

## Trying to add healthy omega-3 fats to meat

### Introducing worm gene into mice is first step

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If you're worried about your heart, there's some good news and some bad news.

Scientists say they have figured out how to genetically engineer animals so they can produce high levels of heart-healthy omega-3 fats in their meat.

For the time being, however, a mouse burger, not prime rib, is the only cut where you'll

By adding a gene from the roundworm *C. elegans* to mice, researchers at Harvard Medical School and Massachusetts General Hospital found that levels of omega-3 fat in the tissue of mice increased dramatically. The mice also produced milk that was high in omega-3 fats.

Scientists say this approach could be applied to more conventional livestock, such as cows, to produce meat and eggs rich in omega-3 fat. It might even be used to produce milk with high omega-3 fat, say the researchers, whose work appears in the latest issue of the journal *Nature*.

However, others expressed doubts about whether such an approach would work.

Even if the technology could be transferred to cattle, it's questionable whether the amount of omega-3 fat would be high enough to produce a real health benefit in people, said Steven Nissen, a professor of medicine at the Center for Bioethics at the University of Minnesota.

"It's going to make for some expensive beef," he said. "This seems relatively inefficient and seems like a long shot right now."

Still, scientists already are trying to produce genetically engineered animals for human consumption.

Miles noted that the U.S. Food and Drug Administration is considering whether a type transgenic salmon, which grows twice as fast as normal salmon, should be allowed in:

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It's only a matter of time before such technology finds its way into commerce, said Mi Pariza, director of the Food Research Institute at the University of Wisconsin-Madison

"It's either going to happen in the U.S. and we're going to lead the world, or it's going in China and we will be sitting here wondering what happened."

Pariza, a professor of microbiology and toxicology, noted that people already share many same genes found in worms, mice and other animals. Consuming tissue from a transgenic animal, especially if it has known health properties, could be beneficial, he said.

Numerous studies have linked omega-3 fats, which are abundant in some fatty fish such as salmon, mackerel, herring, lake trout and albacore tuna, to a lower risk of cardiovascular disease.

The American Heart Association recommends eating two servings of fatty fish a week

Omega-3 fats may have a range of health benefits, including the ability to reduce dangerous arrhythmias and inflammation in the heart, and even the potential to improve cognitive function in the brain.

However, there have been concerns about mercury and PCB contamination in fish. In farm-raised salmon must be fed food made from fish to produce high levels of omega-3

Mammals generally don't produce adequate levels of omega-3 fats unless they, too, are fed a meal or other marine foods, which adds cost.

To get around the problem, the Harvard researchers added the fat-1 gene from the roundworm mice. The gene encodes for an enzyme that converts omega-6 fat to omega-3 fat. Omega-6, which is found in high amounts in many vegetable oils, also is an essential fat. But scientists believe there is an overabundance of it in the Western diet and that more omega-3 fat is

**Big change**

The change was dramatic. The ratio of omega-6 to omega-3 in tissues of the control mice in the study was between 20-to-1 and 50-to-1, said Jing Kang, the study's lead author and an professor of medicine at Harvard. But in the transgenic mice, the ratio improved to about 1-to-1, he said.

The transgenic mice appear to be healthy and normal, he said.

And, he added, "they can transmit it (the gene) from generation to generation."

Kang said they also are looking into whether genetically engineered chickens could produce eggs that are high in omega-3. Since his transgenic mice have high levels of omega-3 in their meat, organs and milk, the presumption is that eggs would have it, too.

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Consumers already can buy omega-3 eggs, but the amount of omega-3 fat is limited as chickens must be fed marine food sources or flaxseed, which contains a type of omega-3 fat found in plants.

### **Far from grocery shelves**

Kang said that before researchers add the worm fat-1 gene to chickens, they plan to add salmon to see if they can produce fish with high levels of omega-3 fat, even when the fish is fed non-marine foods such as vegetable oil.

Either way, the researchers probably will face some high hurdles before meats, eggs and other products from genetically engineered animals start appearing in grocery stores.

Several years ago, Infigen, a biotech and animal cloning company in DeForest, genetically engineered and cloned cattle to produce medicine in their milk.

"We never proposed eating the cattle," said Walter Simson, Infigen's chief executive officer.

The company also has engineered and cloned pigs to produce organs that could be used for human transplantation.

Neither project has gotten beyond the cloning stage.

Simson said he doubts whether the FDA would approve genetically engineered animals that would be eaten by people. He also questioned whether consumers would accept such food.

"From a food management standpoint, it might be easier just to take a vitamin," he said. "The public reaction is, 'Good luck.' "

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