

## Omega-3: Food for (happy) thought

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Fish are an excellent source of omega-3 fatty acids. Photo by Rob Roberson.

As you do your Thanksgiving shopping this year, notice how many products on the supermarket shelves say “omega-3 fortified” on the label. Foods ranging from pasta to eggs to peanut butter are now enriched with this fatty acid. A stroll down the supplement aisle reveals rows of bottles containing omega-3-rich fish oil capsules.

Should you fill your cart with these products, or is this just another nutritional fad? What is the science behind the omega-3 craze? Just what are omega-3s and why should we care?

Omega-3s are a type of polyunsaturated fatty acid. “These are the most interesting nutrients. Fatty acids are very powerful in terms of health effects,” says Bonnie Beezhold, a professor of nutrition in the College of

Nursing and Health Innovation at ASU's Polytechnic Campus.

Fatty acids are components of most of the fat in your body. Although people often think of fats as something to avoid, everyone needs a certain amount of fat to stay healthy. The human brain, for example, is about 60 percent fat. The next time someone calls you a “fathead,” consider it a compliment!

There are two types of fatty acids that your body cannot manufacture on its own—you have to consume them. These are the essential fatty acids called omega-3 and omega-6.

“In our ancestral diet, we got pretty much of a balance between these two types,” says Beezhold. “Scientists believe it was about a two-to-one ratio of omega-6 to omega-3, or at least less than four-to-one.”

Modern diets, however, are vastly different than those of our prehistoric ancestors. A typical American's diet today contains a 15- or 20-to-one ratio of omega-6 to omega-3 fat.

“Today, we eat less [fish](#), and we eat meat produced in a factory system. Instead of grazing on grass, these animals are fed corn and soy, which are major omega-6 plant sources, particularly corn. So their meat has lower levels of omega-3 and higher levels of omega-6 fat. Many animals are confined in small spaces and are not free to roam, which increases the fat content as well as the fatty acid proportions of their flesh,” explains Beezhold.

## **An inflammatory topic**

This imbalance has major effects on health.

Fatty acids are essential components of the membranes of every cell in

your body. These cell membranes form a protective barrier between the cell and the rest of the body. Membranes regulate what goes into and passes out of the cell. To be effective, these membranes must be strong but also flexible. The structure of omega-3s contribute greatly to the flexibility of the membrane.

The fatty acids in cells also produce eicosanoids. These are signaling molecules, kind of like hormones that work locally. They regulate activities like platelet aggregation and the immune response.

Omega-3 and omega-6 fats both produce eicosanoids that regulate inflammation. Inflammation occurs in response to injury or infection, and as we have all experienced, it involves swelling, heat, redness and pain. It's not pleasant, but it's important.

“When you get an injury or infection, you need inflammation. It's an immune response that ultimately repairs the body. Omega-6s generally make the eicosanoids that promote inflammation. Eventually there's a resolution promoted by anti-inflammatory eicosanoids that come from omega-3s,” says Beezhold.

A little bit of inflammation is necessary, but too much can wreak havoc on the body.

“All kinds of diseases have an inflammatory component. Our major chronic diseases, like heart disease and arthritis, have inflammation as an underlying process,” says Beezhold, who is particularly interested in the relationship between inflammation and mood.

“When inflammatory chemicals increase, they can also impact the brain. Research shows that there's such a thing as neuroinflammation,” she says.

She notes that people with heart disease have a higher risk of depression, possibly due to the same inflammatory mechanisms. And studies show that depressed people have lower concentrations of long-chain omega-3s in their blood. One of the best food sources of omega-3s is fish. Research surveying large populations show that low fish consumption is associated with prevalence of depression. For her Ph.D. dissertation, Beezhold conducted a small community survey on fish consumption and mood. She found, not surprisingly, that fish eaters reported better moods than folks who shunned seafood.

Her results made her curious. Are vegetarians – who don't eat fish – more depressed than omnivores? She decided to conduct a study with Carol Johnston, director of ASU's nutrition program. They surveyed Seventh Day Adventists in the Phoenix and Santa Barbara areas. This group is typically about half vegetarian, so the researchers could survey equal numbers of vegetarians and omnivores from a relatively similar population.

“We went into this thinking, ‘This is going to be a slam dunk. People who don't eat fish can't possibly have as good a mood as those who do.’ Interestingly, it wasn't even close. The vegetarians reported substantially better moods than the omnivores,” says Beezhold.

## **The skinny on fatty acids**

To understand how this could be true, it helps to understand more about plant and animal sources of fatty acids. Both plants and animals provide both omega-3 and omega-6 fatty acids. However, plants only provide the short-chain fatty acid variety with 18 carbons. Animals provide the long-chain variety containing 20 or more carbons.

Research shows that short-chain fatty acids are important in their own right, but not nearly as important as the long-chain variety. It is the long-

chain fatty acids, for example, that form eicosanoids and regulate inflammation.

Enzymes in your body can convert short-chain into long-chain fatty acids. However, the omega-6s and omega-3s compete for the same enzymes to do the conversion. When you eat animal sources of these fatty acids, conversion is not needed and these are preferred.

Although the vegetarians in the study weren't eating fish, they also weren't eating many sources of long-chain omega-6s (except in dairy products). So the level of long-chain omega-6s may be more important. And while vegetarians typically have a higher intake of the short-chain plant omega-6s than even omnivores, they also eat plenty of the omega-3 variety as well. Apparently they were able to synthesize the long-chain omega-3 [fatty acids](#) they needed.

Beezhold cautions, "This is just one study and we surveyed a special group—the Seventh Day Adventists—who are typically very health conscious. Thus, results may not be generalizable to the whole population."

To get more information, she has conducted a randomized, controlled trial in which she changed the protein sources and then compared the mood of three groups of omnivores. Her results should be available soon.

Based on what we do know about omega-3s, what does all of this mean for your diet?

"If you're a vegetarian and you're eating plenty of plant sources of omega-3, you probably don't have to worry about mood," says Beezhold. Even so, vegetarians who want to increase their plant-based sources of omega-3s can incorporate more walnuts, pumpkin seeds, flaxseeds and flaxseed oil, canola oil, and leafy green vegetables into their diets to help

to balance their omega-6 to omega-3 ratio.

Her advice for omnivores is to eat more fish and reduce consumption of meat and poultry, most of which is raised in factory farms. People who don't like fish can aim to eat more grass-fed beef and other sustainably-raised meats and poultry, which contain higher levels of omega-3s.

Additionally, omnivores who don't like fish can take fish-oil supplements. Beezhold says supplements that include vitamin E in them may reduce the incidence of fish-flavored burps.

And, while it is not as important as changing the balance of animal products, omnivores also should increase their consumption of the omega-3-rich plant foods mentioned above. Beezhold says she herself is an "enthusiastic omnivore" who tries to eat fish as often as possible. But she admits it's not always easy.

"Fresh fish can be more expensive and difficult to prepare, and there are environmental contamination problems associated with fish. Wild fish that are high in omega-3 fats unfortunately can also be high in mercury. While farm-raised fish are cheaper and more available, they can be high in other toxins like dioxins."

She says that ultimately we need to take a big-picture look at our food and how we raise it. "We really need to think about our agricultural methods. We can produce a lot of food cheaply, but not without adversely impacting our own health."

**More information:** Get more information about seafood, health and the environment at

[www.montereybayaquarium.org/cr/seafoodwatch.aspx](http://www.montereybayaquarium.org/cr/seafoodwatch.aspx) .

The study on vegetarians and mood was published in the June 2010 issue

of *Nutrition Journal*. Read the full study at [www.nutritionj.com/content/9/1/26](http://www.nutritionj.com/content/9/1/26) .

Provided by Arizona State University

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