

Damaging immune response may be cause of COPD infections

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Researchers at the University of Dundee have made an important discovery about why patients with chronic obstructive pulmonary disease (COPD) suffer frequent chest infections, potentially paving the way for new treatments.

The team, led by Dr James Chalmers, has shown that the behaviour of a type of white blood cell, called neutrophils, changes when patients have COPD. Normally neutrophils remove [bacteria](#) from the lungs by 'eating' them, a highly efficient process called phagocytosis that causes no damage to the lung.

This study, however, shows that in patients with COPD, the ability to eat bacteria is greatly reduced and instead the neutrophils are forced to trap bacteria in large webs called Neutrophil Extracellular Traps (NETs). This process is much more damaging to the lung as the NETs contain chemicals to kill the bacteria that also make the lungs more inflamed.

Project researcher Dr Alison Dicker, from the University's School of Medicine, explained, "Think of a [lung](#) infection along the lines of having an infestation of slugs in your garden. Phagocytosis is like carefully removing slugs by hand without damaging the plants whereas NET formation is like using a flamethrower to get rid of them. NETs cause damage to the cells in the lungs as well as killing bacteria and this could be the process which drives COPD progression."

In the study of 99 COPD patients, published in the *Journal of Allergy*

and Clinical Immunology, levels of NETs were measured using a new laboratory test designed by the researchers. This showed that patients with increased NET levels in their lungs suffered from more severe COPD and experienced more [chest infections](#) as a result.

The researchers used advanced sequencing technologies to examine the bacteria in the lungs and found that, when NETs were present, the 'good' bacteria designed to keep us healthy were killed off, leaving behind a harmful bacteria called *Haemophilus influenzae* in the lungs.

The researchers are now keen to find out why NET formation occurs in some patients but not others, and if medications can be developed to prevent it in COPD patients.

Dr Chalmers said, "Whilst this is early research, we hope to use NET levels in the lungs as a biomarker which will enable the better identification of patients at increased risk of exacerbations and rapid disease progression, from that we can work towards novel treatments that target NET formation."

More information: Alison J. Dicker et al. Neutrophil Extracellular Traps are associated with disease severity and microbiota diversity in Chronic Obstructive Pulmonary Disease, *Journal of Allergy and Clinical Immunology* (2017). [DOI: 10.1016/j.jaci.2017.04.022](https://doi.org/10.1016/j.jaci.2017.04.022)

Provided by University of Dundee

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