C15:0 & Improved Vascular Function

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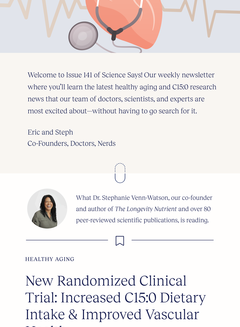

Welcome to Issue 141 of Science Says! Our weekly newsletter where you'll learn the latest healthy aging and C15:0 research news that our team of doctors, scientists, and experts are most excited about—without having to go search for it.

Eric and Steph
Co-Founders, Doctors, Nerds

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

HEALTHY AGING

New Randomized Clinical Trial: Increased C15:0 Dietary Intake & Improved Vascular Health

Last week, we talked about a clinical trial from Salamana-Sanabria et al. that showed people who were supplemented with C15:0 had improved mood. This week, let's cover another newly published clinical trial that evaluated the potential effects of eating more dairy products - and specific fatty acids within dairy (including you, C15:0) - on blood pressure and vascular health.

I'm in. How was this latest clinical trial done?

In this randomized crossover clinical trial by Arghavani et al., 27 adults adhered to the following two dairy diets (which included cheese, kefir, milk, yogurt, and cream):

- **Adequate-Dairy (AD) Diet:** 2 to 3 servings of dairy per day.
- **High-Dairy (HD) Diet:** at least 4 servings of dairy per day.

Each participant started with either the AD or HD diet for 6 weeks. They then had a "washout period" by returning to their normal diet for 6 weeks. Then, they switched (aka crossed over) to the other diet (AD or HD) for the last 6 weeks.

The following measurements were included in this study to evaluate the effects of each diet:

- **Total dairy food intake,** including fatty acids C15:0, C17:0, and C18:0.
- **Plasma phospholipid fatty acid levels,** including C14:0, C15:0, C16:0, C17:0, and C18:0.
- **Blood pressure**
- **Arterial stiffness,** also called vascular stiffness, using a measurement called cfPWV.

By studying the effects of each diet on the same group of people, crossover clinical trials provide particularly powerful findings.

Roger that. So, what did they find?

This study had the following three key findings related to C15:0:

1. **Baseline C15:0 levels were low.** Before starting either of the diets, the study groups had average baseline C15:0 levels varying from 0.15% to 0.16% of total fatty acids. As shared in our Metabolites paper, C15:0 levels less than 0.2% are considered low and have been repeatedly shown to increase one's risk of accelerated aging, including Cellular Fragility Syndrome. The Agrahavani et al. data continue to support Zhang et al.'s findings that populationwide C15:0 levels have been declining.
2. **The more dairy a person eats, the higher their C15:0 levels.** While C15:0 levels did not increase when participants were on the Adequate Dairy diet, C15:0 levels did increase significantly when they were on the High Dairy diet. Specifically, when on the High Dairy diet, C15:0 levels increased from an average of 0.15% to 0.18% within 6 weeks. Further, there was a direct, linear correlation between how much C15:0 a person ate, and their C15:0 levels.
3. **Raised C15:0 levels independently predicted improved vascular health (aka less arterial stiffness).** Importantly, this study showed that when participants increased their C15:0 levels, there was a healthier, linear *decrease* in arterial stiffness as measured by the carotid-to-femoral pulse wave velocity (cfPWV).

Taken together, this clinical trial supports that substantially high dairy intake (4 or more servings per day) is needed to increase baseline C15:0 levels, and higher C15:0 levels predict improved vascular function.

Can you tell me a little more about arterial stiffness?

We can't As we age, our blood vessels become stiffer, making them less able to adapt to changes in blood pressure. As described by Maza-Bustindui et al. and Baldo et al., the stiffer our blood vessels (including our arteries) and higher our cfPWV, the greater our risk of having poor heart health. In turn, the poorer our cardiometabolic health, the stiffer our vessels... which becomes an unwanted spiral that affects both our metabolic and heart health. On the positive side, as shown in the latest clinical trial, healthier vessel function - which was correlated with higher C15:0 levels - can be improved within weeks.

The complicated story of dairy fats.

While eating 4 or more servings of dairy a day did indeed increase C15:0 levels that were correlated with healthier, lower vascular stiffness, this High Dairy diet also increased C16:0 levels. Unfortunately, raised C16:0 levels in this study predicted significantly higher blood pressure.

Here's the rub.

- Dairy fat is our primary source of C15:0, an emerging essential fatty acid with 100+ peer-reviewed studies demonstrating its broad health benefits.
- As shown by Mansson, while dairy fat contains about 1% of C15:0, it also contains about 30% of pro-inflammatory C16:0.
- We now know that odd-chain saturated fatty acids (especially C15:0) have anti-inflammatory and mitochondrial protective activities, while even-chain saturated fatty acids (especially C16:0) have pro-inflammatory and mitochondrial damaging activities.

The net result for dairy? Mixed outcomes, with many showing a net neutral effect.

So what does this all mean?

- In the latest clinical trial, the authors conclude that their findings "highlight the importance of dietary strategies that incorporate specific fatty acids to enhance cardiovascular health."
- This conclusion around specific fatty acids is consistent with Thorning et al., which also concluded that individual beneficial nutrients within dairy fat can be optimized when used in isolation compared to when mixed in the complicated (and sometimes conflicting) whole-dairy food matrix.
- Further, Bishop et al. detailed in relevant animal models how C15:0 alone had metabolic and immune benefits, while dairy fat resulted in impaired liver and immune function.

While whole foods are indeed often our best source of nutrients, C15:0 is emerging as a truly essential nutrient whose benefits can stand best on its own. Have a wonderful week, everyone!

Dive deeper into the science

READ THESE STUDIES

- Salamanca-Sanabria et al. Potential effects of Asian-adapted Mediterranean diet in depression and anxiety among women: a secondary analysis.
- Arghavani et al. Impact of dairy intake on circulating fatty acids and associations with blood pressure: a randomized crossover trial.
- Venn-Watson et al. The Cellular Stability Hypothesis: Evidence of Pentadecanoic and Accelerated Aging-Associated Diseases as Newly Identified Nutritional Pentadecanoic Acid (C15:0) Deficiency Syndrome.
- Zheng, J. S. et al. Changes in plasma phospholipid fatty acid profiles over 13 years and correlates of change: European Prospective Investigation into Cancer and Nutrition-Norfolk Study.
- Maza-Bustindui et al. Impact of cardiometabolic risk factors and its management on the reversion and progression of arterial stiffness.
- Baldo et al. Carotid-femoral pulse wave velocity in a healthy adult sample: The ELSA-Brasil study.
- Mansson, H.L. Fatty acids in bovine milk.
- Venn-Watson et al. Pentadecanoic Acid (C15:0), an Essential Fatty Acid, Shares Clinically Relevant Cell-Based Activities with Leading Longevity-Enhancing Compounds.
- 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.
- Rumora et al. Chain length of saturated fatty acids regulates mitochondrial trafficking and function.
- Thorning et al. Whole dairy matrix or single nutrients in assessment of health effects.
- Bishop et al. Hepatadecanoic Acid is Not a Key Mediator in the Prevention of Diet-Induced Hepatic Steatosis and Insulin Resistance in Mice.

- Nerd out on all the C15:0 science at DiscoverC15.com