Why bad things can happen to the heart when 'good' cholesterol goes bad

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It's yet another example of how a good thing can go bad: Researchers have found evidence in laboratory studies that 'good' cholesterol, renowned for its ability to protect against heart disease, can undergo detrimental changes in protein composition that make it 'bad' for the heart.

Scientists long have suspected that there may be dysfunctional forms of so-called 'good' cholesterol, also called high density lipoprotein (HDL) cholesterol, that can loose their heart-protective effect. But the exact chemical composition of HDL, both good forms and bad, has remained largely unknown, researchers say.

In a study presented today at the 234th national meeting of the American Chemical Society, researchers reported what is believed to be the most detailed analysis to date of the protein composition of HDL. They uncovered surprising new information about HDL, including previously unrecognized proteins that appear to play an important role in maintaining heart health. Their findings could one day lead to new, more accurate lab tests for heart disease as well as new, potentially life-saving treatments for the disease, which is the number one killer in the United States and other developed countries.

"Targeting HDL could represent a new horizon in heart disease diagnosis and treatment," says study leader Jay Heinecke, M.D., of the University of Washington School of Medicine in Seattle. "But simply boosting HDL levels may not be enough to prevent heart disease. You might have to

target the right proteins in HDL."

HDL, which removes cholesterol from artery walls, is also suspected of having anti-inflammatory and antioxidant properties. Its evil twin, low density lipoprotein cholesterol (LDL) deposits cholesterol in arteries. To further explore HDL's role in the body, Heinecke and colleagues conducted a detailed analysis of the protein composition of HDL and found 48 proteins, including 22 proteins that play a role in cholesterol metabolism and 13 proteins not previously known to exist in HDL.

Of the proteins identified in HDL, some might play a previously unsuspected role in preventing atherosclerotic plaques from rupturing. The rupture of these plaques, followed by formation of an artery-plugging blood clot, causes most heart attacks, the researcher says. Other important protective proteins identified in HDL may protect heart cells from injury during a heart attack, Heinecke says.

But other components found in HDL have potentially destructive effects in the body by promoting cholesterol accumulation and inhibiting some of the heart-protective effects of other proteins, Heinecke says. Thus, boosting HDL cholesterol levels alone might not protect the heart, he says. Indeed, a major pharmaceutical company recently withdrew an experimental HDL-boosting drug when it was found that the drug caused an increase in deaths and heart problems, Heinecke notes.

A better understanding of the protein components of HDL could therefore lead to new, more accurate tests for predicting or evaluating heart disease, says Heinecke, whose study is funded by the National Institutes of Health. He notes that heart attacks can occur in people whose cholesterol levels appear normal and that conventional diagnostic tests for cholesterol levels do not always give a clear picture of the disease. More effective, targeted HDL-based interventions could potentially save lives, especially when used in combination with statin

drugs that target low density lipoproteins (LDL), or bad cholesterol, says Heinecke, who notes that more studies are needed.

“There’s still a lot we don’t know about heart disease,” Heinecke says. “HDL is still a big mystery, but we’re closing in on it and we’re pretty excited.” Important interventions for fighting heart disease include exercise, a well-balanced diet, and taking heart medications as prescribed, experts say.

Source: American Chemical Society

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