CALIFORNIA CENTER *for*
FUNCTIONAL MEDICINE

Why A Ketogenic Diet?

One of the liver's main jobs is to make sure that the body (and especially the brain and heart) have an adequate supply of energy. It manufactures both glucose (sugar) and ketones for this purpose.

Ketones are small water-soluble compounds that are metabolized like fats. But unlike fats, they do not need carnitine transport to reach mitochondria. This means they can be used for energy by every human cell type.

Ketones are especially important to neurons, which can only consume glucose or ketones. So, if something is wrong with glucose metabolism, ketones can be the sole usable energy source of neurons. (Other cell types, but not neurons, burn fats.)

A ketogenic diet trains a person's metabolism to run off of fatty acids or ketone bodies. This is what we call being fat adapted, when the body has adapted to run off of fatty acids/ ketones at rest. We use these diets therapeutically in our practice for many reasons such as neurological and cognitive problems (dementia, Parkinson's, Alzheimer's, depression, etc.), metabolic disorders and blood sugar dysregulation.

GENERAL GUIDELINES

A standard ketogenic diet is a type of low carbohydrate diet that is high in fat, moderate in protein and low in carbs.

MACRONUTRIENT RATIOS

Typically, the macronutrient ratios for a ketogenic diet fall into these ranges:

- 60-75% of calories from **fat**
- 15-30% of calories from **protein**
- 5-10% of calories from **carbohydrates**

There are **nine** calories in every gram of fat, and **four** calories in every gram of protein and carbohydrate. You can calculate the number of grams of each macronutrient you would eat using the following formula:

(Total calories) x (% of macronutrient)

Number of calories per gram of macronutrient

For example, if your target calorie intake is 2,000 calories per day, and you want to eat 5 percent of calories as carbohydrate, the formula would be:

(2000) x (.05)

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This yields a result of 25 grams.

Note that these ranges will vary from person to person, and depend on several factors including activity level and health goals. Experimentation (and measuring ketone production using the device recommended below) is crucial to determining your optimal individual ratios.

We recommend speaking with your clinician and/or our staff health coaches to determine what macronutrient ratios are appropriate for your particular situation.

As a starting point, you can use the KetoGains Macro Calculator. It takes several factors into account and makes a recommendation that is consistent with our approach.

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SUPPLEMENTAL FAT

Adding additional fat in cooking and to your plate is important for consuming enough calories and helping you to get into ketosis. Saturated fat was demonized for many years, but in more recent years we have learned that healthy sources of these fats are not problematic for the majority of the population.

That said, a balance of fats—including saturated, monounsaturated, and polyunsaturated—is the best approach for most people. You do not need to put butter in your coffee or eat enormous amounts of coconut oil to get into, and maintain, ketosis.

Also, there is a small subset of the population that may need to restrict saturated fat intake due to very high cholesterol/lipoprotein levels. We screen patients in our clinic to determine if you might be one of these people. If this applies to you, we recommend focusing heavily on monounsaturated fats, for both cooking and adding to food. A few examples of healthy monounsaturated fats include olive oil, avocados, avocado oil, macadamia nut oil, tiger nut oil, and algae oil for cooking (it is 99% monounsaturated and has a very high smoke point; Thrive Algae Oil is a good brand).

Medium-chain triglycerides (MCTs) are a type of saturated fat. They can help you get into ketosis when consumed in high enough quantities. There are two primary sources of MCT in your diet. The first is coconut oil. Coconut oil can be eaten in solid form directly off the spoon, used as a cooking oil, or melted and added to smoothies (made with coconut milk). You can use extra-virgin coconut oil, which has a stronger coconut flavor, or expeller-pressed coconut oil, which has very little coconut flavor.

The second source of MCTs in the diet is pure MCT oil, which can be purchased online. (There are many good, organic brands on Amazon.) The advantage to MCT oil is that, because it is pure MCT, it is more ketogenic than coconut oil - and thus you need less of

it to have the same effect. Another advantage is that it is liquid, so it can be used in salad dressings, drizzled over vegetables, etc.

High amounts of MCT oil can sometimes cause side effects such as nausea, diarrhea, gas and bloating. Consuming them with foods can often be helpful to avoid these side effects.

Also be aware that both coconut and MCT oil are saturated fats, and may thus need to be minimized in the subset of patients that experience dramatic increases in their cholesterol and lipoproteins from saturated fat consumption.

ADDITIONAL STRATEGIES FOR ENTERING KETOSIS

Some people may need a little extra push getting their bodies to transition to using ketones. If you need help getting into ketosis, you can try the following:

- **Intermittent fasting**. One effective way of doing this is “16/8” eating—compressing your food intake into an 8-hour window each day, say from 12-8pm, and consuming nothing but water, tea or coffee outside of that window. You may add fat (butter, cream, MCT oil) to your tea or coffee if desired. Another option is to do alternate day fasting, where you eat only every other day.
- **Amino acids**. L-leucine, an amino acid, is ketogenic. Try taking 5 grams of L-leucine powder (available online) on an empty stomach once a day. If this causes nausea, take it with food.
- **Exogenous ketones**. Exogenous ketones are ketones taken in supplemental form. We generally do not recommend them, except in certain circumstances. Please speak with your clinician or health coach before starting. Exogenous ketones are notorious for their terrible flavor, but Kegenix Prime is better than most. It’s available on Amazon.

PROTEINS

Some keto proponents advocate significant protein restriction and incredibly high fat intakes. The reason for this is that the body can manufacture glucose from proteins (thus suppressing ketone production) when carbohydrate intake is very low.

However, in practice, we do not see normal protein intakes (in the range of 15-20% of calories) have a substantial impact on ketone levels. Also, the very-low protein, very-high fat version of the ketogenic diet can lead to weight gain and muscle loss, in some cases, neither of which is desirable. For these reasons, we typically recommend a moderate protein intake (15–20% of calories) for most people, but as high as 25–30% for those that are highly active or training hard. There are certain circumstances where protein must be restricted for medical reasons; your clinician will advise you accordingly. Protein intake is tightly regulated by the body. When you need more, you'll crave it, and when you need less, you'll feel averse to it. So, as a starting point, it's usually safe to simply follow your cravings.

CARBOHYDRATES

Restricting carbohydrate intake is the primary lever for entering ketosis. We suggest starting at about 7% of total calories as carbohydrate. For someone eating 2,000 calories a day, this would be about 35 grams. You can look up the carbohydrate content of common foods on NutritionData.com or use an app like Cronometer or MyFitnessPal. We recommend that you limit your consumption of fruits to coconut, avocado and a small amount of berries.

TOTAL CALORIES PER DAY

We recommend that you don't count calories. Instead, listen to the needs of your body. You can use an app to journal your food intake and obtain the ratios of your macronutrients. Ketogenic and low-carb diets have a natural appetite control effect, and you will eat less. We recommend the Carb-Manager-Keto-Diet-App.

HOW DO I KNOW IF I'M IN KETOSIS?

The best way to determine whether you're in ketosis, and to what degree of ketosis you are in, is to test your ketones. Historically, blood testing has been the most accurate method. We recommend the Precision Xtra NFR Blood Glucose Monitoring System for blood testing. Recently, Biosense has come to market and is a new breath test option that has proven to be as reliable as blood testing. You are welcome to choose between the two options. (If you choose the blood testing option, make sure to purchase enough ketone strips to assess whether or not you are in Ketosis and then use them to experiment with what you need to eat in order to stay in ketosis.)

Test your ketones each morning. You're in ketosis with any value above 0.5 mmol/L. The optimal range for most people will be between 0.7 mmol/L and 2.0 mmol/L, although this varies from person to person. Those with epilepsy or other neurological conditions may need to stay between 2.0–3.0 mmol/L, or even higher, to manage symptoms.

If you're above 3.0 mmol/L, this usually indicates that you're not eating enough and/or you should probably add some carbohydrate back into your diet. Your goal should not be a particular number, but improvement in symptoms. At this time, we do not recommend breath or urine ketone monitoring, as it has not been shown to be as accurate.

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KETOGENIC RESOURCES AND COOKBOOKS

- The Keto Diet: The Complete Guide to High-Fat Diet by Leanne Vogel
- The Keto Reset Diet by Mark Sisson

Both have a good summary of the "what/why/how" of keto, as well as plenty of recipes.

ADDITIONAL CONSIDERATIONS AND MODIFICATIONS

Hydration. A reminder to stay hydrated throughout the day by drinking enough water and approved ketogenic beverages. Some ways to make sure that you are getting in enough hydration, is to drink a glass of water first thing in the morning, in between meals, before and after exercise, etc. Making sure to have a water bottle with you during the day can help you stay hydrated. We recommend a reusable, glass or stainless steel water bottle.

Exercise. Caution with glycolytic exercises as they can cause a higher carbohydrate demand. You may find that your exercise tolerance decreases while on the ketogenic diet. You may choose to focus more on light activities and endurance exercises, like; light strength training (body weights), cycling, walking, yoga, pilates, etc. while on the ketogenic diet. Choosing not to intermittent fast may help increase exercise tolerance.