

CHORI Research Turns Assumption about Cardiovascular Disease Risk and Cholesterol on Its Head

According to the national Institutes of Health, cardiovascular disease is the leading cause of death in the United States. For decades, diagnosing the risk for cardiovascular disease has included blood tests for cholesterol, which can be a major cause of cardiovascular disease. Current blood tests measure the levels of low-density lipoprotein (LDL) cholesterol—the “bad” cholesterol—and high-density lipoprotein (HDL)—the “good” cholesterol.

In general, it is assumed that the lower your LDL level, the lower your risk; with HDL, the higher the level, the lower your risk.

A research project developed by Michael Oda, PhD, at Children’s Hospital Research Institute (CHORI) is turning part of that assumption on its head. His research also has led to development of a new diagnostic test that more accurately identifies people at risk for cardiovascular disease. “Current testing is based on the notion that the quantity of HDL cholesterol is representative of our risk for cardiovascular disease,” Dr. Oda explains. “We have determined, however, that the quality of HDL—how well it performs its functions—is more important than the quantity in assessing our risk for cardiovascular disease. Simply increasing HDL cholesterol levels in the blood is not sufficient to reduce the risk of heart disease.”

Referring to HDL as the “Swiss Army Knife” of our bodies, Dr. Oda notes that HDL performs a wide range of functions:

- Transporting cholesterol and taking the “bad” cholesterol out of your blood
- Modulating the function of the body’s immune system
- Regulating inflammation, which is another risk for cardiovascular disease
- Controlling blood clotting, which is an essential function to stop bleeding but may also cause heart attacks and strokes
- Transporting fat-soluble vitamins and other nutrients throughout the body.
- Dr. Oda has been working on research in this area since 1996. After clinical studies confirmed that the quality of HDL could be a key risk factor for cardiovascular disease, he began developing a test to measure how well HDL is actually functioning.

“Traditional tests only measure how much HDL is in the blood,” Dr. Oda says. “Our test measures how well HDL withdraws cholesterol from the artery wall. “

The test is relatively simple, requiring only a few drops of blood. The blood is placed in a small device called an ‘electron paramagnetic resonance spectrometer,’ and we can get the results in about 15 minutes.”

Work on the test has been in progress for the past three years. Multiple tests have been performed on blood samples from more than 500 individuals. “So far, the degree of variability in results is less than 4 percent, which is very minimal,” Dr. Oda notes. “For results in traditional cholesterol tests, the variability in multiple tests on individuals can be 10 to 12 percent or more.”

According to Dr. Oda, the test is the first of its kind to detect cardiovascular disease risk equally in younger people and women as in men. It also is the first test of its kind that distinguishes healthy people from those who have had a cardiovascular event, as well as those who are at greater risk for developing cardiovascular disease.

“Current tests were designed mainly for men and older people,” he explains. “Our test works equally well for all ages, so it allows us to evaluate cardiovascular disease risks for younger people. It also allows us to ascertain which women are at greater risk.

Today, more and more women in their late 30s and 40s are at increased risk, and it is a ‘silent risk’ because current tests were designed primarily for men. HDL functionality also diminishes in women who are post-menopausal.”

Dr. Oda is expanding the trial to evaluate no fewer than 5,000 people and will be applying to the Food and Drug Administration (FDA) for approval of the test. “It’s likely that FDA approval will take about three years,” he says. “We are already in talks with distributors in the U.S. for providing the test to the public.” Dr. Oda’s work may also help researchers develop new drugs for cardiovascular disease and make existing drugs better. “We have been working closely with a wide range of companies on this test and potential drug research, including Bruker Biospin, Bristol-Meyers Squibb, Health Corps, and Cleveland Heart Laboratory. We also have performed work for Roche and Merck, and we are currently in talks with CSL Behring. “

At Children’s Hospital Oakland, one of our major goals is to create healthy families,” Dr. Oda adds. “This is a very important test for young people. There are many factors that contribute to the quality of HDL function, such as diet, exercise, metabolic disorders such as diabetes and genetically inherited diseases. For children who are determined to be at risk of developing cardiovascular disease, we can work with their families to lower the risks they can control.