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So, Are Dietary Saturated Fats Good, Bad, or Neutral?

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Welcome to Issue 160 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

The Science Behind Those Saturated Fat Headlines

While saturated fats have been gaining a lot of attention in the news these days, the science around them hasn't actually changed that much over the past decade. So, when asked the question, "Are dietary saturated fats good, bad, or neutral?", the answer remains, "Yes." Without hype or fanfare, let's review the latest science supporting how saturated fats - based on the food source and the type of saturated fat - can influence our health in different ways. Let's dive in.

Not all saturated fats are created equally.

First, it's good to know that there are two distinct types of saturated fats: even-chain and odd-chain saturated fatty acids. As their names suggest:

Even-chain saturated fats have an even number of carbons - including C16:0.

- As reviewed by Korbecki et al., C16:0 and its metabolites activate pro-inflammatory pathways, including NF-kB, TNFα, and IL-6.
- Sergi et al. show how C16:0 also induces mitochondrial dysfunction.
- C16:0 is routinely used in preclinical models to induce inflammation, insulin resistance, and fatty liver disease, as demonstrated by Saraswathi et al.
- In prospective cohort studies following large populations over many years, such as with Forouhi et al. and Li et al., higher levels of even-chain saturated fatty acids, including C16:0, have repeatedly been associated with a higher risk of developing type 2 diabetes and cardiovascular disease.

Odd-chain saturated fats have an odd number of carbons - including C15:0.

- C15:0 directly inhibits pro-inflammatory pathways, including JAK-STAT and NF-kB, as shown by To et al. and Aabis et al.
- Venn-Watson et al. and Duan et al. showed that C15:0 supports mitochondrial function.
- C15:0 has also been shown in preclinical models to protect healthy immune responses as well as metabolic, liver, gut, and cardiovascular health (Venn-Watson et al., Aabis et al., Singh et al.).
- In the same prospective cohort studies that showed links between C16:0 and poorer metabolic and heart health, higher levels of C15:0 were associated with better long-term metabolic and cardiovascular health (Forouhi et al. and Li et al.).
- Further, randomized clinical trials have shown that people who supplemented with pure C15:0 and had raised C15:0 levels were associated with protected liver, red blood cell, cardiovascular biomarker, and gut microbiome health.

Different saturated fatty acids are present at different amounts within food.

Importantly, even-chain saturated fats are present at much higher levels than odd-chain fats in high-fat foods. For example, Williams showed that red meat has 200 to 800 mg of C16:0 per 100 g of meat compared to 6 to 10 mg of C15:0 per 100 g of meat.

The opposing effects of even vs. odd-chain saturated fatty acids were used by Teng et al. to explain why studies sometimes show that foods with saturated fats are bad, while others show they are good. And why the net effects are sometimes neutral - the bad fats may be canceling out the good ones.

In Bishop et al.'s paper, they cover how C15:0 has both insulin-sensitizing and immune calming effects in preclinical models, while C17:0 had just immune calming effects. In contrast, models fed dairy fat had increased inflammation and impaired liver function. Further, they showed that C16:0 was proinflammatory and impaired glucose response. In this study, they concluded that dairy fat had a net negative effect because of the relatively higher amounts of C16:0.

In the recent Argavani et al. cross-over clinical trial, they showed that people who ate more daily servings of dairy fat had higher C15:0, which was associated with improved vascular function… but also had higher C16:0, which was associated with higher blood pressure. Their conclusion? Different saturated fatty acids in dairy fat have different effects.

This is why it's important to see if studies not only look at overall dietary saturated fats, but potential different effects of different saturated fatty acids (like, C15:0 vs. C16:0).

The types of high-fat foods also matter.

Interestingly, Jenkins et al. showed that rodents fed overall high-fat diets have *lower* C15:0 levels. One hypothesis is that C15:0, present in foods at low levels, is unable to compete for absorption compared to other fats, which are present at much higher levels.

In contrast, as demonstrated by Arghavani et al., C15:0 levels are reliably increased based on how much dairy fat we eat. And different sources of dairy fat can have different C15:0 levels. For example, Van Gastelen et al. showed that dairy fat from grass-fed cows had 26% more C15:0 compared to dairy fat from corn-fed animals. Further, cheese (including cheese from grass-fed sheep, like pecorino, as described by Serrapica et al.) can have some of the highest levels of C15:0.

Yuan et al. and Jeong et al. showed in their prospective cohort studies that higher amounts of dietary cheese (more than other dairy products) were associated with higher C15:0 during pregnancy and better cognitive development in children as well as better long-term cognitive health in adults, respectively.

So, when you see studies looking at the effects of dietary saturated fats on health, check to see if they differentiate between different dietary sources of those fats.

These are just a few reasons, among many others, why the science on saturated fats are so mixed.

Why it's okay to hero C15:0 as a healthy fat

Some of the recent news coverage, along with the WHO in their latest review of dietary saturated fatty acids, have indeed acknowledged that odd-chain saturated fatty acids (including C15:0) have evidence of beneficial effects. Interestingly, some are saying that it is impractical to separate these benefits since odd-chain and even-chain saturated fats are in the same foods.

This would be akin to saying we should write off other beneficial nutrients in milkfat - like vitamin D, vitamin A, and B12 - simply because they are in milkfat.

To address the issue of the complicated food matrix that is dairy fat, Thorning et al. recommend that some beneficial nutrients can do more good on their own, without having to be diluted by competing negative components.

Today, 100+ peer-reviewed studies are supporting the health benefits of C15:0 as a nutrient. This science is why the Office of Naval Research invested a decade of funding to study C15:0, including funding the development of a pure C15:0 supplement - to help allow this core beneficial nutrient to shine for everyone.

Have a fantastic week!

Dive deeper into the science

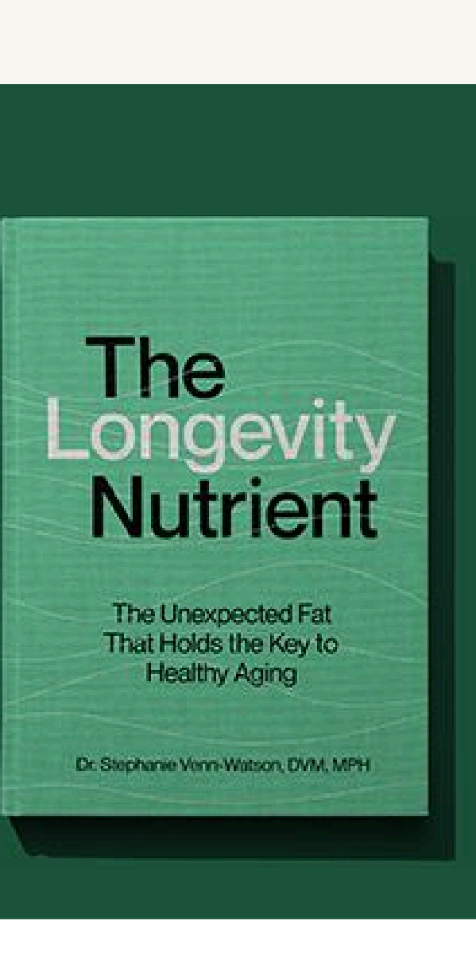
READ THESE STUDIES AT DISCOVERC15.COM/RESOURCES

- Korbecki et al. The effect of palmitic acid on inflammatory response in macrophages: an overview of molecular mechanisms.
- Sergi et al. Palmitic acid, but not lauric acid, induces metabolic inflammation, mitochondrial fragmentation and a drop in mitochondrial membrane potential in human primary myotubes.
- Saraswathi et al. Lauric acid versus palmitic acid: effects on adipose tissue inflammation, insulin resistance, and non-alcoholic fatty liver disease in obesity.
- Forouhi et al. Differences in the prospective association between individual plasma phospholipid saturated fatty acids and metabolic health: the EPIC-InterAct case-cohort study.
- Li et al. Saturated fatty acid biomarkers and cardiometabolic health: a meta-analysis of prospective studies.
- To et al. Pentadecanoic acid inhibits JAK-STAT signaling.
- Aabis et al. Pentadecanoic acid supports liver health by modulating oxidative stress, immune response and ferroptosis pathways in a rat.
- Venn-Watson et al. Efficacy of dietary odd-chain saturated fatty acid pentadecanoic acid parallels broad associated health benefits in humans: could it be essential?
- Duan et al. Odd-chain fatty acid-enriched fats improve growth and intestinal morphology and function in milk replacer-fed piglets.
- Singh et al. Immune effects of dietary pentadecanoic fatty acid supplementation on gut health in mice.

CLINICAL TRIALS WITH C15:0

- Stallings et al. (2013) Int J Clin Pharmacol Ther 51, 263-273.
- Mascarenhas et al. (2015) J Clin Pharmacol 55, 854-865.
- Robinson et al.(2024) J Nutr 154, 2763-2771.
- Chooi et al. (2024) Am J Clin Nutr 119, 788-799.
- Salamanca-Sanabria et al. (2025) Front Nutr 12, In Press.
- Arghavani et al. (2025) Nutr Metab, Cardiovasc Dis 35,104112.
- Kaneko et al. (2023) Med Cons New-Remed 60, 459-470.

- Williams, P. Nutritional composition of red meat.
- Teng et al. C15:0 and C17:0 partially mediate the association of milk and dairy products with health risks.
- Bishop et al. Heptadecanoic acid is not a key mediator in the protection of liver health and glucose balance in mice.
- Arghavani et al. Impact of dairy intake on circulating fatty acids and associations with blood pressure: A randomized crossover trial. Nutr Metab.
- Jenkins et al. The dietary total-fat content affects in vivo circulating C15:0 and C17:0 fatty acid levels independently.
- Van Gastelen et al. Milk fatty acid composition in lactating cows fed grass silage- or corn-silage-based diets.
- Serrapica et al. Seasonal variation of fatty acid profile of a mountain pecorino cheese.
- Yuan et al. (2022) Associations of maternal consumption of dairy products during pregnancy with perinatal fatty acid profile in the EDEN cohort study.
- Yuan et al. (2025) Associations between perinatal biomarkers of maternal dairy fat intake and child cognitive development: results from the EDEN mother-child cohort.
- Jeong et al. Cheese consumption and cognitive health in community-dwelling older Japanese adults: the JAGES 2019-2022 cohort study.
- Thorning et al. Whole dairy matrix or single nutrients in assessment of health effects: current evidence and knowledge gaps.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