

Ketone metabolism is normal in these regions and therefore is an alternative fuel source. Ketones also reduce excitotoxic glutamate, increase GABA, act as antioxidants, mitochondrial enhancers and PPAR inhibitors, amongst other actions 2,3. However, compliance to and restrictiveness of ketogenic diet (KD) is difficult due to cognitive deficit in AD who may inadvertently eat non-KD foods. MCT oil can be administered easily and compliance can be monitored.

MCT oil has several advantages over other oils.

* Bypasses peripheral circulation and enters liver through portal vein 4
* Does not require carnitine for beta-oxidation 4
* May have direct effect on brain like conversion to ketones in astrocytes 4
* More ketogenic than LCFAs 4

Three clinical studies on MCT oil and Alzheimer’s disease have been done so far. Henderson et al (2009) found that daily administration of a ketogenic compound, AC-1202 (MCT, CA8) in 152 subjects diagnosed with mild to moderate AD had significantly elevated the level of serum ketone body (β-hydroxybutyrate) 2 hours after administration when compared to placebo in a US-based, 90-day, randomized, double-blind, placebo-controlled, parallel-group study 5. Reger et al. (2004) found that acute administration of medium-chain triglycerides (MCT) improves memory performance in Alzheimer’s disease patients. Further, the degree of memory improvement was positively correlated with plasma levels of β-hydroxybutyrate produced by oxidation of MCT 6.

Newport et al (2015) described a new way to produce therapeutic hyperketonemia, entailing prolonged oral administration of a potent ketogenic agent-- ketone monoester (KME)-- to anAPOE4 (+) patient with Alzheimer’s disease and a pretreatment Mini-Mental State Examination score of 12 7.

In our study the following was noted:

There is no statistically significant difference on the objective test data possibly due to small sample size and also limited duration of the trial. **Subjectively, all caregivers have reported a stability in function.Further, in 6 out of 10 patients, the caregivers reported an improvement in alertness, ADL function and general awareness of their condition and surroundings. I**n 2 patients, there was an increase in irritability which on probing was atrributed to their increased insight into their condition and also inability to do tasks they were able to in the past. The patients were feeling frustrated due to their condition and overall initiative to do activities had increased.

 **Introduction**

**Alzheimer’s disease (AD) is an irreversible cerebral degeneration. Current therapy provides temporary beefit at most. Most of these are targeted at the Acetylcholine (Ach) deficit, the amyloid plaques and tau proteins. The glucose hypometabolism can be overcome by supplying an alternative fuel, namely ketone. We report the outcome of a 6 month open label trial of MCT oil in AD subjects**

Method

MCT oil was administered at 1ml/Kg post-meal.

Addenbrooke’s Cognitive Examination (ACE)- Indian adaptation by Mathuranath, et al, 2007 were administered at baseline and after 6 months. Blood ketone was measured 2 hour post MCT. Biochemical battery including lipid profile were performed at baseline and every three months.

Results

Blood BHB levels ranged between 0.6 amd 1.4 mmol/dL

A Wilcoxon signed-rank test showed that after 6 months of MCT there was no statistically significant change in the participant’s scores on the ACE total score or any of the subtest scores.

Discussion

Glucose hypometabolism is noted in MCI, early AD and also in pre-AD (Few decades prior to onset of AD). It is caused by relative absence of Glucose transporter (Glut) 1 and 3 in specific regions of the brain (Posterior cingulate, parietal and temporal lobes) 1. This causes inability of these regions to ‘pull’ glucose into these regions 1.

**Conclusion** :

**Ketones supplied through MCT oil can supply the hypometabolic regions of the brain and stabilize the cognitive deficits of AD. To ascertain if there is an improvement in cognitive abilities, a long term trial with a larger sample size is underway.**

**References:**

1. Mosconi L, Pupi A, De Leon MJ. Brain glucose hypometabolism and oxidative stress in preclinical Alzheimer's disease. Annals of the New York Academy of Sciences. 2008 Dec 1;1147(1):180-95.

2. Henderson ST. Ketone bodies as a therapeutic for Alzheimer's disease. Neurotherapeutics. 2008 Jul 31;5(3):470-80.

3. Cunnane SC, Courchesne-Loyer A, Vandenberghe C, St-Pierre V, et al. Can Ketones Help Rescue Brain Fuel Supply in Later Life? Implications for Cognitive Health during Aging and the Treatment of Alzheimer&#39;s Disease. Front Mol Neurosci. 2016; 8: 9:53.

4. Henderson ST, inventor; Accera, Inc., assignee. Use of medium chain triglycerides for the treatment and prevention of alzheimer's disease and other diseases resulting from reduced neuronal metabolism II. United States patent US 6,835,750. 2004 Dec 28.

5. Henderson ST, Vogel JL, Barr LJ, Garvin F, Jones JJ, Costantini LC. Study of the ketogenic agent AC-1202 in mild to moderate Alzheimer's disease: a randomized, double-blind, placebo-controlled, multicenter trial. Nutrition & metabolism. 2009 Aug 10;6(1):31.

6. Reger MA, Henderson ST, Hale C, Cholerton B, Baker LD, Watson GS, Hyde K, Chapman D, Craft S. Effects of β-hydroxybutyrate on cognition in memory-impaired adults. Neurobiology of aging. 2004 Mar 31;25(3):311-4.

7. Newport MT, VanItallie TB, Kashiwaya Y, King MT, Veech RL. A new way to produce hyperketonemia: use of ketone ester in a case of Alzheimer's disease. Alzheimer's & Dementia. 2015 Jan 31;11(1):99-103.



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| [**P2-020** Use of Medium Chain Triglycerides (MCT) in Alzheimer’s Disease (AD) – Pilot Trial](https://alz.confex.com/alz/2017/aaic/extra/index.cgi?username=17100&password=542622&EntryType=Paper&Personid=Person19444&personpwd=756294) |

**Conclusion**

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