Immune cell activity linked to worsening COPD

15 December 2009

A new study links chronic obstructive pulmonary disease, or COPD, with increased activity of cells that act as sentinels to activate the body's immune system.

The University of Michigan and Veterans Affairs research adds to growing awareness of the immune system's role in COPD, a serious, progressive lung disease that affects more than 12 million Americans with wheezing, shortness of breath, chest tightening and other symptoms. Understanding immune factors is key if doctors are to find better ways to detect and treat the disease early when patients might benefit most, believe some COPD researchers.

Nearly all people diagnosed with COPD have emphysema or chronic bronchitis or most commonly, both conditions. COPD is the fourth leading cause of death in the United States. Most people with COPD are smokers or former smokers.

"We found that dendritic cells, a type of immune cell that initiates immune responses, are in the lung interacting with lymphocytes, and that these dendritic cells seem to get more active as the disease goes on. If we could alter or stop their action, perhaps we could stop the disease from progressing," says the study's senior author Jeffrey L. Curtis, M.D., professor of internal medicine at the U-M Medical School and chief of the pulmonary and critical care medicine section at the VA Ann Arbor Healthcare System.

The study appears in the December 15 issue of the American Journal of Respiratory and Critical Care Medicine.

Lung damage occurs well before people with COPD are aware of symptoms. By the time they seek medical help, the destructive forces of chronic lung inflammation often have taken a heavy toll. Immune cells in repetitive overdrive play a key role in that inflammation response, COPD researchers increasingly believe.

Research details

Curtis and his research team analyzed the activity of dendritic cells and other immune cells in lung tissue from patients at early and more severe stages of COPD.
They found that as the disease progresses, multiple types of dendritic cells located in different parts the lung produce more of a stimulatory molecule associated with increased immune system activity. They also found two significant signs of increased activity in CD4+ T cells, important immune cells that, when activated, communicate with and direct other immune cells.

"Our data suggest that CD4+ T cells are more activated in later stages of COPD," says Christine M. Freeman, the study's first author and a research investigator in internal medicine at U-M.

"This is not necessarily a good thing, because increased activation suggests that there is an inappropriate and excessive immune response taking place in the lungs of patients with severe COPD."

One strategy to help prevent COPD from worsening could be to make dendritic cells less inflammatory, says Curtis, adding that it is a significant challenge to intervene in the immune system without undermining its ability to fight infection.

Key facts about COPD

Chronic obstructive pulmonary disease, or COPD, is a leading cause of disability and killed more than 125,000 Americans over age 25 in 2005. It affects slightly more women than men.

Most people under the umbrella term COPD have emphysema or chronic bronchitis, or both. But asthma, respiratory infections, air pollutants and

genetic factors also play a role.

People with emphysema suffer from severe shortness of breath that makes even simple daily tasks like dressing difficult. People with chronic bronchitis experience difficulty breathing, coughing and excessive mucus.

An estimated 40 percent of smokers get COPD. Recent research suggests the disease is more common than previously thought.

Ex-smokers remain at risk. It's common for symptoms to arise in ex-smokers even decades after they have quit smoking.

"Even if everyone in the world stopped smoking today, we would be dealing with the effects of this for 40 years," says Curtis.

Few treatments are very effective. Corticosteroids are of limited use in reducing inflammation.

People with COPD experience higher levels of depression and anxiety that those with other chronic diseases such as cancer and diabetes, studies have shown.

More information: American Journal of Respiratory Critical Care Medicine, December 15, 2009, volume 180, issue 12, page 1179

Provided by University of Michigan Health System