Conjugated Linoleic Acid (CLA)

Some scientists believe that in our quest to lose weight, we are not eating enough fat, or at least not the right kind of fat. The fat that is missing from our diet is conjugated linoleic acid (CLA), which is found in red meat, lamb, and dairy products. Although these foods contain some of this good fat, they do not get a clean bill of health, since they are very high in calories and are also packed with saturated fat, which can promote cancer and heart disease.

In addition to our preoccupation with dieting, our abundance of processed foods also leads to our nationwide lack of CLA. The processing techniques manufacturers use strip the CLA right out of the foods we eat. Without CLA, many aspects of our metabolism fail to operate efficiently, as Mark Stengler explains in *Natural Physician's Healing Therapies*. "It (CLA) helps glucose get into muscle cells more effectively, thus preventing glucose from being converted into fat. It also helps fats enter the cell membranes of muscle and connective tissue, where the fat is burned for fuel." According to Dr. Howenstine, human beings are not able to convert enough linoleic acid into conjugated linoleic acid. If we do not have enough CLA in our bodies, all our dietary fat will be stored as the physical fat that you see on your problem areas, rather than converted into muscle. In other words, people who are struggling with obesity have to add more CLA to their diets, otherwise they will be, in Dr. Howenstine's words, “trapped with an inability to lose weight despite their best intentions to diet.”

Human beings are unable to convert linoleic acid into the needed amount of conjugated linoleic acid. Decreased in-take of conjugated linoleic acid and alterations in the manner of production and processing of the foods that contain CLA has led to people being overweight. Here's the problem: if there is inadequate intake of CLA, dietary fat cannot be moved into cells or used as energy. The end result is that the body stores this fat. You get, and will remain, fat. Conjugated linoleic acid (CLA) has been shown to decrease the volume of adipocytes and thus reduce body fat. However, many overweight people have too many adipocytes. These people need more than CLA to achieve effective weight control.
CLA is a mixture of positional and geometric isomers of linoleic acid, which is found preferentially in dairy products and meat. Conjugated linoleic acid is unique because it is present in food from animal sources, and its anticancer efficacy is expressed at concentrations close to human consumption levels. CLA cannot be produced by the human body, but it can be obtained through foods such as whole milk, butter, beef, and lamb.

“The interesting thing is that dairy cattle that graze produce higher amounts of CLA in their milk than those which receive conserved feed, such as grain, hay, and silage,” says Agricultural Research dairy scientist Larry Satter. This is true even when the non-grazers eat pasture grass conserved as hay. Pasture-grazed cows had 500% more CLA in their milk than those fed silage.

CLA may be one of the most potent cancer-fighting substances in our diet. In animal studies, as little as one half of one percent CLA in the diet has reduced tumor burden by more than 50 percent.

This supplement may speed weight loss for people with Hypothyroidism. For people with thyroid problems who are facing weight loss challenges is the news that the natural dietary supplement Conjugated linoleic acid (CLA) reduces body fat in people who are overweight.

A double-blind, randomized, placebo-controlled study, published in the December 2000 issue of the *Journal of Nutrition* found that CLA reduces fat and preserves muscle tissue. According to the research project manager, an average reduction of six pounds of body fat was found in the group that took CLA, compared to a placebo group. The study found that approximately 3.4 grams of CLA per day is the level needed to obtain the beneficial effects of CLA on body fat.

Dr. Michael Pariza, who conducted research on CLA with the University of Wisconsin-Madison, reported in August 2000 to the American Chemical Society that “It does not make a big fat cell get little, what it rather does is keep a little fat cell from getting big.” Pariza’s research did not find weight loss in his group of 71 overweight people, but what he did find was that
when the dieters stopped dieting, and gained back weight, those taking CLA “were more likely to gain muscle and not fat.”

In a separate study conducted at Purdue University in Indiana, CLA was found to improve insulin levels in about two-thirds of diabetic patients, and moderately reduced the blood glucose level and triglyceride levels.

CLA has been the subject of a variety of research in the past several years, and findings also suggest that some of the other benefits of CLA include the following:

- **Increases metabolic rate** -- This would obviously be a positive benefit for thyroid patients, as hypothyroidism -- even when treated -- can reduce the metabolic rate in some people.
- **Decreases abdominal fat** -- Adrenal imbalances and hormonal shifts that are common in thyroid patients frequently cause rapid accumulation of abdominal fat, so this benefit could be quite helpful.
- **Enhances muscle growth** -- Muscle burns fat, which also contributes to increased metabolism, which is useful in weight loss and management.
- **Lowers cholesterol and triglycerides** -- Since many thyroid patients have elevated cholesterol and triglyceride levels, even with treatment, this benefit can have an impact on a thyroid patient's health.
- **Lowers insulin resistance** -- Insulin resistance is a risk for some hypothyroid patients and lowering it can also help prevent adult-onset diabetes and make it easier to control weight.
- **Reduces food-induced allergic reactions** -- Since food allergies can be at play when weight loss becomes difficult, this can be of help to thyroid patients.
- **Enhances immune system** -- Since most cases of thyroid disease are autoimmune in nature, enhancing the immune system's ability to function properly is a positive benefit.

Taking CLA to help with weight loss, keep in mind that it is not a magic pill, and you will need to start a program of diet and exercise in order to successfully lose weight and keep it off. To obtain the level determined to be effective in the testing -- 3.4 g, or 3400 mg, per day -- you would need to take 4 of these capsules a day, with meals.

**The Basics**

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CLA is a newly discovered good fat called “conjugated linoleic acid” that may be a potent cancer fighter. In animal studies, very small amounts of CLA have blocked all three stages of cancer: 1) initiation, 2) promotion, and 3) metastasis. Most anti-cancer agents block only one of these stages. What is more, CLA has slowed the growth of an unusually wide variety of tumors, including cancers of the skin, breast, prostate, and colon.

Human CLA research is in its infancy, but a few studies have suggested that CLA may have similar benefits in people. A recent survey determined that women with the most CLA in their diets had a 60 percent reduction in the risk of breast cancer.

Few people realize that CLA is also found in nature, and this natural form does not have any known negative side effects. The most abundant source of natural CLA is the meat and dairy products of grass-fed animals. Research conducted since 1999 shows that grazing animals have from 3-5 times more CLA than animals fattened on grain in a feedlot. Simply switching from grain-fed to grass-fed products can greatly increase your intake of CLA.

**Beyond the Basics**

On the molecular level, CLA resembles another type of fat called “linoleic acid” or LA. (Both CLA and LA have 18 carbon atoms and two double bonds holding the chain together. The main difference is in the placement of those bonds.) However, CLA and LA appear to have opposite effects on the human body. For example, LA promotes tumor growth but CLA blocks it.

There are 28 possible types (isomers) of CLA, each one with a slightly different arrangement of chemical bonds. The type most commonly found in meat and dairy products has double bonds between the 9th and 11th carbon atoms and is referred to as “cis 9, trans-11 CLA” or “rumenic acid.” Conjugated linoleic acid actually covers a whole group of closely related biologically active compounds called isomers, all of them derivatives of linoleic acid, which is one of the essential fatty acids and a common component in the diet. However, unlike linoleic acid, conjugated linoleic acid...
is only found in significant quantities in animal products such as cheese, milk and meat. This is because it is generated from linoleic acid in significant amounts in a process called ‘enzymatic isomerisation’, which occurs during the metabolism of linoleic acid by rumen bacteria, found in the gut of ruminant animals, such as cows and sheep. So far, at least eight conjugated linoleic acid isomers of linoleic acid have been identified, although only two are thought to possess significant biological activity: c9, t11 conjugated linoleic acid, which is the most common natural form, and the t10, c12 isomer.

Cows that get all their nutrients from grazed grass—their natural diet—produce milk with 86 percent more vitamin E (alpha-tocopherol) than cows fed a standard dairy diet, according to a recent study. Conjugated linoleic acid occurs in a number of animal foods, especially full-fat dairy produce, lamb and beef, although the actual amounts of conjugated linoleic acid present can be quite variable. Studies have shown that when cattle are fed diets rich in linoleic acid (such as sunflower and soyabean oils), the conjugated linoleic acid content of the milk they produce also increases (2). In addition, cows grazing pasture produce conjugated linoleic acid-enriched milk, especially when the grass is at an early growth stage. As a rule of thumb, however, most full-fat beef and dairy produce will contain between 3 and 7mgs of conjugated linoleic acid per gram of total fat content, 85-95% of which is present as the c9, t11 isomer.

The standard dairy diet consists of large amounts of “concentrate,” which is typically a dry mixture of corn and soy. Some organic dairies raise their cows on pasture and supplement them with organic concentrate; others keep their cows indoors and feed them organic concentrate and stored grasses. The more freshly grazed grass is in a cow’s diet, the more vitamin E, omega-3 fatty acids, and CLA.

Milk from one hundred percent grass-fed cows is healthier than milk from grain-fed cows because it contains more of a number of key nutrients, including omega-3 fatty acids, beta-carotene, and conjugated linoleic acid or CLA. Research shows that cows that graze at relatively high altitudes may produce the healthiest milk of all. Compared with lowland grazers, milk from high altitude grazers (3700-6200 ft) has even more omega3s and CLA.
and significantly less saturated fat. The amount of beneficial CLA and omega-3 fatty acids in a cow's milk is influenced by a host of factors in addition to diet, including her breed, individual genetics, age, and even the time of year. Seasonal variation in CLA levels can be observed in autumn (September October) in colder countries. Now one more factor has been added to the list: prevailing temperatures. Milk and cheese from cows raised in colder climates appear to have the omega-3 and CLA edge.

The reason? It has to do with plant antifreeze. Omega-3 fatty acids stay fluid at colder temperatures than other, more saturated fats. A plant that has to withstand the cold needs more of this natural antifreeze to keep its cell membranes fluid. Cows that graze on this cold climate grass ingest more omega-3s, which they then convert to another good fat—CLA. In a recent study, cows that grazed in mountain meadows had more than twice the amount of CLA in their milk as similar cows that grazed down in the valley. The cows eat this enriched pasture and pass the nutrients on to their milk.

CLA has been a part of the human diet since the first spear was thrown. Deer, elk, and moose have about the same amount of CLA as cattle. Surprisingly, mountain lions and black bears have more (7 and 9 mg/g of fat, respectively) even though they are not herbivores.

**CLA in Cheese**

The way that cheese is made influences its CLA (conjugated linoleic acid) content. In general, the longer cheese is aged, the lower the CLA. Thus, hard cheeses such as Parmesan and Romano tend to have less CLA than softer cheeses such as cream cheese, cottage cheese, feta, farmer's cheese, ricotta, and Brie. In addition, cheese that is aged through "bacterial surface ripening" (Brick and Muenster) has more CLA than cheese that does not go through this process. Finally, a serving of high-fat cheese will have more CLA than a similar serving of low-fat cheese. (The CLA is measured in terms of grams of CLA per gram of total fat; the more total grams of fat in a serving of cheese, the more CLA it will have. Reduced fat swiss is an anomaly, for unknown reasons..)
The table below shows CLA levels in cheese purchased at a grocery store in 1992. In all likelihood, the milk came from confinement dairy operations. If the milk had come from grass-fed animals, the CLA content would have been five times higher.

<table>
<thead>
<tr>
<th>TYPE OF CHEESE</th>
<th>CLA (mg/gram of fat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brick</td>
<td>7.1</td>
</tr>
<tr>
<td>Reduced Fat Swiss</td>
<td>6.7</td>
</tr>
<tr>
<td>Natural Muenster</td>
<td>6.6</td>
</tr>
<tr>
<td>Colby</td>
<td>6.1</td>
</tr>
<tr>
<td>Blue</td>
<td>5.7</td>
</tr>
<tr>
<td>Ricotta</td>
<td>5.6</td>
</tr>
<tr>
<td>Velveeta</td>
<td>5.2</td>
</tr>
<tr>
<td>Medium Cheddar</td>
<td>4.1</td>
</tr>
<tr>
<td>Sharp Cheddar</td>
<td>3.6</td>
</tr>
<tr>
<td>Parmesan</td>
<td>3.0</td>
</tr>
<tr>
<td>Romano</td>
<td>2.9</td>
</tr>
</tbody>
</table>

All cheese made from the milk of grass-fed cows is rich in conjugated linoleic acid (CLA). However, the cheese making process itself can increase or decrease this amount. In a comprehensive survey, the highest amounts of CLA were found in soft cheeses aged approximately three months. Longer aging periods reduced this highly desirable fat.

The type of grasses and legumes growing in a pasture can influence the amount of CLA in cow's milk. When dairy cows grazed pasture that
contained 20 percent red clover, they produced 50 percent more cancer-fighting, fat-busting CLA than cows that grazed on grasses alone. (Search for the study titled, "Paddocks containing red clover compared to all grass paddocks support high CLA levels in milk.") Raising dairy cows on fresh pasture instead of a standard dairy diet increases the CLA content of their milk five-fold. Now there is some evidence that grazing on organic pasture may boost the CLA even further. In a study conducted in Germany, cows on organic pasture had almost twice as much CLA as those grazing on a nearby, non-organic farm. Conjugated linoleic acid was 8.9, 14.3, and 22.1 mg/g of milk fatty acids in the one-third, two-third, and all pasture treatments, respectively. Cows, grazing pasture and receiving no supplemental feed had 500% more conjugated linoleic acid in milk fat than cows fed typical dairy diets. More research is needed.

There were early reports that the conjugated linoleic acid content of these foods could be increased by heat processing, pasteurisation and pan-frying. However, later studies suggested that conjugated linoleic acid content is increased by water loss rather than cooking per se and that the actual ratio of conjugated linoleic acid to total fat grams remains constant. The table below shows typical conjugated linoleic acid contents of various foods (expressed as mgs of conjugated linoleic acid per gram of total fat) and the percentage present as the c9, t11 isomer. Remember, though, that while some low-fat foods, such as yoghurt, have a favourable conjugated linoleic acid/total fat ratio, their low fat content means that the absolute amount of conjugated linoleic acid per portion will also be low.

<table>
<thead>
<tr>
<th>FOOD</th>
<th>Typical mgs of conjugated linoleic acid per gram of total fat</th>
<th>% of conjugated linoleic acid present as c9, t11 isomer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamb</td>
<td>5.6</td>
<td>92</td>
</tr>
<tr>
<td>Homogenised cow’s milk</td>
<td>5.5</td>
<td>92</td>
</tr>
<tr>
<td>Low-fat yoghurt</td>
<td>4.8</td>
<td>84</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Butter</td>
<td>4.7</td>
<td>88</td>
</tr>
<tr>
<td>Cottage cheese</td>
<td>4.5</td>
<td>83</td>
</tr>
<tr>
<td>Fresh ground beef</td>
<td>4.3</td>
<td>85</td>
</tr>
<tr>
<td>Sharp cheddar cheese</td>
<td>3.6</td>
<td>93</td>
</tr>
<tr>
<td>Chicken</td>
<td>0.9</td>
<td>84</td>
</tr>
<tr>
<td>Pork</td>
<td>0.6</td>
<td>82</td>
</tr>
</tbody>
</table>

Typical daily intakes of conjugated linoleic acid from food sources are very hard to estimate. Not only do conjugated linoleic acid contents vary, even among different samples of the same food, but conjugated linoleic acid intake will also depend very much on the lamb, beef and dairy content of an individual’s diet. Estimates range from just 102mgs per day up to 500-1,500mgs per day!

Much of the interest in conjugated linoleic acid has centred on its apparent ability to affect body composition favourably by increasing lean muscle mass and reducing body fat. Most of the early studies on conjugated linoleic acid showed promising results; specifically, adding supplemental conjugated linoleic acid to the diet appeared to improve the ratio of lean body mass to body fat. Although the mechanisms of possible action were (and still are) very poorly understood, it seemed that extra conjugated linoleic acid facilitated the accumulation of more lean tissue and less fat during periods of growth.

**Sheep are the CLA winners**

Dr. Gerhard Jahreis from the Institute Ernaehrung und Umwelt in Germany has studied the CLA content of human milk and milk from a variety of animals. He reports that horses have the lowest CLA content and sheep the highest. Human milk is in the middle. (Mare's milk < sow's milk < human milk < goat's milk < cow's milk < ewe's milk.) With this new finding about CLA, perhaps more US farmers will consider milking sheep.
Turkeys make CLA

CLA (conjugated linoleic acid) is highest in products from grazing animals on a diet of fresh pasture, and it is very low in non-ruminants such as chickens and pigs. But turkeys appear to be an exception, having about 2.5 mg of CLA per gram of fat. (For comparison, chickens have 0.9 and pigs 0.6 mg. per gram of fat.) To date, no one has tested the CLA content of turkeys raised on pasture rather than in confinement, an experiment that begs to be done. It is possible that turkeys with a significant amount of greens in their diet will have even more CLA.

Natural CLA from grazing animals superior to pills

Tens of thousands of people who want to lose weight or reduce body fat have been taking a synthetic version of conjugated linoleic acid or CLA. A new study shows that the pills may cause more harm than good. After reviewing 13 randomized studies, a group of researchers concluded that the pills do not reduce body weight or body fat to a significant degree. Unfortunately, the promising results seen in animal studies do not seem to apply to humans.

Where do you get CLA? Many people take a synthetic version that is widely promoted as a diet aid and muscle builder. New research shows that the type of CLA in the pills may have some potentially serious side effects, including promoting insulin resistance, raising glucose levels, and reducing HDL (good) cholesterol. Worse yet, the researchers found that a kind of CLA found in the pills (CLA (t10, c12) may cause serious health complications, including an enlarged liver.

The main type of CLA found in meat and dairy products (c9, t11 or “rumenic acid”) has been given a clean bill of health. Once again, a natural product has been found to be superior to its synthetic counterpart.

Until recently, all of the experiments demonstrating the cancer-fighting properties of CLA (conjugated linoleic acid) have used synthetic CLA. To see whether the CLA that occurs naturally in cow's milk has similar cancer-fighting properties, researchers recently compared the two. They fed one group of rats butter that was high in CLA and fed another group an
equivalent amount of synthetic CLA. As one would expect, the natural CLA proved to be just as effective in blocking tumor growth as the man-made variety. (In both cases, cancer yield was reduced by about 50 percent.) However, the high CLA butter had an added benefit: the rats eating the butter accumulated even more CLA in their tissues than the rats fed an equivalent amount of synthetic CLA. Reason? Researchers believe that the rats were converting another “good” fat found in the butter, trans-vaccenic acid or TVA, into CLA, giving them a second helping of this cancer-fighting fat.

CLA, a type of healthy fat found in the meat and milk of ruminants, is found in wild game as well, according to researchers Larry Cordain and Bruce Watkins. They discovered that CLA levels are especially high in the bone marrow. This finding is significant because there is evidence to suggest that our hunter/gatherer ancestors sought out bone marrow to add calories and fat to their lean diet. Thus, although CLA is new to modern science, it may have played a key role in human nutrition for eons.

Conjugated linoleic acid or CLA has demonstrated a multitude of benefits in animal studies, including fat reduction, increase in lean muscle mass, reduced risk of diabetes, reversal of arteriosclerosis, and a marked reduction in tumor growth.

Many people do not realize, however, that there are 16 different types of CLA, each with a slightly different molecular shape. New research reveals that each type of CLA has a different set of benefits. The type of CLA most abundant in meat and dairy products (referred to by chemists as "cis-9, trans-11, CLA") appears to be the champion cancer fighter. Compared with another common type of CLA (trans 10, cis 12, CLA) it was a third more effective in blocking the growth of human cancer cells. (78% versus 58% reduction)

But the type of CLA found in meat and dairy products does not appear to reduce fat or increase lean muscle mass in humans. (That property is linked with Trans 10, cis 12, CLA)

It will be some time before researchers match each type of CLA with its particular benefits.
It is possible to purchase excellent butter imported from Ireland by the Kerrygold Company. The butter is made from cows that are raised on pasture or grass silage, making it five times higher in CLA and also higher in vitamin E and beta carotene than commercial butter, whether organic or non-organic. It is more expensive than ordinary butter and about the same as organic butter. It is more yellow than butter from cows raised in confinement, melts at a lower temperature, and has a terrific taste. Look for Kerrygold butter in up-scale supermarkets and specialty stores. Search Kerrygold for "where to buy." You can also order their butter and cheese on-line from http://www.foodireland.com(Once at the site, go to the "Irish Deli" section.)

Milk from grassfed Irish cows is 2–3 times higher in conjugated linoleic acid (CLA) than milk from grainfed American cows. Experiments are underway in Ireland to increase this CLA advantage. Recent experiments show that feeding oilseeds to grassfed dairy cows boosts their CLA production even more. Rapeseeds (the seeds that make canola oil) increase the CLA content of the milk an extra 60%. (To read more, refer to "Milk and Dairy Products for Better Human Health," by D. McDonagh, et al.)

The Irish get added health benefits from their grassfed beef as well, according to a soon-to-be-published study. Compared with animals fed supplemental grain, meat from cattle raised on pasture alone was lower in saturated fat, but higher in the "good fats," including monounsaturated fats, omega-3 fats, and CLA. Commented the researchers, "These data indicate that many Irish beef producers, due to their grass-based production systems, have a natural advantage in producing beef that is more beneficial to human health than beef produced from concentrate-based systems."

(For study details, refer to R&H Hall Technical Bulletin Issue No. 4 ~1999)

French cheeses are among the most carefully crafted and coveted in the world. Now there's another reason to seek them out: they're especially high in cancer-fighting CLA. A 1998 survey found that CLA levels in French cheese range from 5.3 to 15.8 mg/g of fat. American cheese from conventional dairies has half this amount, with levels ranging from 2.9 to 7.1. The reason? Typically, American dairies raise their cows in confinement and feed them a grain-based diet. French dairies are more likely to raise their cows on pasture, resulting in naturally high levels of CLA.

Fortunately, cheese from American pasture-based dairies has the same CLA advantage as French cheese. Search the Eat Wild Pastured Products Directory for cheese suppliers and treat yourself to an extra helping of CLA.]

Counter Point

Conjugated linoleic acid - shows nasty side effects

Researchers studied how mice and rats responded to the supplement conjugated linoleic acid (CLA), an essential amino acid found in trace amounts primarily in beef, lamb and milk. Synthetic forms of CLA are marketed as supplements that help reduce body fat, and some manufacturers also tout CLA for reducing the risk of diabetes and certain types of cancer.

The mice and rats responded in very different ways to CLA, said Martha Belury, the lead author of both studies and an associate professor of human nutrition at Ohio State University.
Mice fed a CLA-supplemented diet lost weight very fast, but also accumulated excessive amounts of fat in their livers - a common side effect of rapid weight loss. Excessive fat accumulation in the liver is linked to insulin resistance, a hallmark of Type 2 diabetes.

Yet CLA didn't help rats lose weight they had gained prior to taking the supplement. But it effectively decreased the amount of fat that had accumulated in the animals' livers due to the weight gain. In turn, the rats were less resistant to insulin.

"Many people take CLA as a supplement in hopes of trimming body fat, and it seems to work," Belury said. "But we're not sure what else it does to the body. Studying CLA's effects in two different animal models may help us to better understand any additional effects in humans.

"It seems that these mice and rats represent a continuum of possible side effects induced by CLA," she continued. "The question is, are humans more like mice or rats? We're probably somewhere in between."

The current mouse study appears in a recent issue of the *Journal of Lipid Research*, while the rat study will appear in an upcoming issue of the *Journal of Nutritional Biochemistry*.

In a study from 2003, Belury found that CLA supplements lowered body mass and blood sugar levels of diabetics. The study participants took CLA supplements for two months.

Researchers fed two groups of mice different diets. The first group ate a diet containing CLA for four weeks, followed by four weeks of a diet without CLA.

The second group of animals ate a CLA-free diet for two weeks followed by two weeks of a diet that included CLA. During the latter two weeks, some of the mice received daily injections of the anti-diabetes drug rosiglitazone. Rosiglitazone makes the body more sensitive to insulin. Mice serving as controls for both groups did not consume CLA.

The researchers monitored insulin sensitivity in all mice throughout the study. They also monitored levels of adiponectin; a hormone secreted by fat tissue and thought to play a role in insulin resistance.

"Adiponectin helps regulate insulin levels," Belury said. "Lowered levels are associated with obesity and type 2 diabetes."

The researchers found that CLA supplementation significantly decreased body fat in the first group of mice, but at the same time excessive amounts of fat accumulated in the animals' livers. Belury and her colleagues linked this accumulation of fat in the liver to increased insulin resistance.

When CLA was removed from the diet, the animals gained weight but lost fat in the liver. The mice also became less resistant to insulin.

"When we took CLA away, we lost that suppressive effect on body fat, but we were actually able to restore insulin sensitivity," Belury said.
But the group of mice that was given rosiglitazone injections while on a CLA-rich diet neither lost weight nor became insulin resistant.

"The drug kept adiponectin levels steady during the weeks the mice consumed CLA," Belury said. "We think that's what kept the animals from becoming resistant to insulin.

"While this is an interesting finding, it doesn't mean that someone taking CLA should also take an anti-diabetic drug," she continued. "It's too soon to tell if that would be the case in humans."

In the rat study, Belury and her colleagues studied a special kind of rat model bred to gain weight quickly. These rats were also less susceptible to CLA-induced weight loss. All rats ate a high-fat diet for four weeks. For the remaining four weeks of the study, half of the rats ate a low-fat diet supplemented with CLA, while the rest of the animals ate a low-fat diet without CLA.

The supplement didn't help the rats lose weight. But it seemed to keep fat from accumulating in the animals' livers, compared to the rats eating the diet without CLA.

Belury pointed out that up to 75 percent of people with obesity and diabetes develop an illness called non-alcoholic fatty liver disease in which fat accumulates in the liver and can ultimately make a person insulin resistant.

CLA may or may not have a similar effect on humans, and it will take time to determine how the human body responds to the supplement. But clinical trials are underway - Belury is currently working with researchers from Ohio State's medical center who are conducting a clinical trial of the effects of CLA on women with diabetes.

Belury conducted the studies with Aparna Purushotham and Angela Wendell, both graduate fellows in human nutrition; and Li-Fen Liu and Gayle Shrode, both graduate research associates in human nutrition.

[Support for the work was provided by Cognis North America, a manufacturer of synthetic CLA headquartered in Cincinnati. Support also came from the Carol S. Kennedy research award and the Anita R. McCormick fellowship.]