Triglycerides implicated in diabetes nerve loss

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A common blood test for triglycerides - a well-known cardiovascular disease risk factor - may also for the first time allow doctors to predict which patients with diabetes are more likely to develop the serious, common complication of neuropathy.

In a study now online in the journal Diabetes, University of Michigan and Wayne State University researchers analyzed data from 427 diabetes patients with neuropathy, a condition in which nerves are damaged or lost with resulting numbness, tingling and pain, often in the hands, arms, legs and feet. The data revealed that if a patient had elevated triglycerides, he or she was significantly more likely to experience worsening neuropathy over a period of one year. Other factors, such as higher levels of other fats in the blood or of blood glucose, did not turn out to be significant. The study will appear in print in the journal's July issue.

"In our study, elevated serum triglycerides were the most accurate at predicting nerve fiber loss, compared to all other measures," says Kelli A. Sullivan, Ph.D., co-first author of the study and an assistant research professor in neurology at the U-M Medical School.

"These results set the stage for clinicians to be able to address lowering lipid counts with their diabetes patients with neuropathy as vigilantly as they pursue glucose control," says Eva L. Feldman, M.D., Ph.D., senior author of the study and the Russell N. DeJong Professor of Neurology at the U-M Medical School.

With a readily available predictor for nerve damage - triglycerides are measured as part of routine blood testing - doctors and patients can take pro-active steps when interventions can do some good, says Feldman.

"Aggressive treatment can be very beneficial to patients in terms of their neuropathy," says Feldman, who is also director of the A. Alfred Taubman Medical Research Institute and director of the Juvenile Diabetes Research Foundation Center at U-M for the study of complications in diabetes.

People can reduce blood triglyceride levels with the same measures that reduce cholesterol levels: by avoiding harmful fats in the diet and exercising regularly.

Context

Diabetic neuropathy affects around 60 percent of the 23 million people in the United States who have diabetes. It is a complication in both type 1 and type 2 diabetes.

Until now, doctors have lacked an effective way to predict which diabetes patients are at greatest risk of neuropathy. Most often, the condition becomes evident when irreversible nerve damage has already occurred. Neuropathy is the leading cause of diabetes-related hospital admissions and amputations that are not secondary to trauma.

Triglycerides are a type of lipid, or fat, that the body makes from calories it doesn't need immediately. Triglycerides are stored in fat cells until they are needed to provide energy. When higher-than-normal amounts circulate in the blood, a person is at higher risk of cardiovascular disease.

Research implications

The new finding adds to an emerging picture of the close connections between cardiovascular disease and diabetes. Elevated triglycerides are one of the most common features of the lipid disorders found in patients with type 2 diabetes, by far the most common form of diabetes, says Rodica Pop-Busui, M.D., Ph.D., one of the study's authors and an assistant professor in the metabolism, endocrinology and diabetes division of the Department of Internal Medicine at the U-M Medical School.

"Cardiovascular disease is the main cause of excess mortality among patients with diabetes. Research also has shown that the presence of neuropathy is an important predictor of these deaths," says Pop-Busui.

"Our findings in this study reinforce the tight links between cardiovascular disease and peripheral neuropathy in patients with diabetes. We demonstrated that the same lipid particles that contribute to the progression of atherosclerosis are also very important players in peripheral nerve fiber loss."

In addition, the study confirms a growing belief among some diabetes researchers that elevated blood levels of certain lipids, rather than solely elevated blood sugar, are key in the progression of diabetic neuropathy. The study pinpoints triglycerides as the critical indicator.

Research details

The researchers examined data from a previous clinical trial of a drug that showed promise for relieving neuropathy. They looked at data from 427 participants who had mild to moderate diabetic neuropathy at the beginning of the one-year trial. Among other factors, the trial measured

myelinated fiber density in a peripheral nerve in the leg in participants over the course of the year. A decline in this density is a prime indicator that neuropathy is worsening.

The new findings from U-M are an example of how medical science often looks for one thing and doesn't find it—the drug trial found that a promising agent turned out to be ineffective for treating neuropathy—but the data can yield unexpected, useful knowledge about something else.

Realizing the trial data held potential clues, the U-M team selected trial participants who had similar characteristics regarding nerve function at the beginning of the study but significantly lower myelinated fiber densities at the end. They used microarray technology not available 15 years ago, when the data was collected.

"We then compared all of the other data concerning lipids and blood glucose. We found that out of all the data collected on these patients, elevated triglycerides were the factor that differed the most, when we compared the patients who lost nerve fibers with those who didn't," says Sullivan.

Elevated triglycerides correlated with the nerve fiber loss independent of disease duration, age, diabetes control or other variables.

More information: *Diabetes*, diabetes.diabetesjournals.org/ … /reprint/db08-1771v1

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