

Vitamin K Helps Lower Mortality Risk in People with Fatty Liver Disease

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STORY AT-A-GLANCE

- › Fatty liver disease affects 1 in 4 adults globally and can silently progress to liver failure, internal bleeding, or cancer without early warning signs
- › Higher vitamin K intake from food was linked to a 19% lower risk of death in people with fatty liver disease, according to long-term research
- › Even moderate vitamin K intake — below 121 micrograms per day — was linked to a 33% drop in death risk, especially in those not taking supplements
- › Obese individuals and older adults showed less benefit from vitamin K, likely due to reduced utilization or nutrient trapping in fat tissue with age and body weight
- › A major cause of fatty liver disease is excess linoleic acid (LA) and low choline intake, which together damage mitochondria, impair fat metabolism, and promote dangerous fat buildup in the liver

Fatty liver disease is fast becoming an epidemic, with one-fourth of adults globally now struggling with it.¹ Many are unaware that they have this condition until severe symptoms manifest. If not addressed immediately, it could lead to liver failure, internal bleeding, or liver cancer.

The good news is that fatty liver disease is preventable and that you actually have more control over your liver health than you think. An easy way to protect your liver health is by consuming a nutritious, well-balanced diet. One of the nutrients that will significantly

help is vitamin K — studies have provided supporting evidence on this.

Moderate Vitamin K Intake Lowers Risk of Death in People with Fatty Liver Disease

Fatty liver disease has undergone a major conceptual shift, both in how it's diagnosed and in how its root causes are understood. Today, the term **metabolic dysfunction-associated steatotic liver disease** (MASLD) has replaced older labels like nonalcoholic fatty liver disease (NAFLD) and nonalcoholic steatohepatitis (NASH).

I prefer to describe this condition as simply “fatty liver disease.” The additional attribution to cause is just medical jargon that provides no additional information about the condition itself and all three are synonyms for fatty liver disease.

A study published in Scientific Reports investigated whether vitamin K intake affects the survival time of people with fatty liver disease. The researchers analyzed health and nutrition data from 7,857 adults diagnosed with fatty liver disease using U.S. National Health and Nutrition Examination Survey (NHANES) surveys between 2005 and 2018.²

- **Researchers investigated whether this specific nutrient plays a role in improving fatty liver disease outcomes** — They tracked these participants' diets and survival outcomes for up to 15 years to determine if there was a relationship between how much vitamin K people ate and their risk of dying from any cause.

Among this group, 842 deaths were recorded during the study period — giving researchers enough data to draw firm conclusions.

- **Here's what they found** — People who ate more vitamin K from foods were significantly less likely to die over the follow-up period. Specifically, every one-unit increase in vitamin K intake was linked to a 19% lower risk of dying.
- **Moderate intake reduced the risk of dying** — What's even more impressive is that for those consuming less than 121 micrograms (mcg) of vitamin K per day, each step up in intake was linked to a 33% drop in the risk of death. Even after adjusting

for different external factors like smoking, alcohol use, body mass index (BMI), and supplement intake, the link between moderate vitamin K consumption and lower mortality risk remained strong.

- **Interestingly, the researchers explored why consuming too much vitamin K didn't provide added benefits** — One explanation is that vitamin K shares a metabolic pathway with vitamin E, and high intake of one might interfere with the other. Both nutrients are processed by the same liver enzyme (CYP4F2), and excessive vitamin E has been shown to reduce vitamin K levels in animal studies.

In this study, when the researchers adjusted for vitamin E intake, the protective effect of vitamin K slightly weakened — suggesting some overlap or competition between the two.

Getting Enough Vitamin K from Your Diet Significantly Reduces Your Risk of Fatty Liver Disease

While the featured study shows how vitamin K is beneficial for people already with fatty liver disease, an earlier study published in the *Frontiers in Nutrition* shows that getting enough of this nutrient from your diet may help avoid the onset of this disease.³

The researchers analyzed data from 3,571 adults across the U.S. using NHANES surveys from 2017 to 2018 to identify whether people with higher vitamin K intake had lower odds of having fatty liver disease — and whether that was different in people who relied on food alone versus those who used dietary supplements.

- **People with fatty liver disease consistently ate less vitamin K than those without it** — On average, the people who developed fatty liver disease consumed about 123 mcg daily, while the healthy group consumed around 145 mcg per day.

After the researchers adjusted for lifestyle, metabolic, and dietary factors, the data still showed the same results — having more vitamin K in your diet leads to a less fatty liver.

- **Vitamin K from foods provided the best benefits** — The study found that the protective effects of vitamin K were strongest in people who got this nutrient from their diet. When the researchers looked specifically at people who did not use supplements, the protective link between vitamin K and lower liver fat remained strong and statistically significant.

But among supplement users, the association lost its strength once other factors — like exercise, calorie intake, or metabolic diseases — were accounted for. Hence, the study shows that eating vitamin K-rich foods provided more liver-protective benefits than supplementation.

- **The protective effects were consistent across most major groups, except for two — the elderly and obese individuals** — One possible explanation is that vitamin K is fat-soluble and gets sequestered in fat tissue. That means obese individuals store vitamin K in fat rather than use it for liver protection.

Why Does Vitamin K Have Beneficial Effects for Fatty Liver Disease?

To understand why [vitamin K](#) is so effective, these two studies highlighted several biological mechanisms.^{4,5}

- **Vitamin K is essential for activating the matrix Gla protein (MGP)** — this protein prevents calcium from hardening in soft tissues. In fatty liver disease, where chronic inflammation accelerates vascular calcification and insulin resistance, this function is especially important. By ensuring MGP is fully activated, vitamin K helps protect both your liver and blood vessels from long-term damage.
- **It reduces inflammation, a key driver of fatty liver disease progression** — Vitamin K does this by blocking a signaling molecule called NF- κ B, which fuels the release of damaging cytokines like IL-6 and TNF- α . This matters because unchecked

inflammation pushes fatty liver disease toward more advanced stages, like fibrosis and cancer. By inhibiting this inflammatory cascade, vitamin K helps keep your liver from progressing to those advanced and life-threatening stages.

- **Vitamin K supports healthy insulin function** — Insulin resistance is one of the primary root causes of fat accumulation in the liver. When your cells ignore insulin, your body stores more fat in the liver — and damage follows. Vitamin K helps restore insulin sensitivity by supporting proper insulin receptor activity. This improves how your body handles glucose and fat, which in turn slows down or even reverses fat accumulation in the liver.
- **Vitamin K protects your liver on a cellular level** — It helps reduce oxidative stress and prevent ferroptosis, a form of cell death triggered by fat-based toxins and free radicals that build up in the liver. Vitamin K interferes with this destructive process, acting like a molecular shield for liver cells.

It also activates a protein called Gas6, which in turn boosts AMP-activated protein kinase (AMPK), an enzyme that governs fat burning and insulin sensitivity. In short, vitamin K signals your liver to burn fat more efficiently and store less of it — helping reverse the key metabolic damage behind fatty liver disease.

The 2 Types of Vitamin K

Vitamin K exists in two forms — vitamin K1 (phylloquinone) and vitamin K2 (menaquinones).⁶ These two forms are differentiated through their sources and their functions in your body:

- **Vitamin K1** — Derived from plant sources like vegetables, this nutrient facilitates blood coagulation, a vital process that prevents excessive bleeding when injuries occur.

- **Vitamin K2** — This plays a more significant role in bone and cardiovascular health, guiding calcium to your bones and away from your arteries. Its primary sources are animal products and fermented foods. In studies, this is the type that protects against fatty liver disease.⁷
- **Vitamin K2 exists in several subforms** — These are designated as menaquinone-4 (MK-4) through MK-13. MK-7 through MK-13 are primarily produced by bacterial fermentation in your gut, but they're also found in fermented foods
- **Vitamin K2 is superior, studies show** — While both forms of vitamin K are indispensable, there are studies showing that vitamin K2 has certain advantages over K1,⁸ particularly in terms of absorption, distribution, and overall impact on your body. I recommend reading "[Vitamin K1 vs. K2 — Understanding Their Distinct Roles in Your Health](#)" for more information on this topic.

What Are the Best Food Sources of Vitamin K2?

As the second featured study mentioned, ensuring adequate intake of vitamin K particularly through K2-rich foods is the best way to reap the benefits of this nutrient. These include:⁹

- **High-quality animal products** — Opt for grass fed and pasture-raised animal products such as tallow and organ meats like liver.
- **Certain cheeses like Gouda and Brie** — These have high K2 content. Choose cheese made with animal rennet instead of GMO alternatives.
- **Fermented foods** — Natto, a traditional fermented soybean product, boasts the highest concentration of highly absorbable MK-7 vitamin K2.
- **Egg yolks** — While egg yolks are classified as an animal product, I do believe they deserve a special mention, as they are among the highest dietary sources of MK-4, a vital form of vitamin K2 that plays a crucial role in bone health, cardiovascular

function, and calcium regulation. Plus, egg yolks are a rich source of choline, another nutrient that plays a significant role in liver health (more on this below).

You just need to be careful about your egg sources as most commercial egg sources — even free-range organic — have high levels of polyunsaturated fats (PUF) levels as they are fed grains like soy and corn. Ideally, chickens should be fed rice, barley and split peas. I personally eat six egg yolks a day from chickens who are fed this and have 80% less linoleic acid (LA) than regular chickens.

Below is a comprehensive overview of egg yolks as a top source of MK-4, along with additional dietary sources and considerations.

Summary Table: Nutrient Comparison in Egg Yolks vs. Other Sources		
Nutrient	Egg Yolk Content (per large yolk)	Other Top Sources
MK-4 (Vitamin K2)	~15 mcg	Chicken liver (~13 mcg/100g), Beef liver (~11 mcg/100g), Butter (~15 mcg/100g)
Choline	~147 mg	Beef liver (~418 mg/100g), Soybeans (~116 mg/100g), Salmon (~56 mg/100g)
Vitamin D	~37 IU (0.925 mcg)	Fatty fish (~400-600 IU/100g), Fortified dairy (~100 IU per serving)
Vitamin A	~245 IU	Beef liver (~6,582 IU/100g), Sweet potatoes (~19,218 IU/100g)
Selenium	~15.4 mcg	Brazil nuts (~544 mcg/100g), Tuna (~108 mcg/100g)
Vitamin B12	~0.6 mcg	Clams (~84 mcg/100g), Beef liver (~70 mcg/100g)
Riboflavin (B2)	~0.2 mg	Beef liver (~4.5 mg/100g), Almonds (~1.1 mg/100g)
Folate (B9)	~24 mcg	Beef liver (~145 mcg/100g), Spinach (~194 mcg/100g)
Biotin (B7)	~10 mcg	Liver (~100 mcg/100g), Almonds (~60 mcg/100g)

However, I do understand that there are circumstances where it may be difficult to obtain this nutrient from dietary sources. In this case, I recommend adding a high-quality MK-7 vitamin K2 supplement to your daily regimen.

A Deadly Combination That Leads to Fatty Liver Disease – Excessive Linoleic Acid and Choline Deficiency

Going back to the topic of fatty liver disease, I believe that one of the most significant factors contributing to its increasing rates today is the excessive LA in our modern diet and how it disrupts cellular health. Pair it with choline deficiency, and you end up with a vicious cycle leading to fatty liver disease.

I've written a paper on this topic, which is still pending peer-review, however, you can download and read a simplified version [here](#). I've also highlighted the most significant points below.



- **A key factor leading to fatty liver disease is mitochondrial dysfunction** – Ethanol (found in alcohol) and LA are the two most significant drivers of fatty liver disease in our modern diets; they produce toxic aldehyde byproducts when metabolized in the liver. Ethanol is converted into acetaldehyde, while LA breaks down into 4-hydroxynonenal (4-HNE), both of which are highly reactive and damaging to mitochondria.

These aldehydes bind to proteins, phospholipids, and mitochondrial DNA, impairing oxidative phosphorylation and reducing the liver's ability to generate ATP. Over time, this impairs the liver's capacity to oxidize fats, allowing them to accumulate inside your liver cells.

- **When the aldehydes damage the mitochondria's protective membranes, the inner structure starts to break down** — This hampers their energy-making process, reducing production of ATP (your cells' main energy source) and causing more reactive oxygen species (ROS) to leak out, which adds to oxidative stress.

As the mitochondria start sending distress signals, it activates immune responses, triggering inflammation in the liver. This worsens fatty liver disease — from simple fat buildup, it progresses to serious conditions like fibrosis or liver cirrhosis.

- **How does choline help?** Choline, an essential nutrient that plays a pivotal role in liver function, mitochondrial performance, and membrane integrity, acts by crossing the intestinal wall and entering the bloodstream. It is then transformed into phosphatidylcholine (PC) through a multi-step process called the CDP-choline pathway. The end result of this process is phosphatidylcholine (PC) — this is the form your liver uses to build membranes and carry fat out of the cell.
- **Choline's roles go beyond liver function** — Once absorbed into cells, choline enters a network of metabolic routes that support brain signaling, gene regulation, fat metabolism, and bile composition. It plays a role in fetal development and infant brain growth, nervous system health, and cardiovascular health.

Protect Yourself from Fatty Liver Disease with These Strategies

As these findings show, it's clear that addressing fatty liver disease starts with making changes to your diet. Certain key nutrients — combined with healthy lifestyle changes — will help protect you from the onset of this disease and minimize its damage. Here are my recommended strategies.

- 1. Improve your diet** — Focus your meals on whole, unprocessed foods, especially vegetables, fruits, lean proteins, and healthy carbohydrates. I also recommend consuming foods high in vitamin K and choline, while removing ultraprocessed foods, especially seed oils that are high in linoleic acid.
- 2. Consider citicoline supplementation** — Choline is abundant in food sources like beef liver, egg yolks, and raw milk. However, if you're not getting enough, taking a high-quality supplement will help boost your intake.

I recommend citicoline because most forms of choline supplements have poor availability. Citicoline is the immediate precursor for the synthesis of phosphatidylcholine, and increased intake helps your fat to be transported out of your liver. Formulations differ depending on the manufacturer, ranging from 500 to 2,500 mg per day. To find out your ideal dose, consult with your health care provider because choline toxicity, while rare, is a real condition.

- 3. Manage your weight** — Excess body weight is a culprit in fatty liver development — as one of the studies mentioned, vitamin K is fat-soluble and could be sequestered into fat tissue instead of being used by your liver. Losing even a modest amount — around 7% to 10% of your total body weight — will have dramatic benefits.
- 4. Stay physically active** — Exercise is one of the best things you can do for your health, as it helps your body burn off excess fat stores, especially around your liver, and boosts insulin sensitivity, directly reducing the inflammatory cycle caused by fatty liver disease. Aim for at least 30 minutes of moderate-intensity activity most days of the week, such as brisk walking, cycling, or swimming.
- 5. Address underlying metabolic imbalances** — If you're diabetic, pre-diabetic, or insulin-resistant, improving your blood sugar control is essential. Pay close attention to your carbohydrate intake, choosing complex carbs (like white rice) over simple sugars.

Frequently Asked Questions (FAQs) About Vitamin K and Fatty Liver Disease

Q: How does vitamin K help protect against fatty liver disease?

A: Vitamin K supports liver health by reducing inflammation, improving insulin sensitivity, and preventing fat-related cell damage. It also activates proteins that help prevent scarring and calcification in liver tissue, slowing or reversing disease progression.

Q: Is vitamin K from food better than supplements for liver protection?

A: Yes. Research shows that people who got vitamin K from food had better protection against fatty liver disease and lower risk of death. Whole foods appear to offer more consistent benefits than synthetic forms.

Q: What makes food-based vitamin K more effective than supplements?

A: Food-based vitamin K is absorbed and used by the body more effectively, especially when combined with other nutrients naturally present in whole foods. Supplements may not deliver the same benefits due to differences in metabolism.

Q: Why didn't obese individuals and older adults benefit as much from vitamin K?

A: Vitamin K is fat-soluble and may get trapped in body fat, especially in obesity. In older adults, metabolic changes might reduce how well their bodies use the vitamin, limiting its liver-protective effects.

Q: What other nutrients affect fatty liver disease risk?

A: Excess linoleic acid (from seed oils) and choline deficiency are a harmful combination that worsens liver damage. Choline helps export fat out of liver cells, while linoleic acid drives mitochondrial injury. Addressing both is key to recovery.

Sources and References

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