Whole-fat vs. reduced-fat milk: Which is better for our cells?

July 30, 2023

Welcome to Issue 55 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. Eric Venn-Watson, our co-founder and Navy physician, is reading.

HEALTHY AGING

Moving to reduced-fat milk negatively impacts red blood cells

In this series, we are catching up on the latest peer-reviewed C15:0 science that has been published during 2023.

This week, let's talk about a new abstract published in *Proceedings of the Nutrition Society*, which studied how moving from whole-fat to reduced-fat dairy products affects children's red blood cells.

Toddlers are often moved from whole-fat to reduced-fat milk.

The American Academy of Pediatrics currently recommends that parents move their kiddos, once they turn 2 years old, from whole-fat milk to low or non-fat cow's milk. As such, Nicholl et al conducted what they called the Milky Way Study, to look at the effects of moving 49 kids (4 to 6-year olds) from whole-fat to reduced-fat dairy products for 3 months. Specifically, they wanted to find out if this dietary change affected the fatty acid profile of their red blood cells.

So, why did they look at fatty acids in red blood cells?

Well, the fatty acid content of our red blood cell membranes provides a super helpful window into the fatty acid content of cells throughout our body. Red blood cell fatty acid measurements readily reflect how a dietary change impacts our cell membrane makeup.

Got it. What did they find?

Nicholl et al. showed that when kids moved from whole-fat to reduced-fat dairy products, C15:0 (pentadecanoic acid) levels in their red blood cell membranes declined. Interestingly, they also showed that omega-3 fatty acid levels decreased, too.

The authors concluded that moving kids from whole-fat to reduced-fat dairy products was detrimental to the fatty acid composition of red blood cells.

But, why are these changes detrimental?

While Nicholl et al. focused on the detriment of lower omega-3s, there are a few reasons why decreased C15:0 content in our cell membranes can be more detrimental.

- **First, cellular instability.** C15:0 is a stable fatty acid that is particularly resistant to lipid peroxidation and keeps our cell membranes strong. Decreased C15:0 content in cell membranes makes red blood cells more fragile and more susceptible to lipid peroxidation.
- **Second, anemia.** Specific to red blood cells, Soboleva et al. showed that kids with fragile red blood cells (aka anemia) have high overall levels of lipid peroxidation. And those who had the lowest C15:0 in their red blood cells, had the most fragile cells and highest levels of lipid peroxidation. In contrast, the more polyunsaturated fatty acids (aka omega-3s) the kids had, the more fragile their cells.
- **Third, a theory on shorter longevity.** This phenomenon of fragility is not limited to red blood cells. As described in A.J. Hulbert's Cell Membrane Pacemaker Theory of Aging, the more stable the fatty acids in all of our cell membranes, the longer a mammalian species lives. Yep - stronger cell membranes explain how we live longer than our fellow mammalian mice.

Should kids (and adults) go back to whole fat milk?

An argument for children. One could certainly argue that kids should just stay on whole fat milk. While the move away from whole fat milk was intended to help decrease their risks of obesity and type 2 diabetes, we've only seen an increase in these issues. Vanderhault et al. extensively reviewed 28 studies and showed that kids who drank whole fat milk were less likely to be overweight than kids drinking reduced fat milk. We're eager for the American Academy of Pediatrics to weigh in.

A different one for adults. For us adults, whole fat milk contains much higher amounts of pro-inflammatory even-chain saturated fatty acids (e.g. C16:0), which continue to be associated with a higher risk of developing type 2 diabetes and heart disease in our older years. In a large prospective cohort study, Xu et al. showed that adults with cardiovascular disease who drank whole-fat dairy milk had higher mortality rates compared to those who drank reduced-fat milk.

And a third for pure C15:0. While we often talk about the science-backed benefits of pure C15:0 related to metabolic, heart, and liver health, Venn-Watson et al. also showed that C15:0 supplementation successfully raises C15:0 in red blood cells, resulting in - you guessed it - stronger, more resilient, and healthier RBCs.

Stay cool, and have a great week!

Dive deeper into the science

READ THESE STUDIES

- American Academy of Pediatrics: Guidance for Cow's Milk & Alternatives
- Nicholl et al. RBC fatty acid composition is detrimentally affected by changes from whole-fat to reduced-fat dairy products in children
- Soboleva et al. Fatty acids of red blood cell membranes and the intensity of lipid peroxidation
- A.J. Hulbert. On the importance of fatty acid composition of membranes for aging
- Vanderhout et al. Whole milk compared with reduced-fat milk and childhood overweight: a systemic review and meta-analysis
- Xu et al. Different types of long-term milk consumption and mortality in adults with cardiovascular disease
- Venn-Watson et al. Increased dietary C15:0 alleviates anemia in dolphins
- Venn-Watson et al. C15:0 supplementation improves red blood cell health
- Check out all the C15:0 science at www.discoverC15.com