Researchers link novel biomarkers to asthma and COPD

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Four novel biomarkers have been identified which may aid in the diagnosis and management of asthma and chronic obstructive pulmonary disease (COPD), according to a study conducted by researchers in Australia, who determined the biomarkers may be used in different combinations to successfully identify patients with either of the airway diseases. In conducting the study, the researchers relied on proteomics, an emerging field of science that focuses on the structure and functions of an organism's proteins.

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

"Using a proteomics approach, we have identified a panel of four blood-based biomarkers that, when used in combination, can discriminate between healthy controls, asthmatics and individuals with COPD, and has the potential to be a valuable tool in the clinical diagnosis of respiratory disease," said Peter G. Gibson, MD, conjoint professor at the University of Newcastle's
School of Medicine and Public Health. "The proteins in the diagnostic biomarker panel are all involved in the regulation of inflammation, and usually function as anti-inflammatory proteins.

"These results were confirmed in a second clinical population of older adults with airflow obstruction," he added.

The proteins identified in the study are predominantly liver-synthesized proteins that can have important anti-inflammatory activity through the inhibition of oxidative stress, which has been implicated in several diseases, including heart disease, Alzheimer's disease and Parkinson's disease.

To identify potential biomarkers, blood samples were collected from 43 subjects with a mean age of 48 years, including 21 with asthma, five with COPD and 17 healthy controls. Using proteomic techniques, plasma proteins were separated from all blood samples. Once protein biomarkers were identified and selected, the researchers measured the biomarkers' abilities, singly and in combination, to distinguish between the groups of patients.

To validate their results, the researchers conducted two additional assessments. In the first assessment, the original group was supplemented with an additional seven asthmatics and nine patients with COPD and repeated the biomarker assessment. The second assessment involved a separate population of 73 older subjects (over 55 years), including 14 with asthma, 22 with COPD, 14 with both conditions and 23 healthy controls. Results were confirmed in both validation groups.

Identifying biomarkers that are involved in the development of airway diseases may allow clinicians to diagnose the diseases in their earlier, and often more treatable, stages, Dr. Gibson noted.

"Our study identified a panel of highly discriminatory proteins that could be extremely useful in a clinical context," Dr. Gibson said. "Since these biomarkers are detectable in blood, which is readily obtainable from patients, and substances are currently available for testing the abundance of these proteins, this panel of biomarkers has the potential to become an extremely useful addition to the clinical diagnosis and management of respiratory disease."

Dr. Gibson noted proteomics played a vital role in the study, which was funded by the Australian government as part of its Cooperative Research Centre for Asthma and Airways program, and suggests the protein-based techniques may prove vital in future studies of biomarkers.

"Combined with well-defined clinical groups and advanced statistical analyses, we have shown that proteomics is a powerful tool for the identification of novel disease biomarkers," he said.

"The study is a good example of how high quality biological science can be translated effectively to a useful result for people with asthma and COPD. Future work is planned to study these markers in the lungs of patients with asthma and COPD, and apply the results in different clinical settings."

Provided by American Thoracic Society