

## stoneharbor

There was a comment here earlier claiming that brain cells can exist purely on ketones. I could not find supporting evidence, but I did formulate an interesting reply. Unfortunately, the comment was removed by the moderators and I also lost my reply which was really quite interesting. So in the interest of the discussion about the benefits of ketones to the brain, I will build a new comment here. I found, quite interestingly, that brain tissue at times of stress or damage as in Traumatic Brain Injury (TBI), turns on pathways and increases enzymes that increase the use of ketone bodies (KB) in preference to glucose. [neuro.psychiatryonline.org/doi/10.1176/appi.neuropsych.20230017](https://neuro.psychiatryonline.org/doi/10.1176/appi.neuropsych.20230017) In this study I found: "TBI is linked to a significant increase (85%) in the number of monocarboxylate transporter channels that facilitate the transport of KBs into neurons and is accompanied by a surge of -hydroxybutyrate-metabolizing enzymes in these cells (1922).

These findings suggest that upon injury, the brain shifts to the energetic pathway involving the metabolism of KBs (2). In line with this concept, the -hydroxybutyrate components of KBs have two well-known neuroprotective properties: supporting the biochemical reconstruction of the respiratory chain and providing at least some energy from KB metabolism when the first complex of the respiratory chain via ATP-sensitive potassium channels is disrupted (21, 22)." Now brain cells are long lived, and hard to replace, but repair is still possible.

This is quite different to muscle cells where repair and replacement are frequent. So this brain feature to focus on ketones for rebuilding is much like the muscle cell rebuilding that is brought on by Intermittent fasting where higher levels of ketone utilization just nightly, routinely signals mitochondria to multiply and rebuild. In brain cells, the need is sensed first, then ketones are called for. In muscle cells, the periodic use of ketones signal the rebuild process.

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## Hippocrates460

Our cells are quite adept at gluconeogenesis including glial cells supporting neurons, thus 'brain cells' are able to source what they need to function well. Our bodies are geared towards generating needed fuels, consider prodigious liver-based gluconeogenesis is well known by many as a very active process and also the kidneys are very active in this role of supplying the body, as are other tissues but the liver and kidneys especially so. This metabolic resiliency evolved over many millions of years and was further refined during human evolution as apex hunters.

As for Frank Llosa, years ago I caught a Dave Asprey interview of ketone researcher and physician Dr Richard Veech in which Llosa was in the background as he's closely connected to Veech through Frank's wife as a family-type connection. Veech worked in Krebs' lab in Europe many decades ago and was keen to influence powerful folks in government to get exogenous ketones made on a massive scale to be readily available for people with Parkinson's and other disorders.

In the interview it was revealed that Llosa is a long time vegan and seemed obsessed with maintaining very high ketone levels (around 8) with his vegan diet (and considerable deprivation?), however, Llosa already appeared to be pale and perhaps sarcopenic. Compare this approach to Dr Shawn Baker's carnivore diet and IMHO it's clear what's happening as a stark contrast in a natural health approach vs extreme biohacking with a vegan diet exacerbating the situation.

Stoneharbor, you made good points here and in other comments on this thread. The incredibly powerful effects of ketones and ruminant-animal-based-diets for healing shouldn't be overlooked. Just this past week I caught yet another interview by Baker of a stunning example of this. It was a young woman with severe arthritis since childhood and bowel disease. Doctors had given up on her only offering to remove her colon saying she wouldn't live to age 30 and now she's absolutely thriving.

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## Guillermou

Articles on carbohydrate and fat metabolism provide a great window into normal diet and disease. Ketones have been shown to sensitize such tumor cells to oxidative stress induced by additional therapy, while normal cells are left unaltered, showing extended survival in therapies that induce oxidative stress such as chemotherapy and radiotherapy. The experiments Ketone bodies have activity against ionizing radiation that produces oxidative stress and damage to DNA and RNA. Reactive oxygen and nitrogen species, ROS and RNS, are ubiquitous in living cells, they are the cause of a wide variety of diseases.

A new ester of D-beta-hydroxybutyrate-R-1,3-butanediol, which is rapidly hydrolyzed to ketone bodies, the metabolism of which leads to the production of NADPH. Ketone bodies also act by inhibiting histone deacetylases, activating the transcription factor FOXO3, and increasing the transcription of enzymes involved in the destruction of ROS. It has been discovered that ketone esters can be used to reduce tissue damage if administered before or after radiation exposure. Specifically, the invention relates to esters and oligomers of (R)-3-hydroxybutyrate that are capable of raising blood levels of (R)-3-hydroxybutyrate and acetoacetate to levels sufficient to reduce cell death caused by damage induced by radiation to DNA and RNA.

[academic.oup.com/book/29504/chapter-abstract/247652504?redirectedFrom=..](https://academic.oup.com/book/29504/chapter-abstract/247652504?redirectedFrom=..) (2016).-----

[aacrjournals.org/clincancerres/article/19/14/3905/78013/Ketogenic-Diet..](https://aacrjournals.org/clincancerres/article/19/14/3905/78013/Ketogenic-Diet..) (2013).---

[journals.plos.org/plosone/article?id=10.1371/journal.pone.0036197](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0036197) (2013).-----

[meridian.allenpress.com/radiation-research/article-abstract/187/6/743/..](https://meridian.allenpress.com/radiation-research/article-abstract/187/6/743/..) (2017).--

[link.springer.com/.../1743-7075-7-33](https://link.springer.com/.../1743-7075-7-33) (2010).--

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## Guillermou

Nrf2 diet also covers electromagnetic fields. Transcription factors are a class of protein that bind to DNA and induce the expression of particular genes, in the case of Nrf2 these are potent antioxidants such as NAD(P)H:quinone oxidoreductase 1 (NQO1)(R) and glutathione S-transferases (GST), and many others. Nrf2 diet, also covers electromagnetic fields. Transcription factors are a class of protein that binds to DNA and induces the expression of particular genes, in the case of Nrf2, these are powerful antioxidants such as NAD (P) H, 1 (NQO1) (R) and GST), and many others.

[www.mygenefood.com/blog/activating-nrf2-pathway-nutrition-need-know/](http://www.mygenefood.com/blog/activating-nrf2-pathway-nutrition-need-know/) ..---- [www.vital-reaction.com/blogs/news/nrf2-explained-in-human-terms](http://www.vital-reaction.com/blogs/news/nrf2-explained-in-human-terms) ..---- [transcendingsquare.com/.../nrf2-promoting-foods](http://transcendingsquare.com/.../nrf2-promoting-foods)

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Interesting that a Keto diet can actually make Chemo more successful as a treatment for cancer, in that it causes cancerous cells to multiply more slowly. I guess this is another way of pointing out the old belief that "sugar feeds cancer". So I can't argue against a Keto diet without these few reservations, another one being that the Keto diet can bring on weight loss quicker, and with less mental torture than almost any other diet. But otherwise, I do accept the latest thinking explained by Dr. Mercola on the disadvantages of trying to live on less than 100 grams daily of net carbohydrates (those digested in the small intestine, and not passed on into the colon, like most fiber).

And actually, I'm glad to have learned that eating carbohydrates is acceptable again, and that Dr. Mercola has joined those now expounding the benefits of a healthy mix of carbohydrates in our daily diet. The great gain I have made in my conversion back from Keto dieting is that I now know that the Intermittent Fasting that was often a component of a Keto diet plan is really a critical piece of maintaining one's health and of increasing our longevity. Reducing the window of when we feed ourselves down to less than 12 hours per day has way more advantages than restricting certain macronutrients.

Time restricted eating actually is proven to extend our life, and is easily measured by looking at the best marker of aging yet, IGF1 (Insulin like Growth Factor). Eating restricted to a 7 hour window lowers IGF1 while even reducing that window to just 12 hours made no difference in IGF1. Extending the fast will extend your life. There's a lot also in this link on how to get MCT oils from certain foods such as goat or sheep milk or cheese, and how these MCT oils are used by the liver to make ketones which are then a preferred food for cells while the body is resting (or sleeping) under Parasympathetic system control. [www.youtube.com/watch](http://www.youtube.com/watch)

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## Guillermou

Thank you stoneharbor, the ability to learn and curiosity fuel health. One of the nutritional therapies proposed to support pharmacotherapy in COVID-19 is the use of a ketogenic diet (KD) or ketone bodies. In this review, we summarize the evidence from tissue, animal, and human models and discuss the mechanisms of action of KD/ketone bodies against COVID-19. KD/ketone bodies were shown to be effective at the stage of virus entry into the host cell. The use of -hydroxybutyrate (BHB), by preventing metabolic reprogramming associated with COVID-19 infection and improving mitochondrial function, reduced glycolysis in CD4+ lymphocytes and improved respiratory chain function, and could provide an alternative source carbon for oxidative phosphorylation (OXPHOS).

Through multiple mechanisms, the use of KD/ketone bodies supported the host immune response. In animal models, KD resulted in protection against weight loss and hypoxemia, faster recovery, reduced lung injury, and improved survival of young mice. In humans, KD increased survival, reduced the need for hospitalization for COVID-19, and showed a protective role against metabolic abnormalities after COVID-19.

It appears that the use of KD and ketone bodies can be considered as a clinical nutritional intervention to assist in the treatment of COVID-19, despite numerous studies indicating that SARS-CoV-2 infection alone can induce ketoacidosis. However, the use of such an intervention requires strong scientific validation. [www.mdpi.com/.../1262](http://www.mdpi.com/.../1262) (2023).--- COVID-19 is associated with subclinical myocardial injury. Exogenous ketone esters acutely improve left myocardial function in healthy participants and patients with heart failure. [www.frontiersin.org/.../full](http://www.frontiersin.org/.../full) (2023).---

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## Guillermou

COVID-19 infection causes cognitive changes in the acute phase, but also after apparent recovery. More than fifty post (long) COVID symptoms are described, including cognitive dysfunction (“brain fog”) that prevents return to pre-COVID level of function, with rates twice as high in women. This cognitive dysfunction is associated with altered brain glucose metabolism, assessed by 18F-fluorodeoxyglucose positron emission tomography (FDG-PET), which shows regions of the brain that are abnormal compared to age-matched controls and sex. In other cognitive conditions, such as Alzheimer's disease (AD), typical patterns of cerebral glucose hypometabolism, frontal hypometabolism, and cerebellar hypermetabolism are common.

. Ketone bodies (B-hydroxybutyrate, acetoacetate and acetone) are produced endogenously with very low carbohydrate intake or on an empty stomach. They improve cerebral energy metabolism in the face of cerebral glucose hypometabolism in other conditions, mild cognitive impairment, MCI and AD. This article hypothesizes that treating neurological symptoms in post-COVID-19 patients using MCT supplements will provide short-term clinical benefit and perhaps aid long-term brain functional recovery. [www.ncbi.nlm.nih.gov/.../PMC10320593](http://www.ncbi.nlm.nih.gov/.../PMC10320593) (2023).--- The ketogenic diet (KD) has demonstrated benefits in numerous clinical studies and animal models of disease in modulating the immune response and promoting a systemic anti-inflammatory state.

This investigation reports a reduction in metalloproteases and an increase in the transcription of inflammatory homeostatic proteins in the heart, with a decrease in serum proinflammatory cytokines, metabolic markers of inflammation, and inflammatory prostaglandins, indicative of reduced systemic inflammation in animals infected under KD. [www.nature.com/.../s42003-023-05478-7](http://www.nature.com/.../s42003-023-05478-7) (2023).---

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## Guillermou

We know that the ketogenic diet (KD) has been used as a treatment for epilepsy since the 1920s, and its role is now being considered in the prevention of many other diseases. In recent years, the use of KD as a therapeutic approach to treat acute pathologies, including ischemic pathologies, has been intensively investigated. However, conflicting data are observed regarding the effects of KD on various organs after ischemic injury. In this review, we provide the first systematic analysis of studies conducted between 1980 and 2022 investigating the effects and main mechanisms of KD and its mimetics on ischemia-reperfusion injury of the brain, heart, kidney, liver, the intestine and the eyes.

Our analysis demonstrated a great diversity both in the composition of the KD used and in the protocols for the treatment of animals, which could be the reason for contradictory effects in different studies. It can be concluded that a true KD or its mimetics, such as  $\beta$ -hydroxybutyrate, can be considered a positive exposure, protecting the organ from ischemia and its negative consequences. [www.mdpi.com/.../2576](http://www.mdpi.com/.../2576) (2023).--

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## Guillermou

Acute brain injury, including trauma and other injuries such as stroke, results in dysfunctional glucose metabolism that can further promote oxygen radical formation and cell death. Ketone supplementation provides an alternative energy source to glucose that can minimize inflammation by altering the concentration of intracellular metabolites and optimizing energy production in dysfunctional neurons. Inducing ketosis is challenging in critically ill patients. Conventional approaches with dietary modification, the ketogenic diet, are limited due to the time it takes to induce ketosis. Alternative exogenous supplements, such as oral ketone esters and intravenous  $\beta$ -hydroxybutyrate formulations, provide supratherapeutic concentrations of ketone bodies within hours of administration. These formulations reduce cerebral infarct volume and improve energy production in animal models of brain injury.

[www.sciencedirect.com/science/article/abs/pii/B9780323898348000064](http://www.sciencedirect.com/science/article/abs/pii/B9780323898348000064) (2023),..

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## beucus

Hello everyone! Guillermou, I'm a bit confused by this article. My mother is 92 years young and surprises me, with her good health. She walks on her treadmill for 45 minutes every single day. I have Mom take Dr. Mercola's Ketone MCT Oil every day. After reading this article, I wonder if I've made a mistake. If you were in my place, would you recommend this for her?

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## DumberFarmer

Let us not forget that the so-called Alzheimer's disease is a condition brought on by lack of cholesterol, usually caused via statins. MCT oils like coconut oil can play a huge role in neural healing, but let us not forget to make sure that we replenish the cholesterol as well and remember cholesterol has been accused of the conditions with plaque and without it, we would all be dead. It's like trying to blame the fireman for the fire.

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## tanya\_marquette

Big Pharma has increasingly been lowering the level of acceptable Cholesterol, even down to a level of 100! It is a great marketing strategy to frighten people while creating the conditions for more illness in order to sell more drugs! Concepts of Socialization, Cognitive Dissonance and Mass Psychosis all help describe how an entire population can be trained to believe a system that has only 1 goal: Mass profit by controlling the population and buying politicians to lobby their interests.

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## Guillermou

Numerous epidemiological studies have demonstrated a significantly increased risk for the development of Alzheimer's disease (AD) in patients affected by type 2 diabetes (T2D). Both diseases are considered protein folding disorders associated with the accumulation of protein aggregates; amyloid beta (A) and tau in the brain during AD, and islet amyloid polypeptide, in pancreatic islets in T2D. Diabetes and Alzheimer's share multiple neuropathological mechanisms.

[www.nature.com/.../mp2016230](http://www.nature.com/.../mp2016230) .----- [www.sciencedirect.com/.../S014976341530155X](http://www.sciencedirect.com/.../S014976341530155X) .----

Neurodegenerative pathways common in obesity, diabetes and Alzheimer's disease Studies have identified several overlapping neurodegenerative mechanisms, such as oxidative stress, mitochondrial dysfunction, and inflammation seen in these disorders.

Advanced glycation end products generated by chronic hyperglycemia and its receptor RAGE provide critical links between diabetes and AD. The peripheral inflammation seen in obesity leads to insulin resistance and type 2 diabetes. Oxidative stress plays an important role in diabetes, as well as Alzheimer's disease and other related neurological diseases. Intracellular oxidative stress arises due to imbalance in the production of reactive oxygen/reactive nitrogen species and cellular antioxidant defense mechanisms [www.sciencedirect.com/.../S0925443916300977](http://www.sciencedirect.com/.../S0925443916300977) .---  
[content.iospress.com/articles/journal-of-alzheimers-disease/jad01013](http://content.iospress.com/articles/journal-of-alzheimers-disease/jad01013) .---

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## Guillermou

The ketogenic diet improves epileptiform spikes, memory, survival in the Alzheimer's model. Mechanistic studies in mouse models of Alzheimer's disease (AD) have shown that altered network activity and epileptiform spikes arise from dysfunctional inhibitory interneurons, which are key elements of cortical circuits underlying cognition. [www.biorxiv.org/.../136226](http://www.biorxiv.org/.../136226) .-- Cerebral glucose uptake and metabolism are impaired in AD and this hypometabolism precedes the onset of clinical signs in AD.

The evidence points to the normalization of aberrant energy metabolism. This dietary approach appears to be promising and deserves further investigation.

[www.sciencedirect.com/.../S2213453016301355](http://www.sciencedirect.com/.../S2213453016301355) .-- Insulin resistance connects obesity with Alzheimer's [www.ingentaconnect.com/contentone/ben/car/2017/00000014/00000008/art00..](http://www.ingentaconnect.com/contentone/ben/car/2017/00000014/00000008/art00..) .--- [nutritionstudies.org/can-ketogenic-diet-lead-alzheimers-disease/](http://nutritionstudies.org/can-ketogenic-diet-lead-alzheimers-disease/) .---

[universityhealthnews.com/daily/memory/ketogenic-diet-shows-promising-r..](http://universityhealthnews.com/daily/memory/ketogenic-diet-shows-promising-r..) In numerous studies, the need for a low-carbohydrate diet has been demonstrated to reduce blood glucose in diabetics, as well as the better metabolic adaptation of the ketogenic diet, with respect to caloric restriction.

[pubmedcentralcanada.ca/.../.--](http://pubmedcentralcanada.ca/.../.--) A review confirms this, highlighting that the ketogenic diet reduces or eliminates the need for medications, with their serious side effects. Dietary carbohydrate restriction as the first approach in diabetes management

[curis.ku.dk/ws/files/153416431/Feinman\\_et\\_al\\_Nutrition\\_Vol\\_31\\_1\\_1\\_13.p..](http://curis.ku.dk/ws/files/153416431/Feinman_et_al_Nutrition_Vol_31_1_1_13.p..) .---

[www.nutritionjrnl.com/.../S0899-9007\(14\)00332-3/fulltext](http://www.nutritionjrnl.com/.../S0899-9007(14)00332-3/fulltext) .--

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## Bouncedancer

Eating microwaved foods could also be a potential cause of Alzheimer's. A Swiss study showed that ALL the mice that were fed only microwaved food got Alzheimer's. There are a LOT of potential causes; we already know about the link to pesticides: o Eating only egg whites and not the yolk -- this was the advice that quite a few people followed and maybe still do. I always thought it was insanity to throw away the part of the egg that directly feeds the brain. o Antacids, which prevent absorption of food and which people pop like Tic Tacs. o ALL the allergy medicines are anti-cholinergic, which means they prevent this most important brain nutrient, choline (which egg yolks are rich in) from reaching the brain! o And a lot of allergies are caused by the inflammation caused by vaccines, which requires more than a bullet point to get into. o Medications like not only the statins you mentioned, but, e.g., gabapentin! It rots your brain.

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A good interview with some different opinions on the subject of ketones, ketosis, and a "ketogenic" diet. But a lot of agreement on the fact that is finally rising to the surface after many studies have been done on ketogenic diets: they are not a long-term method for improving one's health, in any way. Dr. Mercola is one of the leaders of the move away from ketogenic diets. Though many of us (and most of the doctors who pushed ketogenic diets) have tried limiting carbohydrate intake to bring on ketosis, and have seen first hand that it is a way to lose weight while painlessly not feeling hungry, we've also found that our bodies just don't want to be ketosis continually.

So I would say, now when you hear someone recommending against a ketogenic diet after they've tried the diet and seen some of it's effects, we should listen to them. While ketones are always a part of human metabolism since the times that humans were hunter gatherers and usually had to go without food for a good part of each day, they may provide up to 25-30 percent of the energy requirement to the human body, but they never are going to provide more than that, no matter how much you cut down on carbohydrate input. Your body will still get most of it's energy from carbohydrates, fats, and protein. Yes, your body may convert excess carbohydrates to fats, and then also use stored fats for fuel as either fatty acids or ketones, and some of this is good and some is unnecessary if you eat a more efficient diet.

Our bodies have evolved to be resilient and survive, no matter what, and part of that survival is the use of ketones. So science has learned a lot about ketones in the last 5-10 years. One does not need to go off carbohydrates and enter a ketogenic state to profit from ketones. They happen to be a signaling molecule to mitochondria, and when you do intermittent fasting, you gain the rewards of ketone use. Read more here: [www.ncbi.nlm.nih.gov/.../PMC8922216](http://www.ncbi.nlm.nih.gov/.../PMC8922216)

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As today's discussion stresses "exogenous" ketones, and their benefits, we should also realize that some foods have ready-made fats that provide ketones almost as soon as they enter circulation. "Supplemental" ketones are handy, but not always required to get medium chain triglycerides (MCT) into your circulation. MCT rich foods include olive oil, coconut oil, and some fats found more heavily in goat and sheep milk and cheeses. Also all butter. Here's more on these foods: [www.livestrong.com/article/272678-list-of-foods-that-contain-medium-ch..](http://www.livestrong.com/article/272678-list-of-foods-that-contain-medium-ch..) One thing not stressed, but alluded to in today's interview, is that when you ingest some of these MCT oils in your food, they may circulate in your blood even while you are busy burning mostly glucose.

They don't all get stored as fat, and that's a good thing. Because if you run short of glucose, or even glycogen stored in muscle, say in strenuous exercise, your muscle, heart and liver cells can quickly switch to the other side of the Randle Cycle and burn fats and ketones. Ketones are an important survival food (and even a longevity food) throughout the ages. Humans evolved and survived by our great ability to burn fatty acid and ketones during short periods where carbohydrates were lacking. We coined the phrase "intermittent fasting" in the last dozen years, but we've done this since the beginning.

Now, after studying ketosis for a dozen years, we've learned that part of the circadian rhythm that our bodies experience should take advantage of nightly use of ketones, brought into mitochondria when insulin finally drops to levels that allow fats to be released, ketones to be generated, and then mitochondria to receive the ketones that signal it's time to multiply, repair, and get ready for carbohydrate fueled action the next day. [www.ncbi.nlm.nih.gov/.../PMC8922216](http://www.ncbi.nlm.nih.gov/.../PMC8922216) Also, to increase mitochondria, reduce fructose and salt in the diet: [www.youtube.com/watch](http://www.youtube.com/watch)

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## Guillermou

Interesting stoneharbor proposals. So we have two fundamental aspects: metabolic flexibility. Normally, fasting blood insulin is less than 3.0. The lower the better. And on the other hand the brain energy gap reported by scientist Steve Koonin that allows with ketone complementary feeding with anti-inflammatory effects and where also some people experience spectacular cognitive benefits. Consideration of diet in case of mild cognitive impairment (MCI). Brain energy loss increases to 10% or more in some people who have cognitive impairment (MCI) and 20% or more in those with Alzheimer's disease. Because one frequent feature of MCI is a deficiency of glucose, or an inability to use it, in parts of the brain, ketones may serve as an alternative brain fuel.

Strategies to increase ketones, such as eating a reasonable ketogenic diet, MCT oil, and coconut oil, taking ketone supplements, exercising regularly, and fasting could fill in the brain-energy gap that occurs with aging and even more markedly with MCI [mci911.com/wp-content/uploads/12-Surprising-Reasons-Ketones-Deserve-Di..](https://mci911.com/wp-content/uploads/12-Surprising-Reasons-Ketones-Deserve-Di..) (2020).---- Ketone bodies may be temporarily appropriate in Alzheimer's disease by combating acute and chronic inflammation, protecting against oxidative and hypoxic stress, and providing resistance against hypoglycemia and energy stress.

In Figure 1, the performance of ketone bodies in resilience and rehabilitation in relation to ketone bodies protects against the loss of muscle mass in situations of starvation, as well as increased muscle protein synthesis and muscle regeneration induced by damage. These anticatabolic effects in inflammatory, sarcopenic, and cachexic environments act on molecular pathways thought to regulate these processes including NLRP3, HCAR2, NFB, HDAC, ubiquitination, mTORC1, MEK/ERK, and/or cellular NADPH pools. [link.springer.com/.../s11357-020-00277-y](https://link.springer.com/.../s11357-020-00277-y) (2020)

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Yes, Gui, as you stress, and as mentioned by Frank Llosa in the interview, exogenous ketones may be an aid to giving our brain a more complete, 24 hour/day nutrition. This may be a great relief to people now suffering one of the several symptoms of brain insufficiency. I think it's important also that people realize that their bodies may be utilizing ketones daily each and every day of their lives if they are (or become) healthy. And further, people can get their ketones from eating more foods such as butter, olive oil and the fats that are found in A2 cattle milk, yogurt and cheese. They don't need to buy MCT oil supplements if they just eat a few kinds of foods daily.

This link [www.ncbi.nlm.nih.gov/.../PMC8922216](http://www.ncbi.nlm.nih.gov/.../PMC8922216) Explains "In healthy adults, the diurnal circadian concentration of ketones oscillates between 50 and 250 M, contributing to as little as ~5% of total energy expenditure in the fed state and increasing up to ~20% in the fasted and starved states (6, 19, 36). Greater oscillations in circulating ketone body levels occur upon fasting; during adherence to low-carbohydrate, high-fat diets; acutely after exercise; in the neonatal period; or during late pregnancy". Of special note is the "acutely after exercise". May readers here are into strenuous exercise and might find it important to eat such that they are going to be circulating more ketones every night and until they finally eat the next meal of their next day.

In the interview, Frank Llosa confirms this as he mentioned the Tour de France cyclists who take huge amounts ketone esters in order to compete successfully, and further find they have improved performance soon after completing a race (post workout effect). There's no doubt that ketones have a magnificent "recovery" affect. How is this? It's very obvious from the literature that the ketones signal mitochondria to divide and repair. It's not about creation of ATP in mitochondria 100% of the time. Ketones help make mitochondria.

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**tanya\_marquette**

Some of this science is a bit dense for me but one question that I have is how use of ketones impacts the healing from brain seizures such as in strokes? There is some evidence that Coconut oil (MCT) are curative with Alzheimers altho don't know if any formal studies have been done. This suggests that it may also be helpful in healing from strokes--No? And given the individual differences between people, this article and the commentary discussion proves again to me that people need to be flexible and adjust their diet and life style choices.

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**stoneharbor**

Yes, tanya, as mentioned in posts from both myself and Guillermou, and the links within, taking in MCT oils, or otherwise raising the levels of ketones in circulation is proven to be helpful for neural healing, including in the brain. So healing not only occurs more quickly, but the ketone effect seems to be nearly immediately noticeable by people who have been experiencing brain fog or other cognitive problems. [link.springer.com/.../s11357-020-00277-y](https://link.springer.com/.../s11357-020-00277-y) This study was just one that Guillermou cited to show that ketones from MCT definitely aid in brain resilience to chronic stress, and rehabilitation from tissue injury.

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**tanya\_marquette**

Thank you Stoneharbor for confirming my understanding. I followed a 'nutritional endocrinologist' who promoted vegan keto diets. She lead a fasting with food program that I tried a couple of times but despite the goal of eating less than 700 K/day for at least a week to get into ketosis I never could handle that kind of restricted diet. I learned a few things from the experience about myself and my body, but arrived at the point of seeing that such severity was not for me. One thing I did do was increase my fat content somewhat and this discussion encourages me to give it even more attention. The doctor who, several years ago, said she brought her husband back from serious alzheimers by using about 2Tbs organic, cold pressed coconut oil, uncooked in his diet daily. That stayed with me as an important example of what MCT's can do.

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**jon6879**

Question: if one is metabolically flexible, then one is burning fat (has ketones) in the morning and would therefore have natural protection against CT Scans and X-Rays... just keep daily fast going until after the scan or X-ray? Would you still recommend taking the supplement?

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