



# Conjugated Linoleic Acid

## Overview

Numerous animal studies associating CLA with beneficial health properties such as reducing the risk for cancer, atherosclerosis, and diabetes have been conducted. CLA has also been shown to have positive effects on immune function and body composition. However, despite the numerous health benefits seen in CLA-fed animals, health effects of CLA in humans remain controversial.



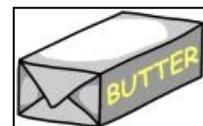
Biological synthesis of CLA occurs through the microbial isomerization of dietary linoleic acid in the digestive tracts of ruminant animals. Therefore, ruminant species and their products are rich dietary sources of CLA. The major dietary sources of CLA for humans are beef and dairy products.

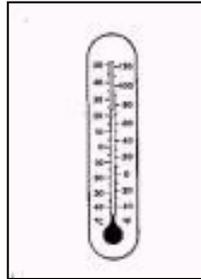
Meats/Fish	Mg/g of fat
Fresh ground beef	4.3
Veal	2.7
Lamb	5.8
Pork	0.6
Chicken	0.9
Fresh ground turkey	2.6
Salmon	0.3
Egg yolk	0.6

Vegetable Oils	Mg/g of fat
Safflower Oil	0.7
Sunflower Oil	0.4



Dairy Products	Mg/g of fat
Homogenized Milk	5.5
2% milk	4.1
Butter fat	6.1
Condensed milk	7.0
Cultured milk	5.4
Butter	4.7
Sour cream	4.6
Ice cream	3.6
Low-fat yogurt	4.4
Custard style yogurt	4.8
Plain yogurt	4.8
Frozen yogurt	2.8
Medium cheddar	4.1
American processed	5.0





Several factors influence the CLA content of food products such as:

- Temperature
- Protein Quality
- Choice of starter cultures
- Period of aging

Variations of CLA content in foods are also affected by the animal's:

- Diet (type of feed, feeding regimen, grass quality, dietary restriction)
- Age or breed
- Seasonal factors



Other processing factors that can influence the CLA content in dairy and meat products include cooking methods (Grilling), the addition of hydrogen donors, and the addition of whey protein.

### About Conjugated Linoleic Acid

CLA has been shown to reduce body fat in mice, as well as in rats and chickens. Evaluation of the metabolic effects of CLA in both intact animal and in adipocyte culture has suggested that CLA directly affects the key enzymes and processes involved in lipid mobilization and storage.



### From Pennington Biomedical Research Center

Several studies observing the metabolic effects of CLA on mice have been conducted at Pennington. It has been shown that CLA reduces body fat in animals fed both a low and high-fat diet. This reduction varies for adipose depots from different sites. The basis of why this is currently is not known. However, it is known that CLA acts by increasing energy expenditure.

CLA feeding produced rapid, sustained reductions in fat accumulation at relatively low doses without any major effects on food intake. The increase in energy expenditure was observed within one week of CLA feeding and was sufficient enough to account for the decreased body fat stores in the CLA treated animals.



Researchers at Pennington have now demonstrated in two studies that CLA treatment increases energy expenditure despite causing a reduction of body lipid stores. This is in contrast to the reduced metabolic rate normally observed with a loss of body weight due to reduced energy intake.

### Health Implications of CLA

#### Cancer



Most of the previous research on CLA has been associated with its anticarcinogenic properties. This was first identified in 1987, when researchers announced that they had identified an agent in grilled beef that inhibited cancer in the epidermis of mice.

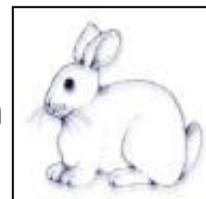
Studies have shown that CLA can delay or reduce the onset of chemically induced tumors in various sites of rats and mice, including skin, mammary glands, and fore stomach. The proposed mechanism of CLA and its anticarcinogenic activities include a reduction in cell proliferation, vitamin A metabolism, and prostaglandin metabolism

#### Immune system

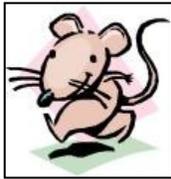
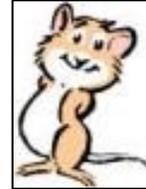
It is believed that CLA may impact the immune system. In animals, it is reported that CLA serves as a protection from the catabolic effects of immune stimulation. It seems to have a protective effect against the catabolism and inflammatory responses induced by cytokines, specifically tumor necrosis factor- $\alpha$ .

#### Heart disease

CLA supplementation has been shown to exert various responses on lipidemic profiles. Feeding rabbits an atherogenic diet supplemented with CLA (0.5 g CLA/d) resulted in a reduction of atherogenesis, in lipid deposition and in connective tissue development.



Similarly, hamsters fed a hypercholesterolemic diet supplemented with CLA (1% of the diet) showed reduced aortic plaque formation. CLA is believed to display antiatherogenic properties in animal models through the reduction of apolipoprotein-B secretion.



### Diabetes

CLA is reported to have anti-diabetic effects in rats, including improved insulin sensitivity. In humans, supplementation with mixed isomers of CLA was associated with improved fasting blood glucose. However, the oxidant property of the trans-10, cis-12 CLA isomer may heighten the risk for cardiovascular disease, which warrants further investigation.

#### Sites:

<http://www.jacn.org/cgi/content/full/19/4/487S>

Rainer, L. Heiss, C. Conjugated Linoleic Acid: health implications and effects on body composition. 2004 *JADA*. 104:6

<http://www.lipidworld.com/content/2/1/6>

The Pennington Biomedical Research Center is a world-renowned nutrition research center.

#### **Mission:**

To promote healthier lives through research and education in nutrition and preventive medicine.

The Pennington Center has several research areas, including:

- Clinical Obesity Research
- Experimental Obesity
- Functional Foods
- Health and Performance Enhancement
- Nutrition and Chronic Diseases
- Nutrition and the Brain
- Dementia, Alzheimer's and healthy aging
- Diet, exercise, weight loss and weight loss maintenance

The research fostered in these areas can have a profound impact on healthy living and on the prevention of common chronic diseases, such as heart disease, cancer, diabetes, hypertension and osteoporosis.

The Division of Education provides education and information to the scientific community and the public about research findings, training programs and research areas, and coordinates educational events for the public on various health issues.

We invite people of all ages and backgrounds to participate in the exciting research studies being conducted at the Pennington Center in Baton Rouge, Louisiana. If you would like to take part, visit the clinical trials web page at [www.pbrc.edu](http://www.pbrc.edu) or call (225) 763-3000.