The Rising Importance of Stronger Cells

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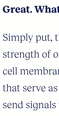
Welcome to Issue 80 of Science Says! Our weekly newsletter where you'll learn the latest healthy aging and C15:0 research news that our team of doctors, scientists, and experts are most excited about—without having to go search for it.

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

Cellular integrity is a thing (really)

In this Whole Body Health Series, we are sharing the latest science on our whole body, from our cells on up.

This week, we'll start with the basic building block of our body: cells. Specifically, the rising importance of cellular integrity (aka strong cells).

Great. What do you mean by "strong cells"?

Simply put, the strength of our cells is determined by the strength of our cell membranes. As a quick reminder, our cell membranes are made of two layers of lipids (aka fats) that serve as an armor for our cells. These fats also help to send signals within and between our cells. So, think of our membranes as critical cellular bodyguards with great communications skills.

Okay, but what makes a cell membrane strong?

Basically, sturdy fats. As described by A.J. Hulbert's *Cell Membrane Pacemaker Theory of Aging*, the more stable the fatty acids in our cell membranes, the stronger our cells... and the longer we live (really).

- Saturated fatty acids, like C15:0, are super stable and contain no double bonds in their molecular structure.
- Unsaturated fatty acids, especially polyunsaturated fatty acids, are unstable because they contain double bonds.

In his studies, Hulbert showed that mammals with the longest lifespans had the most saturated fatty acids (aka the least double bonds) in their cell membranes. This is because double bonds are weak points that make fats susceptible to attack by oxygen, resulting in lipid peroxidation. In turn, as described by Jomova et al., lipid peroxidation leads to cellular breakdown, chronic inflammation, and faster aging.

These days, our cell membranes are under attack by a new enemy called ferroptosis.

As described by Mortensen et al., oxidation of polyunsaturated fatty acids in our membranes can lead to cellular death.

This lipid peroxidation-driven form of cellular death was discovered by a team of scientists at Columbia University. They coined the term, "ferroptosis", in their hallmark 2012 paper. Since then, over 10,000 peer-reviewed papers have been published on ferroptosis, including its role in worsening cognitive, metabolic, and heart health, all while accelerating aging.

Which fatty acids make ferroptosis worse?

Well, those with the most double bonds (aka polyunsaturated fatty acids). While omega-6 fatty acids appear to be the worst actors, Mortensen et al. showed in models of aging and ferroptosis that both omega-3 and omega-6 fatty acids accelerate cellular damage and death.

We'll dive deeper into ferroptosis next week, specifically the added damaging role of iron. For now, it's good to know that the more stable the fatty acids in our cell membranes, the lower the risk of ferroptosis and cell death.

How to make cell membranes stronger.

Here's the good news: what we eat directly influences the fatty acids in our cell membranes - which means that we can readily increase those resilient fats in our cells, especially C15:0. Our own peer-reviewed studies have shown that increasing intake of C15:0 helps make cells 80% stronger.

Others have also shown that cell membranes are really good at swapping out fatty acids based on what we eat, including C15:0:

- Skeaff et al. showed that moving between diets high in polyunsaturated or saturated fats (including C15:0) effectively changed these fatty acids in our cell membranes **within 5 days.**
- When kids moved between drinking non-fat to whole fat cow's milk, Nicholl et al. showed that their cell membrane C15:0 levels changed **within 3 days.**

This encouraging news supports that we can readily protect the resilience of our cells (and ourselves) with some pretty simple steps.

Next week, we'll cover more about the emerging science around ferroptosis, and how C15:0 helps keep our cells in tip-top shape. In the meantime, have a great week, everyone!

Dive deeper into the science

READ THESE STUDIES

- AJ Hulbert. On the importance of fatty acid composition of membranes for aging.
- Jomova et al. Reactive oxygen species, toxicity, oxidative stress, and antioxidants: chronic diseases and aging.
- Mortensent et al. Polyunsaturated fatty acids drive lipid peroxidation during ferroptosis.
- Dixon et al. Ferroptosis: An iron-dependent form of nonapoptotic cell death.
- Venn-Watson et al. C15:0 improves cellular resilience.
- Skeaff et al. Dietary-induced changes in fatty acid composition of cell membrane fatty acids.
- Nicholl et al. Red blood cell fatty acid composition is detrimentally affected by changes from whole-fat to reduced-fat dairy products in children.
- Nerd out on all the C15:0 science at DiscoverC15.com.