Ketogenic Diet & Intermittent Fasting Combination

The **Clean Start Weight Loss®** program combines two great tools into one program. Fasting boosts the metabolism and helps control insulin, while providing an easy way to decrease calorie consumption, and keto (ketogenic diet) keeps the fat-burning going when the fast ends.

Research has shown that combining intermittent fasting (IF) and the ketogenic diet are the gold standard for fat loss and improved health, and they are the key to this program. Some of the main benefits for the entire population (man or woman, child or elderly) are as follows:

- They allow fat loss without the "starvation" feeling and repeated drops in metabolism that lead to repeated plateaus and the yo-yo effect.
- The combination of the two (without exercise) has been proven more effective at fat loss than the standard low-fat, calorie-restricted diet with exercise.
- Unlike glucose (the body's preferred fuel), ketones are clean-burning and don't result in the creation of reactive oxygen species (ROSs) that lead to oxidative stress and damage to DNA, proteins, and more.
- The body gets true nutrition through real food sources.
- They have been proven safe for everyone; multiple studies have shown keto and IF to be safe for many different populations, including children, the elderly, and diabetics, and even those with heart disease, who are usually counseled to avoid fat consumption.

There are additional benefits for those with metabolic syndrome, a group of symptoms that increase your risk of type 2 diabetes (T2D), heart disease, and stroke. Keto and IF can:

- Reverse insulin resistance and T2D[1]
- Improve important markers of heart health, such as blood pressure, triglyceride level, and the LDL/HDL cholesterol ratio, and [2,3,4]
- Reduce insulin dependence for type 1 diabetics, improving their health and reducing their costs. [1,2,3,4]

Very low carbohydrate diets (in which carbs compose less than 3 percent of total calories) are very effective at reducing blood sugar in those with type 2 diabetes compared to a standard diet (in which carbs compose 55 percent of total calories). This holds true even when the number of calories consumed are identical. In other words, the glucose-lowering benefits of carb restriction are not simply due to calorie restriction. This is useful knowledge, especially considering how many health professionals insist, "It's all about the calories."

Since excessive insulin is causing obesity, then the answer lies in reducing insulin. Both the ketogenic diet (a low-carb, moderate-protein, high-fat diet) and intermittent fasting are excellent methods of reducing high insulin levels. A very low carb diet can reduce insulin by more than 50 percent, but you can go another 50 percent by fasting [22].

Insulin & Insulin Resistance – The Key to Fat

The underlying cause of obesity turns out to be a hormonal, rather than a caloric, imbalance. Insulin is a fat-storage hormone. Excessive insulin is causing obesity, then clearly the answer lies in reducing insulin. Both the ketogenic diet (a low-carb, moderate-protein, high-fat diet) and intermittent fasting are excellent methods of reducing high insulin levels. Insulin inhibits lipolysis—it stops the body from burning fat. High insulin levels, which are normal after meals, signal our body to store some of the incoming energy.

Insulin has two major functions. First, it allows the body to immediately start using food energy. Carbohydrates are absorbed and rapidly turned into glucose, raising blood sugar levels. Insulin allows glucose to enter directly into most cells of the body, which use it for energy. Proteins are broken down into amino acids and absorbed, and excess amino acids may also be turned into glucose. Protein does not raise blood glucose, but it can raise insulin levels. The effect is variable, and it surprises many people to learn that some proteins can stimulate insulin as much as some carbohydrate-containing foods. Fats are directly absorbed as fat and have minimal effect on insulin.

Insulin helps store the excess energy. There are two ways to store the energy. Glucose molecules can be linked into long chains called glycogen and then stored in the liver. There is, however, a limit to the amount of glycogen that can be stored away. Once this limit is reached, the body starts to turn glucose into fat. This process is called de novo lipogenesis.

We know that the hypothalamic area of the brain controls the body set weight and that insulin plays a key role in resetting the body set weight up or down.

Time dependence in obesity is almost universally understood but rarely acknowledged. Usually, obesity is a gradual process of gaining 1 to 2 pounds per year. Over a period of twenty-five years, though, that can add up to 50 extra pounds. Those who have been obese their entire lives find it extremely difficult to lose weight. In contrast, people with recent weight gain have a much, much easier time dropping the excess pounds.

Reducing carbohydrates should cause weight loss, regardless of how long they've been overweight. But the time frame matters a lot. High insulin levels cause weight gain. Food choices play a role in raising insulin levels. But we are missing yet another pathway that increases insulin, one that is both time dependent and independent of diet: insulin resistance.

Insulin is normally released when we eat. It directs some of the incoming glucose to be used as energy and some to be stored for later use. In the short term, glucose is stored as glycogen in the

liver, but the liver's storage space for glycogen is limited. Once it's full, excess glucose is stored as fat: that is, the liver begins manufacturing fat from glucose through de novo lipogenesis. After the meal, as insulin levels fall, this process reverses. With no food energy coming in, stored food energy must be retrieved. Glycogen and fat stores in the liver are turned back into glucose and distributed to the rest of the body for energy. The liver acts like a balloon. As energy comes in, it fills up. As energy is needed, it deflates. Balancing feeding and fasting periods over a day ensures that no net fat is gained or lost. But what happens if the liver is already crammed full of fat? Insulin then tries to force more fat and sugar into the liver, even though it's already full of fat and sugar. Just as it is more difficult to inflate a fully inflated balloon, insulin has more difficulty trying to shove more fat into a fatty liver. It takes higher and higher levels of insulin to move the same amount of food energy into a fatty liver. The body is now resistant to the efforts of insulin, since normal levels will not be enough to push sugar into the liver. Voilà—insulin resistance in the liver. The liver, like an overinflated balloon, will try to expel the sugar back into circulation, so continuously high insulin levels are also required to keep it bottled up in the liver. If insulin levels start to drop, the stored fat and sugar comes whooshing out. To compensate, the body keeps raising its insulin levels. Thus, insulin resistance leads to higher insulin levels. High insulin levels encourage more storage of sugar and fat in the liver, which causes even more over-cramming of fat in the already fatty liver, causing more insulin resistance—a classic vicious cycle.

As we develop insulin resistance, our bodies increase our insulin levels to get the same result—glucose in the cell. Excessively high insulin resistance is the disease known as type 2 diabetes. High insulin resistance leads to elevated blood sugars, which are a symptom of this disease. In practical terms, this means that not only does insulin cause obesity, but also that insulin causes type 2 diabetes.

Insulin is the same hormone, whether found in an obese or a lean person. There is no difference in amino-acid sequence or any other measurable quality. Therefore, the problem of insulin resistance must lie with the receptor.

In a 1993 study[17], patients were started on intensive insulin treatment. In six months, they went from no insulin to 100 units a day on average. Their blood sugars were very, very well controlled. But the more insulin they took, the more insulin resistance they got—a direct causal relationship, as inseparable as a shadow is from a body. Even as their sugars got better, their diabetes was getting worse! These patients also gained an average of approximately 19 pounds, despite reducing their calorie intake by 300 calories per day. It didn't matter. Not only does insulin cause insulin resistance, it also causes weight gain.

We know that insulin causes insulin resistance. But insulin resistance also causes high insulin—a classic vicious or self-reinforcing, cycle. The higher the insulin levels, the greater the insulin resistance. The greater the resistance, the higher the levels. The cycle keeps going around and

around, one element reinforcing the other, until insulin is driven up to extremes. The longer the cycle continues, the worse it becomes—that's why obesity is so time dependent.

> *People who are stuck in this vicious cycle for decades develop significant insulin resistance. That resistance leads to high insulin levels that are independent of that person's diet. Even if you were to change your diet, the resistance would still keep your insulin levels high. If your insulin levels stay high, then your body set weight stays high. The thermostat is set high, and your weight will be drawn irresistibly upward.*

Eating a diet high in foods that provoke an insulin response may initiate obesity, but over time, insulin resistance becomes a larger and larger part of the problem and can become, in fact, a major driver of high insulin levels. Obesity drives itself. A long-standing obesity cycle is extremely difficult to break, and dietary changes alone may not be sufficient.

The longer you are obese, the more insulin resistance you have. Gradually, that insulin resistance will cause even your fasting insulin levels to rise. The high insulin levels are the primary insult. Persistent high insulin levels lead gradually and eventually to insulin resistance. Insulin resistance in turn leads to higher insulin levels. But the crucial starting point of the vicious cycle is high insulin levels.

In the case of insulin resistance, it comes down to both meal composition and meal timing—the two critical components of insulin resistance. The types of food eaten influence the insulin levels.

Insulin resistance requires persistently high levels. The nightly fasting caused periods of very low insulin, so resistance could not develop.

Insulin resistance, in turn, leads to higher fasting insulin levels. Fasting insulin levels are normally low. Now, instead of starting the day with low insulin after the nightly fast, we are starting with high insulin. The persistence of high insulin levels leads to even more resistance. In other words, insulin resistance itself leads to more resistance—a vicious cycle.

Sugars are not simply empty calories or refined carbohydrates. They are far more dangerous than that, as they stimulate both insulin and insulin resistance. The extra fattening effect of sugar is due to the stimulation of insulin resistance from fructose, which festers for years or even decades before it becomes obvious. Sugar's effects, as well as obesity, develop over decades, not days.

This explains the apparent paradox of the Asian rice eater. The INTERMAP studies of the 1990s found that the Chinese were eating very high amounts of white rice, but suffered little obesity. The key was that their sucrose consumption was extremely low, which minimized the development of insulin resistance.

This insulin-raising effect has also been shown for other artificial sweeteners, including the "natural" sweetener stevia. Despite having a minimal effect on blood sugars, both aspartame and

stevia raised insulin levels higher even than table sugar. Artificial sweeteners may also cause harm by increasing cravings. The brain may perceive an incomplete sense of reward by sensing sweetness without calories, which may then cause overcompensation and increased appetite and cravings [21].

Insulin and insulin resistance drive obesity. Refined carbohydrates, such as white sugar and white flour, cause the greatest increase in insulin levels.

(source: The Obesity Code: Unlocking the Secrets of Weight Loss (Dr. Jason Fung))

Lowering insulin also rids the body of excess salt and water because insulin is well known to cause salt and water retention in the kidneys. This is why low-carbohydrate diets often cause diuresis, the loss of excess water—in fact, much of the initial weight lost on a low-carb diet is water.

The quickest and most efficient way to lower insulin and insulin resistance is fasting. It has unrivaled power to break through weight-loss plateaus and reduce the need for insulin.

Combining a high-fat, low-carb nutrition plan with intermittent fasting and strategic strength training can result in rapid and dramatic fat loss.

Intermittent Fasting

Fasting is simply the most efficient and effective way to lower insulin levels. There are many ways to practice intermittent fasting. At its simplest, IF is just what it sounds like—alternating intervals of fasting and eating. The intervals could be short or long, daily or biweekly, or any other configuration that suits you. Fasting variations include daily extension of the overnight fast; alternate-day fasting; 24-, 48-, or even 96-hour fasts; and more.

While many people think fasts are unhealthy and lead to the loss of muscle mass, this is based on a lack of understanding of how a bodily process called gluconeogenesis (GNG) is affected by fasting. Instead of scavenging muscle tissue to "provide" the protein you aren't eating (and making glucose from it), fasting causes growth hormone circulation to preserve muscle mass while using fat stores for energy. After all, if food is so hard to find that you haven't had any, your body wants you well-equipped to find and kill or harvest food when you do find it.

In the 1970s, a twenty-seven-year-old Scottish man started fasting at a weight of 456 pounds. Over the next 382 days, he subsisted on only noncaloric fluids, a daily multivitamin, and various supplements, setting the world record for the longest fast.

Short-term fasts:

- Provide metabolism stability,
- Promote blood-sugar control,
- Promote insulin sensitivity, and
- Boost hormones that sustain muscle mass and increase fat-burning.
- Elevates blood ketone levels

Longer fasts of 2–4 days will add benefits such as pushing your body into a deep-clean and repair of old, damaged proteins (called autophagy) and increasing your metabolism anywhere from 3.6 to 14 percent.

The Clean Start Weight Loss® program incorporates IF through daily "eating windows." All your eating will take place within 6–8 hours of the day. This is most easily accomplished by taking advantage of the fast that occurs naturally while you sleep. Don't snack after dinner, and then don't eat until around lunch time the next day.

Contrary to what you commonly hear, breakfast is not an essential "most important meal of the day" that gets you off to a perfect start. The body naturally activates an energy supply in the morning when it wakes you and staying in fasting mode allows your body to continue accessing its fat stores for all additional energy that is required.

Before the 1970's there were no "snacks," it wasn't even a food category! Now, the "snacking" section of your grocery store is massive. Studies [18] confirm that snacking means you eat more.

Subjects given mandatory snacks would consume slightly fewer calories at the subsequent meal, but not enough to offset the extra calories of the snack itself.

Eating more frequently keeps blood glucose from becoming too low. However, unless you have diabetes, your blood sugars are stable whether you eat six times a day or six times a month[20]. The total thermogenic effect of food over twenty-four hours for both the grazing and gorging strategies is the same: neither yields a metabolic advantage. Eating more frequent meals does not aid in weight loss[19].

The inability of most diets to reduce insulin resistance is exactly why they eventually result in weight regain. Fasting, on the other hand, introduces prolonged periods of low insulin levels, which breaks the cycle of high insulin and insulin resistance.

To gain the greatest benefit from fasting, the Clean Start Weight Loss® program combines IF with ketogenic eating, which mimics fasting and allows your body to continue its use of body fat for energy.

Research shows that fasting elevates blood ketone levels due to the absence of carbohydrates and a reliance on fat as a fuel source (Varady et al., 2013).

There are many times of fasting (3-day, 30-day, water fasts, etc..), and there are many types of intermittent fasting (16-hour, 18-hour, 24-hour, 30-hour, 36-hour, 5:2, alternate day, warrior diet). For this program we are only going to be focused on 16-hour and 18-hour intermittent fasting. This is a great way for patients to get started, with the highest compliance and the least amount of medial contraindications. This method of fasting has the patient eating twice a day. The issue with fasts where the patient doesn't consume any food in 24 (or more) hour period, is they have issues with taking medications that should be taken with food, and you greatly reduce any complications, like low magnesium or salt depletion.

Fasting Contraindications

- Pregnant women and nursing mothers.
- Those with serious adrenal challenges or chronic renal disease, are living with chronic stress (adrenal fatigue), or have cortisol dysregulation, you would likely need to resolve these issues before implementing intermittent fasting.
- Patients with porphyria.
- Children under 18 should also not fast for extended periods(+24hrs).
- Any patient who is malnourished or underweight (with a body mass index, or BMI, of less than 18.5), or who has an eating disorder such as anorexia nervosa should avoid fasting.

Intermittent Fasting Cautions/Concerns

- Patients taking medications, especially diabetics, need medical supervision (see above); otherwise there is a risk of hypoglycemia.
- If you are not their primary physician, please consult with them prior to making any medical adjustments.
- Lower blood sugar is not a complication per se, because it's expected during fasting. You want to lower blood sugar. But it does mean that if your patient is taking medication to lower their blood sugar, they may be overmedicated when fasting.
- Blood pressure should be monitored regularly. This can be done at home with any of the widely available devices.
- Blood-pressure-lowering medications may need to be adjusted if they find their blood pressure becomes too low, causing light-headedness.
- Blood magnesium levels occasionally go low. This seems to be especially prevalent in diabetics. we often supplement patients with magnesium to be on the safe side
- Patients with their gallbladder removed. It is imperative they take two supplements: ox bile and a digestive enzyme with plenty of the enzyme lipase. These should be taken any time they eat a high fat food and should help them improve their ability to digest healthy fats. [37]
- Patients that have a goal to build large muscles or engage in competitive sports such as sprinting that require glucose for anaerobic fast twitch muscle fibers, intermittent fasting is not likely to be their best strategy.

Diabetics and Intermittent Fasting

- You may want to reduce medications and insulin before starting their fast in anticipation of lower blood sugar (hypoglycemia).
- Have them monitor their blood sugar at least four times daily if taking insulin because the blood sugar response to a fast is unpredictable.
- If you are having your patient fasting for more than 24 hours, certain medications may cause side effects on an empty stomach: Aspirin can cause stomach upset or

even ulcers. Iron supplements may cause nausea and vomiting. Metformin, often prescribed for diabetes, may cause nausea or diarrhea. You may decide to adjust these medications or have them take them with a small serving of leafy greens, which is low in calories and may not disrupt the fast.

- Low magnesium, which is particularly common in diabetics, may cause muscle cramps. You may suggest an over-the-counter magnesium supplement, or have them soak in Epsom salts, which are magnesium salts.

Intermittent Fasting Common Side Effects

We mitigate many of these side effects by limiting the fasting to either 16-hour (16/8) or 18-hour (18/6). Longer fasts typically show these types of side effects, so you should be aware of them:

- Headaches are common the first few times you fast. It is believed this is caused by the transition from a relatively high-salt diet to very low salt intake on fasting days. The more often they fast, the less this becomes an issue.
- If patients experience dizziness during their fast, most likely, they're becoming dehydrated. Preventing this requires both salt and water. Have them drink plenty of fluids, and in case they're low on salt, add extra sea salt to homemade bone broth or mineral water. Another possibility is that their blood pressure is too low, particularly if they are taking medications for hypertension.
- Low magnesium, which is particularly common in diabetics, may cause muscle cramps. You can recommend an over-the-counter magnesium supplement. They may also soak in Epsom salts (which are actually magnesium salts).
- Constipation. Increase their intake of fiber, fruits and vegetables may help with constipation. Metamucil can also be taken to increase fiber and stool bulk (watch for added sugars and artificial sweeteners).
- Although very rare, educate your patient on the symptoms of hypoglycemia: confusion, sweating, and tremors (this is also in their patient guidebook). Let them know to consume sugar if they experience a feeling of hunger, shakiness, or weakness. Left untreated, it may advance to loss of consciousness, seizures, and, in extreme cases, death.

Intermittent Fasting Concerns

- **I'm going into "starvation mode" and using muscle as energy** – Muscle is preserved until body fat becomes so low that the body has no choice but to turn to muscle. This will only happen when body fat is at less than 4 percent. There is inevitably some lean tissue lost along with fat, but this is generally skin and connective tissue, not necessarily muscle.

What is a Ketogenic Diet?

A ketogenic diet is a very-low-carb diet that restricts carbohydrate consumption enough to allow the body to enter ketosis, which is a metabolic state that converts fat into ketone acids, or ketones. These are used by the muscles, brain, and other tissues for energy. Instead of using glucose for energy, the body will use fat and ketones.

The physiology of the diet is that it induces ketosis by lowering blood glucose, stored glycogen, and insulin levels. The result is an enhanced release and reliance on fat as fuel. Finally, these fats are converted to ketone bodies, which can provide an alternative and more effective fuel source for the body.

Is ketosis unnatural? Babies are born in a state of ketosis and are able to utilize ketone bodies at a rate that is five to forty times greater than adults [31].

Ketogenic diet was originally formulated to replace glucose as a main source of fuel and was first developed as a treatment option for children with retractable epilepsy over 90 years ago. There is evidence showing the viability of the ketogenic diet in reducing severity and the number of seizures in children with epilepsy. [15]

Three macronutrients are found in varying amounts in all foods; they are fat, protein, and carbohydrate. The general calorie breakdown of macronutrient consumption on keto is 55% to 60% fat, 30% to 35% protein and 5% to 10% carbohydrates. Some people call keto the “high-fat” diet. Others call the ketogenic diet a knockoff of the Atkins Diet, which was originally a high-protein, high-fat, low-carb.

When eating ketogenically, patients will eat protein, fat, and low-carb vegetables and fruit. Grains are off the table, as are most sweeteners (though there are some exceptions). Fruits (e.g. berries), starchy vegetables (usually root vegetables), legumes, and nuts are limited, as are full-fat cheese and cultured dairy products (though for different reasons). Leafy, high-fiber vegetables are eaten in abundance with moderate servings of protein.

The exact mechanisms by which ketones can suppress appetite are still to be determined. However, researchers [35] have proposed some possibilities:

- By maintaining normal glucose meal response, which would reduce blood glucose spikes and crashes that lead to increased hunger.
- By maintaining post-meal cholecystokinin secretion, which is responsible for both stimulating the digestion of fat and protein and increasing satiety. (Weight loss typically leads to a reduction in post-meal cholecystokinin secretion.)
- By decreasing circulating ghrelin, the hunger hormone.

Both ketogenic diets and ketones themselves appear to have a strong effect on appetite, which, in combination with their other metabolic effects, such as increased BAT, feed efficiency, and improved insulin sensitivity, could make them helpful for weight loss.

One study found that subjects on a high-fat, low-carbohydrate diet (no more than 50 to 60 grams of carbs and approximately 150 grams of fat per day) lost an average of 0.3 kilogram (0.66 pound) per day over a forty-five-day period [32]. Even though the weight loss can be very impressive in studies, this is not what we promise patients, it's always best to "Under Promise and Over Deliver." We typically tell patients they will lose between 2-3lbs a week. They typically lose closer to 5-8lbs the first week, but this is primarily water weight as the body expels excess water that is not needed. Since men require more "calories" to maintain their lean tissue mass than women, they typically lose more. It does not mean they are more compliant; they just have physiology on their side.

Research shows that people who are overweight and insulin resistant tend to have impaired mitochondrial function and fewer mitochondria overall [33]. Mitochondria are responsible for breaking down fat for fuel and thus play a significant role in the formation and utilization of ketones [34] so problems with mitochondria automatically put those individuals at a disadvantage for becoming keto-adapted. Fortunately, ketogenic dieting itself appears to improve both the number of mitochondria and their function, so the disadvantage can be overcome over time [34].

The Science of Carbs vs Fat

While the macronutrients you eat are processed by your digestive system in roughly the same way (being broken down into smaller component parts for nutrient absorption), the effects they have on your use and storage of energy are different. These differences are what make keto and IF so effective for fat loss.

When you eat carbohydrates, the starch and sugar are broken down into glucose molecules, which are energy. These molecules get absorbed into your bloodstream, which triggers the release of insulin, the storage hormone, to shuttle the glucose out of the blood and into storage as glycogen in your liver and muscles for "immediate" (short-term) use. Only so much glycogen can be stored for short-term use, however, and the rest gets converted into fat for long-term storage. Fat is, after all, stored energy.

The problem, for those who are trying to lose weight, is that since insulin is a storage hormone and it keeps the "exit" door on your fat stores slammed shut, while the "entrance" is wide open. You cannot burn from your fat stores if you have glucose coming in from carbs. On the other hand, if you restrict carbs, you will use up the glycogen and switch to running on your stored fat, which is released readily to provide you with energy.

When glycogen runs out, fat is broken down into fatty acids and glycerol, which the majority of the body can convert to energy. Your brain can't use these for fuel, though, so the liver converts

some glycerol into glucose and some fatty acids into ketone acids (these are completely safe and not to be confused with diabetic ketoacidosis).

The brain and the body run quite well on these ketone acids, or ketones. While there are a few tissues in the body that require glucose as fuel, even if you completely avoided carbs, you would not starve them of energy because of gluconeogenesis (GNG), the body's ability to create glucose in the liver.

The ketogenic diet is neither low-protein nor high-protein. Due to concerns that eating excessive amounts of protein causes GNG, or the creation of new glucose, keto is a moderate-protein diet. This means that the patient's daily protein needs will be around 0.5 grams to 0.8 grams per pound of body weight (e.g. if they weigh 150lbs, they should consume 75 grams of protein per day). The lower protein is for those who are sedentary, and the higher protein is for those who are active and exercise regularly. Even more protein may be required for those who do extreme sports or exercise routines.

Dr. Robert Wolfe is one of the foremost authorities on metabolism. His laboratory conducted a study in which fat was infused into subjects' blood; it showed that when fat was infused by itself, it was used as fuel, and none of the early indicators of obesity, like elevated insulin and glucose levels, were seen [36]. In the next phase of the study, the researchers infused fat and carbohydrate together into subjects' blood. This time, fat was not utilized as fuel; instead, both fat and carbohydrate utilization were impaired. The experiment clearly indicated that fat by itself isn't what is making us fat. Rather, it is the combination of high amounts of fat and high amounts of carbohydrates which is the issue. So, if patients eat a high protein, high carb "fast food" diet, they will in fact gain weight, not go into ketosis and potentially lose weight. [26]

The Sugar and Starch Connection

Carbohydrates are made of three basic parts: fiber, starch, and sugar. The fiber portion provides bulk and keeps things moving and (largely) it isn't digestible. That leaves the starch and the sugar. While "sugar" includes fructose and sucrose and several others, these get broken down into glucose; to simplify things, all types of sugar will be referred to as glucose here.

It's worth mentioning that fructose is converted in the liver, which taxes it quite a bit when large amounts are consumed; considering the number of products that have fructose added to them, this is particularly noteworthy. While avoiding starch may come as a surprise, starch is made of strings of glucose molecules that separate quite readily during digestion.

When glucose is present, your body will default to using it because it is the simplest energy source to use. For this reason, when you consume carbohydrates regularly, your body won't bother with the more complicated task of converting and using fat. Obviously, that makes it quite difficult to get rid of excess weight.

Since ketogenic eating keeps your glucose level very low, it keeps you fed while maintaining fat oxidation (when you "burn" fat), as long as you don't overindulge in fat. First in, first out is the rule, which means that the fat that you consume will be readily available and used before the fat that requires additional steps to pull out of storage. If you've heard keto called a high-fat diet, it is to a point. Patients will eat some fat for flavor and satiety (hunger satisfaction), but excess fat just prevents you from burning your own stores.

Keto's Safety Record

Keto has soared in popularity in recent years. While some think keto is a new fad, it has been around as an intentional way of eating for over a century.

The ketogenic diet originated as a way to prevent epileptic seizures. The clean energy of ketones aids the brain's functioning and allows effective seizure control without medication. The therapeutic keto diet severely restricts carbs, but for its adherents, the relief is worth it.

Over the years, many studies have been done on keto's safety. It has been found safe for obese children, athletes, obese adults of varying ages (both male and female), diabetics, those with metabolic syndrome, and those who are healthy. [5,6,7,8,9,10] In addition to being safe, it provides health benefits by improving all the markers for metabolic syndrome, which relates to stroke likelihood and heart health, such as LDL/HDL ratio, cholesterol, insulin sensitivity, blood pressure, fasting blood sugar, weight, BMI, and waist circumference. [2,3,4]

The biggest "risk" of keto is the possibility of regaining when going off-diet, especially if returning to the SAD—standard American diet. However, that risk is not unique to keto. That risk is exactly what keeps many people all over the world happily on keto once they've achieved their loss—they want to keep it off.

Ketones generally require thirty-six to forty-eight hours of fasting to ramp up. Prior to this, most of the body's energy requirements are met by the breakdown of glycogen.

During fat-burning, the triglyceride molecule is broken down into the glycerol backbone and the 3 fatty acids. The fatty acids are used directly by most of the organs of the body, including the liver, kidney, heart, and muscles. However, certain cells are not able to burn fat, including the inner part of the kidney (renal medulla) and red blood cells. To supply the glucose those cells need, the liver uses the glycerol backbone to manufacture new glucose molecules.

Ketogenic Diet Cautions

- Patients suffering from diabetes and taking insulin or oral hypoglycemic agents suffer severe hypoglycemia if the medications are not appropriately adjusted before initiating this diet
- Due to ketonemia, acetone in the body can sometimes be reduced to isopropanol by hepatic alcohol dehydrogenase which can give a false positive alcohol breath test

result.

- Patients with gallbladder removed: diarrhea on the keto diet may be even more of a problem. A digestive enzyme may be useful in these cases.

Ketogenic Diet Contraindications

- Pancreatitis,
- Liver failure,
- Disorders of fat metabolism,
- Primary carnitine deficiency,
- Carnitine palmitoyltransferase deficiency,
- Carnitine translocase deficiency,
- Porphyrias, or pyruvate kinase deficiency

(source: Ketogenic Diet https://www.ncbi.nlm.nih.gov/books/NBK499830/)

Ketogenic Diet and Diabetics

If the patient's diabetes is well managed, the keto diet can be relatively safe according to these studies:

- The Ketogenic Diet and its Clinical Applications in Type I and II Diabetes, (www.clinmedjournals.org/articles/ijdcr/international-journal-of-diabetes-and-clinical-research-ijdcr-5-092.php)
- Management of Type 1 Diabetes With a Very Low–Carbohydrate Diet (https://pediatrics.aappublications.org/content/141/6/e20173349)

People suffering from diabetes and taking insulin or oral hypoglycemic agents suffer severe hypoglycemia if the medications are not appropriately adjusted before initiating this diet.

However, for Type 1 Diabetics, it may be best to experiment with a lower-carb diet before implementing a full keto diet to see how their body responds.

Ketogenic & Intermittent Fasting Lab Tests

Ultimately, it's your responsibility to determine which tests are most important for you and your patient. Here are some suggested labs you may want to order:

- Alanine aminotransferase (ALT)
- Fasting blood glucose
- Hemoglobin A1c (HbA1c)

- Complete lipid panel (look for VLDL, LCL particle size, LDL-to-HDL ratio, triglycerides, and even high-sensitivity CRP.
- Creatinine
- Microalbumin/creatinine ratio, urine
- Optional blood tests
- Complete blood count (CBC)
- Electrolytes (sodium and potassium)
- Fasting insulin or c-peptide
- High-sensitivity c-reactive protein (hs-CRP)
- Nuclear magnetic resonance (NMR) lipoprofile
- Thyroid stimulating hormone (TSH)
- Uric acid
- Vitamin B12

Ketogenic Common Side Effects

The most common and relatively **minor short-term side** effects of ketogenic diet (sometimes referred to as keto flu) include a collection of symptoms like:

- bad breath (keto breath)
- nausea
- vomiting
- headache
- fatigue
- dizziness
- insomnia
- difficulty in exercise tolerance
- constipation (Traditional Medicinal's Smooth Move tea)
- diarrhea (Some people may not have enough of the enzymes necessary to digest and absorb the foods that they consume, leading to diarrhea. A digestive enzyme may be useful in these cases). As well, excess sugar alcohol sweeteners (i.e. Xylitol) and/or MCT Oil can also be a cause.

NOTE: These symptoms resolve in a few days to few weeks. Ensuring adequate fluid and electrolyte intake can help counter some of these symptoms.

"Keto Breath" should only last about a week or so, while the patient is transitioning into ketosis. Here are our top four ways to minimize keto breath when it does occur: Drink, drink, and

drink more water. Chew on mint leaves. Pop a piece of sugar-free (xylitol) gum. Chew on cinnamon bark.

Drop in active thyroid hormone level: With the weight loss, some patients could have lower thyroid hormone levels. That's because the thyroid hormone increases your metabolism.

On very rare occasions patients may get **"Keto Rash."** The keto rash is not unique to keto, yet multiple scientific reports show that people transitioning onto keto are more likely to develop a rash. Why some people get rashes is unclear, but it does have a specific name: prurigo pigmentosa. Prurigo refers to the intense itching, while pigmentosa refers to the dark patches that are often left behind after the rash disappears. The keto rash more commonly happens to people with diabetes who begin eating a very low-carb diet. [24]

Hair Loss. This is somewhat common with any rapid weight loss program. A major culprit is too little calories. Adding an extra avocado or some coconut oil to your meal are great ways to add nutrient-dense calories quickly. A multi-vitamin may help. Alternately, have them try Nutrafol® hair loss supplement, but we're not 100% sure of that products efficacy.

Long-term adverse effects include: hepatic steatosis, hypoproteinemia, Hypertriglyceridemia, kidney stones, Cardiac complications, and vitamin and mineral deficiencies. [16]

Ketoacidosis

Ketoacidosis is extremely rare and occurs when there is uncontrolled ketone production, which is typically accompanied by high concentrations of blood glucose (i.e., diabetes). In ketoacidosis, blood ketone levels reach 15 to 25 mmol/L, and the acidity of the blood also increases (Cartwright et al., 2012). The potential cause for harm comes from the alarming rise in acidity or lowering of the pH of the blood. Human blood is usually slightly alkaline, with a pH ranging from 7.35 to 7.45. Any deviation from this norm, even by the most modest of margins, can prove fatal.[26]

It primarily happens to people with type 1 diabetes, who tend to have high levels of blood glucose at the same time as high ketone levels. Therapeutic (nutritional) ketosis has a ketone range of 0.5-7/8.0 mmol/L.[26]

Less commonly, ketoacidosis is triggered by excessive exercise, starvation, severe alcohol abuse, or a severe illness. Even with these events, this condition occurs more commonly in a person who already has type 1 diabetes. [16]

Apart from being diabetic, research shows that women who start keto during pregnancy or when breastfeeding may also be at risk for ketoacidosis.

Signs that your symptoms are ketoacidosis and not just keto flu: Excessive nausea and vomiting so much that you can't keep anything down; Urinating much more frequently throughout the

day; Difficulty breathing or being unable to catch your breath; Extreme fatigue (to the point of being unable to get out of bed); Fainting or "blacking out"

For detailed information on ketoacidosis and those with Type 1 Diabetes, please download this study: Hyperketonemia and ketosis increase the risk of complications in type 1 diabetes (www.ncbi.nlm.nih.gov/pmc/articles/PMC4867238)

The Keto "Flu"

When patients first start eating ketogenically, the body starts flushing out water that it doesn't need because they aren't eating carbohydrates. With that goes their electrolytes, largely sodium. Most of the population already is low in magnesium, so this doesn't help. Also, your body isn't used to getting its energy from fat. The digestive enzymes in you are tailored to a high-carb diet currently, and your body will have to switch the ratios around for best use. Your body will adapt, but you may find yourself experiencing the "keto flu."

While it is not a true flu, nor caused by infectious agents, some of the symptoms can mimic the flu. Headache, fatigue, irritability, low energy, nausea, brain fog, muscle cramps, and sugar cravings all are possible symptoms, and they are most likely in the first week.

The good news is that most of the symptoms are caused by the water and sodium loss, so the "treatment" is simple. Stay hydrated, and anytime you start to feel some of these symptoms coming on (or a few times a day, proactively), drink a glass of water with a half-teaspoon of salt stirred into it. Use a quality salt, not table salt. This simple step will help alleviate most of the issues.

Also, make sure patients eat enough fat. If you nearly eliminate carbs, your body needs fat to run on. If you eat too little of it, you'll feel like you're starving. Eat some extra cheese or some natural peanut butter. While you don't want to eat extra fat consistently, it's a good idea in this transition period. A couple other good tips are to avoid strenuous activity and not restrict food consumption too much, just carbs.

To help prevent these symptoms, you can recommend drinking beef or chicken broth one to three times a day. Do not use bouillon, there are too many additives, plus its dangerous if the patient has high blood pressure or a history of heart failure.

Ketogenic Diet and Electrolytes

A ketogenic diet affects electrolyte levels, so patients need to be aware of that and take some steps to prevent any issues. The effect comes from how glucose is stored and how our bodies flush water out. Electrolyte levels appear to drop at the beginning of a ketogenic diet before returning to normal levels once a person is keto-adapted.

Glycogen is the short-term glucose storage in our bodies. It is stored in "pools" of water within our tissues, at a rate of 3 to 4 parts water for each part of glycogen. When the glycogen is used up, the water is no longer necessary. That means, one will initially lose a lot of water weight on a ketogenic diet.

However, when that water is excreted, it takes electrolytes with it. Sodium, magnesium, and potassium are the main losses, and low levels can result in symptoms like headaches, shakiness, weakness, muscle cramps, bloating, constipation, and a racing or palpitating heart.

You could get sufficient amounts of these electrolytes from food, but individuals who exercise regularly need to be liberal with sodium intake because they lose it rapidly during exercise through both urine and sweat.

Sodium is easy to "supplement"; salt your food to taste. Use a quality salt rich with micronutrients, such as Celtic salt, Himalayan sea salt, Real Salt, etc. Iodine can be gotten through fish, seaweed, egg yolks, and dairy, instead of from iodized salt. 3 to 5 grams of sodium should be sufficient (Dr. Stephen Phinney)

A majority of the populations already is deficient in **magnesium**. Eat foods high in magnesium. Suitable food sources of magnesium include avocado, nuts (particularly almonds), seeds (chia, flax, and pumpkin), leafy greens (especially collard, mustard, and turnip greens, kale, and spinach), and fish (salmon, halibut, mackerel).

Excess **potassium** is toxic. You will **not** consume too much through food sources, but supplementation is tricky. 2 to 3 grams of potassium daily for individuals who are exercising regularly. Good food sources include avocados, leafy greens, mushrooms, nuts, and salmon.

Patients who have headaches or feel lethargic in the early stage of the diet see quick improvements when they add an electrolyte supplement that boosts sodium, potassium, magnesium, and/or calcium levels. There are also dependencies based on their diet (for example, whether you eat mineral-rich foods or add salt to your meat),

Ketogenic Diet, Heart Disease & Cholesterol

Heart disease is caused by atherosclerosis—the process by which arteries in the heart become narrowed and hardened by the buildup of plaque. But atherosclerosis is not simply the result of high cholesterol levels clogging arteries. Current opinion holds that plaque develops as a response to injury: the wall of the artery becomes damaged, resulting in inflammation, which in turn allows infiltration of cholesterol and inflammatory cells into artery walls, in addition to the proliferation of smooth muscle. The narrowing of the artery may cause chest pain (also called angina). When plaques rupture, a blood clot forms, which abruptly blocks the artery. The resulting lack of oxygen causes a heart attack. Heart attacks and strokes are predominantly inflammatory diseases, rather than simply diseases of high cholesterol levels.[20]

The liver manufactures the overwhelming majority—80 percent—of the blood cholesterol, with only 20 percent coming from diet. Cholesterol is a key building block in the membranes that surround all the cells in our body. In fact, it's so vital that every cell in the body except the brain has the ability to make it. If you reduce cholesterol in your diet, your body will simply make more.

The heart benefit of the low-fat diet was proven false with the publication of the Women's Health Initiative Dietary Modification Trial and the Low-Fat Dietary Pattern and Risk of Cardiovascular Disease study[23] in 2006. The study, which followed 50,000 women over 7 years, concluded, "No association between percent of calories from fat and serum cholesterol level was shown; nor between ratio of plant fat to animal fat intake and serum cholesterol level." As well, over the seven years, the low-fat, calorie-restricted diet produced no benefits in weight loss. Nor were there heart-protection benefit either. The incidence of cancer, heart disease or stroke was not reduced. There were no cardiovascular benefits. There were no weight benefits. The low-fat diet was a complete failure.

Certain types of foods affect your cholesterol test levels: Fats (monounsaturated fatty acids [MUFAs], omega-3s, and saturated fats like MCT oils) increase HDL, while carbs decrease them. MCT oils (including coconut oil) decrease triglyceride levels. Triglycerides are another component of your annual cholesterol check; they represent free-flowing fat in your bloodstream and increase your risk of heart disease. Consuming high glycemic-index foods (simple carbs) increases overall blood cholesterol more than eating foods high in cholesterol. Saturated fat raises the large, buoyant kind of LDL, while simple carbs increase the small, dense LDL. your LDL ("bad" cholesterol) is rising, but it will be accompanied by an increase in HDL ("good" cholesterol) and decrease in triglycerides (free-floating fat in your bloodstream).

Checking Ketones

The range for nutritional ketosis is to have a blood level of ketones between 0.5-65.0 mmol/L. Ketone levels tend not to rise above 7 mmol/L during diet-induced ketosis. The range is dependent on the patient, their length of time being overweight/obese, their insulin resistance and genes. The number is not as important as the goal, if they lose weight at 1.5 mmol/L then that is the best number for them.

There are three kinds of ketone bodies:

- acetoacetate (AcAc)
- beta-hydroxybutyrate (BHB)
- acetone (Acetone is actually produced by breaking down acetoacetate, making it more of a by-product, but for our purposes, it can be considered a ketone body

It is a good idea for you to have a blood ketone monitor at the practice so you can test a patient's ketone level. In addition, some patients will want to have their own ketone monitor, and they can

choose one of three types: urine test strips, blood ketone monitor, and breath ketone monitor. Ketone level can change throughout the day, so you may not get an accurate reading when they come into the practice.

You're testing for beta hydroxybutyrate (BHB) levels in the blood, acetone in the breath, or acetoacetate in your urine—these are three different types of ketone bodies that patients will start producing once they're in ketosis.

Urine Testing

Urine ketone testing is the cheapest way to test. The strips measure the excess concentration of acetoacetate in the urine. There is a color change—the strip turns dark purple—within 15 seconds if ketones are present. If there are ketones in the urine, then the body is producing ketones and the patient is most likely in ketosis.

PROS: It's the least expensive method for testing ketones. Plus the test is painless: patients just pee on a stick.

CONS Because it only measures acetoacetate in the urine, this method cannot measure long-term ketosis. When one first gets started on keto, the body starts producing ketones right away but it's not yet very efficient at using them, so it gets rid of a lot of them through urine in the beginning. After a while the body gets more used to using the ketones—what we call becoming fat-adapted— one won't see the strip turn color as much because ketones aren't being thrown as much as waste in the urine, they're being used by your body! So even if there are no have ketones in the urine, one still might be in ketosis, with ketones showing up in the blood (as beta hydroxybutyrate). The urine test is very useful in the beginning, and less so over time.

Blood Testing

Blood testing is the gold standard and the most accurate way to test the ketone levels in one's body. It requires a little finger prick that detects beta hydroxybutyrate. The results are shown with a clear digital display. Anything above 0.5 mmol (millimoles) means the patient is in ketosis. Anything below means they are not.

PROS It's accurate. It doesn't get any better than this if you want clear, accurate results.

CONS Blood testing requires a blood-ketone meter (which costs roughly $30) and some blood ketone measuring strips (anywhere from $1 to $3 per strip. Perhaps the biggest con, though, is patients may not like the finger poke

There are now several blood/glucose monitors (both available on Amazon):

- **Precision Xtra Blood Glucose & Ketone Monitoring System** from Abbott: www.abbottstore.com

- **KETO-MOJO:** www.keto-mojo.com

Breath Testing

Another popular way is to use a breath-ketone meter. Breath testing is the only way to measure acetone in the breath. It's a pretty accurate method and the tech is pretty cool—most testers sync to a phone app.

PROS This method is painless, there's no blood and no needles, plus it's easy to do and you can test anywhere and as many times as you want throughout the day.

CONS It can produce unreliable results, because although blood ketone and breath ketone levels usually match up well, sometimes they don't. So it's not as accurate as blood testing. You may not want to or be able to blow into the unit for the required 10 to 30 seconds. It's also more expensive than the other methods: the LEVL device costs about $500 and then you pay about $50 a month to calibrate the meter.

You can buy most of these on Amazon, or directly through their website:

- Ketonix - www.ketonix.com (this is the one I have, it's cheaper to buy and operate)
- LEVL – www.levlnow.com

Ketogenic Plateau Breaking Ideas:

Here are some quick tips for overcoming a plateau (these are also in the Patient Guide):

- **Track carbohydrates**. People tend to let carbohydrates creep up after they stop tracking. Sometimes one needs to adjust their carbohydrate intake down. If they eat carbohydrates, even a little bit, they may stop the weight loss process for up to three days. This means they will come out of ketosis (fat-burning) and may even gain back several pounds of water weight.
- **Use a tracking tool/app.** MyFitnessPal or another calorie/macronutrient tracking app is helpful for them to see if they're eating too many carbs, too little protein. Often, patients are strict at the beginning, then aren't as diligent at entering "all" of the food and drink they consume.
- **More Water**. Make sure one is drinking enough water, at least 64oz a day.
- **Too many calories**. Being on a ketogenic diet doesn't allow eating more calories than are required.
- **Too little protein**. Sometimes patients lower their protein thinking it will help them lose weight, this often has the reverse effect; gaining or having a plateau. It's especially important the protein is higher for those who exercise.
- **Too much protein**. A higher intake might make it difficult to get into ketosis because protein contains glucogenic amino acids (e.g., alanine) that theoretically could be

utilized to make glucose when needed (and stored as fat).

- **Change exercise patterns**. If they are exercising hard three times a week for an hour each time, have them switch it up (cardio, resistance, HITT, yoga).
- **Incorporate mini-fasts**. If not doing an intermittent fast, have them do a 16 or 18-hour fast. Sometimes a 24-hour fast helps (don't eat from dinner to dinner).
- **MCT Oil Powder may contain sugar**. Some MCT Oil powders on the market are mixed with maltodextrin (derived from starch and absorbed like glucose) and therefore could trigger glucose production.

Keep in mind that sometimes the number on the scale don't always tell you what's really going on inside. If your patient loses 2 pounds of fat and gains 2 pounds of muscle, then it may not look like they have lost any weight, but they are losing fat and gaining muscle, which is exactly what you want.

The Clean Start Weight Loss® Program

There are two phases to the Clean Start Weight Loss® program. The first phase is the weight loss phase, where we get your patient into ketosis by changing their diet by consuming low-carb, higher-fat, moderate-protein foods. As well, daily intermittent fasting will not only help them get into ketosis and stay there, but start reducing their insulin resistance, and increase your metabolism.

The entire two-phase program is meant to be very easy. It is critical that they understand what a sugar is and what is starch. Refined carbohydrates are one of the biggest causes of weight gain. They prevent your body from accessing its fat stores, and your body loves to store these calories as more fat. They can review the food lists of appropriate low-carb foods for the Clean Start Weight Loss® program, in the Clean Start Weight Loss® Foods section.

The length of the first phase is dependent on how much weight they want to lose, and how long they've been overweight. They should discuss realistic weight loss goals with you.

Some people lose 2-3lbs a week, others 4-5lbs/week. This is different for every person, and one of the biggest factors is how long they've been on yo-yo diets, been insulin resistant (almost everyone is), and how long they've been overweight. As mentioned in the Insulin section, the longer they are obese, the more insulin resistance they have. Some patients don't lose any weight for a month, but their insulin resistance is slowly lowered, and then all of a sudden, they see the pounds drop. We also want them to get into an exercise routine during this first phase. The first phase is typically between 30-90 days.

The second phase is all about maintaining their new set weight. The good news is that they can start to have the occasional carbs (hey birthdays, holidays happen!) without packing on the pounds. Your daily Total Carbohydrate limit will be raised to 50g. In this phase, they can also start to see how many carbs a day they need to maintain their weight. Experiment with adding 10 grams a day and try and find the number where they start to gain. Now they know their limit! If they have been in ketosis, they may choose to cycle in and out. In the first phase, if they cheated and got kicked out of ketosis, it may take they 2-5 days to get back in, but now that they've been in ketosis for a minimum of a solid month, it can be as quick as a day. The tools they learnt in phase 1: eating keto, exercising regularly, and intermittent fasting will come in handy for keeping the weight off.

A very important part of the entire program is tracking everything they eat with a food tracking app (i.e. MyFitnessPal, Chronometer, etc..). Studies show those who track their food have better success keeping the weight off than those who don't, as well, these apps make it easy for they to track macronutrients (carbs, fat, protein).

Another important part of the program is to consistently do at least 20 minutes of exercise every day. This does not mean they must go out and run hard daily. It can simply be a brisk twenty-minute walk. If they can do more, do it! They will see the best long-term weight loss results if they can move up to one hour of exercise a day. Remember, its ok for them to mix it up, do cardio (walking, biking, running) one day, and alternate with strength training exercises (see the exercise section in the book with the details). It is also important to do their exercise routine at that same time every day, as this will help solidify it into a habit.

There are other factors that affect insulin and weight loss such as sleep deprivation and stress (cortisol effect). They should have at least 6, and preferably 8 hours of sleep every night.

Reducing stress is difficult, but vitally important. Contrary to popular belief, sitting in front of the television or computer is a poor way to relieve stress. Instead, stress relief is an active process. There are many time-tested methods of stress relief, including mindfulness meditation, yoga, journaling, massage therapy and exercise. Studies on mindfulness intervention found that participants were able to use yoga, guided meditations and group discussion to successfully reduce cortisol and abdominal fat.[25] There are apps like Calm and Headspace that can help with creating a meditation routine.

Regular exercise is an excellent way to relieve stress and lower cortisol levels. Exercise can also release endorphins and improve mood. This benefit far exceeds the relatively modest caloric reduction achieved by exercise.

Phase 1 – Clean Start Weight Loss®

Here they are going to combine intermittent fasting with the keto diet. Please note, we have found combining the two at the beginning gets people into ketosis the quickest, but it's not necessary. If they prefer to start intermittent fasting first, then start a ketogenic diet a week or two after, that is fine (or vice versa).

Your patient's daily allotment of carbs will be 25 grams (of "total" carbs, NOT "net"), and protein will be between 0.5 to 0.8 times your weight (in pounds) in grams per day. They are going to eat real foods, nothing processed, and eat them only within the eating window and when they are hungry. They are also going to avoid all added sugars, and snacking.

If they like to count calories, they can, but remember as we mentioned earlier "calorie is not a calorie." Their daily calorie intake will probably be at least 200 calories below what they need to maintain their weight and should fall somewhere between 1,400 (female) and 1,900 (men) calories/day. You may need to work with your patient to find the right daily calories for them.

Intermittent Fasting:

They will practice intermittent fasting throughout Phase 1. For the first week they should follow the 16:8 fast (fast for 16 hours, eat in an 8-hour window). Then they will move to the 18:6 fasting protocol (fast for 18 hours, eat in a 6-hour window).

An example of a 16:8 schedule is as follows:

In the morning, they will continue the overnight fast by sticking to water, plain coffee, or plain tea. At 11 a.m., they eat their first meal; they are free to choose "breakfast" or "lunch" foods, just make sure they get some protein in to help promote satiety. Dinner should be finished by 7 p.m., and no other food or caloric drink should be consumed before bed. From 7 p.m. to 11 a.m. would be their fasting window, and their eating window would be 11 a.m. to 7 p.m. The eating window may be moved earlier or later in the day to accommodate your schedule.

18:6 hour fast:

After the first week, they will move to a six-hour eating window. As with the 16:8 fast, they will continue the overnight fast in the morning—and perhaps through the early afternoon. The precise hours of their eating window may vary; they can tailor its location in the day to with their work or other schedule. For example, let's assume they have an eating window of 1–7 pm. They would continue their fast until 1pm, when they will eat your first meal, followed by dinner around 6 or 6:30. Do not eat after 7 pm.

What can they drink during their fast?

Anything non-caloric, with no artificial sweeteners.

- **Water.** Still, sparkling, mineral are all good choices. Water is critical for both the ketogenic diet and intermittent fasting. They should aim to drink at least 64oz of water every day. As soon as they wake up, they should have an 8oz glass. Staying hydrated helps prevent hunger (drinking a glass of water prior to a meal may also reduce hunger and help prevent overeating). If their stomach is growling, try drinking mineral water!
- **Coffee** (can add a tablespoon of heavy cream), but sugar, artificial sweeteners or flavors are not allowed. Can be hot or iced.
- **Tea** (black/green/herbal/oolong). Hot or iced.
- Some people like drinking a cup of **bone broth**, homemade is best, since many store-bought versions have added sugars and starches. Vegetable broth is an alternative, but add salt.
- **Chia seeds**: Chia seeds are high in soluble fiber and omega-3 fatty acids. These seeds absorb water and form a gel when soaked in liquid for thirty minutes, which may aid in appetite suppression. They can be eaten dry or made into a gel or pudding. These

may be taken during a fast to help suppress hunger. Once again, while technically breaking the fast, the effect is so slight that it does not significantly detract from the benefits of the fast.[17]

If they experience dizziness during the fast, most likely, they are becoming dehydrated. Preventing this requires both salt and water. Be sure they drink plenty of fluids, and in case they're low on salt, add extra sea salt to homemade bone broth or mineral water. Another possibility is that their blood pressure is too low—particularly if they are taking medications for hypertension.

It may be too much to eat a big meal as their first meal after they fast, so they can have a snack or small dish to start, then wait for thirty to sixty minutes before eating their main meal.

If they experience hunger, have them drink more water. Hunger does not persist but instead comes in waves, so tell them to hang on, it will pass. Staying busy during a fast day is often helpful for your patients.

Many patients find that they have more energy during a fast—probably due to increased adrenalin. Basal metabolism does not fall during fasting but rises instead. They'll find they can perform all the normal activities of daily living. Persistent fatigue is not a normal part of fasting. If they experience excessive fatigue, they should stop fasting immediately and contact you

Helpful Tips for your Patients - Top 9 Fasting Tips

(We also put these in the patient guidebook, but it may be helpful to remind them!)

1. Drink water: Start each morning with a full eight-ounce glass of water. It will help you start your day hydrated and set the tone for drinking plenty of fluids throughout the day.
2. Stay busy: It'll keep your mind off food. Try fasting on a busy workday. You may be too busy to remember to be hungry.
3. Drink coffee: Coffee is a mild appetite suppressant. There's also some evidence that green tea may suppress appetite. Black tea and homemade bone broth may also help control appetite. Do not add MCT oil to your coffee during the fast, it has calories and could break your fast.
4. Ride the waves: Hunger comes in waves; it is not constant. When it hits, slowly drink a glass of water or a hot cup of coffee. Often by the time they've finished, your hunger will have passed.
5. Don't tell people you are fasting: Most people will try to discourage you simply because they don't understand the benefits of fasting. A close-knit support group of people who are also fasting is often beneficial, but telling everybody you know is not a good idea.
6. Give yourself one month: It takes time for your body to get used to fasting. The first few times you fast will be difficult, so be prepared. Don't be discouraged. It gets

easier.

7. Follow a nutritious diet on non-fasting days: Intermittent fasting is not an excuse to eat whatever you like. During non-fasting days, stick to a nutritious diet low in sugar and refined carbohydrates. Following a low-carbohydrate diet that's high in healthy fats can also help your body stay in fat-burning mode and make fasting easier.
8. Don't binge: After your fast, pretend it never happened. Eat normally (and nutritiously—see #7), as if you had never fasted.
9. Fit fasting into your own life: This is the most important tip I can offer, and it has the greatest impact on whether you stick to your fasting regimen. Do not change your life to fit your fasting schedule—change your fasting schedule to fit your life. There will be times during which it's impossible to fast, such as vacations, holidays, and weddings. Do not try to force fasting into these celebrations. Afterwards, you can simply increase your fasting to compensate. Or just resume your regular fasting schedule. [22]

Ketogenic Diet

There are many ways to over-complicate a ketogenic diet. You have enough to think about, and we don't want to cause any unnecessary stress, so we are going to keep it simple.

- Don't eat more than 25 grams of "total" carbs per day
- Eat 0.5 grams of protein x your body weight if you don't exercise (e.g. if you weigh 150lbs, you would consume 75g of protein per day). Eat 0.8 grams of protein x body weight if you do exercise (e.g. if you weigh 150lbs, you would consume 120g of protein per day).
- Choose foods found in the "Clean Start Weight Loss® Foods" section.
- Don't eat any added sugars or starches (e.g. sweets, bread, rice, pasta, potatoes), or drink alcohol.

Phase 1 At-A-Glance (from the Patient Guidebook)

- Stick to your fast.
- Don't eat more than 25 grams of "total" carbs per day
- Eat 0.5 grams of protein x your body weight if you don't exercise and 0.5 grams of protein x your body weight if you do exercise.
- Eat proteins, low-carb vegetables, and healthy fats.
- Don't eat any sugars or starches (e.g. sweets, bread, rice, pasta, potatoes).
- No alcohol.
- Limit fruit (the occasional ½ cup serving of berries is ok)
- Weigh yourself every morning.
- Commit to 20–30 minutes of exercise, 5 times a week.
- Make sure the last thing you eat is more than 3hrs before you go to bed.

Clean Start Weight Loss® Phase 2: Maintenance

When they have achieved their desired weight loss with Phase 1, it's time for the maintenance phase. They can now increase their "total" carbohydrates to 50 grams a day.

Given the health benefits of fasting, they should continue the daily fast or modify it. Now that they know they can do an 18-hr fast with no problem, they may want to extend it to a 24-hr or 30-hr intermittent fast.

Adding fiber and healthy fats to their diet is the best way to achieve maintenance. If they decide not to continue fasting, eating another protein-based meal (breakfast) may be all they need to reach maintenance.

They can SLOWLY add some sugar and starch into their menu. It is always better to avoid white enriched flour; try to choose whole grains instead.

They can also experiment with increasing their daily carbs even higher, to find their specific carb limit. Some people can eat up to 100g of carbs a day, and stay in ketosis, for others its 40g or 50g a day. It is really dependent on their history, the longer they've been overweight and/or are insulin resistant, the less carbs they can eat. The good news is that the longer they stay in ketosis, the better their metabolism will get, thus allowing they to eventually eat more carbs!

Every other day or so, they can choose one carbohydrate (starch) to incorporate into their diet and weigh themselves the next morning to see how their body reacted. For example, eat half a

baked potato one day and see how their body reacts. Next time try some lentils or beans. What they want to do is find the foods that their body is sensitive to, so they can avoid or plan for those foods. If they find they gain weight when they eat pasta, they may want to ensure the rest of that day's meals are low carb and avoid alcohol.

The longer they maintain their target weight, the more likely their body will reset to that weight. They should try and maintain a consistent daily caloric intake. Tell them not go crazy on the weekends and cut back during the week, as this will not "set" their new weight and can take them 3-5 days to get back into ketosis.

You may need to remind them the body always wants to stay at a certain weight, and any deviation above or below that weight triggers adaptive mechanisms to get us to return to that weight. That's why, after weight loss, we become hungrier and our metabolism relentlessly slows, so that we have to eat even less just to maintain our lower weight. That's the body trying to get us to gain weight to get us back to our set weight.

Alcohol in Phase 2

Here is the good news for many, yes, they can have alcohol in phase 2! However, this is not a license to go crazy, and if they have more weight to lose, they may want to keep their alcohol detox going.

The good news is the moderate consumption of red wine does not raise insulin or impair insulin sensitivity, and therefore may be enjoyed.[28] Up to two glasses a day is not associated with major weight gain[29] and may improve insulin sensitivity.[30] The alcohol itself, even from beer, seems to have minimal effects on insulin secretion or insulin resistance. Keep in mind that alcohol consumption affects people differently, and they may find if they drink wine and/or another alcohol, they will gain weight.

It's best to stick with zero carb alcohols like: whiskey, rye, bourbon, scotch, gin, tequila, brandy*, rum* and vodka. Check their brand of alcohol to make sure it's truly carb-free. They can combine these alcohols with zero carb mixers, like soda water.

* Some versions of alcohols do have some carbs (e.g. Courvoisier brandy has 0 carbs, but Hennessy has 1g of carbs).

Phase 2 Guidelines (from Patient Guidebook):

- Increase daily "total" carbs to 50g.
- Add fiber and fat or a protein breakfast to achieve maintenance.
- Slowly add higher carbohydrates vegetables and fruits into their diet, if desired. (Never too much at once! The idea is to maintain a reduced-carb lifestyle.)
- Weigh themselves every morning.
- Keep the intermittent fasting going.
- Commit to 30–40 minutes of moderate exercise, 5 times a week.
- Alcohol can be added in moderation.
- Make sure the last thing they eat is more than 3hrs before they go to bed.

Ketogenic Supplements

There are some supplements that may assist your patients with getting into ketosis more quickly, and staying there. MCT oil (Medium-chain triglycerides) is a popular supplement, and now exogenous ketones, like ketone salts and esters are becoming more popular However, they are not the same!

Medium-chain triglycerides are not the same as exogenous ketones; you would likely need 20-plus grams of MCTs to get even a small bump (0.3 mmol/L) in blood ketone levels. Ketone salts are typically bound to mineral salts, such as sodium, calcium, and magnesium, while ketone esters (which are mostly liquid) are bound to either glycerol or 1,3 BD. Ketone salts are cheaper and more palatable than ketone esters, and there is ongoing research investigating their effects on multiple variables.

MCTs are broken down in the liver, with ketones being the by-products of that breakdown process. Exogenous ketones, on the other hand, don't need to be broken down because they are ketones already.

MCT Oil

MCT oil is a fairly common keto supplement because medium-chain triglycerides (MCTs) go straight to the liver for energy or turned into ketones. MCT oils help improve cholesterol levels and may help block the rise of ghrelin (the appetite-stimulating hormone that typically rises in people who go on diets). Also, MCT oils help combat constipation and are a great way to kick-start ketosis.

Patients like to add MCTs to their diet for an "energy boost," and to help them get into ketosis quicker. MCT oils help you lose weight because they boost levels of the satiety hormone, leptin,

preventing you from overeating. Studies show that it helps to rid you of pesky fat around the midsection, which is the worst type of fat for your health, and it helps boost gut-friendly bacteria, which are also crucial for maintaining a healthy weight. Finally, it's a great fuel for your brain so it can keep you focused on your goals during your intense workouts. Generally, most people will use 1 or 2 tablespoons of MCT oil before a workout to help improve their energy[24] .

You can add MCT oil to your coffee, tea, salad, in any food after it has been cooked as a dressing. Do not cook with MCT oil, it's better to cook with coconut or avocado oil.

Note a few things, though: your body already activates an energy supply just before you wake up, putting fat in your coffee will break your fast. Since MCT oil has a high number of calories, it is not a good idea to take it during your fast. MCT supplements can also cause digestive upset if not started gradually, so start with a teaspoon at a time and work your way up. MCT oils are available in both liquid and powdered form. However, often MCT powders are mixed with maltodextrin (derived from starch and absorbed like glucose) and therefore could have some effects on glucose, so be careful on what you choose. Look for an MCT powder that is bound to soluble corn fiber rather than maltodextrin to get the best effects and to incorporate a combination of C8, C6, C10, and even C12 into your diet.

If you want to try for extra energy with MCTs, cold-pressed virgin coconut oil is a natural source, but make sure you don't heat it too much—it is delicate and will oxidize easily, damaging its healthy properties.

MCTs do not require enzymes to break them down, so they are rapidly absorbed and delivered. This rapid introduction of fat can overwhelm our bodies and leave our stomachs in distress, which might result in a sprint to the restroom. Over time, the body can adapt and eventually build up a tolerance; however, we suggest that if you want to try MCT oil, you build up your intake slowly.

The effective dose of MCTs needed to enhance ketone production. To elevate ketone levels from zero to around 0.3 mmol/L using MCTs only, research indicates that you would need to consume 20 to 100 grams or more, which could be challenging due to the gastric distress you might experience if you consumed such a large amount (Van Wymelbeke et al., 1998; Freund and Weinsier, 1966; Courchesne-Loyer et al., 2013; Bergen et al., 1966).

Patients should not rely on MCTs alone to elevate their blood ketone levels, but it's certainly helpful to ensure enough fat is being consumed while on the ketogenic diet.

A more effective, and quicker acting way to boost ketone levels to higher, therapeutic levels, exogenous ketone supplementation.

MCT supplementation has been shown to increase metabolism in the short term (St-Onge et al., 2003), raise blood ketones (Van Wymelbeke et al., 1998), and enhance fat loss (Tsuji et al., 2001).

Exogenous Ketones: Ketone Salts & Esters

NOTE: We don't include a section on "exogenous ketones" in the patient guidebook. This is for your information. It is your decision if you decide to incorporate exogenous ketones into their program.

Ketone salts are cheaper and more palatable than ketone esters (esters have a sharp, bitter taste). They can raise blood ketone levels quickly and sustain that elevation for a short time.

Both ketone esters and ketone salts have GRAS (Generally Recognized as Safe) approval at various doses. The biggest safety concerns with ketone salts are the mineral load and possible impurities. However, the mineral load needs to be taken in the context of a well-formulated diet, one's degree of physical activity, etc.

Ketone salts are white powdered substances that are becoming more available. They consist of a BHB molecule bound to a mineral salt, such as sodium, calcium, magnesium, or potassium

It is important to be aware of the mineral loads of these supplements and factor them into one's daily intake. Some people who are being treated for various conditions need to pay particular attention to this to avoid excess consumption of certain minerals.

Ketone esters have been developed. Ketone esters are salt-free liquids that exist in monoester (one), diester (two), and even triester (three) form. This means that instead of the ketone molecule being bound to a mineral, as is the case with ketone salts, the ketone molecule is bound to a different substance via an ester.

Any short-term effects of exogenous ketones (for example, on insulin secretion, free fatty acids, and lipolysis) don't always lead to long-term effects, especially when it comes to body composition and optimal health. And even if exogenous ketones do have an effect on insulin, that effect would likely be comparable to what's seen after drinking a protein shake, which means that it is likely negligible and wouldn't have long-term negative effects on fat storage or breakdown.[26]

Glossary of Ketogenic & IF Terms:

Autophagy – the method the body uses to remove and replace old, defective, and damaged protein cells; happens during fasting, with a 3-fold increase in autophagosomes (the cellular bodies that do the work) at 36 hours fasted.

Carbohydrates – the macronutrient comprised of sugar, starch, and fiber, both soluble and insoluble.

Gluconeogenesis – the process by which the body turns protein into glucose, used to provide energy to key tissues that must use glucose—even during fasting or starvation.

Glucose – sugar molecules that are released into your bloodstream for energy use.

Glycogen – the form that glucose takes during its short-term storage in the liver and muscles.

Insulin – the storage hormone, released in the bloodstream after carbohydrate consumption to remove glucose from the blood; its presence in the blood prevents fat stores from being accessible.

Intermittent fasting (IF) – fasting intervals combined with eating intervals.

Keto flu – a collection of flu-like symptoms that come largely from a combination of electrolyte loss and dehydration.

Ketones – a clean-burning form of energy created from fat during fasting or ketogenic eating.

Ketosis – a metabolic state that is entered during fasting or ketogenic eating, called so for the ketone acids, or ketones, that are created as special fuel during these times.

ROSs – reactive oxygen species that lead to oxidative stress (damage) to DNA, protein, and other cells; formed during glucose metabolism but not ketone production/use.

Starch – chains of glucose bonded together; effectively glucose.

Sugar – in its basic forms: glucose, fructose, lactose, etc.; compound forms are numerous; see Other Names of Sugar, page 16.

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