

Coconut Oil for Alzheimer's Disease?

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Abstract An estimated 5.4 million people in the United States diagnosed with Alzheimer's disease or related disorders (ADRD) receive about \$210 billion worth of unpaid care annually from about 15 million loved ones. As these numbers grow, the urgency builds to discover causes, treatments, and cures. Ever searching for promising, effective, and less expensive treatments, family caregivers are eager to adopt treatments, promoted strongly in the media. Coconut oil, especially virgin coconut oil, has started in recent years in several internet and newspaper anecdotes as providing significant cognitive improvements in people with ADRD. A comprehensive literature review found only two studies examining the impact of coconut oil in humans though neither study dealt with ADRD. Research on dementia leading to diminishing cerebral glucose metabolism has reported on the benefit of ketone food. More controlled research is needed about the value of ketone foods, such as the varieties of coconut oil and MCT Oil. Though well researched the FDA-regulated (2009) ketone-medical-food Axona® which contains some coconut oil ingredients has shown evidence of cognitive improvements in people with mild to moderate Alzheimer's disease but more research is needed to clarify individual sensitivities, side effects, and health risks such as acidosis or hypocalcemia, possible with long-term use by people with ADRD.

Keywords Alzheimer's Disease, Related Dementias (ADRD), Coconut Oil, MCT Oil (Medium-Chain Triglycerides Oil), Ketone Food, Mitochondria, Cognition

1. Introduction

An estimated 5.4 million people in the United States, diagnosed with Alzheimer's disease (or a related dementia) receive about \$210 billion worth of unpaid care annually from an estimated 15 million loved ones.¹ The numbers of progressive dementia cases are expected to grow to about 16 million by 2050; thus, with no cures yet available or in sight, the urgency mounts to discover causes and treatments.¹ In the search for treatments that are more effective than the available anticholinergics and less expensive than the escalating costs of prescription medicines and medical foods, family caregivers are eager to adopt treatments such as coconut oil that are promoted strongly in the media. In particular, *virgin coconut oil* has started in several anecdotes on the internet and in newspapers as responsible for significant cognitive improvements in people with Alzheimer's disease.²⁻⁷ Often families rely on such anecdotes, promotions, or word-of-mouth declarations to guide them without any other medical or health provider supervision. When asked for medical recommendations, physicians have little peer-reviewed research information about the impact of coconut oil on human cognitive function to make research based, off-label or standard of care

recommendations.

1.1. The Newport Story

For example, during the past few years, much interest has surfaced in newspapers and the internet about the claims of Mary Newport, MD, a Tampa, FL physician (neonatologist), whose husband Steve Newport, after a diagnosis of Alzheimer's disease, took high levels of MCT (medium-chain triglycerides) Oil, vitamins, and related supplements. Dr. Newport reported that after adding on nonhydrogenated, extra-virgin coconut oil for two weeks, her husband interacted better with family and improved on cognitive tests. She reported even more improvement 37 days after starting the coconut oil. As evidence Dr. Newport has presented to the public her husband's drawings of a clock, which show few details drawn before starting the coconut oil and many details drawn after taking the coconut oil.^{2,3}

1.2. Concerns about the Newport Story

Several concerns arise about the claims of Dr. Newport. Of note and not discussed or credited much for Mr. Newport's improvements were changes already in his daily: 1) diet, 2) exercise routine, and 3) intake of various supplements, such as omega-3 fatty acids, cinnamon, turmeric (curcumin), L-carnitine, Coenzyme Q, Memory XL⁸, and several other vitamins and minerals.^{2,3,9} Of concern is the high calorie count of Mr. Newport's daily doses of MCT Oil and nonhydrogenated, extra-virgin coconut oil which together comprise half of his daily, calorie

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intake. Also, since Alzheimer's disease is a slowly progressive disease, more than two or three years on a high ketone diet may increase the risks for negative effects such as acidosis, hypocalcemia, hyperlipidemia, or carcinogenesis.⁹⁻¹²

Another concern that arises from the Newport story is the subjective nature of the reported better communication during family gatherings which may overlap with a *placebo effect*. After taking several treatments and adding a new one, it becomes difficult to identify which one(s) over the short-term, long-term, or in combination offered an improvement to Mr. Newport. When the expectation is high for a new treatment to improve function, the positive results may relate to expecting a positive effect but not the actual results of the coconut oil treatment.

Additionally, the question arises about the series of neuropsychological tests which offer a more objective evaluation of change, but the meaning or significance over time of the increased details over time in Mr. Newport's clock-drawings is unclear. The multiple repeated lines in the clock-drawing after two weeks of coconut oil intake suggested perseverative behavior, which may or may not indicate cognitive improvement.

Still, Dr. Newport's accounts of improvements in her husband's cognition and the various internet testimonies from other people about cognitive improvements in their loved ones, which they attributed to coconut oil intake, indicate a need for carefully controlled research. The research is necessary to learn about the actual impact of coconut oil on Alzheimer's disease and/or related disorders for the short- and long-term and to build a reliable, valid literature to provide guidance to health practitioners of people dealing with Alzheimer's disease and related dementias. In addition, research is necessary to learn about reactions such as the impact on older people with health conditions which may increase sensitivities to or systemic vulnerabilities to side effects from coconut oil.

2. Research about Coconut Oil Impact on Humans with Alzheimer's or Related Dementias

A comprehensive literature review using the internet and especially web sites of PubMed and the National Institutes of Health (www.ncbi.nlm.nih.gov) revealed a paucity of careful research on the impact of coconut oil in people with Alzheimer's disease or related disorders. Much commercial and anecdotal information exists about the values and properties of the varieties of coconut oil. Though several, peer-reviewed laboratory studies of animals such as mice and rats exist, no careful, subject-control research surfaced about the impact of coconut oil on humans with Alzheimer's disease or related dementias.¹³

2.1. Studies on Laboratory Animals

Nevin and colleagues (2004) found that virgin coconut oil increased HDL (high-density lipoprotein) and decreased

LDL (low-density lipoprotein) peroxidation in their laboratory rats.¹⁴ A number of animal studies found that the intake of coconut oil led to improvement in mental skills.¹⁴⁻¹⁶ In a recent animal study Lemieux et al. (2011) found that the fatty acids of coconut oil may offer protection from cardiovascular disease particularly in the cardiac mitochondria of rats and speculated along with other researchers that the benefits may result from the tocopherol and polyphenols in the coconut oil.^{13,17} However, discrepancies exist across publications, for example, a number of studies have linked coconut oil to higher levels of LDL^{13,18,19}, higher risks for cardiovascular disease^{18,19}, and impairments in memory^{15,16,18,19} as well as in hippocampus morphology^{16,18}

2.2. Studies on Humans

PubMed revealed three different research publications which examined the impact of coconut oil in humans though two did not address cognitive function. Two studies assessed people in the Philippines because of the high incidence of cardiovascular disease and their common use of coconut oil for cooking. In the first of these two publications, a cross-sectional study of pre- and post-menopausal women, Feranil et al. (2011) found that a high coconut oil intake related to high HDL in 1,121 premenopausal women but not in the 718 post-menopausal women.²⁰ In the second publication, a brief, one-month study involving 20 obese people (13 females and 7 males) who used virgin coconut oil, Liao et al. (2011) found an average reduction of about 1 inch in the waistline of the 7 males with no change in anyone's blood lipids.²¹ In the third research publication on humans, Krikorian et al. (2012) examined the effect of a six-week, low carbohydrate diet on memory function in people with Mild Cognitive Impairment and found a significant, positive correlation (improved memory scores).²²

The only other research related to coconut oil intake by people with Alzheimer's disease or related dementias was the research on Axona®, a medical food that contains some ingredients from coconut oil as well as several other ingredients. Evidence of the development, testing, and findings of Axona® unfold in the lengthy track record of peer-reviewed publications on beta-hydroxybutyrate²³⁻²⁵, AC-120226-27, AC-120327, Ketasyn®²⁶ (see www.medicalnewstoday.com/releases/81005.php), and finally Axona®.^{23,25-32}

The medical food Axona® underwent several clinical, double-blind, placebo controlled studies to determine safety, side effects, and improvements on memory and cognition in people diagnosed with Alzheimer's disease and related disorders²³⁻³² (see www.centerwatch.com/drug-information/fda-approvals/ for 2009). As a result of several positive research findings, in March 2009, the U.S. Food and Drug Administration (FDA) decided to regulate Axona® as a medical food available by prescription for the "dietary clinical management of the metabolic processes associated with mild to moderate Alzheimer's disease". (See www.centerwatch.com/drug-information/fda-approvals

[/drug-details.asp](#) and www.centerwatch.com/drug-information/fda-approvals/ for 2009. Patent application information at www.freepatentsonline.com/y2008/0009467.html.) Axona® is now undergoing Phase III trials.

2.3. Brain Cells and Ketones

The attention to coconut oil may stem initially from the budding interest first in MCT which break down into ketone “food” and appear to increase cognitive function.^{31,33-35} Brain cells depend upon *mitochondria* which act as tiny power plants to transform glucose into energy for cell activities. During the decline of Alzheimer's disease or related dementias, cerebral glucose metabolism seems to suffer as mitochondria become less able to absorb and use glucose.^{23,29} Acting as a glucose substitute, ketones from the breakdown of MCT^{27,36} which contain medium-chain fatty acids appear to offer the necessary simple fuel for the dysfunctioning mitochondria in the brain cells to use for energy.^{17,33} Reger et al. (2004) in a carefully controlled study found that high levels of a ketone food such as beta-hydroxybutyrate helped people with probable Alzheimer's disease function significantly better on paragraph recall.²⁵ In a later study Costantini and colleagues (2007) found improved cognitive function with AC-1202 intake.³⁰ The recent six-weeks study of Krikorian et al. (2012) found improved memory function in people diagnosed with Mild Cognitive Impairment whose low carbohydrate intake induced ketosis.²²

3. Discussion and Conclusions

Though no cure is available for Alzheimer's disease, a range of current treatments include fixing the reversible dementias such as vitamin B12 deficiency or endocrine imbalances, addressing cardiovascular conditions such as hypertension, cholesterolemia, or atrial-fibrillation, recommending a healthy lifestyle especially regular physical exercise, avoiding anticholinergics such as antihistamines, and managing depression, anxiety, and stress.²⁸ In addition, for progressive dementias such as Alzheimer's disease a prescribed anticholinesterase, such as donepezil (Aricept®), rivastigmine (Exelon®), or galantamine (Razadyne®), works for a while in many people to improve cognition.³⁷⁻³⁹ While the benefit of the anti-glutamate memantine (different brands available such as Akatinol®, Axura®, Ebixa®, Memox®, and Namenda®) is questionable in mild Alzheimer's disease, memantine appears to reduce cognitive deficits in moderate to severe disease.^{40,41}

With no cure for Alzheimer's disease yet available, the temporary help of available cholinergics, and the increasingly expensive medicines and medical foods, families continue to search for more effective, affordable treatments. Anecdotes via the media and word-of-mouth have promoted great interest in the action of ketones and, thus, coconut oil.

Brief descriptions of three readily available sources of ketone foods, follow³⁶:

1. *Coconut oil* contains the medium-chain fatty acids of caprylic acid, capric acid, and lauric acid. Nonhydrogenated virgin (or extra virgin) coconut oil is considered healthier than the hydrogenated version which has the unhealthy trans-fatty acids.^{16,18,19,36}

2. *MCT (medium-chain triglycerides) Oil* contains the medium-chain fatty acids of caprylic acid and capric acid.³⁶

3. *Axona®* (from Accera, Inc., Broomfield, CO), FDA-regulated as a medical food, contains the medium-chain fatty acids of caprylidene, a powdered form of caprylic acid. Among the many ingredients in *Axona®* are products/substances from coconut oil, palm kernel oil, milk and soy. (See ingredients at www.drugs.com/drug/axona.html and www.about-axona.com).³⁶

3.1. Coconut Oil

Coconut oil typically comes from the coconut white “meat” (called *copra*), coconut milk, or coconut milk residue. Processing by drying, wet-squeeze, or centrifuge steps separates out the oil.^{17,42,43} The drying process, either from the sun or a kiln, may decrease some of the nutritional value by inactivating the tocopherols (Vitamin E) and polyphenols.^{17,42,43} While coconut oil has a long shelf life (some suggest for two or more years⁹), when it turns yellow, it should be discarded.^{17,42,43}

When coconut oil is separated into different components, some of the main saturated fats are the medium-chain fatty acids, *caprylic acid/capric* and *lauric acid*. Medium-chain fatty acids move quickly to the liver with most medium-chain fatty acids quickly supplying energy to the body and a small amount of medium-chain fatty acids becoming stored fat in the body (more information at www.naturebath.com/caprylic_capric_triglyceride.html).

Virgin coconut oil and *extra virgin coconut oil* use fresh coconut, which goes through a wet-squeeze process that differs from the heated drying process. The wet-squeeze process, which usually leaves a slight coconut odor and taste in the oil¹⁰, maintains or increases the natural vitamin and polyphenol content available in the final product.¹⁴

3.2. Brief Words about MCT Oil

Medium-chain triglycerides (MCT) are medium-chain fatty acids that are digested more easily than other fats. Found, for example, in coconut oil and palm oil, MCT convert readily in the liver into energy for the body. Since MCT may foster ketogenesis or metabolic acidosis, people with diabetes or liver problems should avoid MCT.³⁶

3.3. Brief Words about Axona®

As discussed earlier, the FDA decided to regulate the medical food Axona®, available only by prescription at this time. A few patients have reported side effects such as nausea, vomiting, stomach cramps, or diarrhea. Persons who suffer such side effects should stop the Axona® and check with their physician. The physician may recommend re-starting the Axona® at a much lower dose and increasing

to the therapeutic dose more slowly than the directions on the package state.^{15,16}

3.4. Cautions about Ketone Foods

In general the published studies on animals and people seem to indicate that ketones are safe; however, it is important to check with a physician before starting an over-the-counter ketone food, such as virgin coconut oil or MCT Oil, and to be in tune with individual differences regarding cardiovascular or liver conditions, insulin regulation, and tolerance and sensitivity to foods and medicines, such as gastrointestinal upset. Research on ketogenic diets have reported concerns about acidosis, hypocalcemia, hyperlipidemia, insulin resistance, and carcinogenesis.^{9-11,36,44,45} Monitoring calorie counts in a person's daily diet is important because the large amount of calories in ketone food (oils) may lead to an unhealthy weight gain. Of course, people with an allergy to any form of coconut, palm kernel oil, milk or soy should avoid coconut products altogether as well as *Axona*® and MCT Oil.^{36,42,44,45}

To minimize gastrointestinal upset when ingesting a ketone food, a physician may recommend a schedule that guides one to go "lower and slower", for example, starting with half of a teaspoonful or one teaspoonful after a meal, such as lunch each day for a week. Then a slow increase to recommended amounts (checking with the physician and the label for directions) may help to avoid any possible side effects. Due to the nature of ketones lasting in the body from one to three hours, the directions for varieties of coconut oil or MCT Oil may indicate two to three doses a day. Some people add the virgin coconut oil to cold food such as cold cereal, some people add it to oven-baked goods, such as casseroles or brownies, and some people sauté foods with it.

Axona® has specific directions about dose. The directions specify the starter dose, how to build up to the therapeutic level and safety concerns.⁴⁴

3.5. Conclusions

The growing population dealing with Alzheimer's disease or related dementias, the lack of a cure or long-lasting, effective treatments, and cost factors³¹ have motivated families to use inexpensive products that the media publicize as highly successful treatments for cognitive dysfunction. Stories in newspapers and on the internet have promoted coconut oil as leading to significant cognitive improvements in people with Alzheimer's disease or related dementias. Before trying these publicized "treatments", families should consult their medical provider for guidance. However, more research is needed to help physicians determine the potential harmful versus beneficial effects for patients, given their individual differences, and the different types of progressive dementias. Insufficient research information handicaps physician recommendations regarding emerging popular treatments such as coconut oil for patients dealing with Alzheimer's disease, related dementias, and co-occurring chronic health conditions such as cardiovascular problems,

hormonal imbalances, or other systemic health changes.

A comprehensive literature review found two research articles that studied the impact of coconut oil in humans, though not the effect on cognitive function. A recent third research article examined the impact of low carbohydrate intake and improved memory in people with Mild Cognitive Impairment.

The well-researched ketone food, *Axona*® seems to improve memory and cognition in people with minimal side effects, other than gastrointestinal, is FDA-regulated as a prescription-based, medical food, and now is undergoing Phase III trials. However, more detailed studies are necessary to identify physiological changes such as malabsorption of vitamins and minerals in the gastrointestinal system and neuropsychological changes such as in memory, language skills, praxis, attention, executive function, visual-spatial function, and other cognitive functions. More research is needed to identify the appropriateness of *Axona*® in treating various dementias, such as different categories of Mild Cognitive Impairment, early or later stage Alzheimer's disease, Lewy body disease, cardiovascular dementias, the frontotemporal lobar degeneration diseases, or any other types of dementia. Knowing the health risks as a result of using *Axona*® for more than two or three years is important, especially since many progressive dementias last several years and in the case of Alzheimer's disease may last more than 20 years.

Though coconut oil and MCT Oil deliver ketones to substitute for glucose as cerebral glucose metabolism in mitochondria diminishes during the course of Alzheimer's disease, more research is needed to determine if ketone foods act as mitochondrial medicine and improve cognitive function or contribute to further mitochondrial dysfunction, especially with long-term use. While the study of Krikorian et al. (2012)²² showed a positive, significant correlation when examining the effect of a ketogenic diet on improved memory scores in people with a diagnosis of Mild Cognitive Impairment, clearly more controlled research studies on the impact of medium-chain fatty acids in foods such as varieties of virgin coconut oil and MCT Oil are needed to identify significant, specific improvements in memory, language, praxis, executive function, other cognitive parameters, and motor dysfunctions in people with parkinsonism dementias.

Future studies of ketone foods should consider the impact of differences in metabolism, physiological tolerance, nutrition, impact on the gastrointestinal system and related organs such as the liver, physical exercise, and brain exercise, all critical to the health and function of the aging brain. With the mounting attention given to genetic factors such as apolipoprotein and biomarker tests to target at-risk people and early intervention, research should examine whether ketone foods are potentially protective to delay the onset or slow the trajectory of decline.

Essentially, much more future, carefully controlled (randomly assigned, double-blind clinical research with comprehensive neurological and neuropsychological pre- and post-evaluations) research is necessary before we can

determine the impact (both cognitive benefits and health risks) over the long term of types of coconut oil and related ketone foods in people with long-term progressive dementias such as Alzheimer's disease or related disorders.

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