietitian to help with side effects of treatment





Not so bad after all?

- Food provides more than just nutrition, many foods traditionally labelled “bad” provide a sense of comfort or joy to children
Every food provides energy which is beneficial for maintaining weight and supporting growth



Common Nutritional Challenges & Strategies to Address Them



Nausea and Vomiting

- Common side effect of chemotherapy and radiation
It is often easier to prevent nausea before it occurs vs treating it once it has started
Anti-emetic (anti-nausea) medication regime may be prescribed by your child's team and may need to be adjusted over time



Nausea and Vomiting

Strategies:

- Avoid empty stomachs - hunger can make nausea worse
Offer bland, starchy foods to help absorb stomach acid (ex. Crackers, dry cereal, toast)
Offer foods that are easy to digest (ex. Broth, clear liquid, soda cracker, rice, pretzels, dry cereal, digestive cookies)
Offer lots of fluids, ensure your child stays hydrated
Avoid: greasy, fried, spicy, acidic, sweet or strong-flavour/odour foods
Serve food at room temperature or colder
Relax and eat slowly
Try offering small frequent meals instead of 3 larger meals
Rinsing often (with saltwater or water) may help get rid of bad tastes



Fatigue

- Common side effect of cancer treatment (chemo, radiation, medications)
May be worsened by inadequate energy intake, dehydration and nutrient deficiencies

Strategies:

Offer a wide variety of foods for your child

Try small frequent meals throughout the day

High energy, high protein foods (small volume, more energy)

Have your child rest when they need to

Plan activity for when your child has the most energy

Speak to your child's medical team



Constipation

- May be caused by certain treatments, medications, decrease fluid intake, decreased fibre intake and decreased activity level
Constipation often leads to decreased appetite

Strategies

Ensure your child is hydrated

Offer fibre-rich foods - whole unprocessed foods such as whole fruits (especially kiwi), whole veggies, oatmeal, flaxseed, chia seeds, legumes and nuts

Encourage gentle movement

Ensure your child has protected bathroom time, squatty potty may help

Talk to your child's team about laxative options



Diarrhea

- Common side effect of cancer treatment

To prevent dehydration, ensure adequate consumption of fluids to replace water and electrolytes lost

Choose soluble fibre to bulk up stool

- Oatmeal, bran, barley, potatoes, rice, bananas, apple / apple sauce

Avoid large amounts of juice, sweetened beverages, artificial sweeteners, and stimulants such as caffeine or alcohol as they can increase diarrhea



Mucositis

- Common side effect of chemotherapy and/or radiation therapy to the oral cavity
 - Mucositis refers to ulcerative lesions of the mucosa throughout the GI tract
 - Pain control is key
 - Focus on fluids and soft, cold/cool foods such as oral supplements, ice cream, popsicles, mashed potatoes, apple sauce, smoothies, etc.
 - Avoid acidic, spicy, salty foods



Taste Changes

- Common side effect of chemotherapy and/or radiation therapy to the oral cavity
Trial and error, try new foods and tastes to find what your child enjoys

Strategies:

Bland foods

Flavours - sour, tart, tangy, salty foods

Textures - crunchy, juicy, cold foods

Small, frequent meals

Add sauces and condiments to meals

Metallic taste with meat - use plastic cutlery



Appetite Changes

- Small, frequent meals

- Energy boosting strategies

- High energy, high protein foods
 - Add sauces, oil, butter, cream, etc. to meals and snacks
 - High fat dairy products
 - Nuts/nut butters & seeds

- Oral supplements (Ensure, Boost)

- Try your best to be active if possible



Nutrition Therapy Options

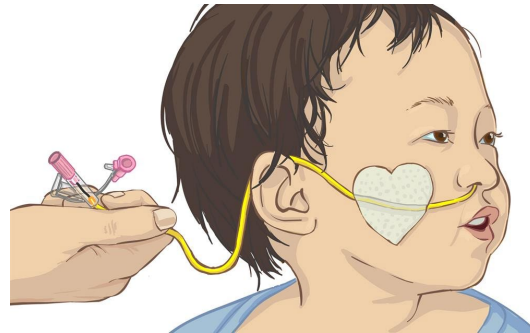


Nutrition Therapy Options

- If your child is unable to meet nutritional needs orally, there are nutrition support options available.

Speak to your child's medical team about:

- Oral Supplements (ex. ensure, pediasure)
- Nasogastric (NG) feeding tube (bridge to nutrition)





Common Nutrition Myths & Nutrition Facts



“Sugar causes
cancer”

MYTH



Sugar & Cancer

- The association between sugar and cancer is fueled largely by misinterpreted science

The causes of cancer are complex

- Genetic mutation is the primary cause of cancer

There are no conclusive studies that have directly linked sugar consumption to cancer

All cells require glucose for energy. The body needs glucose to function.

Of note: excess consumption of sugar (or any food) can lead to obesity, which can increase risk of cancer.

The bottom line: it is okay to consume sugar in moderation.

Mazumdar, 2020
"Sugar and cancer - Canadian
Cancer Society", 2021



“Individuals with
cancer should
avoid all meat”

MYTH



Meat & Cancer

WHO has classified **processed meat** as Group 1, carcinogenic to humans

- There is sufficient evidence from epidemiological studies to support eating processed meat causes colorectal cancer.

Processed meat includes salted, cured, fermented, or smoked meat to enhance flavour or improve preservation. Examples include hot dogs, sausages, ham, corned beef, beef jerky, canned meats.

WHO has classified **red meat** as Group 2A, probably carcinogenic to humans

There is limited evidence from epidemiological studies showing a positive association between red meat and colorectal cancer.

Red meat includes beef, veal, pork, lamb.

"Cancer: Carcinogenicity of the consumption of red meat and processed meat", 2015



Meat & Cancer

The Bottom Line:

- Red meat also provides nutritional benefits such as protein, iron, zinc, and vitamin B 12

Moderate consumption of red meat as a part of a balanced diet is unlikely to increase cancer risk

Limit processed meats. Eat red meat in moderation (3 times per week).

Choose poultry, fish, and plant-based protein sources more often.

McAfee et al., 2010
"Why you should limit red meat and avoid
processed meat - Canadian Canc", 2021



“Fat and oils are
bad for kids with
cancer”

MYTH



Fat & Oils

- Fat is our friend when it comes to nutrition, despite previous beliefs

Benefits of Fats

Protects our organs and plays important role in metabolism, hormone balancing, optimal brain function and transport of vitamins

Some fats such as omega-3 fats, are considered essential, which means our body cannot make them and we rely on sources from our diet. Omega 3's uniquely help reduce inflammation in our body.

Excellent source of long-lasting energy

Tasty!

Truth about Fat. Canadian Cancer Society, 2021.
Kushi & Giovannucci, 2002.
Bojkova et al, 2020.



Fat & Oils

Examples of Healthy Fats

- Oils (olive, avocado, safflower, sunflower, canola and walnut oil)
 - Tip: try not to heat oils too high as they reach a “smoke-point” which reduces their nutritional quality

Avocados and olives

Fatty fish (such as salmon, trout, arctic char and herring)

Nuts & seeds

Butter, ghee and coconut oil (in moderation)



Creative Tips to Foster Good Nutrition Throughout Treatment



Top Creative Tips

- Oral nutrition supplements (Ex. ensure, boost) - 3 ways
Spreads & sprinkling - high energy, high protein
Taste changes - crunchy combos





Oral Nutrition Supplements - 3 ways

1. Blended into a smoothie (in place of milk or water)
2. Mixed with whole cow's milk ex. 75% ensure 25% cow's milk (for children who find it too sweet) *check with your child's RD first
3. Make into pudding (ex. Chia seed pudding topped with fruit and nut butter)





Spreads & Sprinkling- High Energy, High Protein

Spreads

- Butter or ghee
- Coconut or olive oil
- Hummus
- Avocado or guacamole
- Baba ganoush
- Cheese (ex. Ricotta, feta)
- Cream cheese
- Nut & seed butters
- Full-fat yogurt
- Mayonnaise
- Gravy

Sprinkles

Hemp hearts
Nutritional yeast
Sesame seeds
Sunflower seeds*
Pumpkin seeds*
Walnuts, cashews, almonds
etc. *
Dried fruit

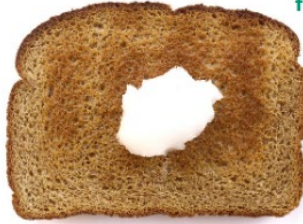
*modified based on age



Spreads & Sprinkling- High Energy, High Protein



layer of
coconut
oil first



then top
with
nut/seed
butter



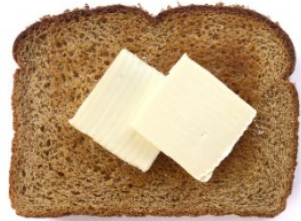
layer of
olive oil
first



then top
with
smashed
avocado



layer of
melted
butter/
ghee
first



then top
with
cream
cheese +
fruit



Credit: Feeding Littles



Taste Changes- Crunchy & Fresh & Juicy Combos

1. Cucumber + parmesan cheese slices
2. Almonds* + red pepper slices + cream cheese dip
3. Pretzels + apple slices + tzatziki dip
4. Watermelon + feta cheese + mint leaves
5. Kiwis + walnuts

*Children >4 years old



High Energy Chocolate Banana Peanut Butter Smoothie

5 minutes • Serves 1

Ingredients

- 1 chocolate oral nutrition supplement (ex. ensure)
1 frozen banana
1 tablespoon peanut butter
½ tablespoon coconut oil (melted)
Water (as per preference)
Optional: hemp hearts

Directions

1. Blend all ingredients, add water to desired consistency , sprinkle with hemp hearts & enjoy!



Questions?





Carnitine

A nutrient created from amino acids (proteins), carnus = flesh in latin (derived from meat)

Functions

- Responsible for transporting fats in the body
Critical role in energy production

Sources

Made in the body

Animal sources (meat, fish, poultry and milk) and formula

- Redder meat = higher carnitine

Small amounts found in whole wheat bread, cheese and asparagus

Patients with cancer can become deficient in carnitine (especially those on long-term parenteral nutrition or with a limited intake of meat), which can contribute to feelings of fatigue