

NATURAL TERRAIN THERAPY

Nutritional & *Therapeutic Ketosis*

A comprehensive guide to the ketogenic diet as a metabolic tool in cancer support.

For use alongside medical treatment — not a substitute for professional medical advice.

75%

FAT

20%

PROTEIN

5%

CARBS

3

KETONE TYPES

Metabolic Institute of Health · Terrain Advocate Programme

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SECTION 01

The Warburg Effect & Why Ketosis

Fasting Mimicking, Fasting & the Ketogenic Diet

Warburg's discovery, now termed The Warburg Effect, led to The Metabolic Approach to Cancer — the concept that cancer cells preferentially take up an excess of glucose and convert it to lactate for energy (ATP) production.

This is precisely how oncologists locate tumours today. They use PET scans that use radiolabelled sugar (glucose) to find where the highest amount of glucose is being consumed in the body.

The same year Warburg made his discovery, the Ketogenic Diet was discovered to be beneficial for epilepsy. The Ketogenic Diet, designed to mimic the effects of starvation and fasting, helped relieve difficult-to-control seizures. A new diet regime intended to mimic the effects of fasting was developed and termed the "ketogenic diet." Of course, we don't call it the "starvation diet" anymore — it's called fasting.

SECTION 02

Benefits of Ketosis

Starving cancer of glucose and insulin; providing ketones to healthy cells as a fuel source.

One trait shared by tumour cells is dysregulated metabolism. The ketogenic diet, caloric restriction, intermittent fasting, and extended fasting all cause a metabolic change, a reduction in blood glucose, and an increase in blood ketones. We must look at a ketogenic diet as a therapeutic tool, no different than detoxing, chemotherapy, or any other recommendation from a physician.

The ketogenic diet always targets symptoms of metabolic dysfunction, and sometimes it's also treating the root cause. It is not solely the answer; meaning, if someone has major immune or toxicity issues, keto is not the cure. It will help slow the growth of cancer so the primary problems can be addressed.

Benefits

- ✓ Restores normal apoptosis in cancer cells
- ✓ Inhibits HDACs
- ✓ Lowers angiogenesis (impact on HIF1 and VEGF)
- ✓ Promotes mitochondrial biogenesis
- ✓ Reduces common treatment side effects
- ✓ Promotes autophagy, lowering inflammation
- ✓ Destabilises tumour tissue DNA
- ✓ Reduces levels of insulin, IGF-1, & mTOR
- ✓ Upregulates the immune system
- ✓ Upregulates SIRT1 and AMPK
- ✓ Enhances the action of standard treatments
- ✓ Reduces tumour size over time

SECTION 03

Macronutrient Percentages

75%**FAT**

Appropriate fat intake is key to getting into ketosis and is the primary source of daily caloric intake.

20%**PROTEIN**

Protein is the building block of muscle mass. Too little and you lose muscle; too much and it converts to glucose through gluconeogenesis.

5%**CARBS**

The purpose of the ketogenic diet is to stop your body from relying on glucose/carbohydrates for energy and instead force it to burn fat.

The human body has two fuel sources: glucose and ketones. When glucose is present, your body will always use that first. It doesn't use ketones until your glucose tank is empty. A ketogenic diet has been shown to reverse type 2 diabetes, autoimmune disorders, PCOS, and other chronic diseases.

The Ketogenic Diet for our clients will typically start with 75% fat, 20% protein, and 5% carbs. This calculation should be sufficient to get into nutritional ketosis when correctly implemented.

Macro breakdown

- 5% of calories comes from carbs — carbs have four calories per gram
 - Target: 12–20 grams of net carbs per day
- 20% of calories comes from protein — protein has four calories per gram
 - 0.8 grams per kg of ideal body weight per day (IBW)
 - Exception: 1.0g/kg lean body mass with malnutrition, recent surgery, muscle loss
- 75% of calories comes from fat — fat has nine calories per gram
 - Balance of intake in the form of healthy fats

A calorie-restricted ketogenic diet virtually guarantees that you will reach Nutritional Ketosis (blood ketones at or above 0.7 mmol/L). Most people who restrict calories are at or near therapeutic levels of both glucose and ketones (a 1:1 to 2:1 ratio of blood glucose to blood ketones).

Lower calorie limits: 1,200–1,500 cal/day for women and 1,600–2,200 for men, considering age, current weight, and activity level.

SECTION 04

Macro Calculations

Use the app **Cronometer** or one of the many Keto Calculators found on the internet. One kilogram is equal to 2.2 lbs.

Starting example: 1,500 calorie diet, ideal body weight of 150 lbs.

Step 1 — Protein		
Ideal Body Weight (IBW)	150	lbs
IBW ÷ 2.2	68	kg
× 0.8 grams protein	54.5	grams
× 4 cal/gram	218.2	calories
Step 2 — Carbs		
20 grams of carbs	20	grams
× 4 calories per gram	80	calories
Step 3 — Fat		
Total carbs & protein calories	298.2	calories
Total calories needed	1,500	calories
Total calories remaining	1,201.8	calories
÷ 9 cal/gram	133.5	grams fat

This specific macro range is intended to promote ketosis and trick your body into burning more fat for energy instead of sugars.

SECTION 05

Ketone & Glucose Ranges

	KETONES	GLUCOSE
Nutritional Ketosis	0.5 – 3.0 mmol/L	Target: under 85 mg/dL
Therapeutic Ketosis	3.0 – 7.0 mmol/L	Targeting the 70s for therapeutic ketosis

Nutritional ketosis is a metabolic state where BHB ketone levels are present in the blood, starting at 0.7 mmol/L.

Therapeutic ketosis is where BHB ketone levels are 3.0 mmol/L and greater. When patients are in a therapeutic level or extended fast, glucose levels can be in the low 50s — no problem.

Levels above 5.0 mmol/L are not a problem, and are common during intense exercise, extended fasting, or with exogenous ketones.

Ketoacidosis is typically not seen until you get to 10+ mmol/L, and it's in combination with elevated glucose. Ketoacidosis is when blood ketones **and** blood glucose levels are both elevated. If someone had glucose above one hundred and BHB levels at 10+, that could indicate ketoacidosis — they should consult with their physician ASAP.

Therapeutic ketosis is important for brain cancer, glucose-slugging cancers, and endometrial cancers, and will be beneficial for people doing hyperbaric oxygen and radiation treatments.

SECTION 06

Getting Started

Score Yourself & Score Your Clients

These questions will help in understanding their metabolic flexibility. The more yes's you get, the more difficult it will be. Educating them on the *why*, the *what*, and the *how* will be your keys to success.

- Do you have a hard time cutting down on carbs?
- Do you have a hard time cutting down on sugars?
- Do you have a hard time cutting down on alcohol and/or beer?
- Do you have strong cravings and desires for fast food?
- Do you have strong cravings and desires for fried food?
- Does your focus on food consume your thoughts?
- Is changing your diet difficult?

First Step: The 13-Hour Fast

Start with a 13-hour fast — finish dinner at 6 PM and no food until 7 AM. Water and herbal tea are fine but nothing else. If they are not showing ketones via urine at 13 hours, they are metabolically broken.

They should not consume any alternative sweeteners, cream, milk or coffee before testing their blood ketones.

If after 13 hours there is even a trace amount, then start there and push it a little further. Work up to a 14, 15, 16, 18-hour fast. Intermittent fasting and ketosis go hand in hand.

If folks are still showing urinary ketones two to three weeks into that process, that could mean they are not doing keto properly, or there are other issues. Adaptation, on average, takes one to four weeks.

Planning Checklist

- Go grocery shopping for metabolic, ketogenic groceries
- Have keto supplements onboard
- Gain support from family
- Get ketone urine strips
- Order KetoMojo
- Understand macronutrient goals per day
- Know what ideal bodyweight should be
- Download Cronometer

- Clean out the kitchen of tempting foods
- Order a cookbook — Ketogenic Kitchen, Maria Emmerich, Alison Gannett
- Make cooking simple and fun
- Start with extending fasting windows
- Pre-make fat bombs

Find a good calculator at **KetoMojo** or **Ketogenic.com** and determine ideal macronutrients % and caloric intake based on: age, desired weight loss (or not), and activity level.

SECTION 07

The First Few Days or Weeks

- Don't focus solely on calories — especially if you haven't been eating fat. You could feel hungrier.
- Don't get on the scale. Water retention will fluctuate because of electrolyte imbalance.
- Focus on fat percentage. Targeting the percentage of macros is the key to getting into ketosis.
- Test regularly with urine strips throughout the day.
- Use electrolytes to help with Keto Flu symptoms.
- Try adding in BulletProof Coffee with MCT oil.
- Tip on MCT Oil: Start with small amounts to avoid stomach issues. Build up to 1 TBSP a day — you'll likely need to start with a teaspoon or less.

In the beginning, apply simplicity. Focus on low glycemic, above-the-ground vegetables: celery, cucumber, red leaf lettuce, cabbage, and zucchini. Add olive oil with plenty of salt & pepper to taste. Start with greens, asparagus, cruciferous vegetables, radishes, onions, peppers, and fennel.

Stick with good grass-fed, organic meats and fish. Salmon is excellent. If you like the taste, sardines or oysters in olive oil are great. Keep it simple.

Understand Keto Flu and load up on a good pink Himalayan sea salt (Redmond's recommended). When you start producing ketones, your body uses more sodium, magnesium, and potassium.

Keto Flu symptoms: bad breath, cramping, leg spasms, poor sleep patterns, constipation, headaches, tiredness. Take a tsp of Redmond's Salt and let it dissolve under the tongue — within 15 minutes you should feel much better.

SECTION 08

Net Carbs vs Total Carbs

Total carbs are the total amount of carbs, including fiber & sugar. Net carbs are everything included in that total number, minus the fiber.

Net Carb Formulas

WHOLE FOODS

Net carbs = total carbs – fiber

PROCESSED FOODS

Net carbs = total carbs – fiber – sugar alcohols

Sugar Alcohols

DO NOT count toward net carbs

Erythritol, Xylitol, Mannitol, Lactitol

DO count toward net carbs

Maltitol, Sorbitol, Isomalt, Glycerin

(Each gram counts as ~½ gram of carbs)

$$\text{Net carbs} = \text{total carbs} - \text{fiber} - \text{sugar alcohols} + (\text{maltitol} / 2)$$

The important rule: **TEST!** Don't trust marketing gimmicks. Understand the difference between soluble and insoluble fiber.

Vegetables listed as high in carbs but low in net carbs: Avocado, Broccoli, Blackberries & Raspberries, Asparagus, Chia seeds, Macadamia nuts, Spinach, Collard greens, Mustard greens, Kale, Brussels sprouts, Artichokes, Hazelnuts, Green beans, Pecans, Dried coconut.

SECTION 09

Ketone Types & Testing

ACETATE	BHB (Beta-Hydroxybutyrate)	ACETONE
Tested in urine Good in the beginning of keto journey	Tested in blood (preferred long-term) Most accurate. Use KetoMojo device.	Tested via breath Not preferred — not accurate for cancer patients

When to test

- Morning — one to two hours after waking, before caloric intake, and after the dawn phenomenon
- Before meals — will be at the lowest
- Switch it up — test at different times

We recommend **KetoMojo**. They have a device that checks glucose and ketones with one prick. They are the best priced ketone testers, with an app that integrates with food apps so that everything can be tracked in one place.

Acetone (breath ketones) are not helpful for metabolic flexibility testing — many things can interfere with results, including alcohol, breath mints, chewing gum, throat lozenges, and mouthwash. For cancer patients, high LDH can give off high acetone levels too, potentially giving misleading readings.

SECTION 10

Troubleshooting — Why People Struggle

You will hear people say that the keto diet doesn't work for them or that they did it and it didn't feel right. You will realize they were all doing it incorrectly when you dig in. Poor execution is the problem — not epigenetics.

Common reasons people struggle

- Review food log
- Review macronutrients
- Not getting enough fat
- Look at blood glucose
- Look at blood ketone levels
- Review labels
- Pre-packaged keto foods
- Over exercising
- Too much stress
- Counting net carbs (without testing)
- Consuming alcohol
- Epigenetics

The only way to know if someone is doing it correctly is to log foods and test ketones & glucose. Use **Cronometer** to truly see what their macro and micronutrients are. One person may be sensitive to dairy; another might thrive on dairy. You can't see those things without doing the dietary glucose and ketone testing simultaneously.

Are they sitting behind a computer all day, or working late at night? Is their circadian rhythm off? Just two nights of sleep disruption will drive up IGF1. Your insulin growth factor is a key driver in more than 70 percent of cancers.

Over-exercising: Their cortisol levels are out of whack, driving up glucose and the estrogens — all major growth factors. A lot of micro-tears, and the body compensates by spiking glucose, cortisol, and estrogens.

SECTION 11

Press-Pulse Therapy

"Hyperbaric oxygen therapy combined with the calorie-restricted ketogenic diet will kill tumour cells through apoptotic and anti-angiogenic mechanisms while also reducing inflammation in the tumour microenvironment and systemically. It is our view that the "Press-Pulse" paradigm is a compelling and parsimonious therapeutic strategy for effectively managing the vast majority of malignant cancers with minimal toxicity, as this approach will target the major energy pathways responsible for tumour cell growth and survival while enhancing the energetic efficiency of normal body cells and tissues."

— Thomas Seyfried & Dom D'Agostino, Metabolic Management of Cancer

Press-Pulse was a study done by Thomas Seyfried and Dom D'Agostino. The Press-Pulse paradigm is a therapeutic strategy for effectively managing the vast majority of malignant cancers with minimal toxicity, targeting the major energy pathways responsible for tumour cell growth and survival.

SECTION 12

Practical Tips

Eating Out

- Ask for a gluten-free menu and start there.
- Bring pink Himalayan salt and avoid the iodine table salt.
- Usually, wild-caught fish is safer than meats like beef, chicken, or turkey.
- Salads are usually safe — look at the ingredients; remove candied walnuts, croutons, raisins, corn, beans.
- Olive oils are mostly trustworthy. Bring your own dressing, FBOMB's, or portable packs of oils.
- Switch out the sides of carbs and double on veggies, then add olive oil to your veggies.
- To get more fat — add sour cream, a side of oil, or melted butter.
- Common terms: naked or bunless — wrapped in lettuce.

Travel Tips

- Look for places with a kitchen and a mini-fridge.
- Research before your trip for good quality restaurants.
- Look for local farm-to-table options.
- Instead of thinking you are "limited," think about the opportunity to discover something new and fun.
- Use portable Berkey water filters.

SECTION 13

Common Questions

Will Keto give me heart disease?

The biggest concern is that saturated fat and cholesterol cause heart disease. But there has never been any scientific study published linking cholesterol and saturated fat to heart disease. Many studies show that a high carbohydrate diet and elevated blood sugar and insulin are highly associated with inflammatory heart disease.

What if I get ketoacidosis?

Ketosis and ketoacidosis both involve ketone production, but the likeness stops there. Ketosis is a natural metabolic process. Ketoacidosis (DKA) is a life-threatening condition associated with severely uncontrolled type 1 diabetes. It's nearly impossible to get ketoacidosis without type 1 diabetes.

I can't get enough vegetables — they're too high in carbs.

Because vegetables contain insoluble fiber, net carbs matter. We provide a large list of suitable vegetables. Above-ground, leafy vegetables, cruciferous vegetables, and avocados are good. Root vegetables are not.

Can keto cause kidney issues?

Only if they're eating junk keto, ingesting poor quality food, too much protein, and not enough water. Kidney issues should not be the case for anyone we advise — educating on the importance of quality is critical.

I've heard keto only works for some cancers.

Ketosis can work in all cancers. There are no contraindications. A Therapeutic Ketogenic Diet can be ONE way of achieving ketosis. Fasting, exogenous ketones, a low carb diet, and certain supplements or medications can also induce ketones. Ketones impact every single one of the hallmarks of cancer — no matter the type.

I've heard some cancers feed off ketones.

That is a matter of interpretation of certain cell line studies and not something I nor my colleagues have ever seen clinically. When one does a monthly assessment in their actively cancering patients or periodic testing in those with stable disease, we don't find this to be a concern.

I was told a vegan diet is better than keto.

Read The Metabolic Approach to Cancer. The book breaks down why a vegan diet is not helpful for anyone. Nutrients missing in someone dealing with cancer are D3, K2, B12, magnesium, selenium, zinc (and vitamin A). All those nutrients are void in a vegan diet. And those carbs sequester glyphosate — a known carcinogen impossible to avoid in a high legume/grain-based diet.

How do a keto diet and fasting fit together?

That is the entire premise of Dr. Seyfried's work — caloric restricted ketogenic diet for the win in brain tumours. Fasting also bumps up a higher metabolic state of ketosis. They are very synergistic.

I'm underweight — won't keto make me lose more weight?

Miriam Kalamian's book and Dr. Fung's latest book explain why this is not a concern. Proper guidance and nutritional macronutrient balance are the keys to achieving a state of ketosis while maintaining the desired body mass (higher OR lower). Understanding and managing macronutrients and calorie intake will be critical.

Do exogenous ketones work?

They can raise ketone levels, but they are not as impactful as the real deal. Not eliminating sugars and carbs while taking ketones gives you a false sense of security. They can help push people through a plateau, onboard folks having difficulty getting past initial discomfort and cravings, and help bump ketone levels before specific therapies like HBOT or radiation.

Is it possible to do a plant-based keto diet?

Our ketogenic diet for cancer is plant-based. Plant-based means plant dense, not animal deficient. I have never seen a vegan diet work, but have managed to help vegetarians (though harder to achieve and a harder commitment). Ultimately, folks should aim for 9–15 servings of veggies per day.

Should I continue with my medications if I go keto?

Typically, yes — but you should be under guidance as the need for those medications will alter drastically and need to be managed and adjusted accordingly. Blood pressure, cholesterol, and diabetes medications in particular.

What are the most common myths about using keto for cancer?

That it is high in protein. That folks will starve. That it isn't sustainable. That it isn't enjoyable. That ketones cause/drive cancer. That it is hard on the liver/kidneys. That fat causes cancer.

Is it safe to do keto all the time, or should I cycle in and out?

If actively cancering — NEVER cycle. If in recovery and long-term maintenance, then depending on your labs, you might be able to do that. Some folks can stop eating high fat, low carb and just employ intermittent fasting to achieve an ongoing or cyclic state of ketosis.

The terrain is not a metaphor. It is your life.

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