CLA: A Versatile Fatty Acid With Promising Applications

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The pivotal collaborations that lead to groundbreaking inventions are typically born in the hallways of research institutes or during coffee breaks at scientific conferences. But on a running path? That's where two ambitious scientists with seemingly different interests bumped into one another one day while setting out for their respective daily exercise jaunts on the University of Wisconsin-Madison (UW-Madison) campus.

Mark Cook, Ph.D., refers to himself as "the chicken guy" when recounting that fateful crossing of paths almost 20 years ago. A nutritionist in the department of animal science at UW-Madison, Cook was studying the influence of nutrition on the immune response in animals, particularly birds. At that time his work in chickens was demonstrating how certain immune molecules negatively affect their growth, and recent results indicated that a family of compounds — fatty acids — was involved in this response.

Meanwhile, the research of another UW-Madison scientist, Michael Pariza, Ph.D., a professor in the department of food

microbiology and toxicology and director of the University's Food Research Institute, was burgeoning. Like Cook, Pariza cared greatly about fatty acids; in fact, he had established a reputation worldwide for his 1987 discovery of the anticarcinogenic effects of a fatty acid called conjugated linoleic acid (CLA). Pariza's work on CLA had led to a greater understanding of not only its anticarcinogenic properties, but also its effects on body composition and metabolism.

When Pariza stopped Cook to bid him a casual hello on the running path, he told him of his need for laying hen, and Cook realized the value of his molecule in his animal wasting model. Pariza could supply the CLA, and Cook would execute the chicken experiments. Their very first set of experiments resulted in a publication demonstrating the ability of CLA to prevent immune-induced growth suppression in animals. This marked the start of a fruitful collaboration that has since yielded hundreds of worldwide patents involving the use of CLA. From dietary supplements aimed at reducing body fat wasting to therapeutic treatments for autoimmune diseases, the versatile nature of CLA has proven to be valuable.

According to John Hardiman, licensing manager at the Wisconsin Alumni Research Foundation (WARF), the circumstances of how Pariza's and Cook's scientific interests first collided was "a good start to the serendipitous nature of this entire story. We're very pleased about the commercial success of CLA," he says. "It represents a home run for WARF and we feel it has tremendous future potential."

About CLA

It helps to know something about CLA to better understand how this fatty acid can impact our health. CLA actually refers to a wide range of isomers (compounds with the same composition and molecular weight, but differing structures) in naturally occurring linoleic acid. A member of the omega-6 fatty acid family, linoleic acid is found in beef, dairy products and vegetable oils. One of the first health benefits CLA was found to impart was in weight and body composition management; the molecule both increases lean body mass and decreases fat mass.

CLA's mechanism of action involves the suppression of enzymes that normally help fat cells absorb triglycerides – the most common type of fat, or lipid, in our body. Instead of being taken up by fat cells, triglycerides are diverted to the muscles and used as fuel. CLA also induces the breakdown of fat by stimulating the release of other enzymes linked to that process.

> *"The research of Pariza and Cook has spawned studies that have since demonstrated additional health benefits of conjugated linoleic acid (CLA) — from immune system support, cancer reduction, and antioxidant protection to positive inflammatory response.*

The Licensing and Manufacturing of CLA

As Pariza and Cook's collaborative animal studies demonstrated convincing results in the realm of body composition and feed efficiency, the potential for commercialization of CLA was clear. Together they approached WARF about patenting CLA for its ability to prevent against body wasting in animals, and once the idea caught on, WARF took an active approach in obtaining licenses. Cook does admit feeling surprised when WARF decided to first license CLA as a dietary supplement, a field of food and nutrition that was in its early stage of development, but now says that "it turned out to be a good move."

One of the first major nutritional companies to get excited about the potential of CLA was EAS. Now owned by Ross Products, a division of Abbott Laboratories, EAS is a leading manufacturer of athletic and sports training dietary supplements. The company recognized the value of CLA as a preventative agent in the phenomenon of immune-induced growth suppression. Bodybuilders and athletes are often susceptible to wasting and loss of muscle mass when

they become sick — a phenomenon that Cook first demonstrated in his research on chickens. One of the companies that supplied CLA to EAS, Natural ASA, based in the Netherlands, (and now called Aker Biomarine), contacted WARF in 1995 about licensing opportunities.

"If not for Natural we might have lost our momentum," says Hardiman. "Many big companies looked at CLA but failed to pull the trigger. And some major American firms obtained rights and then terminated them."

What followed was a succession of large international manufacturing companies requesting the right to license CLA either directly from WARF or from Natural. Currently, in addition to several smaller licenses, Cognis, headquartered in Germany, and Lipid Nutrition, headquartered in the Netherlands, possess licenses to use CLA in dietary supplements and food ingredients. BASF, also in Germany, and Lipid Nutrition secured the rights to manufacture CLA for use in animal nutrition. The original partnership between Natural and the University of Wisconsin/WARF is the reason why CLA is now available worldwide, and supplements containing CLA can be found at nutrition stores and pharmacies and are widely used.

CLA technology developed at the University of Wisconsin was funded primarily by the University's Food Research Institute and gifts to Pariza's and Cook's research program. In its earlier stages, their research was funded by local companies and not for profits such as Wisconsin Milk Marketing Board and the American Meat Institute. Natural provided significant financing for early stage research as well.

CLA on the Horizon

The animal studies designed by Cook and Pariza to study the effects of CLA in body composition have since led to another exciting avenue for CLA — the treatment of autoimmune diseases. One autoimmune disease, lupus, which is characterized by inflammation of different organs in the body such as skin and kidneys, is currently being tested for its response to CLA. The fatty acid is believed to be effective in preventing body weight wasting in lupus patients. This is because it plays a role in regulating leukotrienes, inflammatory substances that are released by mast cells during allergic reactions. In individuals with lupus, the inflammatory pathway typically overacts, forming damaging immune complexes that then attack vital organs.

As more research is conducted on the various ways CLA affects our health, more benefits are identified and the significance and versatility of this nutrient may continue to expand. Pariza is pleased with how his early work on the anticarcinogenic effect of CLA in hamburger has led to applications now worthy of annual international research symposiums and that may be just the beginning.

"The role of CLA in controlling body fat remains the main application at this point, although I do think its other positive effects such as those found in the immune system will be important," he says. "While most of the attention first focused on CLA's effect on preserving muscle in bodybuilders, I think it will turn out to have a much greater effect in the general population."

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