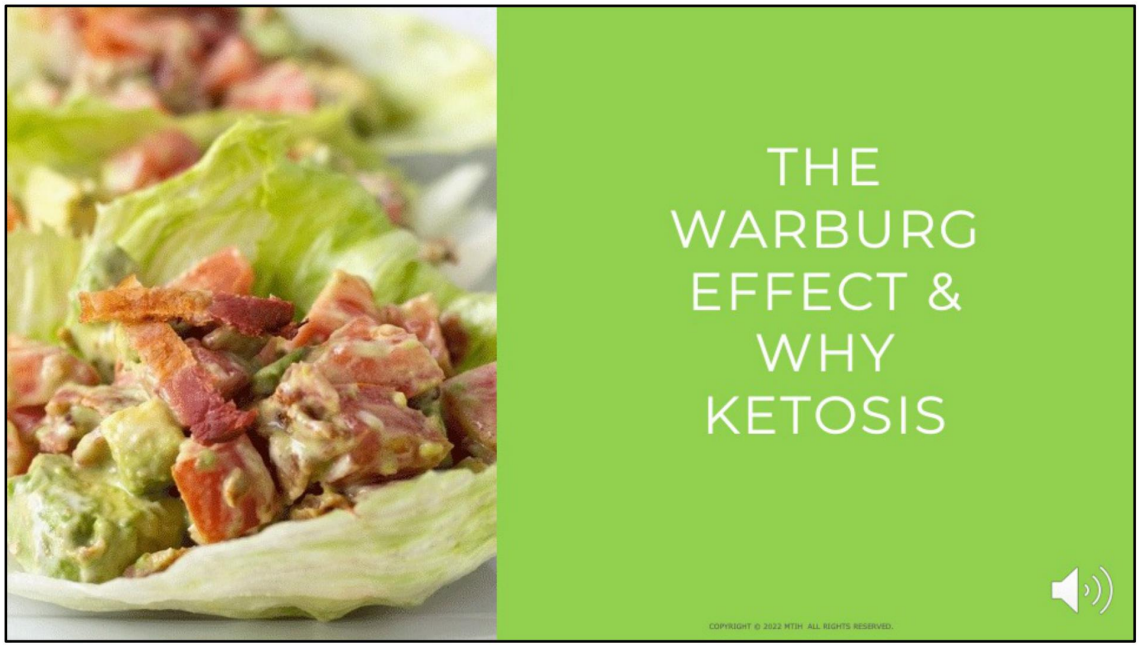
Nutritional & Therapeutic Ketosis

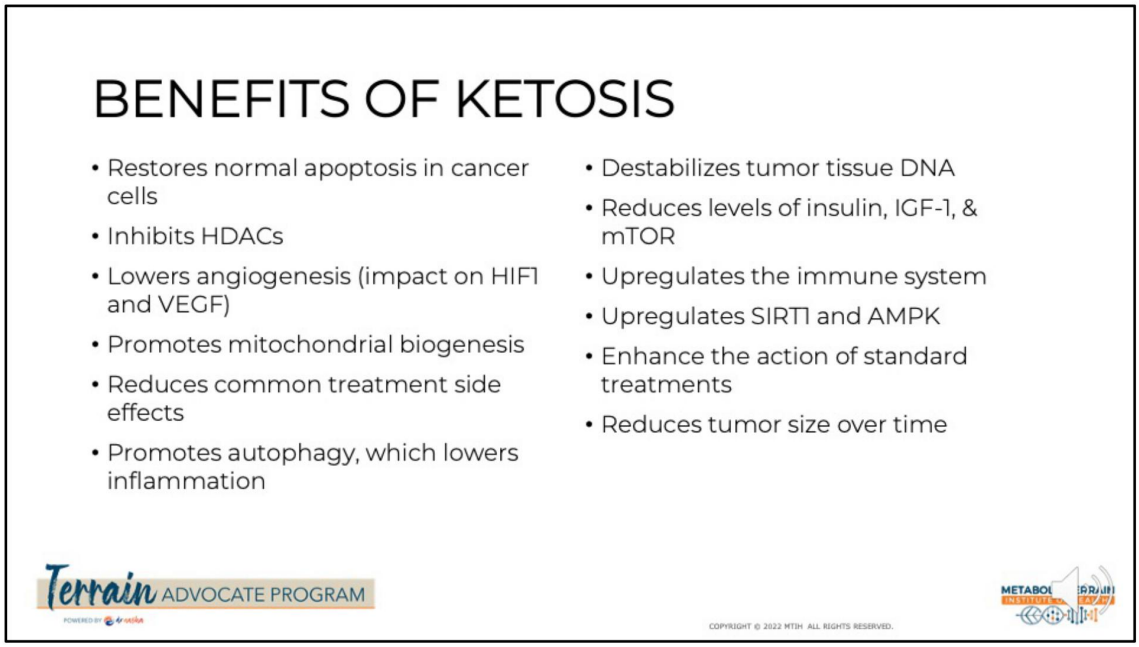


Fasting Mimicking & Fasting and Ketogenic Diet.

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

And that is precisely how oncologists locate tumors today. They use PET scans that use radiolabeled sugar (glucose) that they can then follow 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. This approach was based on the fact that ketone bodies were found in the blood of subjects on a "starvation diet," which helped with seizures. It was proposed that the benefits of this diet could be obtained if the levels of ketone bodies could be elevated by other means. Therefore, 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.



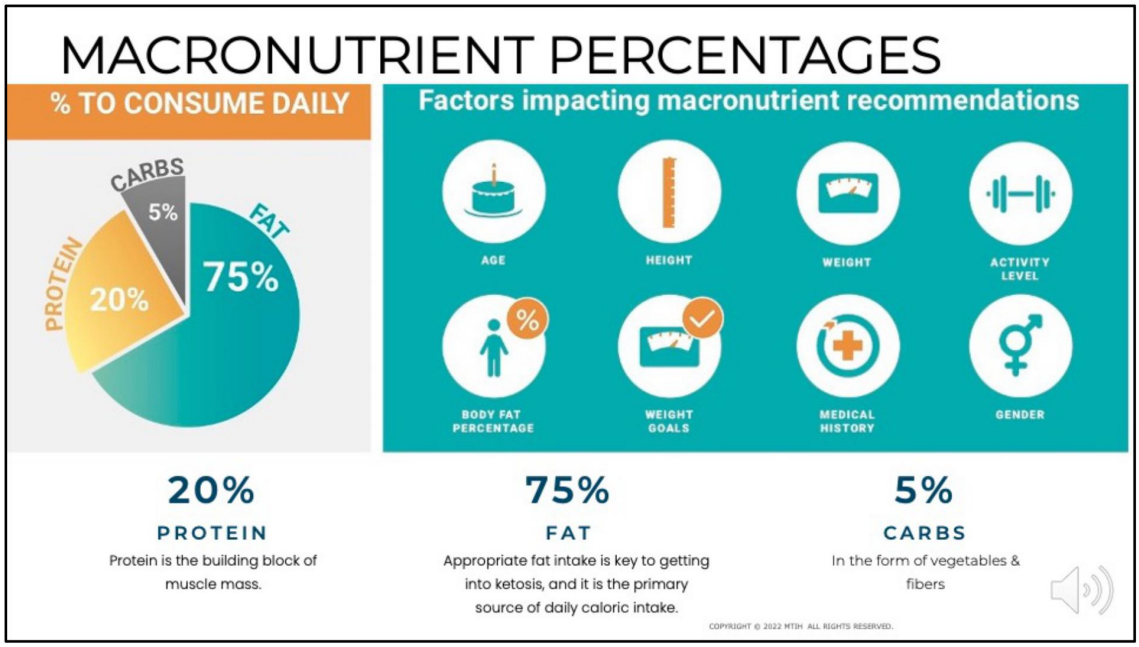
Benefits of Ketosis: Starving cancer of glucose and insulin; providing ketones to healthy cells as a fuel source

One trait shared by tumor 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. When we look at treating cancer, we target the root cause and the symptoms. 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 and lowers inflammation
- Destabilizes tumor tissue DNA
- Reduces levels of insulin, IGF-1, & mTOR
- Upregulates the immune system
- Upregulates SIRT1 and AMPK
- Enhance the action of standard treatments
- Reduces tumor size over time



The human body has two fuel sources, glucose and ketones. There is an ongoing argument regarding which one is preferred and which one should be primary. When diets changed in the 1900s to being carbohydrate-dense, diseases started to rise. When glucose is present, your body will always use that first. If it always has glucose on board, it is never getting ketones. 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 proof is in the pudding! Go to PubMed and search on a ketogenic diet. There are over 3.8K articles to date, proving it's an important therapeutic tool that has and is currently being studied for many diseases.

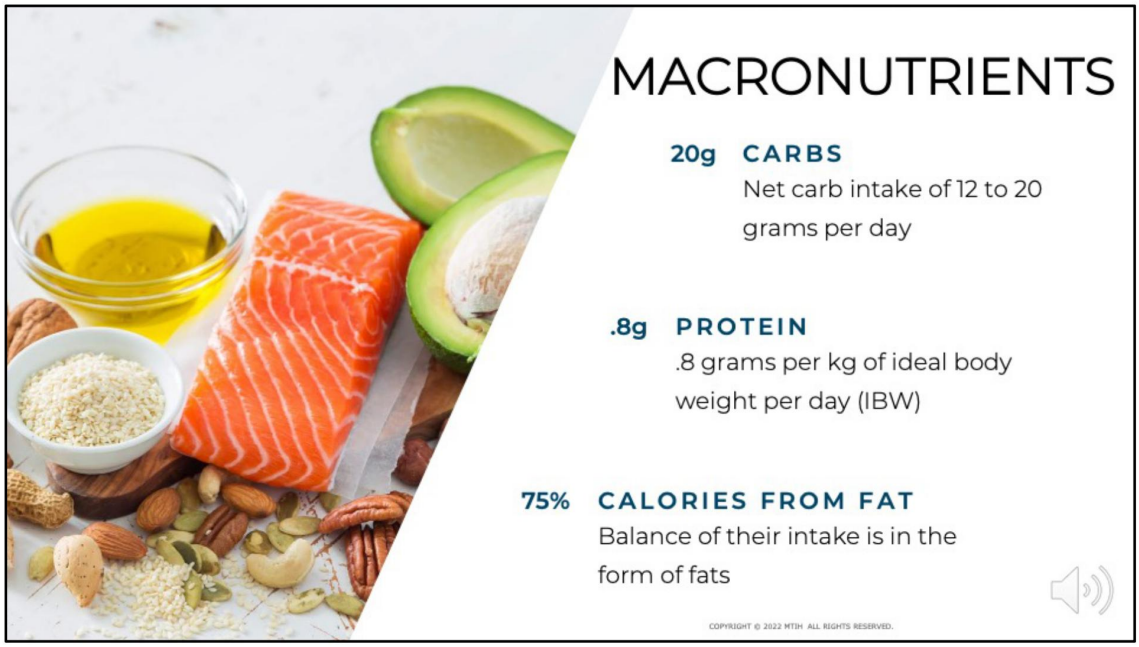
The Ketogenic Diet for our clients will typically start with 75% fat, 20% protein, and 5% carbs. This calculation should be sufficient to get into nutritional ketosis when correctly implemented.

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

Protein: Protein is the building block of muscle mass. If you don't eat enough, you

may lose muscle mass. If you eat too much, the excess protein will convert to glucose through a process called gluconeogenesis, and this will knock you out of ketosis.

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

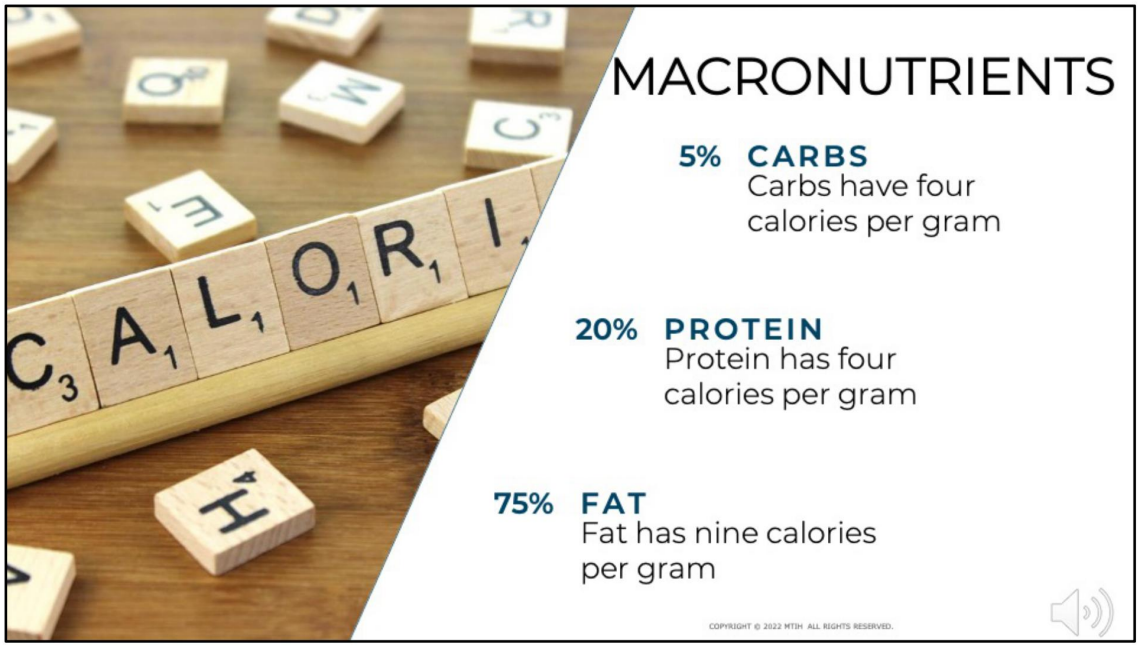


To do this, you must severely limit your carbohydrate intake. The total amount of carbohydrates a person can eat while maintaining ketosis varies from person to person. It's widely accepted that nearly everyone can reach ketosis if they eat moderate protein and restrict carbohydrates to 20 grams per day while starting their ketogenic diet. You will hear people make different recommendations, but this is very important. Ketosis isn't a point system like Jenny Craig or Nutrisystem. There is no one size fits all plan. You must put yourself into a physiological state of ketosis. You must test. Everyone must test to see what works for them.

I encourage most people with cancer to lower their net carb intake to 12 to 20 grams per day. They should reduce protein to .8 grams per kg of ideal body weight per day (or 1.0 gram per kg of lean body mass). Protein exceptions are if there is malnutrition, recent surgery, muscle loss and some treatments. Changes to the recommended protein intake need to be reviewed with a physician.

The balance of their intake is in the form of fats. When feasible and safe, I suggest calorie restriction, but not to the extremes that I see with weight-loss diets. Lower limits should range from 1200 to 1500 calories for women and 1600 to 2200 for men, considering age, current weight, and activity level. A calorie-restricted ketogenic diet

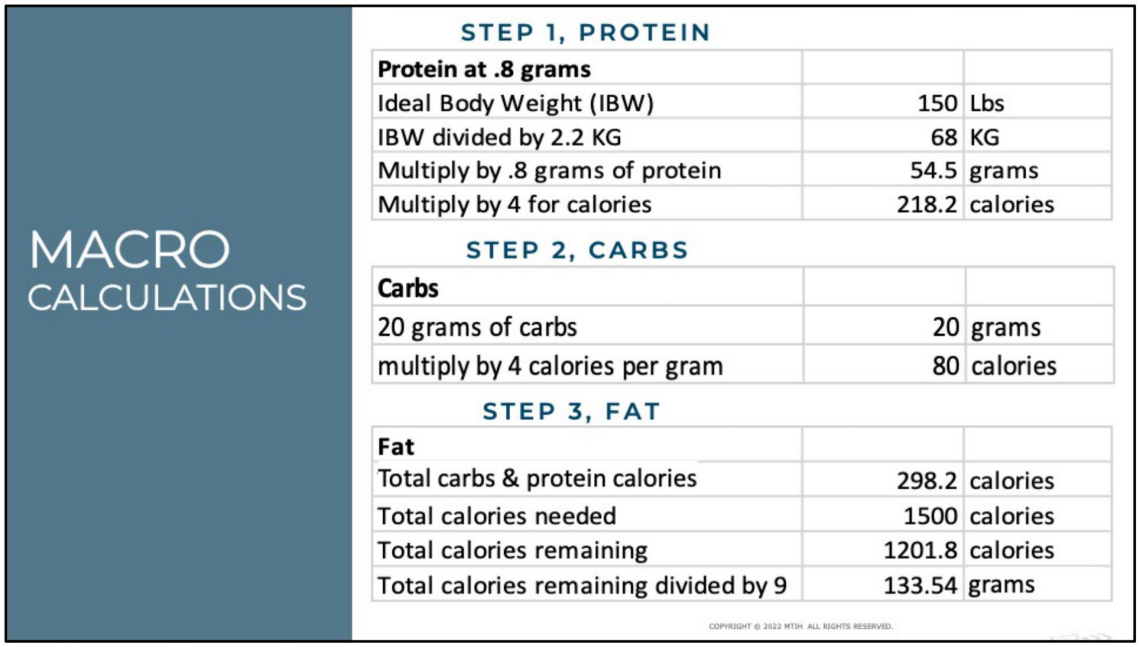
virtually guarantees that you will reach Nutritional Ketosis (blood ketones at or above 0.7 mmol/l). Most people who restrict calories are at or near therapeutic levels of both glucose and ketones (a 1:1 to 2:1 ratio of blood glucose to blood ketones).



I will explain how the macro's break down, but you don't have to do this or know this. You can easily use the app called Cronometer or one of the many Keto Calculators found on the internet.

The typical macro ratio looks like the following:

- 5% of calories comes from carbs
    - Carbs have four calories per gram
- 20% of calories comes from protein
    - Protein has four calories per gram
    - .8 grams per pound of body weight per day
- 75% of calories comes from fat
    - Fat has nine calories per gram
- One kilogram is equal to 2.2 lbs



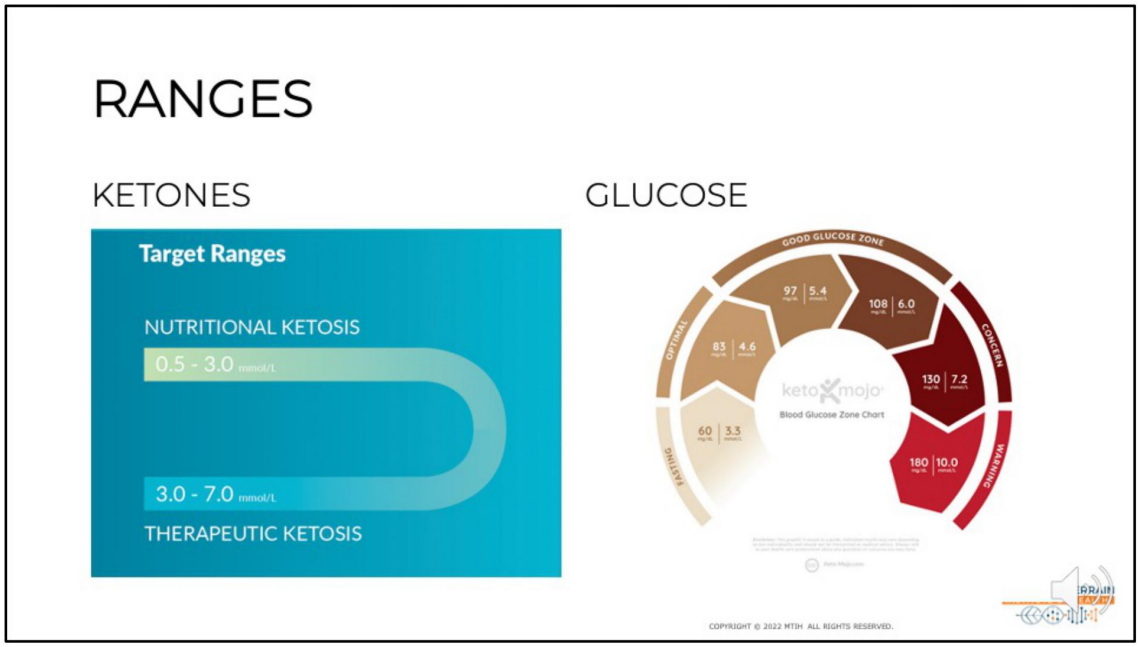
Starting with a 1500 calorie diet and assuming an ideal body weight of 150 lbs, divide the weight by 2.2 to convert it to kilograms. Use 20 grams of carb and .8 gram/kg protein.
Ideal Body Weight can be found on Calculator.net

- Step 1, starting with protein.
  - Ideal Body Weight (IBW) = 150 lbs
  - IBW divided by 2.2 KG = 68 KG
  - Multiply by .8 grams of protein = 54.5 grams of protein
  - Multiply by 4 for calories= 218.2 calories from protein

- Step 2, total carbs
  - 20 grams of carbs = 20 grams
  - Multiply by four calories per gram = 80 calories of carbs

- Step 3, total fat
  - Total carbs & protein calories = 298.2 calories
  - Total calories needed = 1500 calories
  - Total calories remaining = 1201.8 calories
  - Total calories remaining divided by 9 = 133.5 grams

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



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 ketones levels are 3.0 mmol/L and greater.

Ideally, we want glucose to be under 85 or lower. If we are shooting for therapeutic ketosis levels, you will have to drive glucose levels lower, targeting the 70s.

When patients are in a therapeutic level or extended fast, glucose levels can be in the low 50's 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+. And it's in combination with elevated glucose. Ketoacidosis is when blood ketones **and** blood glucose levels are 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 certain therapeutic strategies and will be assessed by the physician. As an advocate, it's important to understand if you are helping someone get to nutritional ketosis or therapeutic ketosis. Being in therapeutic ketosis will be beneficial for people doing hyperbaric oxygen and radiation treatments. Brain cancer, glucose slugging cancers, and endometrial cancers all benefit from therapeutic levels of ketones.

Getting Started:

Questions for your clients:

- 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?

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.

First step:

Start with a 13 hour fast; finish dinner at 6 PM and no food until 7 AM. That is an overnight fast. Water and herbal tea are fine but nothing else. If they are not showing ketones via urine at 13 hours, they are metabolically broken. Getting started could be a huge struggle, so you don't want to be strict and rigid in the beginning unless the situation warrants that kind of approach.

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

When we are healthy in our metabolic processes, we should be showing at least trace amounts of ketones after a 13 hour fast in our urine; we should be releasing a little bit of acetate into the urine.

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. These are some ways to start creating metabolic flexibility.

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. The sicker the patient, the more metabolically broken, the longer you give it. The more metabolically broken and unstable, and genetically predisposed a person is, the longer it will take. It could take as long as six months for some patients to get to this, and you don't give up. It's a tool needed to survive and thrive.

Find a good calculator at KetoMojo or Ketogenic.com and determine ideal macronutrients % and caloric intake. These are also based on –

- Age
- Desired weight loss (or not)
- Activity level

Setup Cronometer or another keto tracking app.

Enter target macros into Cronometer – grams of fat, grams of protein, grams of carbs.

Cleanout the kitchen and pantry. Change is tough. Having tempting food around will make it tougher.

Get the right groceries (grocery list attached), focusing on quality and including sodium, magnesium & potassium.

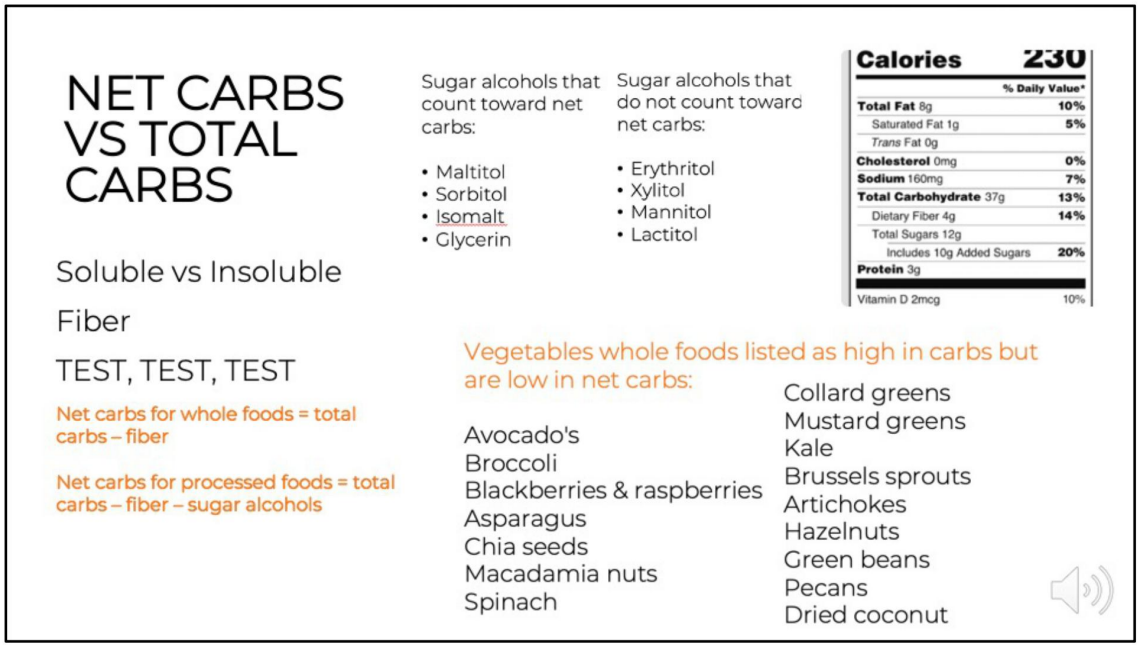
Have recipes onboard that include fat bombs. They are a good way to make sure you are getting your daily fat. They can also help satisfy the snack craving. If they are pre-maid, they are easy after dinner or when an urgent craving needs to be quenched.

Getting enough fat is one of the hardest things to do initially. Alison Gannett has good fat bomb recipes in her cookbook/course.

Understand Keto Flu and load up on a good pink Himalayan sea salt. Redmond's is good and doesn't have all of those plastic residues. It's also higher in potassium and magnesium and has a good amount of minerals. We are talking a good three to four teaspoons a day. I've talked about salt consumption in other modules. Increasing salt intake goes against another common myth that might take quite a bit of education and understanding. But know that when you start producing ketones, your body uses more sodium, magnesium, and potassium. That is what causes Keto-Flu, the feeling of being completely deprived of energy!

Keto flu symptoms are bad breath, cramping, leg spasms, poor sleep patterns, constipation, headaches, tiredness. If that happens, take a tsp of Redmond's Salt and let it dissolve under the tongue. Within 15 minutes, you should feel much better. If cramping still exists, take a bath with Teal's salt loaded with magnesium.

Herbal teas can help with cravings and with staying hydrated. Bulletproof coffee is a really good tool for getting those ketones kicked up first thing in the morning. You can get creative, use heavy whipping cream (HWC), coconut milk, ghee, or butter. Lots of fun options to play around with.



The great debate on net carbs vs. total carbs:

The important rule for our community is TEST! Don't trust marketing gimmicks. And understand the difference between soluble and insoluble fiber.

Total carbs are the total amount of carbs, including fiber & sugar. When we talk about net carbs, we're talking about everything included in that total number, minus the fiber.

Net Carbs:
Net carbs for whole foods = total carbs – fiber
Net carbs for processed foods = total carbs – fiber – sugar alcohols (sometimes – sugar alcohols) (everyone does it differently)

Two important components to calculating net carbs are fiber & sugar alcohols.

There are two types of fiber, soluble and insoluble fiber. Soluble is digestible by the body because it can dissolve in water and the gastrointestinal fluids of the stomach & intestines. Eventually, it converts into a gel-like substance that bacteria digest in the

intestines and release calories & gases. Insoluble fiber is undigestible as it does not dissolve in water. As a result, it remains the same while moving through the tract and thus release no calories.

In a nutshell, soluble fiber is more likely to increase your carb count where Insoluble fiber will not. Let's take an avocado as an example. It contains 13.5 grams of fiber. On a keto diet, that is a lot; however, only 2.1 grams are soluble.

It can be tricky. You will see keto bread on the market that lists 37g of carbs but 25g of fiber. That fiber is usually psyllium husk or something of that nature. Your body doesn't say, hey, thanks for giving me that psyllium husk so I can ignore the carbs. Won't work. It will knock you out of ketosis.

Regarding sugar alcohols; remember not all sugar alcohols are truly carb-free. Some manufacturers are selling "low-carb" foods with more carbs than they are claiming.

The following sugar alcohols do not count toward net carbs:
- Erythritol
- Xylitol
- Mannitol
- Lactitol

These sugar alcohols count toward net carbs:
- Maltitol
- Sorbitol
- Isomalt
- Glycerin

Each gram of maltitol, sorbitol, isomalt, or glycerin counts as about half a gram of carbs, so take the number of grams of the sugar alcohol, divide by 2, and add it to your carb count. For example:

Net carbs = total carbs – fiber – sugar alcohols + (maltitol / 2)

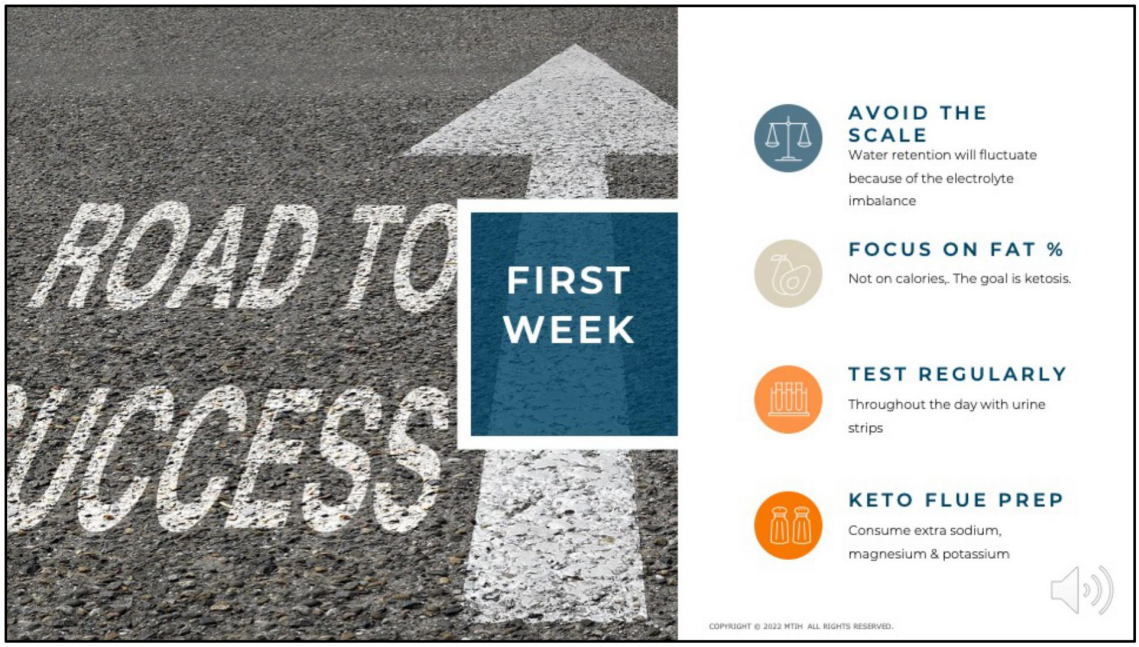
That is why testing is so important. Labels & creative marketing can be deceiving. Get to know labels, read them, understand them and if you are working with clients, educate them as well.

Vegetables listed as high in carbs but are low in net carbs:

Avocado's
Broccoli

Blackberries & raspberries
Asparagus
Chia seeds
Macadamia nuts
Spinach
Collard greens
Mustard greens
Kale
Brussels sprouts
Artichokes
Hazelnuts
Green beans
Pecans
Dried coconut

Know that a keto diet that is not dense in vegetables and is low in fiber can change your gut microbiome. Vegetables are the key to fiber and maintaining a healthy gut microbiome.



Getting Started - 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 KetoFlu symptoms.
- Try adding in BulletProof Coffee with MCT oil.
- Tip on MCT Oil: Start with small amounts to avoid stomach issues. Build up to 1TBSP a day but you'll likely need to start with a teaspoon or less.

In the beginning, apply simplicity. Focus on low glycemic, above the ground vegetables, like celery, cucumber, red leaf lettuce, cabbage, and zucchini. Add olive

oil with plenty of salt & pepper to taste, and maybe a little lemon juice. When I say olive oil, I'm talking about probably way more than you would naturally be comfortable with; a couple tablespoons to a ¼ - ½ cup. Celery is great with good quality pesto, and pestos can become the best keto friend in the world. They are loaded with good fats and flavors and can be added to most proteins.

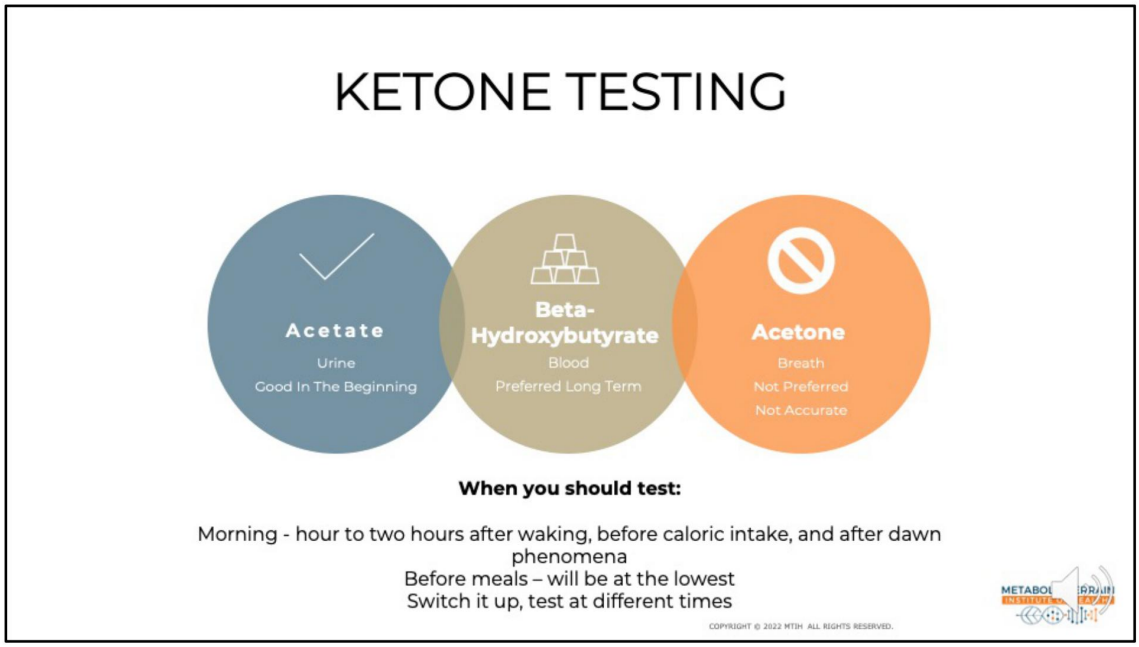
Start with greens, asparagus, cruciferous vegetables, radishes, onions, peppers, and fennel can be added on as you get deeper into ketosis.

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

If you want to juice to feel better, juicing cucumber, celery, parsley, lemon & ginger are an excellent way to go.

If you need to add some fat bombs to get your fat percentage up, you can look at really simple puddings with unsweetened cocoa nibs. There are lots of good recipes that can make it enjoyable and fun.

Capers, pickles, fermented veggies, green tea, organic herbal teas, bone broth, and coffee are things that can help nourish, hydrate, and help with hunger levels. Plus, they become nice salt carriers.



Ketone Types and Testing

Ketones are produced mainly in the liver. They pass the blood-brain barrier and are used as energy by most neurons. They can supply the majority of the brain's energy needs.

The body produces three forms of ketones, and it's important to understand the difference when measuring ketone levels.

Acetate (acetoacetate) is tested in the urine. If someone is not metabolically flexible, these are an effective route to test for ketosis or ketones. When you become ketone adapted, your body uses them more for muscle and tissue. They are converted into beta-hydroxybutyrate, which means you won't be excreting as many of them in your urine. So, urine ketone strips can be effective at the beginning of someone's ketogenic journey or journey to metabolic flexibility. They will show anywhere from zero to trace to large amounts of ketones. Still, it's not exact, and the urine strips tend to be the least accurate over time.

Beta-Hydroxybutyrate or BHB is tested in the blood. Note that these ketones are the

preferred fuel for heart, muscle, and brain; Blood is the most accurate testing and can help indicate if someone is in nutritional ketosis or therapeutic ketosis. After a few weeks, you will want to move from urine testing to testing BHB via blood. It's a simple finger prick, and you can check your glucose simultaneously.

We recommend KetoMojo. They have a device that checks glucose and ketones with one prick. They are the best priced ketone testers out there. They have an app that integrates with food apps so that everything can be tracked in one place. They also have an incredible website with tons of resources; many great tips, a lot of great recipes and ideas, and a lot of good research articles.

Acetone is tested via breath. These ketones are small enough to pass from the blood into the lungs so small quantities are present in exhaled breath. But they do not help us test for metabolic flexibility and many things can interfere, causing erroneous results. Things that impact the results include the health status of your lungs and any of the following items consumed up to two hours before the test; alcohol, breath mints, chewing gum, cough drops, throat lozenges, smoking, lip balm, mint or green tea, mouthwash, alcohol sweeteners, toothpaste, and many others Those are issues for the non-cancering keto dieters For our community, it's especially problematic because high LDH can give off high acetone levels, too. So, the breath monitor might make it look like you are achieving therapeutic ketosis when in fact you are in a massive cancering process Or the other side of it can be true. If patients are deeply suppressing their sugar intake, (carbohydrate intake) it can actually show an opposite effect. It can show they're not in ketosis. It's just not an accurate read, for anybody, but in particular for the cancer world.

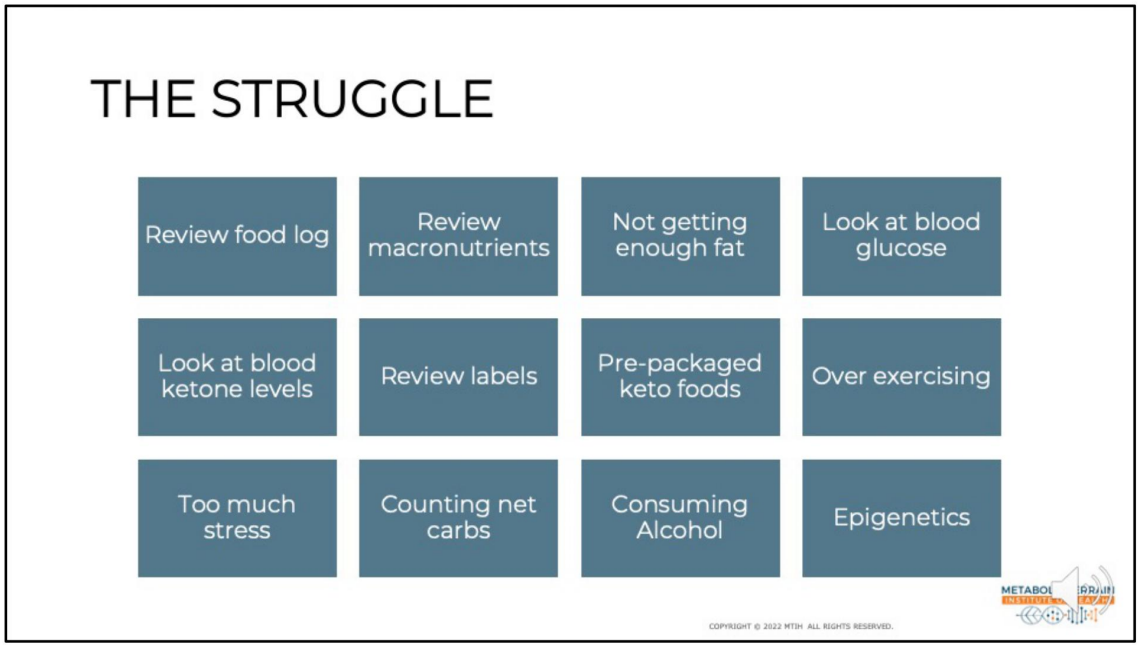
When you should test:

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

When you first start testing with urine strips, test often. Start finding trends. See if something is knocking you out of ketosis, or if you just simply can't get in it.

When you graduate to blood tests, start by testing in the morning to see your fasting levels. You will need to wait an hour because of the dawn phenomenon, also called the dawn effect. This is when glucose levels are high because your cortisol wakes you up. For some, it might rise for an hour, and for others it might be three hours. You want to get your testing done before caloric intake, breakfast, or morning drinks with added calories, like bulletproof coffee.

We recommend testing an hour after a meal and before bed to see how food affects you. Testing can get expensive, so mix it up and look for trends. Don't rely on a single day's numbers.



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 for them. You will realize they were all doing it incorrectly when you dig in.

Are there epigenetic issues that can make it tougher? Yes, but it doesn't make it impossible. Most of the time, though, it's not epigenetics driving it. It may be a factor, but poor execution is the problem.

Steps to evaluating each patients' challenges:

- 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
- Consuming alcohol
- Epigenetics

It's hard to start consuming a bunch of fat when we've been brainwashed our entire lives to believe it's bad; especially for women who are afraid of eating fat and getting fat or for men who believe they will have a cardiovascular event. The brain needs to be rewired.

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, to see exactly what their diet and lifestyle components are, what they're eating, and the amounts they're eating. Data is in the details.

One person may be sensitive to dairy, and another might thrive on dairy. You can't see those things without doing the dietary glucose and ketone testing simultaneously to help troubleshoot.

Other troubleshooting tools:

Do they sit behind a computer all day, work late at night or night shift? Is their circadian rhythm off?

Are they eating too many nuts, macadamias, cashews, and things like that? They thought they just had little snacks, and before they knew it, they had too much, and the protein kicked them out of ketosis.

Is implementing keto and a cancer diagnosis adding stress and driving up cortisol? I bet for every person, the answer is yes, so here are some tools to help.

Heart rate variability technologies are helpful to get feedback and can show us their sleep patterns and if that is problematic. 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 and likely all cancers at different times.

Over-exercising. A lot of people realize that under-exercising is a problem. We've heard that being a couch potato is as bad as cigarette smoking. But vegan endurance athletes can be the hardest to tackle. They are completely malnourished. Their omega six to three ratios are off, and they are over oxidized and inflamed. Their cortisol levels are out of whack from over-exercising, and they have a lot of tissue

damage, a lot of micro-tears, and what happens then is the body completely tries to compensate and spikes up the glucose and the cortisol and the estrogens to try and balance this out, all of which are major growth factors.

THE STRUGGLE

Example

Is the person being sucked in by the marketing that appeals to everyone feeling deprived without bread or carbs?

The big blue square shows this food has 6g of net carbs. They've added fiber to negate the carbs. These ingredients are junk; gluten, more gluten, wheat, preservatives, more wheat flour. You must inspect how much of someone's food is coming from real, whole ingredients vs how much is purchased premade and processed. If they are eating a lot of premade foods, check the labels.

Most of the time, pea proteins, whey proteins, and other types of processed proteins will contain plastics, heavy metals, and sugar. If you can find the source, you are better to say no. Also, it's always better to get the protein from whole food, fish, poultry, etc.

OTHER CONSIDERATIONS	FAT METABOLISM	Gene	NOTES
	X	PPAR Alpha	Hardest one to obtain ketosis. Takes patience and a lot of troubleshooting, but possible. Ignore what nutrition genome says about ketogenic diet being contraindicated in someone with snps here.
	X	ACAT 1&2	Could make achieving/maintaining ketosis more difficult, usually needs some digestive enzymes (lipase) to break down the fat, talk to the doctor about best supportive enzymes. (lipase & bitters are examples). Bitters and sunflower lecithin help emulsify the fat and thin the bile for easier absorption (unless prostate cancer where there are a few cell line studies suggesting choline could be a driver for this cancer type) are safe to recommend. Enzymes, check with physician.
	X	FADS1/S2	This is all about fatty acid synthesis and are they absorbing them (fats). If they have things like cracked heels, dry skin, dry mouth, dry eyes, this might suggest a need for fish oil. If fats are deficient, we don't absorb our fat-soluble nutrients or utilize mistletoe or LDN (low dose naltrexone) as effectively and may have poor endocannabinoid tone.
	X	PEMT	Specific to choline synthesis. Link showing increase of fatty liver disease because if you can't synthesize, you are storing it up in the wrong place. Low choline might require supplementaiton, (always pay attention to prostate cancer, don't want extra choline). Low choline can lead to poor pregnancy outcomes, higher incidence of fetal alcohol syndrome, low sperm/abnormal sperm dysfunction. It's cell protective and keeps the cell membrane flexible to allow inflow of nutrients and outflow of toxins.
X		ACSL1/2	Likely red meat and dairy are not a good idea here except in extreme moderation as this SNP pattern can stimulate MTOR, IGF and gluconeogenesis. Recommend fish, poultry & eggs over tallow, lard, dairy and red meat. Too much protein drives cancer in these patients.
X		APOA2	No red meat. Too much protein drives cancer. Stick with a lower protein intake in general: .8g IBW (Ideal Body Weight)
	X	APOE3/3 & 3/4	Fats consumed can oxidize and push the wrong pathways. Stay away from animal fats (lard, tallow, dairy, fatty meat and include olive oil, walnut oil, avocado oil (coconut oil & ghee in moderation). May aim for a cup of olive oil a day (quality counts here!). And fatty fish is a bonus/must for these folks.
X		TCF7L2	This tells us that the patient doesn't make the appropriate amount of amylase to breakdown starch and is also related to reactivity to grains and difficulty processing carbohydrates of any kind. This leads to higher incidence of metabolic syndrome and requires a low carbohydrate diet. Definitely need to avoid grains and legumes.
X		BHMT	In general, this SNP points to a higher cancer risk and is zinc dependent—lectins from grains/legumes can be "anti-nutrients" to our minerals, such as zinc. Looking at the nails and watching for white spots if this SNP is present is also telling. This SNP relates to how the body generates methionine and to re-methylate homocysteine—so an elevated homocysteine level can alert us to issues here and may also tell us to lower protein intake and do more intermittent fasting with these folks and supplementation of zinc and possibly methylated b-vitamins (to be determined by their physician)
X		MTHFR	All about how the patient is methylating, B vitamin dependent which is lower in folks that are vegan or vegetarian and patients who take medications that leach the vital nutrients, etc. It is also good to monitor homocysteine status to determine how this SNP is expressing. Drugs that drive up homocysteine that impact mitochondrial health and lower B vitamins: metformin, laxatives, diuretics, birth control pills, anti-inflammatories, anti-folate drugs like 5-fu and methotrexate or folfiri/folfox treatment, anti-convulsant drugs
	X	SLC22A5	carnitine shuttle which is about mitochondria ATP production pathway. The carnitine is the bus that shuffles the fat across the mitochondrial membrane. When that SNP is present, the shuttle isn't getting the fat to where it needs to be. This is a good one to review with the patient and doctor to see if a carnitine supplement is necessary—you might see this play out if difficult to achieve/maintain ketosis or in folks that are not eating red meat for whatever reason
		ACE1 & ACE2	Involved in all metabolic pathways and related to hormonal health, immune health (the very receptor that is involved in both the covid virus and the covid vaccine and why folks with metabolic syndrome, low d3, and cardiovascular disease and obesity are at highest risk for issues with the virus or the vaccine, have these SNPs), cardiovascular/perfusion health. Folks with ace SNPs have higher prevalence of diabetes
		ALDH2	All about lactase dehydrogenase/mitochondrial health, sugar metabolism issues if this is present, need to restrict carbs more aggressively
	X	BCM01	Fat-soluble vitamins (a, d, k) SNPs are about how they are synthesizing and absorbing. Clients with these issues will likely need supplements. Particularly a problem for the vegetarian world—they must come from animal sources for best absorption. You only get this from animal fat. Cod liver oil is a safe recommendation across the board and brings in all the fat-soluble vitamins in fish oil base.
	X	CYP2R1/VDR	Fat-soluble vitamins (a, d, k) SNPs are about how they are synthesizing and absorbing. Clients with these issues will likely need supplements. Particularly a problem for the vegetarian world—they must come from animal sources for best absorption. You only get this from animal fat. Cod liver oil is a safe recommendation across the board and brings in all the fat-soluble vitamins in fish oil base.
	X	VKORC1*2	Fat-soluble vitamins (a, d, k) SNPs are about how they are synthesizing and absorbing. Clients with these issues will likely need supplements. Particularly a problem for the vegetarian world—they must come from animal sources for best absorption. You only get this from animal fat. Cod liver oil is a safe recommendation across the board and brings in all the fat-soluble vitamins in fish oil base.
X		FTO	This is the hunger SNP. Folks with this will always find it hard to feel satiated and will tend to reach for carbs, but fat is the satiating nutrient and can help overcome this SNP malfunction
X		LCT	GG phenotype is the one most associate with lactose intolerance which is about the allergy to dairy, however the other phenotypes, and whether or not this is green/yellow or red on the nutrition genome test, will depend on the other SNPs and labs involved (high igf-1, acsl combo for instance means dairy likely a no go). And dairy in general should always be pristine clean, preferably raw and preferably A2 genetics for better absorption when consumed
X		SHBG	This points to higher incidence of PCOS, metabolic syndrome with relation to hormonal imbalance. Quality and low estrogenic foods is critical.
X		SIRT1	Related to longevity and "overfeeding" is a problem and these folks thrive on intermittent fasting

Single nucleotide polymorphisms (SNPs) in genes

Will they have challenges getting into ketosis or staying there?
Are there genetic challenges that need to be considered for proper nourishment?

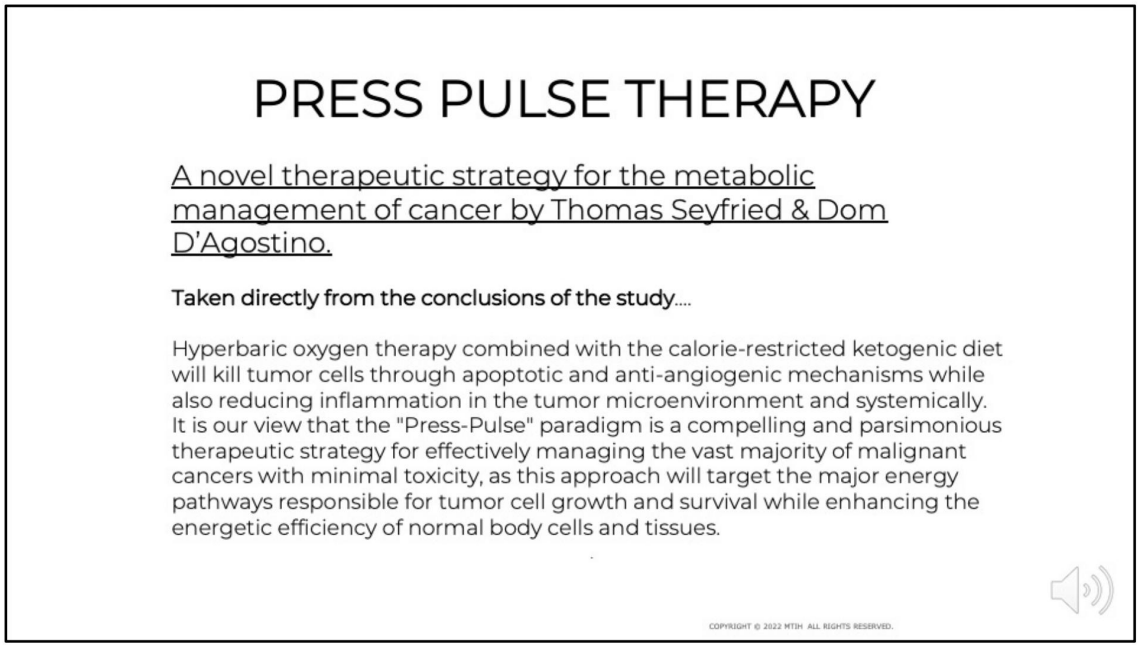
Nutrition Genome can help answer some of these questions. Keep in mind it is only a troubleshooting tool because you never know how much each gene is actually expressing. The following chart highlights genes and possible SNPs involved in fat metabolism, moving fat in and out of cell membranes and mitochondrial energy pathways. They might need enzyme support or help with nutrient absorption. If they have issues with these genes, they might have more issues. It doesn't mean that the keto diet is not a good choice, but they may need additional support.

Do they have the SNPs that make moving fat throughout the body a challenge? Do they need a supportive mechanism to carry the carnitine across?

What are their APOE SNPs? Are they turning red meat into candy bars?

Do they have SNPs that turn dairy into sugar? Do they need a good lipase digestive

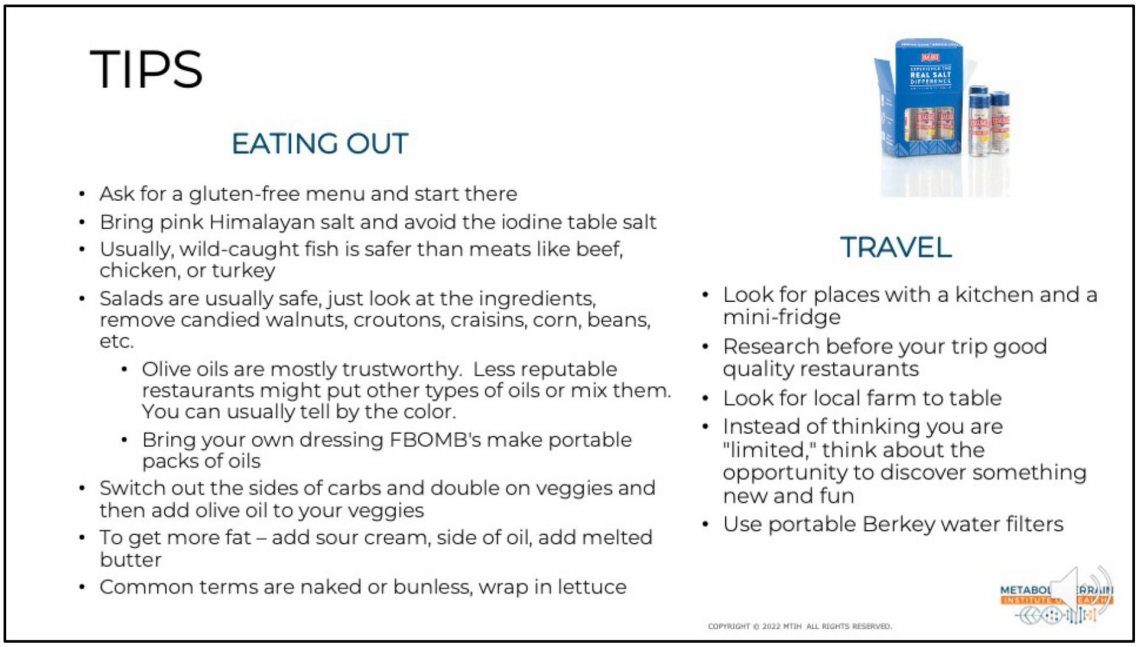
enzyme to help or remove dairy altogether?



Press-Pulse Therapy:

Press-Pulse - a novel therapeutic strategy for the metabolic management of cancer was a study done by Thomas Seyfried and Dom D'Agostino. Taken directly from the conclusions of the study, it states, “Hyperbaric oxygen therapy combined with the calorie-restricted ketogenic diet will kill tumor cells through apoptotic and anti-angiogenic mechanisms while also reducing inflammation in the tumor 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 tumor cell growth and survival while enhancing the energetic efficiency of normal body cells and tissues.”

Excellent video and deep dive of the study.



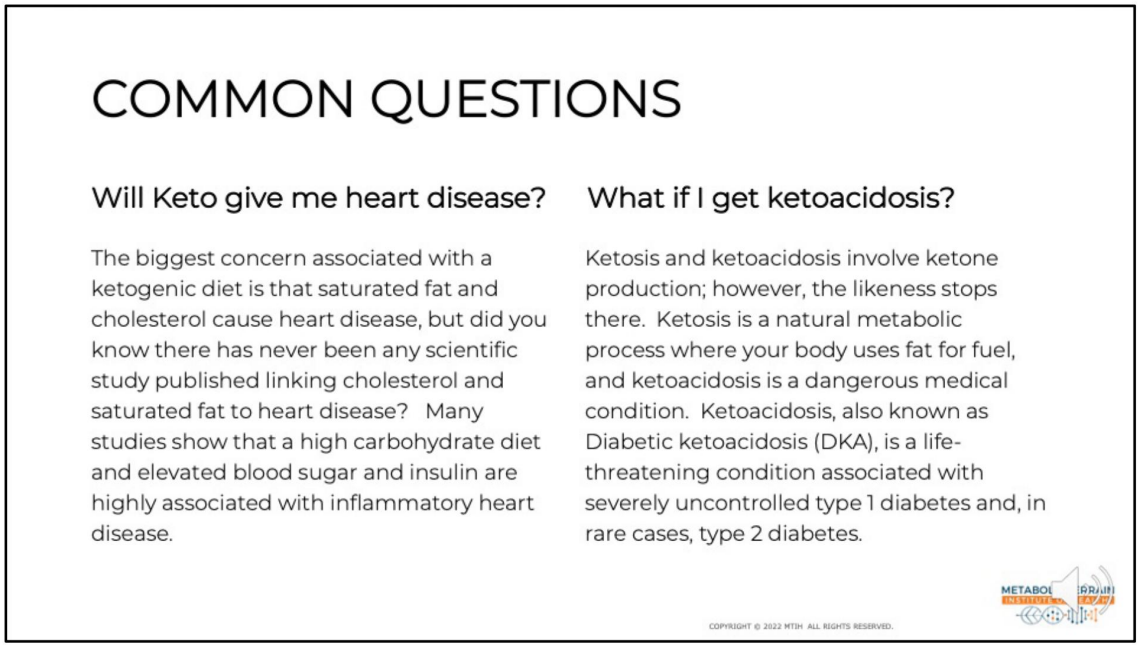
Eating Out Tips:

- 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, just look at the ingredients, remove candied walnuts, croutons, craisins, corn, beans, etc.
    - Olive oils are mostly trustworthy. Less reputable restaurants might put other types of oils or mix them. You can usually tell by the color.
    - Bring your own dressing, fat bombs, or make portable packs of oils.
- Switch out the sides of carbs and double up on veggies and then add olive oil to your veggies.
- To get more fat, add sour cream, a side of oil, or melted butter.
- Look for common terms like naked or bunless, which means 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.



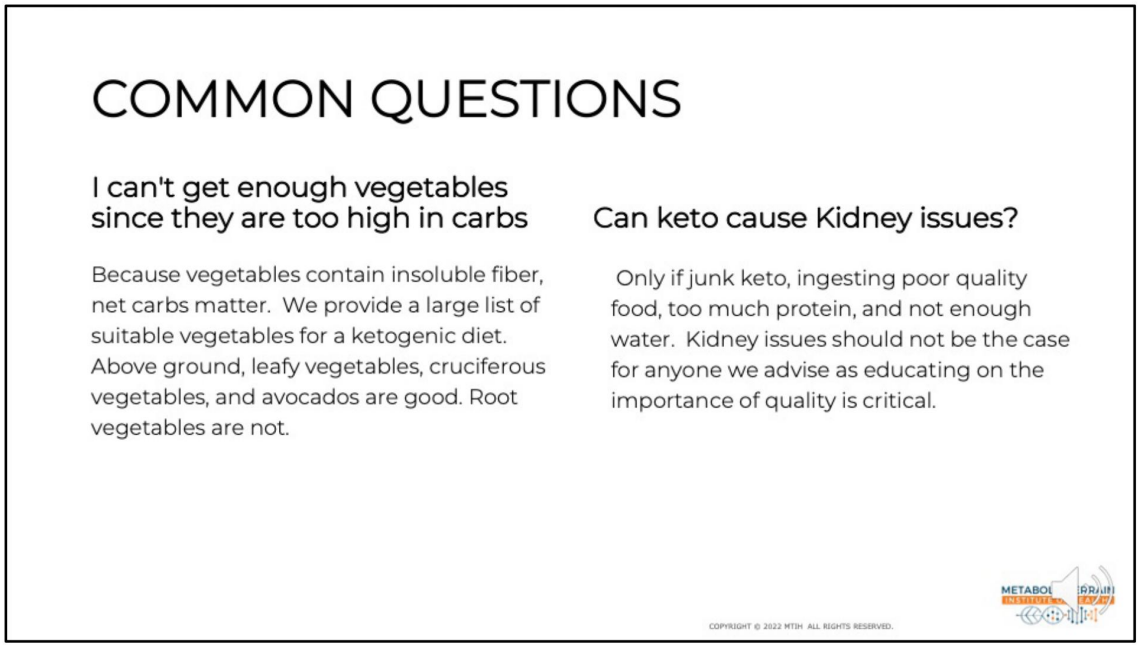
Will Keto give me heart disease?

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

Studies for your reference, https://pubmed.ncbi.nlm.nih.gov/20071648/, https://jamanetwork.com/journals/jama/fullarticle/205916, & https://academic.oup.com/jn/article/132/7/1879/4687418?sid=b379a1dd-7b6d-4503-b5bf-609cf81ee916 & https://www.hopkinsmedicine.org/news/media/releases/low_carb_higher_fat_diets_add_no_arterial_health_risks_to_obese_people_seeking_to_lose_weight & http://high-fat-nutrition.blogspot.com/2009/03/cholesterol-within-nations-studies.html

What if I get ketoacidosis?

Ketosis and ketoacidosis involve ketone production; however, the likeness stops there. Ketosis is a natural metabolic process where your body uses fat for fuel, and ketoacidosis is a dangerous medical condition. Ketoacidosis, also known as Diabetic Ketoacidosis (DKA), is a life-threatening condition associated with severely uncontrolled type 1 diabetes and, in rare cases, type 2 diabetes. (1) DKA can happen when the body produces dangerously high levels of ketones at the same time as high blood sugar, which can change the normal functioning of internal organs, such as your liver and kidneys. The main cause of ketoacidosis is poorly managed type 1 diabetes (i.e., people not properly taking insulin), typically in younger people. Illnesses, stress, poor diet, and alcohol and drug misuse are also triggers for diabetics. It's critical that anyone experiencing ketoacidosis gets prompt treatment; (2) It's nearly impossible to get ketoacidosis if you don't have type 1 diabetes. The keto diet can have a significant effect on ketone and glucose levels. So if you have type 1 diabetes and want to try keto, you should work directly with your doctor to avoid any serious complications.

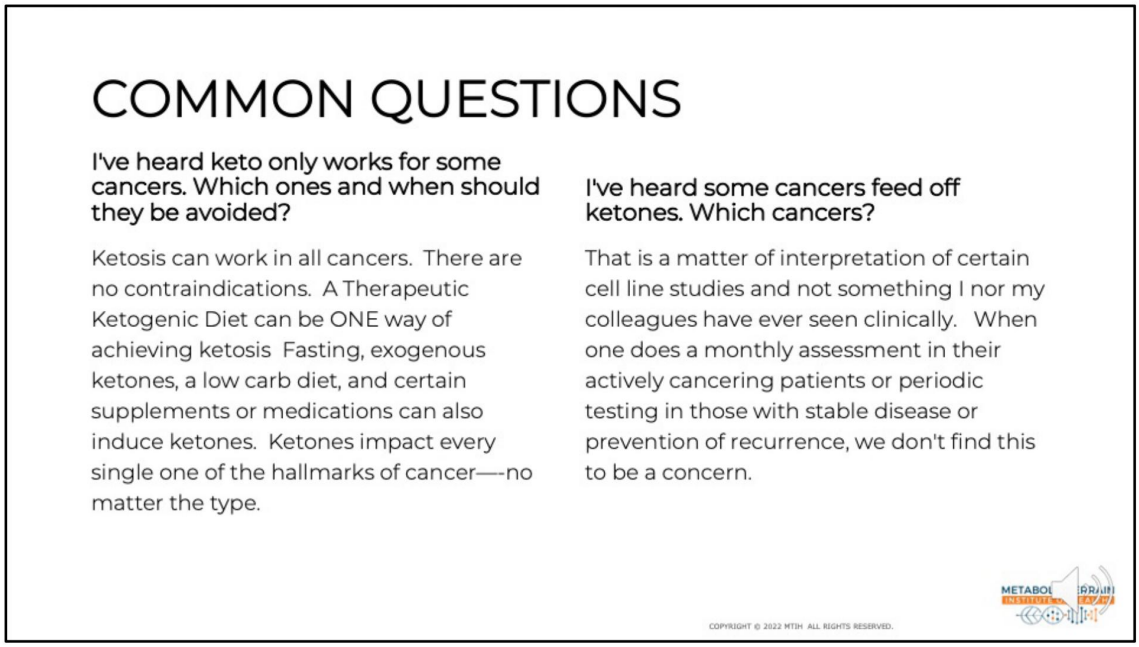


I can't get enough vegetables since they are too high in carbs.

Because vegetables contain insoluble fiber, net carbs matter. We provide a large list of suitable vegetables for a ketogenic diet. 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 as educating on the importance of quality is critical.

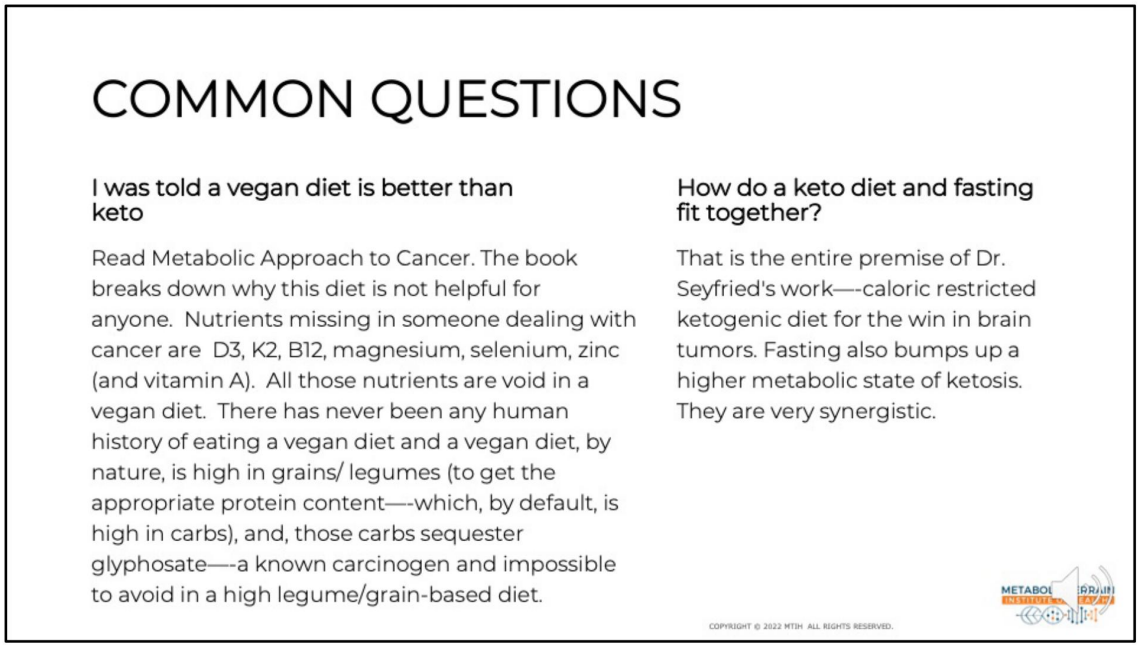


I've heard keto only works for some cancers. Which ones and when should they be avoided?

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. Which cancers?

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 or prevention of recurrence, we don't find this to be a concern.

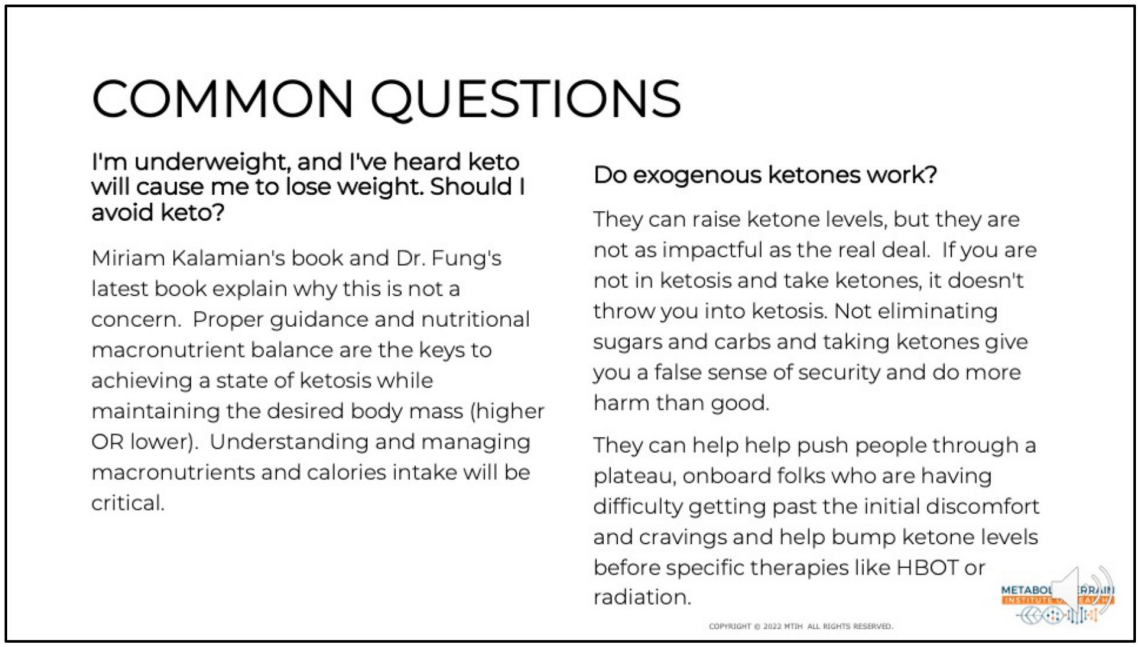


I was told a vegan diet is better than keto.

Read The Metabolic Approach to Cancer. The book breaks down why this 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. There has never been any time in human history where people ate a purely vegan diet. And a vegan diet, by nature, is high in grains/legumes (to get the appropriate protein content—-which, by default, is high in carbs), and, those carbs sequester glyphosate—-a known carcinogen. Glyphosate is 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—-a caloric restricted ketogenic diet is a win in brain tumors. Fasting also bumps up a higher metabolic state of ketosis. They are very synergistic.



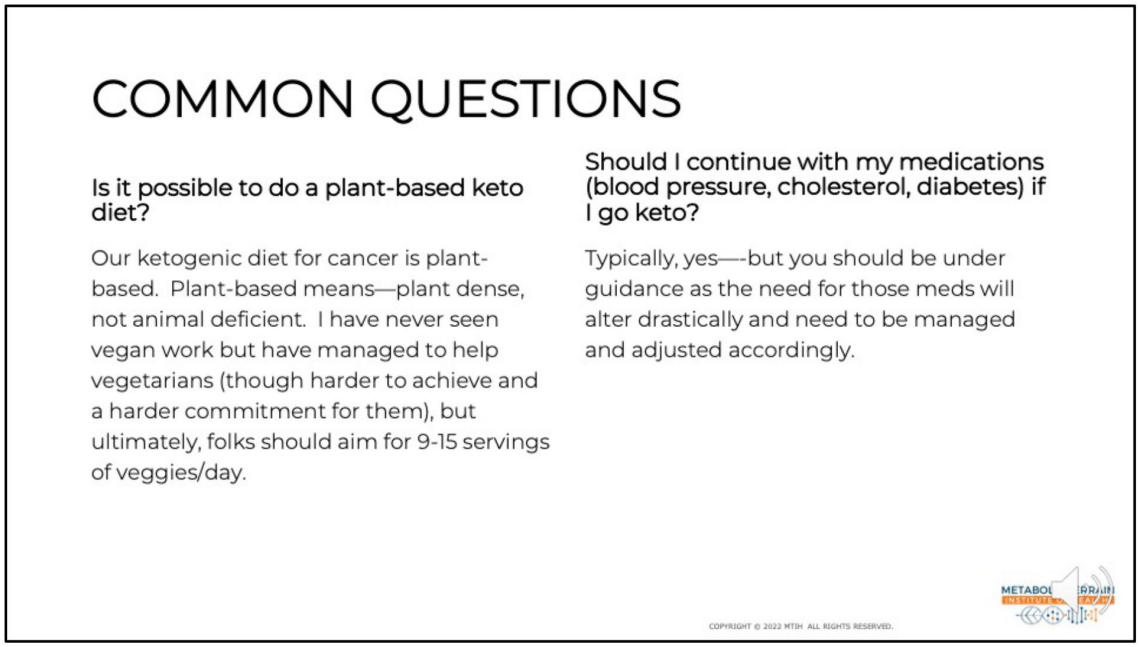
I'm underweight, and I've heard keto will cause me to lose weight. Should I avoid keto?

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 calories intake will be critical.

Do exogenous ketones work?

They can raise ketone levels, but they are not as impactful as the real deal. If you are not in ketosis and take ketones, it doesn't throw you into ketosis. Not eliminating sugars and carbs and taking ketones give you a false sense of security and does more harm than good.

Exogenous ketones can help push people through a plateau, onboard folks who are having difficulty getting past the initial discomfort and cravings, and help bump ketone levels before specific therapies like HBOT or radiation.

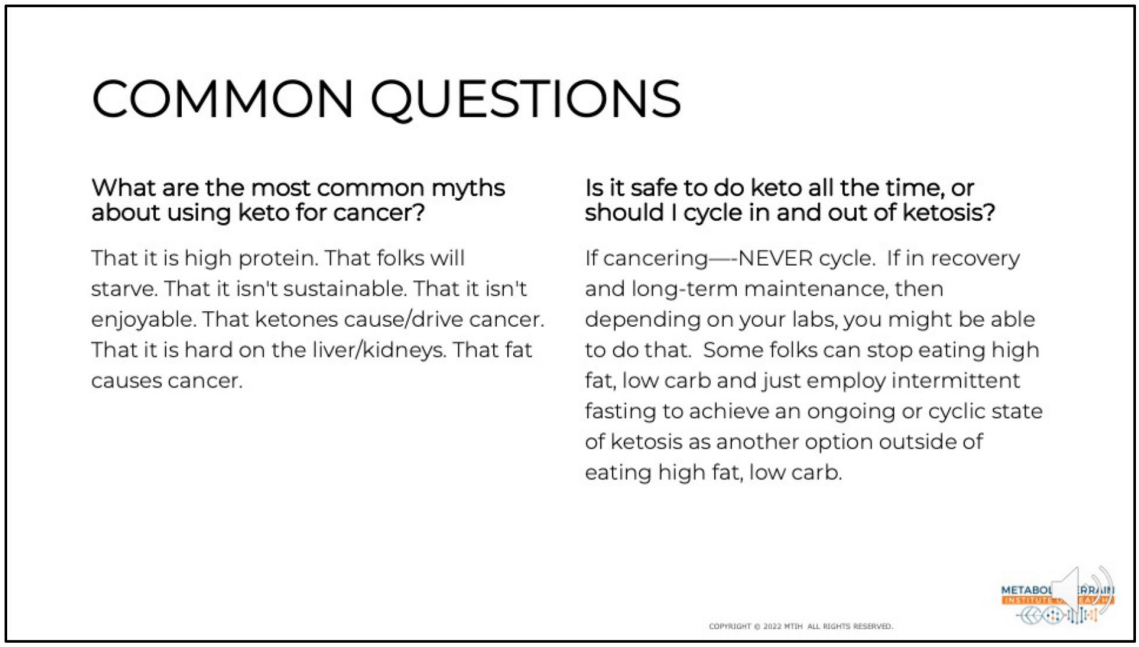


Is it possible to do a plant-based keto diet?

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 I have managed to help vegetarians (though ketosis is harder to achieve and is a harder commitment for them), but ultimately, folks should aim for 9-15 servings of veggies/day.

Should I continue with my medications (blood pressure, cholesterol, diabetes) if I go keto?

Typically, yes—-but you should be under guidance of a physician as the need for those meds will alter drastically and need to be managed and adjusted accordingly.



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 of ketosis?

If 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 as another option outside of eating high fat, low carb.

THANK YOU