



## How Do Ketones Work and What is Their Benefits

- *Is Nutrient and Energy Dense*
- *Increases TCA Cycle Efficiency and ATP Production*
- *Does Not Contain Insulinogenic Compounds*
- *Will Not Promote Lipogenesis*
- *Promotes High Nitrogen Retention Protein Synthesis*
- *Provides Elevated and Sustained High Energy Ketones*
- *Promotes Sustained Energetics*
- *Increases Lipolysis for Energy Substrate Utilization*
- *Promotes Thermogenesis*
- *Provides Neuroprotection & Increase brain activity*
- *Promotes Triglyceride Reduction*
- *Promotes Enhanced Neurological Efficiency*
- *Helps Reduce Blood pressure*
- *Promotes Re-balancing of Yeast in Gut (candida)*

Medium chain triglycerides are rapidly metabolized by the portal vein, providing immediate energy. Longer chained fatty acids are absorbed by the lymphatic system, thus requiring a longer metabolic process. This is why individuals with digestive disorders are often given MCTs – they don't take long to be "broken down" and converted to energy like other foods and dietary supplements.

Thus they are considered a great source of energy that is efficiently metabolized by the body. Additionally they provide the brain with ketone bodies as a source of energy. Both glucose and ketones provide the brain with energy that it needs to properly function, but most people don't give their brain sufficient ketones. These ketones can have a restorative effect on the brain and tend to not only boost mental energy, but enhance cognitive function.

### WHAT IS KETO-OS?

Keto-OS is your "ketone operating system" it is the First Therapeutic Ketone Supplement on the market. The proprietary blend is owned by Prüvit and is Dr.Approved, Lab Tested, University backed and the technology in Keto-OS is patent pending, developed by one of the most world renown Dr.'s and experts on Ketosis. Prüvit was the first company approved by University of South Florida to acquire the sublicense rights to use this patent pending technology. It is a powder that you mix with 8-10 oz. of water. Within 15-30 minutes it puts your body into Ketosis. Prüvit owns the worldwide rights to Keto-OS. Keto-OS has a certificate of analysis for purity, consistence and efficacy.

### WHAT ARE THE BENEFITS OF KETO-OS & KETONES?

The benefits of ketones, and ketone supplementation are vast, and as research continues to expand, the list keeps growing. Currently, research support the use of ketones for the following benefits: • Weight loss • Blood sugar balance and enhanced insulin sensitivity • Increase satiety, and decreased food cravings • Improved energy levels, oxygen capacity, motor performance & athletic performance • Mostly

due to the impact of ketones on enhanced blood flow, through vasodilation • Migraine treatment • Neuro-protective benefits in seizure disorders; ADHD; Alzheimer 's disease, memory and cognitive function; Parkinson's Disease and Multiple Sclerosis • Autism and improved behaviour and social impacts • Mood stabilization in bipolar disorder (type II) • Stroke prevention; cardiovascular disease; metabolic syndrome management; improved cholesterol levels • Inflammation management • Endurance enhancement.

### **DOES KETO-OS HAVE ANY SIDE AFFECTS?**

Supplementing with **Keto-OS** or following a ketogenic diet can cause a slightly diuretic effect, and can deplete magnesium, potassium and sodium stores. This can be rectified by supplementing with a good electrolyte or increasing the sodium in your diet. However **Keto-OS** adds additional sodium to the formulation to counter-act this sodium depletion. **Keto-OS** is blended with medium chain triglycerides, which can often times cause digestive distress. This is due to the fact that your body has not yet adapted to the increased fats in your diet, and is less efficient at utilizing ketones as its fuel source. Once the body has adapted to this increased fat in the diet, the digestive distress should resolve. We recommend to start slowly and build up to a full serving twice a day, but it is totally up to the individual.

### **WHY WOULD I TAKE KETO-OS?**

Supplementing with exogenous ketones allows you to experience ketosis - the benefits of elevated blood ketone levels, without having to follow such a restrictive ketogenic diet, or super low carb diet, which is often difficult for some people to adhere to. Optimize your human potential.

### **WHAT KIND OF DIET SHOULD I FOLLOW WHEN I'M TAKING KETO-OS?**

The wonderful thing about taking exogenous ketones via **Keto-OS** is that you can experience the benefits of ketones without diet modification. Even those who don't change a thing, will still experience the benefits. However, it is encouraged that you slowly begin to follow a lower carbohydrate diet, and enhance your body's ability to utilize. Follow the 8 steps in the N8tive OS-Zone to get you on the right track. [www.justpruvit.com/n8tive-zone](http://www.justpruvit.com/n8tive-zone).

### **WHY IS THERE SODIUM IN KETO-OS?**

**Keto-OS** was formulated with a higher salt concentration in order to counter balance the sodium that is lost through ketone supplementation. It also acts as a slight buffer, since ketones can be a bit acidic. When taking exogenous ketones, it is often encouraged that you increase your salt intake, with **Keto-OS**, the additional sodium is provided for you.

### **CAN CHILDREN TAKE KETO-OS?**

Yes, children can also take **Keto-OS**, however the dose would have to be adjusted for the age/weight of the child.

### **How long before KETO OS provides benefits?**

Many people have reported that they noticed cognitive improvement after just a single teaspoon.

### **HOW DOES KETO-OS AFFECT INSULIN UTILIZATION AND SENSITIVITY?**

Keto-OS can enhance insulin sensitivity. In preclinical studies, exogenous ketones have been shown to do this. Richard Veech (scientist at the NIH) showed that feeding exogenous ketone supplements lowers blood glucose while simultaneously lowering blood insulin “research has demonstrated “ If more glucose is removed from the blood with less insulin that suggests that insulin sensitivity has been enhanced. We are experiencing this from testimonies of **Keto-OS**. As with any medical condition we recommend you consult with your physician.

### **HOW DOES KETO-OS AFFECT KIDNEYS AND LIVER AND THE ROLE IN METABOLIZING KETONES?**

As with all medium chain triglycerides, the MCT powder portion of the product will largely be converted to ketones by the liver within a few short hours of consumption. MCT create a readily supply of Ketone production for the liver to use for ketones. The BHB-salt portion should simply be absorbed into the blood as ketones. The BHB supplies another source, which doesn't require the liver to produce ketones. There is no reason that the ketones produced by the product will affect the kidneys or liver any differently than ketones produced from exogenous fats (such as when eating a ketogenic diet) or ketones produced from stored fats (such as when calorie restricting or losing weight). Exogenous ketone scientific literature does not suggest that neither the kidney nor liver function is negatively affected by ketosis. The major role of the kidneys when it comes to ketones is to excrete excess ketones in the urine. This excretion will likely be highest during the first few days of keto-adaptation (either in eating the keto diet or consuming Keto-OS), but the body will retain more and the tissues will begin to preferentially burn the ketones as consumption continues. The liver is the major site of endogenous ketone production, so taking exogenous ketones with **Keto-OS** would provide another source besides the liver to make ketones. Remember, **Keto-OS** and exogenous ketones are a source of calories; so be sure to consider it in your daily goals. **Keto-OS** and exogenous ketone supplementation is not hard on the liver.

### **DOES KETO-OS POSITIVELY INFLUENCE ADRENAL STRESS AND THE HPA AXIS?**

Seeing how ketosis induced by the ketogenic diet affects these things. It is likely the ketosis induced by **Keto-OS** would elicit similar effects, but not perhaps exactly the same. Cortisol is a hormone produced by the adrenal glands that is tightly correlated with metabolic syndrome. Patients with metabolic syndrome have elevated blood cortisol levels which appear to be due to dysregulated cortisol metabolism. (Cortisol can be produced, cleared, or regenerated enzymatically, and abnormalities in any of these steps can cause cortisol dysfunction). In obese patients, cortisol clearance is increased and

cortisol regeneration is reduced, causing an elevation in blood cortisol, which is linked to metabolic syndrome (obesity, hyperlipidemia, insulin resistance, hypertension, etc). In a study in obese men (Link: <http://press.endocrine.org/doi/pdf/10.1210/jc.2007-0692>), Ketosis reversed the dysregulated cortisol metabolism, decreasing cortisol clearance and increasing cortisol regeneration. This too resulted in an overall increase in blood cortisol; however, importantly, it was due to the reversal of the dysregulated cortisol metabolism observed in patients with metabolic syndrome. (This is important because sometimes the increase in cortisol which occurs with Ketosis is used as a weapon for attacking the diet, but those who argue this point are majorly oversimplifying the situation and must not be aware of the intricacies of cortisol metabolism which affect metabolic health.) In this study, the changes in cortisol metabolism induced by Ketosis accompanied improvement in the symptoms of metabolic syndrome (improved weight loss, improved fasting glucose/insulin levels), suggesting that Ketosis alters cortisol metabolism and adrenal function in a way, which confers improvements in metabolic health. We are finding this to be true with the experiences **Keto-OS** customers are having as well.

### **DOES KETO-OS HAVE ANY DELETERIOUS EFFECTS ON THE BRAIN AND NERVOUS SYSTEM WITH LONG TERM USE?**

**Keto-OS** is a source of ketones. Ketones are an efficient energy substrate for the brain. The scientific evidence does not suggest that therapeutic levels of ketosis are damaging to the brain or nervous system over a long period of time. In contrast, conditions such as the ketogenic diet and calorie restriction, which are characterized with an elevation in blood ketones, confer many neuroprotective effects. (See this article: <http://www.ncbi.nlm.nih.gov/pubmed/18845187>,. Many studies suggest the neuroprotective effects due to ketone metabolism. Thus, it is likely that exogenous ketones that **Keto-OS** delivers would have similar effects. It may even prevent neurodegeneration, as impaired glucose metabolism often accompanies the development of dementia such as in Alzheimer's disease. Providing another energy source to the brain in these circumstances could be very protective. There is ongoing research on this topic. Pruvit is aggressively funding University Research on this with them using **Keto-OS**.

### **TOO MANY KETONES CAN CAUSE KETOACIDOSIS, WHICH IS VERY DANGEROUS. CAN THIS PRODUCT CREATE KETOACIDOSIS?**

Ketosis is NOT diabetic ketoacidosis, which is a serious complication of uncontrolled diabetes that occurs when your body produces high levels of blood acids called ketones in conjunction with high levels of glucose. You can consider comparing therapeutic ketosis to ketoacidosis to be like comparing a fireplace to a house fire. Fire is a great and useful thing when controlled and in the proper situations, but it also has the potential to become very dangerous if not used properly. Ketones are extremely therapeutic and beneficial when in a certain blood level, but are very dangerous at extremely high levels. In therapeutic ketosis, total blood ketones are in the 0.5-5mM range while in ketoacidosis, blood ketones

are typically  $>20\text{mM}$ . This is a huge difference. There is no reason to be scared of elevating blood ketones to the levels seen in therapeutic ketosis, but rather this level of ketosis is associated with many health benefits (improvements in metabolic health, weight loss, neuroprotection, etc). Until very recently, the only way you could receive the many benefits of ketones would be consuming a calorie restricted or carbohydrate restricted ketogenic diet. The benefit of exogenous ketones with **Keto-OS** the First of its kind that is exclusive worldwide with the Pruvit product is that since you are consuming (at least in the part of the BHB-salt), pure ketones, making it easier to elevate blood ketones to therapeutic levels. This also means, though, theoretically, you can elevate your blood ketones to any level depending on how much of the product is consumed. So, is it possible to elevate your blood ketones to a dangerous level with this product? Yes, technically it could be done; however, I would imagine someone would have to try very hard to do so. You would need to basically buy a lot of the product and shovel it in your mouth in a very short period of time to reach a dangerous level. Here's a really quick scenario that might help. Each packet of product is 11.8g. For even a very small adult, let's say a 100lb (45kg), a 10 g/ kg dose would be 240 packets. If we really oversimplify things and make some assumptions, let's say 40 packets would similarly elevate a 45kg person's blood to 3mM. If 20mM is the approximate dangerous level, and the dose response is pretty linear, then it would take eating about 270 packets at one time for a person to elevate their blood ketones to that level. Not likely going to happen. Even at that time they would probably not even hit those levels due to their body rejecting the consumption of that much salt (throwing up) and/or excreting through urine as well.

### **CAN A TYPE 1 OR TYPE 2 DIABETIC TAKE THIS PRODUCT?**

Let's provide a little background info (most of which you probably already know). In both T1 and T2 diabetes, patients have abnormal insulin signaling. In T1, the pancreas doesn't make enough insulin, and in T2, the body's tissues are resistant to insulin. Insulin helps transport glucose from the blood into the cells where it can be used for energy. In severely uncontrolled diabetes (typically someone not being treated for their condition and who have let it go completely out of hand), insulin signaling is wildly impaired, and an acute and life-threatening condition called ketoacidosis can occur. If a person is eating a standard diet wherein carbohydrate is a major portion of their macronutrient intake, their tissues are mostly burning glucose for fuel. Therefore, if insulin signaling is incredibly impaired, this will cause glucose to build up in the blood because it can't get into the cells. Thus, the cells are basically starving even though there's plenty of glucose in the blood. (This is sometimes referred to as "starvation in the land of plenty.") This causes the liver to begin making ketones from stored fats, just as it would if you were starving from not eating anything. Insulin also plays a role in regulating ketone production, and normally it inhibits ketone production if it's too high to keep ketones at a proper level in the blood. So, if the patient's diabetes is too severely uncontrolled, it is possible that a situation called "runaway ketogenesis" occurs. The liver makes lots and lots of ketones in a short amount of time. Ketones are acids, and when at extremely high levels (typically  $>20\text{mM}$ ), they can cause blood pH to drop, which can

be very dangerous and/or fatal. This is diabetic ketoacidosis. Is being in therapeutic ketosis itself dangerous for a diabetic? No. There is substantial scientific evidence to suggest that consuming a ketogenic diet could actually be a very good treatment for diabetes as well as exogenous ketones. Many individuals are even able to go off insulin once they switch to a ketogenic diet because it takes away the real culprit (carbs). Ketones don't require insulin to enter the cells and be used as energy. Therefore, switching the body away from glucose metabolism and towards ketone metabolism is very helpful. Glucose doesn't store up in the blood (because you're not consuming carbs), and the impaired insulin signaling isn't as important since ketones can get into the cells without it. Plus, as described before, ketones enhance insulin sensitivity. Especially in someone trying to manage their diabetes with a low carb or keto diet, thus, **Keto-OS** providing therapeutic ketone levels to the blood also provides this benefit. The only condition wherein I would expect a diabetic could potentially be harmed by taking this product as it is supposed to be taken (i.e. not 270 packets at once, haha), is if that person had extremely uncontrolled diabetes and were already in an acute diabetic ketoacidosis crisis. In that situation, no, they would not want to take the product, as it would elevate ketones further. It is almost an impossibility of this situation occurring. Someone would have to disregard their healthcare to the point of potentially entering diabetic ketoacidosis as or before purchasing or using ketone supplementation.

### **WILL KETO-OS CAUSE OR AGGRAVATE KIDNEY STONES?**

Kidney stones are a known potential side effect of the ketogenic diet. Exogenous ketone supplements are a novel technology, so it is currently unknown if it could cause a similar problem, but it is possible. Clinically, potassium citrate is used to help decrease the risk of kidney stones (See here: <http://www.webmd.com/kidney-stones/potassiumcitrate-for-kidney-stones>), including those that occur with the ketogenic diet. Potassium citrate is available commercially; however, as always, consumers should consult with their physicians before taking any supplements.

### **WILL KETO-OS CAUSE A "FALSE POSITIVE" ON A DRUG TEST?**

There are no scientific studies investigating this possibility. Thus, there is currently no objective evidence to suggest that being in ketosis, whether via the ketogenic diet nor exogenous ketone supplements, could cause a "false positive" on a drug test. This question has been posed often on online forums by users consuming a ketogenic diet concerned by such a possibility. Collectively, the responses to these questions include anecdotal reports of users who were in ketosis when drug tested and experience no such problem. Thus, it does not appear to be a matter of concern.