Oil from biotech soybeans increases key omega-3 fatty acid in humans

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Oil from soybeans modified through biotechnology increased levels of omega-3 eicosapentaenoic acid (EPA) in red blood cells according to research presented at the American Heart Association's Scientific Sessions 2009.

"This soybean oil could be an effective alternative to fish oil as a source of heart-healthy omega-3 fatty acids," said William Harris, Ph.D., lead author of the study and chief of cardiovascular health research at Sanford Research/USD and professor of medicine at Sanford School of Medicine, University of South Dakota in Sioux Falls, S.D.

"We know that giving pure EPA to people reduces their risk for heart disease," he said. "Presumably, if you gave this special soybean oil to people, you'd do the same thing — reduce heart attacks."

The American Heart Association recommends eating two servings per week of fatty fish which is high in EPA and docosahexaenoic acid (DHA), like mackerel, lake trout, herring, sardines, albacore tuna and salmon. Eating fish containing these omega-3 fatty acids has been associated with a decreased risk of cardiovascular disease.

Fish oil contains two forms of heart-healthy, long-chain omega-3s, EPA and DHA. However, many Americans don't like eating fish because of the taste, preparation and/or concern that it may be contaminated by mercury and other pollutants.

A few plants, particularly soybeans, produce oils that contain alpha-linolenic acid (ALA), which is another type of omega-3 fatty acid. The human body converts ALA to stearidonic acid (SDA), but this is a very inefficient process. The body converts SDA to EPA far more effectively, resulting in more EPA per gram consumed.

The researchers sought to bypass the ALA-to-SDA conversion step in the body by doing so in the soybean plant. They developed the new soybean variety by inserting one gene from another plant and one from a fungus to allow the soybean plant to produce SDA. The result is a soybean oil enriched in SDA, which when consumed allows the body to produce more EPA than if it started with ALA.

Harris and his colleagues recruited healthy volunteers in Cincinnati, Sioux Falls and Chicago into the double-blind study. "Our goal was to see if the oil from the genetically engineered soybean would raise red blood cell levels of EPA," he said.

The researchers randomized participants to three groups. Each group received two packets of oil (7.5 grams each) to put on food and two gel caps (500 milligrams each) to swallow daily:

- One group received 15 grams of the SDA enriched soybean oil (SDA) in packets and gel caps totaling one gram of regular (i.e., commodity) soybean oil per day.
- A second group consumed one gram of EPA in gel caps and 15 grams of commodity soybean oil.
- The control group got only commodity soybean oil — 15 grams from packets and one gram from the gel caps.
  At the end of the 12-week study, data from 157 volunteers who

completed the study per protocol showed:

- EPA levels rose 17.7 percent in the SDA group and 19.7 percent in the EPA group, both statistically significant changes. "That means the SDA in the oil was converted to EPA in the body," Harris said.

- Compared to ALA, which did not raise cellular EPA levels at all, SDA raised blood cell EPA levels with about 18 percent of the efficiency of pure EPA.

- In volunteers with high triglycerides, consuming SDA or EPA reduced fasting triglycerides by 26 percent to 30 percent, compared with the control group, also a significant result.

- Volunteers suffered no adverse side effects.

Although most volunteers who completed the study were white (70 percent), the team expects its findings will apply to all races, based on what is known about EPA in the body, Harris said.

"This oil could make a major contribution to our national omega-3 intake. The supply could be virtually endless, and it would provide omega-3s without putting additional pressure on fish stocks. What's more, it will be free of contamination from mercury, PCBs or dioxins, the harmful things that can get into some types of fish," he said.

"Our next step is to formulate this SDA soybean oil into food products such as breakfast bars, yogurts and salad dressings, and then do a study to see if it is absorbed by the body and converted to EPA," Harris said. "It should be, but you don't know until you test it."

Other study limitations included the number of dropouts, which reduced

its statistical power, and no long-term data on the soybean oil's preventive effects on heart disease.

Source: American Heart Association (news : web)