Dr. Mark Hyman & Steph Highlight: Nutritional C15:0 Deficiencies

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Welcome to Issue 73 of Science Says! Our weekly newsletter where you'll learn the latest healthy aging and C15:0 research news that our team of doctors, scientists, and experts are most excited about—without having to go search for it.

Eric and Steph
Co-Founders, Doctors, Nerds

What Dr. Stephanie Venn-Watson, our co-founder and author of over 80 peer-reviewed scientific publications, is reading.

HEALTHY AGING

Nutritional C15:0 Deficiencies & Dairy Fat

Last week, Dr. Mark Hyman and our co-founder, Dr. Stephanie Venn-Watson, had a deep-dive discussion on the science behind C15:0. Among the many topics was nutritional C15:0 deficiencies. As Dr. Hyman pointed out, he is seeing a surprising number of patients with low C15:0 levels.

So, let's talk about why nutritional C15:0 deficiencies are ever-present, dairy fat as our traditional source of C15:0, and the science behind the health benefits of pure C15:0.

Why do many of us have low C15:0 levels?

There are two answers to that question. First, most of our dietary C15:0 comes from whole dairy fat. As shown in Zheng et al., as we have decreased our intake of whole fat dairy products, our C15:0 levels have gone down. Second, as shared by Tsoukalas et al., our C15:0 levels naturally decline as we get older.

Wait, do my C15:0 levels really matter?

Heck, yes. As summarized in our recent *Nutrients* paper, here's why maintaining healthy C15:0 levels matter:

- Dozens and dozens of studies link higher C15:0 levels to better metabolic, heart, and liver health.
- Pure C15:0 strengthens our cells, repairs our mitochondria, and activates AMPK + PPARs, which keeps our metabolism and immunity balanced.
- Pure C15:0 supplementation raises circulating C15:0 levels and directly supports metabolic, heart, and liver health.*

This science all showcases C15:0's role as an essential fatty acid - the first to be discovered in over 90 years.

How do I know if I have low C15:0?

Multiple studies have shown that having C15:0 levels less than 5 μg/ml (or approximately 0.2% of total fatty acids) is considered low. When above this level, mitochondria function better, proinflammatory cytokines are lower, and cells are more resilient. This is consistent with a meta-analysis by Trieu et al., which showed that people with C15:0 levels greater than 0.2% had better heart health.

There are readily available blood tests that your doctor can request, such as the Genova Diagnostics Fatty Acids Nutritional Test, to measure your C15:0 levels.

Here's how much daily C15:0 you need to maintain healthy levels.

You need about 100 to 200 mg of C15:0 per day to maintain that healthy 5 μg/ml level. This is based on extensive human studies by Stallings et al., using pure, free fatty acid C15:0.

Can't I just raise my C15:0 levels by drinking whole fat milk?

You can, but it comes with a couple of important caveats.

- First, whole dairy fat isn't what it used to be. Van Gastelen et al. showed that the C15:0 content in dairy fat is dependent on what cows eat. If a cow eats corn versus grass, it has less C15:0 in its milk. Even the type of grass can dictate how much C15:0 is in milk.
- Second, dairy fat contains only 1% of healthy C15:0. In contrast, as demonstrated by Mansson, dairy fat has much higher amounts (like, more than 40%) of proinflammatory even-chain saturated fats. Especially C16:0 and C18:0.

As such, it's harder to get the C15:0 you need from dairy fat without paying the higher cost of competing proinflammatory fats.

The science behind the need for pure C15:0

While there has been a lot of debate on saturated fats as healthy vs. neutral vs. bad, recent studies are definitively showing that C15:0 is a healthy, odd-chain saturated fatty acid, while C16:0 and C18:0 are unhealthy, even-chain saturated fats.

Here are some recently published examples:

- Mice with type 2 diabetes and fatty liver disease were provided pure C15:0, pure C17:0 (a fellow odd-chain fat), or dairy fat. C15:0 lowered glucose, cholesterol, and cytokines, as well as improved liver health. C17:0 had some benefits, but not as many as C15:0. Dairy fat made mice worse - including more inflammation and impaired livers. Bishop et al. directly attributed the negative impacts of dairy fat to C16:0.
- In a just-published study, Teng et al. show that higher C15:0 and C17:0 predicted a lower risk of bladder cancer, while higher C18:0 predicted a higher risk. They conclude that dairy fat has had mixed results related to cancer because of differences in odd-chain saturated fatty acid benefits versus even-chain fatty acid risks.

The World Health Organization recently reviewed the science on dietary saturated fats, and came to the following conclusion in their 2023 nutritional guidelines: Although there is evidence of C15:0 benefits, these benefits are likely unable to compete with the much higher levels of proinflammatory saturated fatty acids present in foods.

Combined, the latest science supports that the goodness of C15:0 is best harnessed as a pure, fatty acid. How about that? Have a great week, everyone!

Dive deeper into the science

READ THESE STUDIES

- Zheng et al. Changes in C15:0 levels over a 13-year period
- Tsoukalas et al. Declining C15:0 levels with age
- Venn-Watson et al. C15:0 as a leading longevity-enhancing nutrient
- Chooi et al. C15:0 supplementation lowers LDL cholesterol and improves gut microbiome
- Venn-Watson et al. C15:0 as an essential fatty acid
- Trieu et al. C15:0 associated with lower risk of heart disease
- Genova Diagnostics Nutrition Test: Fatty Acids
- Stallings et al. Pharmacokinetics of pentadecanoic acid (C15:0) in humans
- Van Gastelen et al. Effects of corn-fed diets on C15:0 content in cows' milk
- Mansson. Fatty acids in bovine milk fat
- Venn-Watson et al. C15:0 improves metabolic health
- Yoo et al. C15:0 improves liver health
- Bishop et al. Milkfat worsens inflammation and liver health
- Teng et al. Risks of bladder cancer based on types of fatty acids
- World Health Organization Guideline (2023). Saturated fat intake for adults and children

- Check out all the C15:0 science at discoverC15.com