

Not all proteins are created equal

Most Americans are eating enough protein. But research shows it can be tricky to eat the right mix

BY SUJATA GUPTA

Protein is having a moment. Crucial to helping the body build muscle, bones, cartilage, skin and blood, protein has begun cropping up as an additive in everything from cookies and chips to beverages. Social media influencers with muscles seemingly carved from stone tout high-protein diets as key to, well, looking like them.

The official memo is that people in the United States are getting more than enough protein. Recent figures from the U.S. Department of Agriculture suggest that adults in the United States are eating 35 to 55 percent more protein than the recommended daily allowance established by the government of 0.8 grams of protein per kilogram of body weight. “Based on that... we don’t have a protein issue in the [United States],” says nutritionist Joseph Matthews of the University of Arkansas for Medical Sciences (UAMS) in Little Rock.

Except there’s a catch: Dietary guidelines worldwide tend to hinge on the assumption that all whole-food protein sources are created equal.

In the United States, for instance, the guidelines stipulate that the protein in an ounce of meat equals the amount of protein in, for example, a cooked egg, a quarter cup of cooked beans, a tablespoon of peanut butter or half an ounce of mixed nuts.

Mounting evidence says that’s not true. “Those equivalencies aren’t equivalent,” says metabolism expert Rob Wolfe, also at UAMS. “We should pay attention to the quality of the protein.” Quality is determined by the molecular makeup of a given protein and how it gets digested in the body. Work by Wolfe and others shows that animal foods such as meat, dairy and eggs typically contain higher quality proteins than plant foods, including legumes, nuts and seeds.

So right now, even if most people are eating enough protein, they may not be eating the right mix. Older populations are especially vulnerable, with some estimates suggesting that up to half of U.S. adults over age 70 struggle to eat enough high-quality proteins. That deficiency can lead

to lost muscle mass over time and weakness. That can make it hard for people to perform daily tasks and increase their risk of falls.

It's not that people should be eating more meat, says Glenda Courtney-Martin, a nutritional scientist and dietitian at the University of Toronto Hospital for Sick Children. People in wealthy countries are generally advised to eat less meat to reduce greenhouse gas emissions and improve overall health, because eating meat is linked to ailments from cardiovascular disease to cancer.

Instead, she and other nutritionists say people can get high-quality protein if they adjust how much plant-based protein they eat, which foods they eat together and even how they prepare their protein sources.

PROTEIN QUANTITY VS. QUALITY

Proteins are made up of long amino acid chains. How those amino acids are sequenced determines the type of protein created. To work properly, the human body needs 20 amino acids. Our cells can make 11 of those amino acids, while the remaining nine, called essential amino acids, must come from food.

Foods vary widely in their essential amino acid composition. Beef, chicken, fish, milk and eggs contain enough of all the essential amino acids; nuts and most beans do not. Additionally, proteins in food come bound up in fibers and other substances that the body must break down to access the essential amino acids. This affects what nutritionists call their bioavailability. In general, the body is better at breaking down animal proteins than plant proteins.

Moreover, the body will make only as many proteins as possible with the amino acids present and bioavailable in a given time frame, though researchers aren't yet sure if this means hours or days. Any extra amino acids cannot combine to make a complete protein, so they get tossed out.

"If only half the protein you eat is actually being digested and absorbed into the body, [and the rest]

just passes through you and is excreted, it's not providing any benefit," Wolfe says.

Current dietary guidelines, which consider protein quantity but not quality, can mislead consumers, Wolfe and his team argued in May 2021 in the *Journal of Nutrition*. The researchers randomly assigned 56 adults ages 18 to 40 to one of seven food options: beef sirloin, pork loin, eggs, kidney beans, peanut butter, tofu or mixed nuts. Each person ate what counts as the same amount of protein under the U.S. dietary guidelines. Using an intravenous tracer, the team could measure how efficiently each person turned amino acids from the protein source into muscle proteins, a process known as muscle protein synthesis. The researchers found that participants in the animal product groups synthesized more proteins than participants in the plant groups.

In an accompanying commentary, Courtney-Martin says that this sort of research is key to sustainably transforming the global food system. The study shows that U.S. dietary guidelines "promote a false equivalence that all proteins are equal, which indeed, they are not," she writes.

One solution is to build dietary guidelines around essential amino acids rather than proteins, says nutritional biochemist Donald Layman of the University of Illinois Urbana-Champaign. "We don't have a protein requirement at all. What we have is a requirement for nine essential amino acids."

To that end, Layman and his team have developed a tool, the EAA-9, to calculate amino acid requirements. Consider an egg. A single egg provides around 25 percent of the recommended daily allowance for several amino acids, but only 15.77 percent of the allowance for the essential amino acid histidine. Because the body will toss out all the amino acids in excess of the histidine, an egg gets an EAA-9 score of 15.77. Peanut butter, meanwhile, is so deficient in the essential amino acid lysine that a single tablespoon clocks in with a score of just 4.04.

Current U.S. guidelines stipulate that the amount of protein in a tablespoon of peanut butter is equivalent to the amount of protein in a single egg, but based on the EAA-9, that's woefully off base, Layman and colleagues reported in July in the *Journal of the Academy of Nutrition and Dietetics*. Per those scores, a person would need to eat roughly four times as much peanut butter to get the same protein benefits found in a single egg. When it comes to legumes, a person

35 – 55 percent

The amount of protein U.S. adults are eating in excess of the daily recommended allowance

would need to eat more than twice the recommended daily intake—for instance, over half a cup of kidney beans instead of the recommended quarter cup—to match an egg’s protein benefits.

Part of the reason protein guidelines tend to fall short is they assume people are eating a meat-heavy diet, experts say. The Netherlands illustrates how to reorient nutrition guidelines around a plant-based diet without compromising people’s consumption of high-quality proteins, Matthews says. For several years, the country has sought to reduce greenhouse gas emissions by encouraging people to eat less meat. The Health Council of the Netherlands recommends that people reduce red meat consumption while eating weekly servings of legumes and fish. The council also advises that people eat daily servings of fruits and vegetables, dairy and nuts.

In their early guidelines, the Health Council of the Netherlands advised individuals who don’t eat meat, including vegetarians and vegans, to consume 30 percent more protein than meat eaters. More recently, though, Dutch officials said vegetarians can meet their protein needs through animal foods, including dairy and eggs. Vegans should still try to eat more protein.

Increasing the amount of protein people get from plant-based sources without eating more calories can be tricky, researchers say. In the United States, most of the suggested protein swaps have roughly the same amount of calories. Calibrating serving sizes according to amino acid availability instead of caloric intake shows that a person would need to eat 370 calories of peanut butter or 120 calories of kidney beans to get the same protein benefits found in a single, 70-calorie egg.

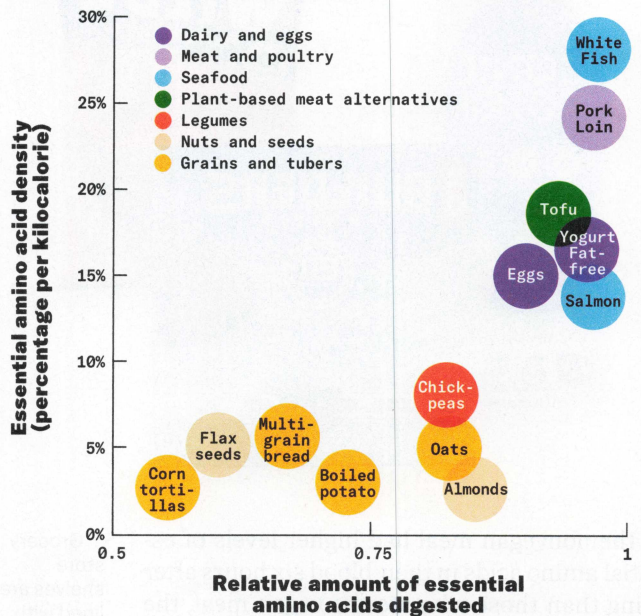
“If your diet has mostly lower-quality proteins, then you need more quantity,” Matthews says.

VULNERABLE POPULATIONS

Certain populations may struggle to safely reduce meat consumption, Dutch officials noted. Pregnant and breastfeeding individuals, for instance, require more protein than average.

Meanwhile, mounting evidence suggests that lowering meat consumption may be particularly challenging for older adults, who often struggle to eat large meals. Older adults also seem to require more of certain amino acids than younger adults. For instance, Courtney-Martin’s work shows that adults over 60 require more than double the amount of the amino acid leucine

PROTEIN QUANTITY VS. QUALITY



↑ Different foods provide higher quality proteins based on their essential amino acid density and how well they’re digested in the intestines.

than current recommendations.

Inadequate amino acid intake can hamper people’s ability to turn proteins consumed into muscle. And that can in turn increase older adults’ likelihood of developing sarcopenia, an age-related musculoskeletal disease that leads to reductions in muscle mass, strength and performance. Thought to afflict over a quarter of people over age 60 worldwide, sarcopenia can increase the likelihood of injuries, such as broken bones from falls, and the time it takes to recover from such injuries.

Part of the challenge for older adults is less efficient muscle protein synthesis, research shows. For instance, Dutch researchers found that muscle protein synthesis in healthy, twentysomething males was similar for groups that consumed plant proteins, such as those in potatoes or wheat, and milk proteins. But the team reached the opposite conclusion in a similar study of healthy older adults.

In that study, the team recruited 16 adults ages 65 to 85 and compared how their bodies responded to a vegan meal of chickpeas, quinoa, soybeans, broad beans and soy sauce versus a meal of lean ground beef, string beans, potatoes, applesauce and herb butter. Both meals contained complete amino acid profiles and similar quantities of protein. Participants who



ate the nonvegan meal had higher levels of essential amino acids in their blood six hours after eating than those who ate the vegan meal, the team reported in the *Journal of Nutrition* in July 2024. Crucially, those eating the nonvegan meal showed 47 percent higher muscle protein synthesis rates than those eating a vegan meal.

Some scientists now argue that the daily protein requirements should be raised for adults age 65 and older — from 0.8 grams to up to 1.5 grams of protein per kilogram of body weight.

HOW TO BALANCE YOUR PROTEINS

Athletes and pregnant or lactating individuals may also benefit from eating more protein than current recommendations. But most younger adults in developed nations can safely replace some animal proteins with plant proteins, Courtney-Martin says. A diet higher in plants may even help people feel better.

Many people with Western diets consume too much saturated and trans fats, leading to cardiovascular disease — “a plague in developed nations,” Courtney-Martin notes. Considerable research shows that diets high in plant foods also contribute to improved blood sugar control, better bowel health and lower cholesterol.

The benefits are more than physiological. Food production, particularly meat production, takes a heavy environmental toll in terms of greenhouse gas emissions, biodiversity loss and land-use changes, researchers wrote in February 2019 in the *Lancet*. They recommended that people worldwide consume primarily plant foods, some seafood and poultry and almost no red meat.

↑ Grocery store shelves are lined with processed foods with added protein. But experts recommend getting most protein from whole foods.

Whatever the reason, one key to reducing meat consumption is helping people learn how to eat, and ideally enjoy, plant-based foods while still meeting their protein needs.

Matthews, Wolfe and their team listed several recommendations for how to improve the protein quality of foods in July in the *Journal of Nutrition*. Legumes, for instance, don’t have very much of the amino acid methionine, but they have ample amounts of lysine. Rice has the opposite amino acid profile. So eating beans and rice together, as is common throughout the world, can provide a high-quality protein. This is not a new concept; more than 50 years ago, Frances Moore Lappé, author of the 1971 book *Diet for a Small Planet*, noted that combining different plant-based foods gives people access to amino acid profiles similar to those in animal-derived protein.

Another tactic is substituting rice with other cereals, such as sorghum or millet. And simple processing methods for lentils and beans such as soaking, sprouting and fermentation can reduce antinutrients, compounds that hinder the body’s ability to digest proteins, such as phytates, tannins and calcium oxalates.

People can also get more protein out of meats and other animal products so they can eat less of them, the team noted. For instance, older adults may have difficulty chewing their food, which limits protein availability. Such people can opt for the same amounts of foods but choose ground beef over steak or soft foods such as yogurt.

But consumers still need clear guidance on how to get the most from what’s on their plates, Courtney-Martin says. She envisions simple dietary guidelines built around plant-based diets and personalized to the needs of given demographic groups. For instance, a model plate for a young adult might show chickpeas, rice and vegetables as a complete meal, while a similar plate for an older individual might depict that same trio of foods alongside a small cut of meat, an egg or a cup of yogurt.

Most people in Western nations have some wiggle room to reduce their consumption of animal proteins and still meet their nutritional needs, Courtney-Martin says. For her part, she has started cooking a pot of beans or lentils and storing them in the fridge for a week. Instead of having two pieces of chicken for dinner one night, she can have one piece with a quarter cup of legumes.

“I am consistently eating less animal than I would normally eat,” she says. ✖