The CLA Network

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Harvesting the health promise of conjugated linoleic acid

CLA offers new hope in battling disease

Human health potential related to cancer, heart disease, obesity, diabetes, kidney disease and bone density

Research is revealing that one of the next great disease fighters may already be found in the refrigerator or on the backyard grill.

Conjugated linoleic acid (CLA) is a "good fat" found naturally in dairy and beef products. Though relatively unknown a decade ago, pioneering studies based largely on animal models have shown considerable CLA promise for human health benefits related to cancer, heart disease, diabetes, kidney disease, bone density and obesity.

"CLA is no ordinary fat," says Dr. Spencer Proctor, Director of the Metabolic and Cardiovascular Diseases Laboratory at the University of Alberta. "For a food component, it has shown extraordinarily strong potential to aid in the fight against these conditions."

Capturing benefits

Proctor is one of many leading researchers aiming to identify and take advantage of CLA opportunities, as part of the CLA Network. Founded in Canada in 2001, the CLA Network is a collaborative team from academia, industry and government, including representatives from many areas of expertise such as research, food industry, health and communications. Together, they are working to harvest the expanding health potential of CLA in dairy and beef products.

Proctor leads the CLA Network's Human Health module, one of six modules in the network. Other modules include Animal Mechanisms, Dairy Production and Product Development, Beef Production and Product Development, Product Development and Market Research, and Communications.

Scientists have now well established that ruminant animals produce CLA that is transferred into dairy and beef products, note Proctor. They also know levels of this natural CLA can be increased substantially in these products through simple changes to animal diets, and indications are a variety of other approaches have considerable potential to also increase CLA.

"In the Human Health module, our role is to identify and understand the human health benefits of different types of CLA, as a means to drive progress toward realizing

"For a food component, CLA has shown extraordinary strong health potential."

those benefits through a number of approaches," says Proctor.

CLA Network priorities to date have focused on other modules, as planned for the network's early start-up phase. But the Human Health module has played a critical role during this period in supporting other modules and in laying the groundwork for future progress.

"For now, in our specific Human Health module studies, we've chosen to concentrate on completing fundamental cell and animal based studies," says Proctor. "These will strengthen our foundation for future human clinical trials, which we plan to pursue as Network capacity for the Human Health module increases."

Broad advances

Several studies have been completed, each with encouraging results

Understanding different CLA types. A key thrust for the module has been to look at many different CLA types – known as isomers – and determine which health outcomes or benefits each different structure may have.

Among the many different CLA isomers, two of these - CLA 9,11 and CLA 10,12 - have been linked to health benefits and studied extensively for biological function. These two CLA isomers are known to be present in dairy and beef products.

Also known to be present in beef and dairy products is vaccenic acid, which recent research has revealed as a precursor to CLA 9,11. This precursor can be converted into CLA once inside the human body.

"A lot of our concentration is to take the specific isomers the Network as a whole is investigating, and examine them from a human health perspective to translate what type of health outcome or benefit those particular structures might have," says Proctor.

Dramatic cancer progress. The most advanced area of CLA human health research is cancer prevention and treatment. In a series of cell culture studies, module researchers have confirmed specific types of CLA can reduce the proliferation of cancerous cells.

Researchers initially believed CLA would act in the same way as omega three fatty acids, derived from fish oil, which have shown significant anti-cancer promise. However, study results point toward CLA as having quite different mechanisms and producing an anti-cancer effect at a much lower concentration.

"The potential CLA is showing to aid in the battle against cancer is remarkable," says Dr. Catherine Field,

a leading researcher on the effect of nutrition on the immune system and Professor of Human Nutrition at the University of Alberta.

CLA's cancer-fighting effect has held up in all the major animal models of cancer that are used for testing drug efficacy, notes Field. These include primarily models for breast cancer and the colorectal cancers, along with models for some forms of leukemia and liver cancer, including hepatoma.

Among the key findings, module research has confirmed indications that major isomers CLA 9,11 and CLA 10,12 appear to act differently in relation to various forms of cancer. "This opens the door to fighting cancer with CLA through more than one pathway," says Field.

In addition, CLA appears to affect both the growth and death of cancer. This is of great significance to cancers such as breast cancer, which are characterized by mutated genes that stop cell death.

"CLA has potential to act in the manner of some chemotherapy drugs by 'turning back on' the death process of cancer cells," says Field. "A benign food ingredient with this activity would be a remarkable tool for cancer treatment."

Supporting heart health. Cardiovascular disease is another key research front. Human Health module research has helped to confirm components of early animal studies by other researchers, which have indicated feeding animals CLA improves the profile of fats in the blood. In particular, indications are CLA may play a role in reducing high levels of low-density lipoproteins (LDL), which are associated with heart disease.

"There are also indications that CLA may influence an inflammatory-related mechanism that reduces the disease pathology," observes Proctor. Further animal studies are underway to examine CLA links to guarding against heart disease, and the research effort is shifting to focus more on human studies.

Anti-obesity evidence. Module animal studies have assisted in confirming links between CLA and increased energy expenditure, increased body muscle and reduced body fat.

Ties to diabetes. Also related to the obesity benefits is the positive potential for type II diabetes.

"Through our research knowledge to date is very limited, our studies have shown some indication that CLA may play a role in normalizing glucose metabolism," says Proctor.

New activity

With favorable results in hand, module researchers are pursuing more studies to further identify and understand the health benefits of different CLA isomers.

Effects on metabolic syndrome. In a new animal study, module researchers are exploring the potential effect of CLA 9,11 and a CLA-precursor on several of the metabolic syndrome risk factors.

Metabolic syndrome is a chronic health condition characterized by the presence of a group of metabolic risk factors in one person. These risk factors include abdominal obesity, high cholesterol and other blood-related heart disease risk factors, insulin resistance and a pro-inflammatory state.

Battling breast cancer. Module researchers are also further applying a growth inhibition model for cancer, using key CLA isomers, by testing this model in a study involving two human breast cell lines.

"We're characterizing the mechanisms for growth inhibition using CLA 9,11 and CLA 10,12 isomers and a 50:50 mixture," says Field.

Expanding heart benefits data. In another series of studies, module researchers are pursuing further data on CLA effects on heart disease in animal models.

"The goal is to provide potentially stronger evidence for the links to heart benefits indicated in previous studies," says Proctor.

Comparison to fish oil treatments (omega three). In addition, module researchers are completing the first in a series of large studies with rodents, geared to further identify and understand CLA health benefits.

In this first large study, which includes several laboratories across the country, scientists are comparing CLA butter oil extract to fish oil treatments, which contain beneficial omega three fatty acids.

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Moving toward human clinical trials. For the future, researchers plan to carry forward progress in several areas to the human clinical trial stage, as resources become available.

Supporting health claims. As knowledge of CLA benefits increase, they are also preparing to design and implement related studies to facilitate specific health claims that may be labeled on food products.

Exploring benefits of vaccenic acid. Furthermore, along with further exploration of key CLA isomers, the scientists also plan greater study of vaccenic acid, the precursor to CLA 9,11.

"It's clear vaccenic acid may have a substantial role in promoting CLA levels," says Proctor. "As a result, we will expand our focus in a number of areas to include more investigation of this component."

For more information on the CLA Network, visit www.CLAnetwork.com or email: CLAnetwork@gov.ab.ca.

Visit www.CLAnetwork.com for more articles on activity and progress.

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