Measuring Your C15:0 Levels

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Welcome to Issue 96 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

The science behind deficient, healthy & optimal C15:0 levels

A few weeks ago, we shared our latest peer-reviewed paper describing how low C15:0 levels cause Cellular Fragility Syndrome, the first nutritional deficiency syndrome to be discovered in 75 years. This week, we announced a new at-home test from Genova Diagnostics to measure your C15:0 levels.

So, let's dive deeper into the science behind "deficient", "healthy", and "optimal" C15:0 levels for this test.

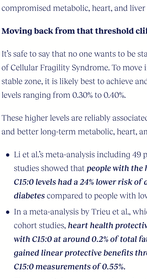
There's a critical threshold effect.

As an essential fatty acid, our cells need certain amounts of C15:0 to maintain our baseline cellular health. One of C15:0's biggest jobs is to serve as a sturdy fatty acid that strengthens our cell membranes to protect them (and us) against aging-related breakdown.

As described in the recent *Metabolites* paper, studies consistently support that our cells have a tipping point, where they go from "okay" to "fragile".

- ***If our cell membranes have more than 0.2% of sturdy C15:0*** *(among all fatty acids), our cells are more likely to remain healthy and protect our red blood cell, metabolic, heart, and liver health.*
- ***If our cell membranes have < 0.2% C15:0****, they are more likely to become fragile and susceptible to lipid peroxidation + ferroptosis, a newly discovered form of cell death. This accelerates aging and impairs our red blood cell, metabolic, heart, and liver health.*

Here is a science-backed scribble of how C15:0 membrane levels reflect our health status:



Venn-Watson, *Metabolites* 14:355 (2024).

Most of us are standing at the edge of this threshold cliff. Why?

Over the past 50 years, our C15:0 levels have been declining due to:

- Dramatically decreased dietary intake of C15:0 from avoidance of whole dairy fat.
- Changing agricultural practices (i.e. feeding cows corn vs. grass) that lower the amount of C15:0 in dairy fat.
- Naturally declining C15:0 levels with age.

Today, most people have C15:0 levels around 0.2% (typical range of 0.14% to 0.30%), which means that most of us are right on the edge of (or even off) the Cellular Fragility cliff. Thus, while 0.2% is our *expected* current C15:0 level, this is not an optimally healthy level. Having such a large percentage of the population at this threshold is helping to explain why we have become increasingly susceptible to compromised metabolic, heart, and liver health.

Moving back from that threshold cliff.

It's safe to say that no one wants to be standing on the edge of Cellular Fragility Syndrome. To move into a safer, cell stable zone, it is likely best to achieve and maintain C15:0 levels ranging from 0.30% to 0.40%.

These higher levels are reliably associated with stronger cells and better long-term metabolic, heart, and liver health.

- Li et al.'s meta-analysis including 49 prospective cohort studies showed that ***people with the highest circulating C15:0 levels had a 24% lower risk of developing type 2 diabetes*** compared to people with lowest C15:0 levels.
- In a meta-analysis by Trieu et al., which included 18 cohort studies, ***heart health protective effects started with C15:0 at around 0.2% of total fatty acids, with gained linear protective benefits through the highest C15:0 measurements of 0.55%.***
- Zheng et al.'s large prospective cohort study with 15,919 adults showed that C15:0 concentrations were linearly and inversely correlated with liver enzymes ALT, AST, and GGT. ***Those with the highest C15:0 levels had the lowest ALT, AST and GGT levels (aka the healthiest livers).***

Importantly, as reviewed in a study published in *Nutrients*, higher C15:0 concentrations have been shown to directly and dose-dependently reverse and slow cellular aging, including strengthened cells, repaired mitochondria, activated longevity-supporting biological pathways, and calmed immune responses.

So, how do we get from 0.2% to an even safer, healthier C15:0 zone? Most people who have around 0.2% C15:0 can achieve healthier C15:0 levels by adding 100 to 200 mg of pure free fatty acid C15:0 to their daily diet.

For more information on why to include C15:0 supplementation vs. just food sources to support your long-term C15:0 needs, check out this blog. There really is a science-backed reason to use pure, free fatty acid C15:0 supplementation, along with dietary changes.

Exploring optimal C15:0 levels.

As we have shared, there are hints that higher C15:0 levels can optimize our heart health and longevity. This includes studies from Longevity Blue Zone Sardinians, who have average C15:0 levels of 0.6%. Stay tuned for more information on that front.

For now, however, let's start by fixing nutritional C15:0 deficiencies affecting an estimated 1 in 3 of us. With an at-home test now available, we are increasingly able to detect and prevent Cellular Fragility Syndrome. Not a bad place to start for our nerdy do-gooder mission of improving global health, one amazing person at a time. Have a great week, everyone!

Dive deeper into the science

READ THESE STUDIES

- Venn-Watson S. The Cellular Stability Hypothesis: Evidence of Ferroptosis and Accelerated Aging-Associated Diseases as Newly Identified Nutritional Pentadecanoic Acid (C15:0) Deficiency Syndrome.
- Li et al. Saturated fatty acid biomarkers and risk of cardiometabolic diseases: A meta-analysis of prospective studies.
- Trieu et al. . Biomarkers of dairy fat intake, incident cardiovascular disease, and all-cause mortality: A cohort study, systematic review, and meta-analysis.
- Maciejewska et al. Is the fatty acids profile in blood a good predictor of liver changes? Correlation of fatty acids profile with fatty acids content in the liver.
- Zheng et al. Association between plasma phospholipid saturated fatty acids and metabolic markers of lipid, hepatic, inflammation, and glycaemic pathways in eight European countries: A cross-sectional analysis in the EPIC-InterAct study.
- Venn-Watson and Schork. C15:0 shares clinically relevant cell-based activities with leading longevity-enhancing compounds.
- Manca et al. Circulating fatty acids associated to human longevity.
- Nerd out on all the C15:0 science at DiscoverC15.com.