

SCIENTIFIC BACKGROUND INFORMATION ON

CLARINOL[®] CLA

summary



Clarinol® CLA

Conjugated linoleic acid (CLA) refers to a mixture of isomers of linoleic acid (Fig. 1). Two major bioactive CLA isomers, c9,t11 CLA and t10,c12 CLA, exist naturally in the diet and have beneficial effects on health, including improving body composition (the ratio of fat mass to lean mass). CLA is traditionally found in beef and dairy products and also in vegetable oils and seafood, as well as in many processed foods. Cows and other ruminant animals produce CLA from linoleic acid via biohydrogenation, which is naturally present in their diet (i.e. through consumption of grass). Therefore, products produced from ruminant animals such as milk, beef, cheese and yogurt are sources of naturally occurring CLA, but at low levels.

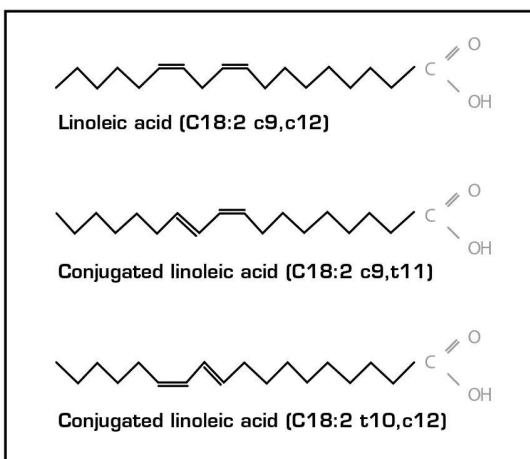


Figure 1
Chemical structures of linoleic acid and conjugated linoleic acids c9,t11 CLA and t10,c12 CLA

The levels of CLA required to improve body composition are too high to be obtained from a natural diet, making dietary supplementation necessary with products such as Clarinol® CLA.

Clarinol® is rich in the two active isomers, c9,t11 and t10,c12 CLA, that improve body composition by:

- Reducing the amount of body fat mass
- Increasing lean body mass (which includes muscle)

Additionally, Clarinol® CLA has been shown to reduce the side effects from a low-calorie diet.

Beneficial Effect of CLA on Body Fat Mass

Several studies have demonstrated that CLA can positively affect body composition by significantly reducing fat mass. It was initially discovered that dietary supplementation with CLA in various animal species such as mice, rats, and chickens reduced a significant amount of body fat mass in 4–8 weeks. Similar findings are being reported in humans, including reduction of body fat mass and body weight in normal weight to obese people. A recent study found that 3.4g of Clarinol® CLA per day significantly reduced fat mass in as little as three months and 5.6% after six months. In this study, the loss of fat was also pinpointed to occur mostly around the legs, with arm fat and trunk fat being lost as well (Fig. 2). CLA works to effectively reduce fat mass by preventing fat from being deposited into the adipocytes, or fat cells. CLA does this by reducing the activity of lipoprotein lipase, an enzyme that is needed for fat cells to take up fats from the bloodstream. The storage of fat is therefore reduced, leading to significant reductions in fat mass.

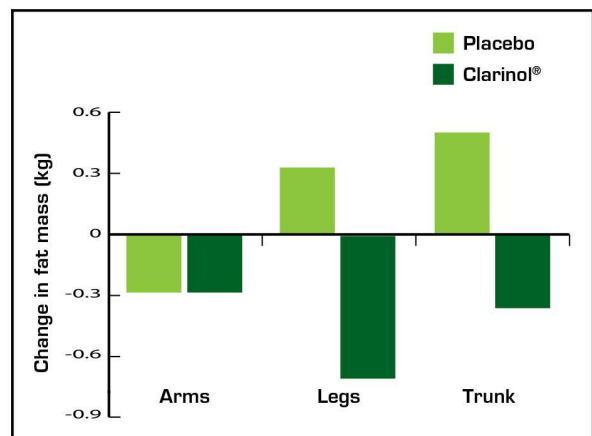


Figure 2
Clarinol® reduces region-specific fat mass after six months

A recent meta-analysis of 15 peer-reviewed, double-blind, placebo-controlled studies found that CLA reduces fat mass in a dose-dependent manner (Fig. 3). It was further concluded from this analysis that CLA administered at 3.2g/day resulted in 90g of fat mass loss per week. This amount of fat loss is significant because it is the inverse of typical weight gain that occurs over time in humans.

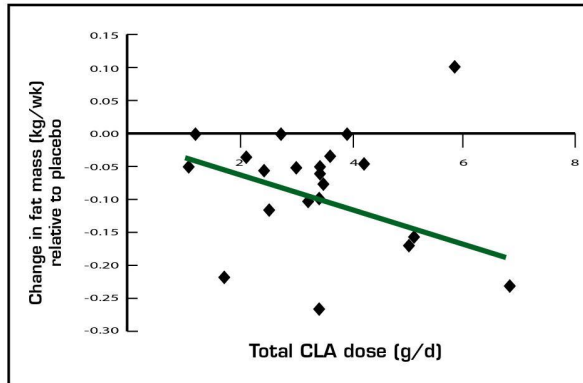


Figure 3
Studies show that CLA significantly decreases fat mass in a dose-dependent manner (Whigham et al., 2007)

Beneficial Effect of CLA on Lean Body Mass

In animal and human studies, diet supplementation with CLA has been shown to help improve the ratio of lean body mass to fat mass, as well as increase muscle growth. Mice fed diets supplemented with CLA reduced their body fat by 60% and increased their lean body mass by 14%. Similar findings were reported in pigs, rats and chickens. In humans, supplementation with CLA increased lean body mass in people who exercised. Furthermore, it has been demonstrated that overweight people in an anabolic state (i.e. gaining weight after a weight loss diet) preferentially gain lean body mass, thus improving body composition while taking CLA. It has recently been demonstrated that long-term intake of CLA can also significantly increase lean body mass and improve weight loss in overweight subjects. A recent study found that 3.4g of Clarinol® CLA per day significantly increased lean body mass after six months without any diet or exercise intervention (Fig. 4).

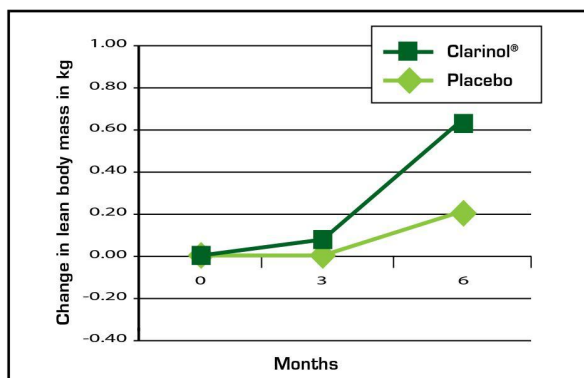


Figure 4
Clarinol® increases lean body mass

Mechanisms Underlying the Effect of CLA on Body Composition

The health benefits of CLA on body composition are suggested to be attributed to the 50:50 mixture of c9,t11 and t10,c12 CLA isomers, which are the two active isomer forms of CLA. The health benefits of CLA may be explained by its ability to:

- Increase the breakdown of fat
- Prevent the filling of fat cells
- Prevent the differentiation of fat cells
- Increase energy expenditure
- Increase β -oxidation (fat burning) in skeletal muscle

The way in which CLA improves body composition is still under investigation, but several mechanisms have been proposed. CLA is known to influence many of the enzymes involved in fat metabolism, e.g. lipoprotein lipase, stearoyl-Co A desaturase, and fatty acid binding protein. In addition, CLA has been shown to not only modify fat metabolism, but also adipocyte growth and differentiation, therefore modifying the very site of fat storage. Such modification of many processes leading to an overall reduction in fat storage, and ultimately fat mass, is thought to be the result of CLA acting as an agonist to certain nuclear transcription factors that control all of these processes. At the same time, CLA increases the activity of an enzyme that increases the breakdown of fats. The storage of fat is therefore reduced, fat is burned at a higher rate, and less muscle tissue is broken down for energy during a catabolic state. This leads to a reduction in fat mass and an increase in lean body mass.

Additionally, Clarinol® CLA has been shown to reduce several side effects from fat and weight loss while on a low-calorie diet. CLA administration during a low-calorie diet resulted in significantly fewer adverse events such as infection, skin rash, irritability, hair loss, and depression while the participants lost 10% of their body weight.

CLA — Safe and Effective Weight Management Aid

Human studies have shown no adverse effects from supplementation with CLA containing both c9,t11



and t10,c12 CLA isomers in a 50:50 ratio. Long-term studies in overweight (2-year, 3.4g/day) and obese (1-year, 6g/day) subjects have confirmed the safety of the mixture of isomers. Studies showing no adverse effects due to CLA intervention vs. placebo also support this finding. Furthermore, there were no differences between CLA and placebo groups on measures such as liver function, and glucose and insulin metabolism.

Based on the totality of published and unpublished information, an expert panel of independent biomedical scientists, qualified by their scientific training and relevant national and international experience, has determined that Clarinol® is Generally Recognized As Safe (GRAS).

Conclusions

There is now conclusive evidence from human studies that Clarinol® CLA improves body composition. Clarinol® can reduce fat mass and increase lean body mass (which includes muscle) with a daily dosage of 1.7g/day to 3.6g/day. Clarinol® is both a safe and effective way to improve body composition.

Clarinol® Helps to:

- Reduce the amount of body fat mass
- Increase lean body mass
- Improve body composition
- Reduce the side effects from a low-calorie diet

Suggested Reading

Blankson H, Stakkestad JA, Fagertun H, Thom E, Wadstein J, Gudmundsen O. Conjugated linoleic acid reduces body fat mass in overweight and obese humans. *J Nutr* 2000; 130: 2943–8.

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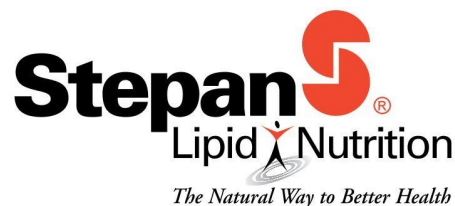
Whigham LD, O'Shea M, Mohede I, Atkinson RL. Effects of conjugated linoleic acid (CLA) on body composition and adverse events after weight loss [Abstract]. FASEB San Diego, U.S.A., 2003.

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