Short-term, high-fat consumption may be beneficial to the heart

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Approximately one million Americans suffer a heart attack each year of which some 400,000 attacks are fatal. A key cause of heart attacks is atherosclerosis, a process in which cholesterol builds up in the arteries and impedes the ability of the blood to flow to our most vital organ. Atherosclerosis is often associated with a high-fat diet in humans, but in a new study using an animal model researchers have found that a high-fat diet for a very short period can protect the heart from heart attacks and result in less tissue damage when heart attacks occur.

Lauren Haar, Xiaoping Ren, Yong Liu, Min Jiang, Sheryl Koch, Michael Tranter, Jack Rubinstein and W.K. Jones of the University of Cincinnati (UC), Cincinnati, OH, conducted the study. Ms. Haar, a doctoral candidate, will present the team's findings in a poster presentation entitled, "Acute high fat feeding influences cardiac function and confers cardio protection against ischemic injury," at the meeting Experimental Biology 2011 (EB 2011). The meeting, sponsored in part by the American Society for Experimental Therapeutics (ASPET), is being held April 9-13, 2011 in Washington, DC.

Methodology

According to Haar, the researchers established test groups comprised of seven male mice. Female mice were not included in order to eliminate the effects of estrogen and metabolism of fat. Each group was fed a high-fat diet (lard-based, with 60 percent of the calories coming from

saturated fat) for one of the following feeding periods: 24 hours, one-, two-, or six weeks. The control group received a standard grain and vegetable-based diet.

After the feeding periods the researchers induced ischemic injury in the hearts of the mice, similar to what humans experience during a heart attack. The animal hearts were subsequently examined for cardiac function and tissue damage.

Results: No Protection in the Longer Term

The researchers found that the injury to the heart tissue among the mice that received the high-fat diet in the short term (24 hours, one- and two-weeks) was reduced by 70 percent compared to the group that was fed the high-fat diet for six weeks which was shown to have a larger injury to the heart like the effect seen in control fed animals. No cardioprotection was observed in the six-week group, indicating that short-term "splurges" were crucial to the impact.

Further, mice fed a high-fat diet for 24 hours and then returned to a control diet for 24 hours prior to heart attack experienced a prolonged or "late phase" protection against injury, indicating that short-term high fat feeding in animal models could preserve cardiac function.

Current Study Adds to Knowledge Base

According to Haar, the study adds to an existing body of research which has found that certain patients with high cholesterol levels have better survival rates after heart injury or heart failure than do patients with lower cholesterol levels. The reason for this phenomenon is unclear.

Since few studies exist that shed light on the effect of acute high-fat

diets on a heart attack, Haar and the team decided to test the impact in animals. With the current results in hand, the team will look more closely at why the cardiac protection goes away over time, and consider whether a genetic component might be involved.

Ms. Haar noted, "We hope that additional studies, which are now underway, will lead us to understand why the cardioprotective effect occurs and why it goes away over time. This understanding will provide us with better insights into the interaction between diet, health and heart diseases."

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