Simple blood test detects early emphysema in smokers before symptoms appear

EurekAlert

NEW YORK (March 11, 2011) -- During a regular annual physical exam, blood is usually drawn to check the health of a person's heart, kidneys and liver. Now, researchers at NewYork-Presbyterian Hospital/Weill Cornell Medical Center say a blood test that detects the early development of emphysema -- well before symptoms occur -- may someday also be offered.

In the March 14 online edition of the *American Journal of Respiratory and Critical Care Medicine,* the researchers say that because most cases of emphysema are caused by smoking, the test they are developing can warn smokers about impending development of the untreatable disease -- which is currently a major cause of disability and death in the U.S.

Not all smokers develop emphysema, but those who find out they are at risk will be motivated to quit to halt progression of the disease, says the study's lead investigator, Dr. Ronald G. Crystal, chairman and professor of genetic medicine and the Bruce Webster Professor of Internal Medicine at Weill Cornell Medical College and chief of the Division of Pulmonary and Critical Care Medicine at NewYork-Presbyterian Hospital/Weill Cornell Medical Center.

"We know, from other studies, that smokers who learn from objective evidence that their health is in danger are much more likely to quit," he says. "That is the only thing that will help them avoid this deadly disorder."

Emphysema and chronic bronchitis are the twin disorders that make up chronic obstructive pulmonary disease (COPD), which is now the fourth leading cause of death in Americans. Given the aging population, COPD is soon expected to move up to third in mortality prevalence, Dr. Crystal says.

The new test measures particles that are shed by tiny blood vessels known as capillaries that surround air sacs (alveoli) in lungs. These particles are debris shed by ongoing injury to the air sacs -- damage that eventually results in devastation of the sacs and the "Swiss cheese" appearance of the lungs. The alveoli are where critical gas exchanges occur: blood in the capillaries brings carbon dioxide from the rest of the body for release into the air sacs, and the oxygen in the sacs (taken in from breathing) is taken up by the blood and transported to the rest of the body.

As the sacs are destroyed, people develop shortness of breath because they cannot take in enough oxygen to feed the body and eventually cannot remove carbon dioxide from the blood.

Dr. Crystal and his colleagues reasoned that as capillaries surrounding the air sacs

are being injured, the debris would be carried out by the blood supply and could potentially be quantified as a disease biomarker. So they began to look for evidence of what they called endothelial microparticles (EMP).

"Our blood vessels are always being replenished, so we all have some level of EMPs in our blood," he says. "What we are looking for are elevated levels of EMPs. For smokers, this is the equivalent of a smoke detector sounding its alarm; elevated levels of EMPs suggest their air sacs are being injured and it is time to act."

To do this, the researchers enrolled three groups of people -- healthy nonsmokers, healthy smokers, and smokers with early evidence of lung destruction. Study participants had their medical histories taken, and to gauge lung function in these participants, all underwent two pulmonary function tests. One is spirometry, which measures the volume and speed of air as it is inhaled and exhaled from the lungs. The other, known as DLCO, is the only lung function test available today that can detect emphysema in patients. It uses a machine that measures the ability of gases to diffuse across the alveolar-capillary membrane.

The researchers found a 95 percent positive correlation between elevated EMPs in the blood and an abnormal DLCO test result, meaning that it detected nearly all verified cases of early emphysema in participants.

Two other independent groups of participants were then given the same group of tests -- spirometry, DLCO and the EMP blood test -- and, once again, a positive EMP finding correlated with an abnormal DLCO 95 percent of the time. Differences in the spirometry findings had no bearing on results of DLCO or EMP.

DLCO, which must be administered by a pulmonologist, is most often used to confirm a suspicion of emphysema, Dr. Crystal says. By contrast, the EMP blood test is designed to be a simple, low-cost screening tool that can pick up development of emphysema in individuals who show no signs of the disorder.

"We need a blood test that can be administered to the 20 percent of American adults who smoke as well as nonsmokers exposed to secondhand smoke -- all who may not understand their risk of developing this progressive lung disease," says Dr. Crystal.

The researchers are conducting further studies of the EMP test in larger groups of participants in order to validate these initial findings.

SOURCE [1]

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http://www.mdtmag.com/news/2011/03/simple-blood-test-detects-early-emphysema-smokers-symptoms-appear?qt-recent_content=0

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