

Super



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Steak

A naturally occurring compound in the milk and meat of ruminant animals could offer a way to fight cancer and could open another market for beef producers.

BY JENNIFER RYAN

Above: While trying to find agents in beef that might cause cancer, researchers instead found a possible cancer preventive, conjugated linoleic acid (CLA).

In the late 1970s, concerns that cancer-causing compounds were present in fried hamburgers made front-page news across the country, says Michael Pariza, head of the University of Wisconsin (UW)-Madison Food Research Institute. Research intending to identify these mutagenic compounds instead found something inhibiting mutagenesis — an anticarcinogen.

Subsequent research identified the cancer preventive as conjugated linoleic acid (CLA), Pariza explains. “Now, there are literally hundreds of researchers across the world working on CLA. It’s an enormously growing area.”

CLA is a trans fatty acid found primarily in the meat and milk of ruminant animals. It has produced amazing results in rodent tests at the UW-Madison, showing it improves feed efficiency in animals, enhances the immune system and protects against cancer. The research might provide insight into another way the beef industry could find favor with an ever-growing number of health-conscious consumers.

“It’s ironic that the beef industry has been told for years and years to produce leaner and leaner meat, but severely reducing fat in meat also reduces the CLA content,” Pariza says.

Not new

CLA was discovered in the 1950s, but no biological research had been performed. After discovering the specific anticarcinogenic compound, Pariza tested CLA using a cancer model.

At the same time, his colleague Mark Cook, animal sciences professor at UW-Madison, was studying how to buffer the body from its own immune system during an illness. Illnesses or vaccinations cause the immune system to release compounds to fight the invaders, he explains, but they

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often attack the body itself — causing cachexia, a condition symptomized by general physical wasting and malnutrition. Cachexia is usually associated with chronic disease, such as cancer.

Pariza and Cook discovered some of the health benefits of CLA during a friendly conversation about their respective research. Pariza mentioned CLA and asked Cook to feed it to some laying hens.

“When he described it, I said, ‘Man, this might be what I’m looking for!’ We fed it to chicks, and low and behold, it protected them from this immune-induced weight loss. We did it in mice, we did it in rats, and it seemed to work everywhere we went,” Cook says.

“A couple of the students mentioned the CLA animals that ate less food. They ate less food, but they grew faster,” he adds. “They were much more feed-efficient. The only way that can happen is if you change body composition. They had no

abdominal fat. It reduced body fat or prevented body-fat gain.

“In a normal diet, a mouse’s total body fat is 14%. Feed it CLA, and body fat goes from 14% to 4%. It’s absolutely incredible!” Cook says.

The basics

“We don’t know everything about CLA,” Cook admits. “CLA is doing a lot of things. We’re finding that CLA is not just one compound, it’s actually a collection of compounds.”

CLA is synthesized by bacteria in the gut of cattle. There are two major types of CLA, called isomers. One is *cis* 9 *trans* 11 (C9T11), referring to the location of the double bonds in the molecular structure. Another type is *trans* 10 *cis* 12 (T10C12). Each type does different things, Cook says.

“Depending on how you feed, cattle will determine which of these fatty acids are incorporated in beef. You can feed them certain ways, and they will produce more of the

C9T11, and other ways will produce more of the T10C12,” he says. “The C9T11 is probably the most common, and we don’t fully understand everything that C9T11 is doing, but we definitely know C9T11 is active in the prevention of cancer.”

Studies have shown that CLA prevents mammary cancer in rodents, suggesting it might do the same for humans. A study from France has shown a relationship between CLA consumption and CLA content in mammary adipose, or mammary fat, in humans. The higher the CLA content in the fat tissue, the lower the occurrence of mammary cancer, Cook says.

Cook says CLA prevents many types of cancer: mammary cancer, prostate cancer, stomach cancer, colon cancer and skin papilloma.

The potential health benefits of CLA are far-reaching, and the benefits are not diminished by cooking, pasteurization or homogenization, Cook says. Besides preventing cancer and

cachexia, it appears to enhance growth in animals, and it has been proven not only to reduce atherosclerosis, a thickening and hardening of the arteries, but actually to reverse it.

The implications for humans are incredible, too, Cooks says. He is concerned about current dietary recommendations that suggest reductions in animal fat and dairy products — which means a reduction in CLA and an increase in linoleic acid, a required nutrient similar to CLA. Linoleic acid, he explains, promotes most of what CLA prevents and actually provides a nutrient for cancer growth.

Dietary recommendations to avoid animal fat and dairy products have reduced CLA consumption and increased consumption of linoleic acid two- to threefold, Cook says. “Those recommendations were going to cure the world of all these dreaded diseases ... I think the population has reduced their fat consumption about 13% to 14%, and things have only gotten worse.”

CLA-added beef

Increased consumption of CLA can occur by eating a larger quantity of meat and dairy products or by increasing the concentration of CLA in them. Increasing concentration is more feasible, says Tilak Dhiman, assistant professor in the department of animal, dairy and veterinary sciences at Utah State University, Logan.

“It will be more consumer-acceptable if the fat found in milk and meat is found to prevent cancer,” Dhiman says. “Not all fats are bad. We must distinguish that and tell consumers about it. CLA is a good fat.”

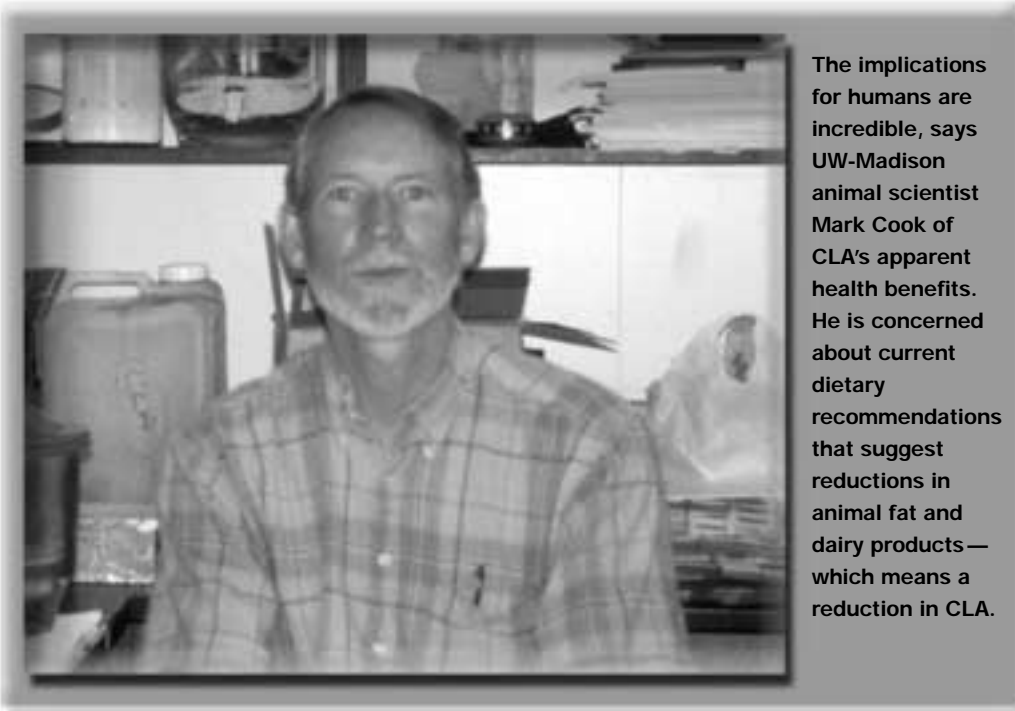
Dhiman performed research to increase the levels of CLA in beef cattle through changes in diet. Results show that grass-fed cattle had a higher amount of CLA. Dhiman says CLA’s effect on humans will need further research before his findings will mean much to the dairy or cattle producer.

“The main question people



PHOTOS BY JENNIFER RYAN

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The implications for humans are incredible, says UW-Madison animal scientist Mark Cook of CLA's apparent health benefits. He is concerned about current dietary recommendations that suggest reductions in animal fat and dairy products — which means a reduction in CLA.

ask me is, 'How much premium am I going to get if I raise CLA-enhanced beef or milk?' There is simply not enough data in humans to tell how it will affect producers," he says.

Larry Satter, Agricultural Research Service (ARS) dairy scientist, performed research to increase CLA content in milk. His findings show that grazing and feeds containing free vegetable oil, such as soybean or linseed oils, will increase the CLA content in milk.

Satter says the animal research is encouraging, and there potentially could be another market for milk and beef, but the theory needs to be proven in humans.

"A lot needs to be verified and proven beyond question before there can be any claims," Satter says. "It's yet to be proven in a

convincing way that CLA in humans is anticarcinogenic. Can doses of CLA that we get in reasonable amounts be sufficient to have impact on humans? The levels of CLA used in laboratory experiments tend to be somewhat higher, but not unreasonable. Perhaps, if we increase the CLA content of beef and milk and with some CLA supplementation, it would be possible to achieve CLA intakes comparable to what has been used in laboratory animal experiments.

"Animal fats have been taking it on the chin for a long time," he says. "CLA gives us a bit of positive news about beef, lamb and milk products."

The human side of CLA

Rodent tests showing CLA benefits generally use higher

doses than could be found in an ordinary serving of meat or dairy products, says Clement Ip, a cancer research scientist at the Roswell Park Cancer Institute in Buffalo, N.Y.

"Right now, we don't even know what doses could be effective in preventing cancer with humans. It's a new field," he says. "We simply can't say how exactly humans are going to be affected by it."

Only a few human clinical trials with CLA have been started due to the expense and the length of the studies. Until those studies are completed, the ramifications of CLA on the beef producer and the consumer will be largely unknown.

"Those will be very long-term studies," says Richard Atkinson, professor of medicine and nutritional sciences at the UW-

Madison. "The companies would much rather cite the animal data and ignore the human data because it would be very expensive."

Atkinson performed a study showing CLA didn't provide any weight loss for obese people. He gave 80 patients either a placebo or a CLA pill combined with a standardized diet and exercise to see if CLA would enhance weight loss. It did not. However, later analysis revealed that a group of individuals gained lean body mass. Twice as many subjects in the CLA group gained lean body mass compared to those in the placebo group.

Regardless, Atkinson says more studies must be done before the human benefits are certain.

"It's not likely that you can find beef or milk with enough CLA in it to make changes in body weight — improvements in cancer, very hard to know. It's possible that small amounts will give you benefits in preventing cancer. It doesn't accelerate the rate of weight loss. It's possible that it will do something for obese people, but in the particular study that we did we ... it does not. At least in the doses that we used," Atkinson says.

CLA is currently available as a nutritional supplement, but Atkinson says he's leery of the benefits these supplements provide.

"CLA probably is beneficial. There's not a huge pressure on the manufacturers to do any significant amount of research to show that it is beneficial. Why take the chance?" Atkinson says. "From the animal data, this stuff needs to be put in the drinking water — it's fabulous."

Atkinson says he sees two major areas of upcoming CLA research. First, commercially useful benefits, such as agricultural uses of CLA that might give added value to animals in terms of feed efficiency and reduced body fat. Studies to show human benefits also will have to be performed.



The CLA content of common foods (milligram/gram of fat)

Foodstuff	Total CLA	Foodstuff	Total CLA
Dairy products		Meats	
homogenized milk	4.5	ground beef	4.3
condensed milk	7.0	lamb	5.6
butter fat	6.1	pork	0.6
mozzarella cheese	4.9	chicken	0.9
plain yogurt	4.8	salmon	0.3
ice cream	3.6	ground turkey	2.5