

# Aggressive CHO Restrictive Cancer Diet

## Overview

The nutritional changes involved in the Marsden Cancer Diet are based on four fundamental concepts:

1. Unlike healthy cells, almost all cancer cell metabolism requires sugar to fuel its energy needs
2. Nutrients (**vitamins, minerals, phytosterols, bioflavonoids, etc.**) found in certain fruits and vegetables have been shown to reduce cancer incidents, reduce rates of recurrence and improve patient condition throughout cancer treatment
3. Due to environmental contamination and non-sustainable agricultural methods many foods are laden with harmful and potentially toxic substances. These substances are implicated in the cancer development process
4. Certain foods are more likely to cause allergic or hypersensitive reactions which can lead to alterations in bowel function and reduced nutrient absorption ultimately leading to sub-optimal immune and detoxification reactions

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### The Problem With Sugar

In 1924 German Nobel Prize winner Otto Warburg discovered that most cancer cells do not generate their energy in the normal manner. The mitochondrion in cancer cells do not function properly therefore oxygen cannot be used to fuel the production of energy from sugar. This leads to reduced efficiency of energy production and lead to the excessive production of lactic acid, the byproduct of oxygen deficient energy metabolism of the cell. This has been referred to as the **Warburg Effect**.

Recent findings both in Europe under the research team of Dr. Coy and in the United States at the Harvard Medical School have each identified enzymes that are elevated in cancerous cells. These enzymes are shown to shunt sugar away oxidative metabolism to the formation on lactate and other cellular components necessary for cancerous growth. Both researchers found that by altering or limiting the activity of these enzymes they were able to reduce the growth of cancer cells (Demetrius, Coy and Tuszynski 2010). Currently, research is being done to discover drugs that can alter expression and activity of these enzymes; however, until the discovery of those drugs, there are still options to limit the activity of these enzymes by limiting the sugars that are processed by them.

Dr. Coy and colleagues in Germany have proposed a diet plan called Tavarlin<sup>®</sup> that takes advantage of this metabolic anomaly. By reducing patient's **carbohydrate** intake to between 40-60 g/day we can essentially starve aggressively growing tumor cells of their fuel. Healthy cells can utilize protein and fats to make the rest of its energy and therefore proper function in these cells can continue. Foods that contain high levels of carbohydrate that can be used to fuel cancerous metabolism are:

Simple Sugars – Candies, cookies, desserts and other sweets  
Starches – breads, pasta, rice, cereals and other grains  
Certain Fruits – certain fruits, while high in certain anti-oxidants, often release significant levels of sugar and increase insulin

By reducing the carbohydrate intake in the body the liver is triggered to secrete a hormone called glucagon. This triggers the mobilization of **glycogen** (short term sugar stores) from the liver. Once the glycogen stores are used up **glucagon** causes normal cells to feed off of **fat** and **amino acids** derived from protein. The creation of energy from fats relies on the formation of **ketones** from the breakdown of fatty acids. These ketone bodies begin to be used as

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energy by cells when the carbohydrate intake falls below 70 g/day. Some critics of low carbohydrates are concerned that excessive ketone bodies in the blood may lead to **ketoacidosis** a potentially severe, life threatening medical condition. This is avoided in the diet by the addition of a small amount of carbohydrate each day (40-60g/day). Thus making this diet a safe long-term strategy for cancer patients.

*A Note On Cachexia*

Cachexia, or significant weight loss, is a serious condition that can occur in patients with cancer. It is problematic because it is associated with a poorer prognosis. Cachexia generally has two main causes:

1. Reduced Appetite

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often one of the most common side effects of many conventional therapeutics like chemotherapy and radiation is nausea, vomiting and reduced appetite. In addition, appetite can decline through any chronic illness for a variety of reasons. At Core Health we attempt to employ a variety of botanical and homeopathic interventions to improve appetite and resolve or reduce nausea and vomiting. Let us know if you are experiencing a reduction in appetite during your treatments...we can help.

2. Metabolic tumor demands

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since the energy metabolism of cancer cells is inefficient it requires substantial amounts of sugar to fuel its growth. As a result it can sequester calories from the rest of the body by this increased demand. The diet we recommend is calorie dense, but not derived from sugar. While you may lose weight on this diet during the initial phases your weight should stay stable. If you are hungry choose from our acceptable list of foods to snack on or add to your meals. There are no limits to how much of these foods you can eat. If you do experience consistent weight loss on this diet please speak to your doctor at the clinic

**Foods that Have Potential Anti-Cancer Effects**

Many foods have been studied for their potential anti cancer effects. While no food at this time has been shown to be a cure for cancer, many foods have been shown to have an antagonistic action against the metabolism and growth of cancer cells. Below is a list of power foods supporting the body's defense against cancer:

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Food	Effect	Notes
Vegetables in General	Vegetables have a variety of <b>phytochemicals</b> that have shown potent effects against <b>carcinogenesis</b> . Regardless of the type, eating more than 6 servings of vegetables/day have been shown to reduce rates of cancer and rates of cancer recurrences (Millen et al 2007).	Breast cancer
Cruciferous Vegetables (cabbage, broccoli, cauliflower, brussel sprouts, etc.)	The vegetables in the cabbage family are well known for their anti-cancer properties. These vegetables have a variety of compounds that inhibit cancer growth (Hara et al 2003). In addition, components in cruciferous vegetables aid in detoxification and therefore can help in reducing the accumulation of cancer causing toxins in the body.	For the best effects these vegetables should be lightly cooked via stir fry or cooking in a minimum amount of liquid and should be chewed well.
Green Tea	Green and White Tea contains catechins, most notably EGCG (epigallocatechin gallate), which have been shown to inhibit cancer growth and in large epidemiological studies to reduce rates of cancer (Shimizu et al 2011 and Wu et al 2011). Green tea also contains a compound called theanine which helps with mood, reduce appetite and improve sleep. All of these effects are important in cancer prevention.	Japanese Matcha Tea has the highest level of catechins however any green tea or white tea has high levels of EGCG. In general green teas should be steeped at 175°C for 3 minutes.
Berries (Aronia, Acai, blueberries, black berries, bilberry, etc.)	Berries are nature's most powerful antioxidants. They contain compounds called bioflavonoids which act as oil in the energy making machinery of all cells. By reducing oxidation or the formation of free radicals they have been shown to improve	The darker and fresher the berry the higher the anti-oxidant content. Choose organic produce

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	DNA repair and prevent cancer cell creation.	to avoid exposure to pesticides often used in the harvest of these berries
Omega 3 Oils (Fish Oils, flax seed oil, hemp oil)	Essential Fatty Acids, including omega 3 oils, have recently been shown to be useful in the management of several cancers including pancreatic, gastric and colorectal tumours (Liang et al 2008). Some of the mechanisms behind this supportive effect are the anti-inflammatory effect (COX-2 inhibition) along with the dense energy source they can provide.	Omega 3 oils can become readily oxidized and therefore fish should be lightly cooked and oils like flax or hemp should never be heated
Garlic, Onions, Leeks, Shallots and Chives	The "Allium" or garlic family of vegetables has large quantities of sulfur containing compounds. Animal studies have validated this family's role in the prevention of many cancers. Not only do these sulfur compounds lead to cancer prevention, but they can also support general detoxification (Tanaka et al 2006). Please note that some individuals react poorly to ingesting the allium family and your doctor may recommend that you avoid these vegetables for a period of time or all together during your therapy. Consult the Food Allergen section in "Nutrition" for specific recommendations for you.	Fresh, crushed garlic is the best source of sulfur compounds and should be preferred over supplements
Soy (Tofu, soy milk, edemame, miso, roasted soy beans)	Soy products (except soy sauce) contain important compounds called isoflavones. These molecules can act as hormone buffers and reduce risks of hormone sensitive cancers. They have been suggested as the reason why Asian countries have lower rates of cancers like ovarian, breast, or prostate (Kim et al 2011).	Patients who are taking hormone antagonistic drugs like tamoxifen or arimidex should keep their intake of soy to no more than

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		100g/day
Mushrooms	Mushrooms contain molecules called polysaccharides. These are long chains of sugars. These polysaccharides have important actions on the immune system (Tanaka et al 2011).	Shitake and Maitake are the most commonly available mushrooms for cooking applications that have these polysaccharides. Light stir frying can increase their palatability while not inhibiting their immune stimulating action.
Turmeric	Turmeric is a very well studied herb/spice for its potential effects against cancer. Compounds in turmeric called curcuminoids (most importantly curcumin) have been shown to inhibit cancer growth and actually kill cancer cells in lab conditions (Garcea et al 2005).	
Tomatoes	Tomatoes contain high levels of carotenoids and bioflavonoids. Carotenoids and bioflavanoids have been shown to have in vitro properties of cancer prevention and cancerous growth inhibition (Vrieling 2007).	

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**Avoiding Potentially Toxic Foods**

Unfortunately, the modern industrialized world has created an environmental toxic crisis of epic proportions. Heavy metals, pesticides and herbicides, PCBs, Dioxin, plasticizers, synthetic hormones, etc. have all been dumped into our environment and subsequently into our food supply. At Marsden Centre for Naturopathic Excellence we strongly recommend choosing local, organic produce to cook with along with hormone free meats.

While there are no guaranteed clean foods, we do know that certain foods are more contaminated than others. Here is a list of foods with documented toxicities to avoid:

<b>Seafood to avoid due to toxicity concerns:</b>	
<ul style="list-style-type: none"> <li>• Bluefin tuna or Torro and</li> <li>• Albacore tuna and even</li> <li>• Skipjack tuna</li> <li>• Halibut</li> <li>• Chilean Sea Bass</li> <li>• Grouper</li> <li>• Orange Roughy</li> <li>• Shark/Dogfish</li> <li>• Skate</li> <li>• Atlantic Sole</li> </ul>	<ul style="list-style-type: none"> <li>• Catfish</li> <li>• Lingcod</li> <li>• Mahi Mahi (Opah)</li> <li>• Marlin</li> <li>• Farmed Salmon</li> <li>• Farmed Shrimp</li> <li>• Striped Bass</li> <li>• Swordfish</li> <li>• Asian derived Tilapia</li> <li>• Tile Fish</li> </ul>
<b>Seafood that have not been found to be contaminated with toxic chemicals, but are to be avoided due to sustainability concerns:</b>	
<ul style="list-style-type: none"> <li>• Atlantic Cod</li> <li>• Monk Fish</li> <li>• Abalone (unless it is farmed)</li> <li>• Anchovy</li> <li>• Clams</li> <li>• King Crab from Russia</li> </ul>	<ul style="list-style-type: none"> <li>• Octopus</li> <li>• Rockfish</li> <li>• Giant Scallops</li> <li>• Red Snapper</li> <li>• Spiny and Rock Lobster from Central America</li> </ul>
<b>Seafood safe to consume and do not harm the environment:</b>	
<ul style="list-style-type: none"> <li>• Arctic Charr</li> <li>• Pacific Halibut</li> <li>• Herring</li> <li>• Jelly Fish</li> </ul>	<ul style="list-style-type: none"> <li>• Mackerel</li> <li>• Mullet</li> <li>• Pollock</li> <li>• Sablefish</li> </ul>

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<ul style="list-style-type: none"> <li>• Sardines</li> <li>• Squid</li> </ul>	<ul style="list-style-type: none"> <li>• Blue Whiting</li> <li>• Alaskan Sockeye salmon</li> </ul>
<b>Heavily Sprayed Produce (always purchase this produce list organically grown):**</b>	
<ul style="list-style-type: none"> <li>• Peaches</li> <li>• Apples</li> <li>• Sweet Bell Peppers</li> <li>• Celery</li> <li>• Nectarines</li> <li>• Strawberries</li> </ul>	<ul style="list-style-type: none"> <li>• Grapes (Imported)</li> <li>• Blueberries</li> <li>• Spinach</li> <li>• Potatoes</li> <li>• Lettuce</li> <li>• Kale/collard greens</li> </ul>
<b>Produce with the lowest Pesticide Residues (these products contain lower amounts of pesticide and are not as important to be purchased in the organic variety)**</b>	
<ul style="list-style-type: none"> <li>• Onions</li> <li>• Avocado</li> <li>• Sweet Corn (Frozen)</li> <li>• Pineapples</li> <li>• Mango</li> <li>• Sweet Peas (Frozen)</li> <li>• Asparagus</li> <li>• Mushrooms</li> </ul>	<ul style="list-style-type: none"> <li>• Kiwi</li> <li>• Cabbage</li> <li>• Eggplant</li> <li>• Cantaloupe</li> <li>• Watermelon</li> <li>• Grapefruit</li> <li>• Sweet potato</li> </ul>
<b>Meats and Poultry</b>	
<ul style="list-style-type: none"> <li>• Most animals in North America are given hormones to encourage rapid development and growth. The European Commission has banned the use of hormones in meat due to their potential effects on human health.</li> <li>• Excessive hormones have been implicated in a variety of cancers.</li> <li>• Most meat and poultry products in North America are given large doses of</li> </ul>	<ul style="list-style-type: none"> <li>• antibiotics to prevent infection mostly due to poor raising conditions and cramped quarters. This overuse of antibiotics can lead to antibiotic resistance and excessive human ingestion.</li> <li>• You should always eat organic, free range, antibiotic free meats and</li> <li>• poultry.</li> </ul>

\* Source: Seawatch 2011

\*\* Source: Environmental Working Group 2011



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## Food Allergen/Sensitivity Avoidance Recommendations

Optimal digestive system health is essential for overall health regardless of what disease you might be suffering with. Some foods that we eat can have significant effects on intestinal flora and inflammatory reactions at the level of the gastrointestinal tract (Tlaskalova-Hogenova et al 2011). Ingestion of these foods can lead to **intestinal dysbiosis and mycosis**, mucosa irritation and eventually intestinal atrophy which is often referred to as **“leaky gut”**.

Dysfunction in the gastrointestinal tract will lead to:

1. Reduced absorption of nutrients
2. Impaired excretion of toxins
3. Impaired immune function

**The following are foods to be avoided (your doctor will check all that apply to you):**

- Dairy
  - Milk
  - Cheese (all types)
  - Yogurt
  - Cream
  - Ice Cream
  - Butter
- Meats
  - Beef
  - Pork
  - Game Meats (rabbit, venison, boar, moose, etc.)
- Citrus Fruits
  - Oranges
  - Melons
  - Cantaloupe
- Lemons and Limes are acceptable
- Glutenous Grains
  - Barley
  - Rye
  - Oats
  - Wheat
  - Spelt
  - Kamut
- Nuts
  - Peanuts
  - Hazelnuts
  - Brazil nuts
- Eggs
- Onions and Garlic

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### **Juicing...An excellent source of nutrient**

**Gerson Juice Therapy** is a traditional treatment plan used in cancer for over 40 years. This approach involved the consumption of 10-13 glasses of fresh vegetable and fruit juices per day along with supplementation of potassium and iodine; and the performance of three or more coffee enemas daily. Proponents of the approach claim that this diet will cure cancer by alkalinizing the body, supporting healthy cellular metabolism and improving detoxification. While there are many case studies completed over 40 years and an inpatient treatment clinic providing this therapy, to date there have been no properly controlled trials showing the efficacy of the approach. In addition, it requires full time help to administer this treatment. Ultimately it is not a feasible treatment plan for most patients and the juicing of fruits goes completely against the low carbohydrate approach.

Having said that juicing certain vegetables is an excellent way to ensure you meet or exceed your recommended 7-12 servings of vegetables in a day. In addition, it is a great way to gain cancer preventing/fighting **phytochemicals** like **phytosterols, vitamins, enzymes**, etc. Remember the following rules when juicing vegetables:

1. Use only the vegetables mentioned on the always allowed list or use the juicing recipes included at the end of this section to ensure you do not exceed your carbohydrate levels for the day
2. Use organic vegetables if at all possible to reduce the amounts of pesticide residues in your food
3. Wash using a vegetable wash then peel all vegetables prior to juicing. This again will reduce pesticide residues in you juice
4. Prepare only enough juice that you can immediately consume. Fresh vegetable juices are immediately oxidized and lose some of their healthy effects even after 20 minutes. Do not refrigerator your juices...consume immediately
5. Use a juice extractor juicer not a blender style juicer. Removal of cellulose component of the juice is essential for increasing the nutritional value and improving tolerability

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**Acceptable Food List Summary**

Food on this list can be consumed in any quantity at any time on this diet

**Meats**

??Lamb

**Vegetables**

??Cauliflower\*

??Broccoli\*

??Green/Yellow Beans

??Brussel Sprouts\*

??Cabbage (all varieties)\*

??Egg Plant

??Fennel

??Cucumber

??Kale\*

??Kohlrabi\*

??Watercress

??Celery

??Leeks

??Swiss Chard\*

??Parsley

??Radishes

??Olives

??Asparagus

??Spinach\*

??Tomatoes

??Onions

??Avacados

??Endive

??Green Lettuce

??Romaine Lettuce

??Arugula

**Mushrooms**

??Cremini

??Portobello

??Shitake\*

??Maitake\*

??Chantrelles

**Dairy and Goat**

??Sour Cream

??Goats Cheese

**Poultry**

??Chicken

??Duck

??Goose

??Turkey

**Nuts and Seeds**

??Peanuts

??Pine Nuts

??Coconuts

??Almonds

??Walnuts

??Macadamia Nuts

**Fish**

??Arctic Charr

??Pacific Halibut

??Herring

??Jelly Fish

??Mackerel

??Mullet

??Pollock

??Sablefish

??Sardines

??Squid

??Blue Whiting

**Fats and Oils**

??Flaxseed Oil\*

??Olive Oil

??Grapeseed Oil

??Hempseed Oil

??Butter (clarified butter preferred)

**Seeds**

??Flaxseed\*

??Sesame seed

**Miscellaneous**

??Tofu

??Stevia

\*Food marked with an asterisk should be emphasized in the diet as they are especially helpful due to their health effects.

Note: If you do not see a food item on this list but would like to include it on the diet please contact the clinic nutritionist to ensure it can be added in safely.

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**Yellow List**

You can make one choice from the food on this list to be consumed 1x/day

Name Maximum	Quantity/Serving
Strawberries	80 g
Bilberries	55 g
Raspberries	90 g
Redcurrants	65 g
Gooseberries	60 g
Cranberries	100 g

**Orange List**

You can make a choice from the food on this list to be consumed 3x/week

Name Maximum	Quantity/Serving
Grapes	30 g
Pineapple	80 g
Beetroot, cooked	85 g
Watermelon	60 g
Mango	35 g
Papaya	200 g
Carrots, raw	85 g
Peaches	55 g
Apples	40 g
Plums	45 g
Apricots	55 g

Food on these lists contain a moderate amount of carbohydrates which should not be over consumed to prevent exceeding the daily carbohydrates target.

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**Red List**

Food on this list contain significant levels of carbohydrate in forms that lead to rapid elevations in blood sugars. These should be avoided at any time while on this diet.

<b>Grains and Starches</b>	<b>Fruit</b>	<b>Condiments</b>
(This includes any product that contains these grains) <ul style="list-style-type: none"> <li>• Amaranth</li> <li>• Corn</li> <li>• Quinoa</li> <li>• Rice</li> <li>• Buckwheat</li> <li>• Any food containing flour</li> <li>• Pretzels</li> <li>• Noodles</li> <li>• Rolls</li> <li>• Bread</li> <li>• Crisps</li> <li>• Salt sticks,</li> <li>• Biscuits</li> <li>• Breadcrumbs (breadcrumb coating!)</li> <li>• Ready-to-serve meals</li> <li>• Sauces, thickened</li> <li>• Biscuits and pastry</li> <li>• Cereal products</li> <li>• Soups, thickened</li> <li>• Tortilla</li> <li>• Bread</li> <li>• Cake</li> </ul>	<ul style="list-style-type: none"> <li>• Bananas</li> <li>• Pomegranate</li> <li>• Dry fruits</li> <li>• Raisins</li> <li>• Figs</li> <li>• Dates</li> <li>• Fruit juices, undiluted</li> <li>• Beans</li> <li>• Chickpeas,</li> <li>• Peas</li> <li>• Vegetable juices</li> <li>• Potatoes</li> </ul> <hr style="border-top: 1px dashed white;"/> <p><b>Drinks</b></p> <ul style="list-style-type: none"> <li>• Alcohol (exception 1 glass of red wine)</li> <li>• Beer</li> <li>• Spirits</li> <li>• Liqueur</li> <li>• Chocolate Milk</li> <li>• Fruit Juice</li> </ul>	<ul style="list-style-type: none"> <li>• Jam and marmalade</li> <li>• Sugar</li> <li>• Honey</li> <li>• Syrup</li> <li>• Sweets or Candies</li> </ul>

## Nutrition Plan Summary

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Increase foods predominantly composed of proteins and fats and leafy, green vegetables

Limit foods that have moderate levels of carbohydrates outlined on the Yellow and Orange Lists

Avoid foods that contain substantial amounts of simple carbohydrates and starches, which are outline on the Red List

Avoid the foods checked off by your doctor that may not be beneficial due to potential sensitivities. These may interfere with nutrient absorption and assimilation

Use juicing as a technique to easily ingest nutrient dense and alkalizing vegetables in substantial amounts

Avoid foods that may contain environmental toxins that may contribute to illness or inhibit healthy immune and detoxification responses

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