

The surprising reason eating less meat is linked to a longer life: A smelly toxic gas

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Credit: Valeria Boltneva from Pexels

High-protein diets are having a moment. In any grocery store you can now buy a protein bowl, pick up a protein box of eggs and nuts for lunch, or snack on a protein bar.

But there's evidence that restricting which proteins you eat—particularly cutting back on meat—could be important for healthy aging. The surprising reason: it forces the tissues to make hydrogen sulfide (H_2S), a gas that's poisonous if inhaled and smells like rotten eggs, but promotes health inside the body.

As a physiology researcher, I have long been interested in the strange role of H_2S in the body. This is not a gas anyone wants around. It stinks, is a component of flatulence, and its toxicity has been [linked to at least one mass extinction](#).

And yet, the body naturally produces small amounts of it as a signaling molecule to act as a chemical messenger. Now, we are starting to understand the link between diet and H_2S production.

Diet restrictions that increase longevity

Less can be more when it comes to food. When scientists have put organisms on carefully balanced but restricted diets, these organisms have substantially increased healthy lifespans.

This holds true for [yeasts, fruit flies, worms and monkeys](#). In mice, such diets [reduce cancer risk](#), strengthen the immune system and improve cognitive function.

But because aging and longevity are complex processes, it has been difficult for researchers to pin down the mechanisms at work. Recent studies have shed new light, and it is apparent that H_2S plays a crucial role.

Studies since the 1990s have shown that reducing intake of certain sulfur-containing [amino acids](#), the building blocks of proteins, can increase [longevity in rats](#) by around 30 percent. More recently, a collaborative

team involving me and led by scientists at Harvard, performed a series of animal studies in which we restricted the intake of two sulfur amino acids—cysteine and methionine—to study what effects this had.

It caused the animals to [ramp up production](#) of H₂S in their tissues, which triggered a cascade of beneficial effects. These included increased new [blood vessel generation](#), which promotes cardiovascular health, and better resistance to oxidative stress in the liver, which is linked to liver disease.

But it remained to be seen whether similar effects would occur in humans. Earlier this year, a study using data from the 11,576 adults in NHANES III, the U.S. national nutrition survey, [delivered evidence that they do](#). It found that reduced dietary intake of these sulfur amino acids is linked to lower cardiometabolic risk factors, including lower levels of cholesterol and glucose in the blood. Cardiometabolic risk factors are those linked to heart disease, stroke and diabetes.

Eat less meat, live longer?

The upshot of this research is that there's good evidence that limiting intake of foods containing high levels of sulfur amino acids can reduce the risk of chronic diseases like diabetes and heart disease, and promote healthy aging. In North America, most of us are a long way from achieving this. Because these sulfur amino acids are abundant in meat, dairy and eggs, which feature prominently in our shopping carts, we eat on average [2.5 times our daily requirement](#) of them.

Red meat is particularly high in sulfur amino acids, but fish and poultry white meat also contain a lot (the dark meat has less). Switching to [plant-based proteins](#) would help reduce this intake.

Beans, lentils and legumes are good sources of protein that are also low

in sulfur amino acids. But beware: soy protein, which is the basis of foods like tofu, is surprisingly high in sulfur amino acids. Meanwhile, vegetables like broccoli contain lots of sulfur but not in amino acid form.

One important caveat is that sulfur amino acids play vital roles in growth, so children should not adopt diets that are low in them.

Other roles for H₂S

It might seem odd that a toxic gas can help maintain health, but it may reflect the origins of life on early Earth when the atmosphere was much richer in sulfur gas than it is today. Indeed, we are starting to appreciate how fundamental H₂S signaling may be. For example, it has also been shown to reduce inflammation, opening the door to potential [new treatments for arthritis or potential use as a painkiller](#).

The trick is delivering H₂S where it's needed—safely. Several [pharmaceutical companies](#) are working on compounds that bind it while in transit through the body, and release it in tiny doses in the tissues. In time, these could be used as preventive measures to support healthy aging. This would be useful because the drawback of a low-sulfur amino [acid](#) diet is that humans are notoriously bad at sticking to such plans long-term.

In the lab, we can control experimental diets. In the [real world](#), people snack or grab a burger when they don't want to cook. If delivery mechanisms can be made reliably and cheaply enough, it could be possible to gain the health effects of increased tissue H₂S without dictating what people eat.

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