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Press release
For immediate release

Med Uni Graz researchers discover a new COPD subtype: Machine learning helps in identification of COPD

Graz, 09 October 2025: Around five percent of Austrians suffer from COPD (chronic obstructive pulmonary disease), a widespread disease. The most common symptom of COPD is shortness of breath, which greatly impairs the quality of life of the many affected by it. As COPD progresses, the supply of oxygen decreases so that even minor efforts can become unmanageable tasks. The Med Uni Graz Lung Research Cluster is investigating the role of the immune system in the development and progression of chronic pulmonary disease. The latest findings of an in-depth analysis of molecular and clinical parameters have recently been published in the journal *iScience* and show which changes in the lungs arise in COPD. The researchers were even able to identify a new subtype of the disease.

What is COPD?

COPD is the fourth most common cause of death worldwide. It is characterized by chronic inflammation and irreversible damage to the lungs. The disease can manifest itself in different ways, for example in the form of changes in the respiratory tract and emphysema, the accumulation of air in the lungs. Due to these differences, the variable course of the disease and the lack of a cure, treatment of COPD has proven to be difficult. In advanced cases, a lung transplant remains the only option.

The immune system plays a central role in the development of COPD because it promotes structural changes and disease progression. The complexity of immune cell interactions and the diversity of the immunological changes triggered by this disease make it more difficult to draw clinically relevant conclusions for individual patients.

"Most of prior research on the involvement of the immune system has concentrated on specific immune cell populations. Sufficient comparison with healthy lung tissue was not possible because an inadequate amount of material for comparison was available. The investigation of local immune cell destruction in the lungs of patients with COPD is thus top priority," explains researcher Leigh Marsh.

Immune cells at the center of COPD subtypes

The study investigated the immunological changes in COPD with a particular emphasis on the role of the immune system in the development and the progression of the disease.

"The findings show pronounced lymphocytic inflammation in the lungs of COPD patients accompanied by elevated levels of important immune signaling molecules in the lungs as well as in the bloodstream. This noticeably disrupted immune environment indicates that immune cells are continuously summoned to the lung and trapped there. Such a continuous inflammatory response might explain why the disease is so persistent and remains so difficult to treat," says Marsh about the research findings.

Machine learning has helped to identify a unique new subtype of COPD: the emphysema inflammatory subgroup (EIS), which differs from other COPD subtypes in its immune profile and a more distinctive form of emphysema.

What do these differences mean?

The study generally shows the significance of immunological changes in the lung for the development of COPD. The identification of this new subtype might help to develop new therapeutic approaches or make more accurate predictions of how COPD will progress in this group of patients.

Link to the study:
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Profile: Leigh Marsh
Leigh Marsh finished his habilitation at Med Uni Graz in 2020. He directs a research group at the Otto Loewi Research Center and within the newly established Lung Research Cluster. His research combines basic research with clinical research to explore the interaction and interdependence of immune cells and to determine their contribution to the pathogenesis of chronic pulmonary disease.