Medical Xpress

New blood test reveals risk for metabolic syndrome

May 20 2008

University of Minnesota researchers have discovered that people with high oxidation levels of the low-density lipoprotein (LDL) particle that carries cholesterol throughout the blood are much more likely to develop metabolic syndrome – which can lead to a considerably increased risk of developing heart disease.

Researchers measured oxidized LDL in more than 2,000 generally healthy people aged 33-45 (average age 40) in an ongoing study, called CARDIA. After deleting those with metabolic syndrome, they followed the remaining 1,889 for five years. Those with the highest levels of oxidized LDL had 3.5 times the risk of developing metabolic syndrome five years later.

The findings were published today in the *Journal of the American Medical Association*.

These findings are especially important for prevention of heart disease since the participants in this study were relatively young and few had any signs of it. Although neither diet, physical activity, nor smoking were directly studied, this finding bolsters the belief that all of these lifestyle factors need attention from youth onward to prevent heart disease.

“Smoking is one of the most common sources of oxidative stress. Optimal diet and an active lifestyle can keep the antioxidant defense system in balance and prevent oxidized LDL from forming,” said David Jacobs, Ph.D., principal investigator of the study, and a professor in the

School of Public Health.

In some people, cholesterol in the blood tends to deposit on arterial walls, leading to a building of plaque that causes atherosclerosis. Atherosclerosis damages artery walls, impedes flow of blood, and eventually causes heart attack. But cholesterol is also an important component of all cell walls and is therefore central to life. So why does excess cholesterol in the blood have a bad effect on health, when cholesterol itself is a fundamental building block of life"

Because cholesterol is a fat (lipid) that does not dissolve in blood, the body has devised a system of enveloping cholesterol in protein to transport it. These small bodies found in the blood are called lipoprotein particles. Many scientists believe that oxidation of the lipoprotein particles that carry cholesterol in the blood may answer the question of why cholesterol does damage. Oxidation is necessary to processing of oxygen and fueling the body. However, free radicals, formed as a product of oxidation, can be dangerous.

While free radicals can be used by the body to fight bacterial infections, if they are not kept in tight balance they can damage important molecules in the body. In particular, LDL particles are highly prone to oxidative damage (oxidized LDL). LDL particles are constantly zipping in and out of arterial walls, delivering cholesterol for needed biologic functions. If oxidized, the particle has trouble leaving the arterial walls, white cells are called in to attack the “invader,” and before long an atherosclerotic plaque is developing, with the ultimate risk of heart attack.

With collaborators from Belgium and South Korea, University of Minnesota researchers have provided new information about how the process works.

Metabolic syndrome is a constellation of factors that predisposes people to conditions such as heart disease and diabetes. It includes obesity, mild glucose abnormalities, elevated blood pressure, and adverse alterations in blood lipids. It is complementary to other heart disease risk factors, such as smoking. Those with metabolic syndrome are at considerably increased risk for heart disease.

The blood test for oxidized LDL was invented by the first author of the paper, Professor Paul Holvoet, Ph.D., of Katholieke Universiteit, Leuven, in Belgium.

“If LDL particles are severely damaged, the body recognizes them and excretes them. But minimal oxidation is not as easily recognized. The test we devised identifies minimally oxidized LDL particles, which we theorized were the ones that are most likely to be incorporated into atherosclerotic plaque and cause health problems,” Holvoet said. “The finding that oxidized LDL relates particularly to metabolic syndrome advances our understanding of how the atherosclerotic process works.”

Source: University of Minnesota