

# Medium-Chain Triglycerides

***"Medium-chain triglycerides can be used to increase metabolic rate giving some people the added energy they need."***

The literature tells us that chronically ill as well as obese patients have a greater tendency to have mitochondrial impairment. Mitochondrial dysfunction may be a little difficult to understand for some people, so let's use campfire word pictures to talk about the different dietary energy sources.

First, light the twigs and thin branches, add thicker branches as the fire gets good and hot. Eventually we toss on those big logs. Carbohydrates are like the twigs. Long chain fatty acids like olive, fish or flax seed oil are like the logs. And the medium branches used to get the fire hotter are like medium-chain fatty acids or another term for the same molecule is medium-chain triglycerides (MCTs).

Here's the big idea for today. If we have mitochondrial dysfunction those big logs, i.e. long chain fatty acids, aren't being used for maximum energy production. The result is people have to rely on carbs for energy.



Medium-chain triglycerides can be used to increase their metabolic rate. And for some people it will give them the added energy they need. Let's look at a few definitions before we look at the clinical application.

Short-chain fatty acids are defined by having less than 6 carbons. Medium-chain triglycerides are 6-12 carbons.

Long-chain fatty acids (LCFAs) contain 13-21 carbons and very long-chain fatty acids are longer than 22 carbons.

Because MCTs are smaller molecules they are more rapidly hydrolyzed by intestinal lipases. The medium-chain fatty acids are bound to serum albumin, absorbed directly into the portal vein and travel to the liver. This absorption bypasses the lymphatic system. They are metabolized in 1/8 the time of long-chain fatty acids without accumulation in the body as fat. Long-chain fatty acids are broken down in the intestine and remade into chylomicrons and transported via the lymph system to the liver. But MCTs are absorbed intact and taken to the liver where they are used directly for energy. In

this sense, they are processed like carbohydrates. Once in the liver MCTs are metabolized to a ketone called beta-hydroxybutyrate.

From an energy stand point, MCTs cross the double mitochondrial membrane very rapidly and unlike LCFA do not require the presence of L-Carnitine. The result, MCTs are burned faster than LCFAs and up-regulate the metabolism more.

One study showed an increased metabolic rate of 12% over 6 hours after participants consumed MCT meals compared to 4% increase with LCFA meals. "Endpoint trunk fat mass, total fat mass, and intra-abdominal adipose tissue were all lower with MCT consumption than with olive oil consumption."

Some authors, however, have found that the real benefit of MCTs are the improvements in body composition (ratio of fat to lean tissue) rather than just weight loss. But remember our interest is mitochondrial support.

In an earlier broadcast we talked about four processes occurring simultaneously in neurological diseases: oxidative damage caused by free radicals, excitotoxicity, inflammation and a greater need for energy. Dr. Steve Haltiwanger shared that glucose is the usual source of energy for neurons (brain cells). But when oxidative, excitotoxic and inflammatory conditions are present nerve cells can develop dysfunction of glucose transport into cells and essentially cells will then starve and die.

Neurons can use glucose or ketones but prefer glucose if available. Ketones however can be used as an alternative fuel for neurons that cannot effectively transport glucose. If ketones are present in circulation, even at low levels they can increase cerebral blood flow by as much as 40%. Dr. Haltiwanger shared that ketones used within mitochondria can be used to drive the chain reaction that produces

ATP. Ketones by increasing ATP reduce the generation of free radicals, increase production of endogenous glutathione and act as an anti-inflammatory agent. MCT is an excellent source of ketones.

One study used a patented form of medium-chain triglycerides and found it resulted in significant differences in pre and post cognitive scores vs. placebo in mild to moderate Alzheimer's patients.

Remember we said MCT contain 6-12 carbons. The most easily absorbed are the smaller size fatty acids. Bio-MCT from Biotics contains 97% of the 8 carbon caprylic acid. The smaller size makes it easy to absorb, easy to transport and easy to be used as a source of energy. It comes in a 16 ounces bottle as a clear, flavorless liquid.

So whether it is for more energy, an increased thermogenic effect or providing a source of ketones for healthy brain function MCT oil is a product to consider. Start with one tablespoon mixed on food once a day and increase to 3 tablespoons for a clinical trial. Always use on food and take throughout the day for maximum benefit to avoid any mild GI symptoms.

Yes that's extra calories but the assumption is that patients are off the empty calories found in refined foods. So the additional calories are negligible to get the increased thermogenic effect.

Of course we want to fix the mitochondrial dysfunction but until the patient is healthier, Bio-MCT could be a major asset to help the transition. Not everyone will respond but the ones that do will love you.

Thanks for reading this week's edition of the Tuesday Minute. I'll see you next Tuesday.