# 'Microparticles' useful in identifying earliest signs of emphysema

EurekAlert

Monitoring blood for tiny particles released by cells lining the lungs may help clinicians diagnose emphysema in its earliest stages, according to researchers from Weill Cornell Medical College. The particles, called endothelial microparticles (EMPs), are shed during the disease process as tiny blood vessels in the lungs, called pulmonary capillaries, are injured and die.

The findings were published online ahead of the print edition of the American Thoracic Society's *American Journal of Respiratory and Critical Care Medicine*.

"This study confirmed that levels of EMPs are elevated in the blood samples of smokers, consistent with the concept that emphysema is associated, in part, with the death of cells lining the pulmonary capillaries, and suggesting that the early development of emphysema might be monitored with blood tests to measure EMP levels," said Ronald Crystal, MD, chairman and professor of genetic medicine at Weill Cornell Medical College.

Previous studies have linked vascular disease with elevated blood levels of EMPs. In light of growing evidence that early emphysema is associated with the loss of pulmonary capillaries, Dr. Crystal and his colleagues hypothesized that EMP levels might also be elevated in patients in the early stages of emphysema.

To conduct their study, the researchers used two lung function tests: spirometry, which measures the amount and speed at which a patient exhales; and a lung diffusion test which measures the lung's ability to diffuse, or transfer, carbon monoxide (DLCO). Patients with early emphysema typically have normal levels of inhalation and exhalation, but exhibit low DLCO.

"One of the key differences between spirometry, which is commonly used in physicians' offices, and DLCO, which is a more sophisticated test usually used only by pulmonologists, is that spirometry is less sensitive to the changes that occur in the lungs in the early stages of lung disease," Dr. Crystal said. "The DLCO test is much more sensitive and is able to pick up the earliest signs of emphysema."

In their study, the researchers assessed the levels of circulating EMPs in an initial patient population of 92 subjects, including healthy nonsmokers, healthy and symptomatic smokers with normal lung function and healthy smokers with normal spirometry but low DLCO. Because smoking is known to affect blood vessels in many areas of the body, EMPs were assessed for a specific enzyme that occurs primarily in pulmonary vessels. To confirm their findings, the assessment was repeated in two prospective cohorts, including a group of 92 patients similar to the initial patient population and a group of 15 patients with HIV.

Assessing their results, the researchers found both symptomatic smokers and healthy smokers with normal spirometry and normal DLCO had mild increases in EMP levels compared to healthy nonsmokers, and there was no difference in EMP levels between healthy and symptomatic smokers. In striking contrast, healthy smokers with normal spirometry but low DLCO had a significant increase in EMP levels.

"The data in these patient populations demonstrate that smokers with normal spirometry and normal DLCO have levels of circulating EMPs that are mildly elevated compared to healthy nonsmokers, but smokers who have normal spirometry and reduced DLCO have marked increases in the levels of circulating EMPs," Dr. Crystal said.

"Interestingly, the smokers with the highest EMP levels are healthy smokers with normal spirometry and low DLCO," he added. "This suggests that the vascular-based contributions to the development of emphysema may contribute to the early development of the disease, and may identify a point in time where intervention with smoking cessation therapy may prevent the irreversible lung destruction associated with the development of COPD."

A blood test to monitor for levels of EMPs may offer an alternative to high-resolution computed tomography (HRCT), which is currently used to identify early-onset emphysema, with varying degrees of success.

"Assessment of EMP levels may provide an early and inexpensive approach to identifying early evidence of emphysema, without the radiation exposure associated with chest computed tomography (CT) scans," Dr. Crystal noted. "Elevated EMP levels may be a useful biomarker to identify smokers with early emphysema at a stage where intervention may prevent further permanent lung destruction."

SOURCE [1]

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