Lung bacteria 'feign pregnancy' to avoid detection

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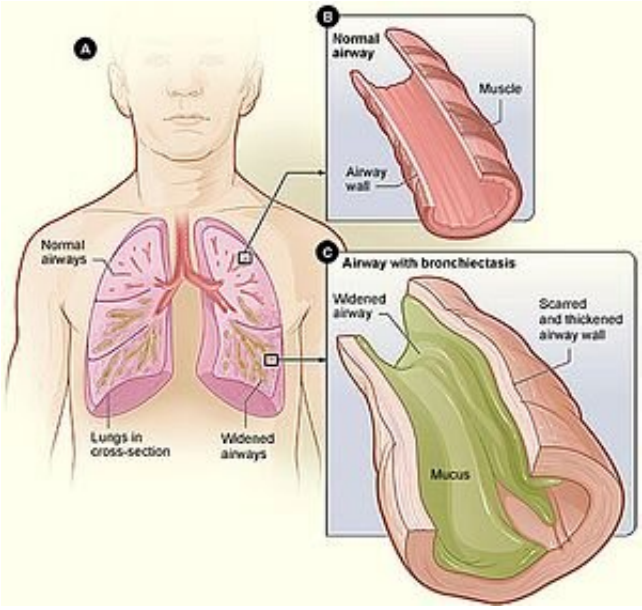

Figure A shows a cross-section of the lungs with normal airways and widened airways. Figure B shows a cross-section of a normal airway. Figure C shows a cross-section of an airway with bronchiectasis. Source: National Heart Lung and Blood Institute CC0: Public Domain

Disease-causing bacteria in the lung evade the body's immune system by pretending the lungs are pregnant, according to University of Dundee research presented today at the European Respiratory Society Congress in Madrid.

A new study, funded by the British Lung Foundation and the Scottish Government's Chief Scientist Office, has revealed that people with two common lung diseases—COPD and bronchiectasis—produce Pregnancy Zone Protein (PZP) in their lungs when they have a chest infection.

Both men and women can produce small amounts of PZP, but it is produced at much higher concentrations in the blood during pregnancy. It is believed that PZP suppresses the immune system in the womb to protect the fetus from being rejected. Previous studies have demonstrated that PZP reduces the activity of white blood cells, which protect the body from infection.

COPD is a lung condition caused by smoking, while bronchiectasis is a type of lung disease where the airways widen abnormally within the lung. Both conditions prevent the lungs from clearing out germs and other harmful substances. Being unable to clear the mucus causes people with lung disease to develop frequent chest infections, which take longer to clear than normal.

Professor James Chalmers, GSK/British Lung Foundation Professor of Respiratory Research at the University of Dundee and lead author of the study, said, "People with chronic lung diseases are far more likely to get regular chest infections. Despite this fact, we find that the body's normal mechanisms for dealing with infection doesn't work properly in those situations, which leaves patients trapped in a vicious cycle of coughing and spluttering from frequent chest infections.

"We were surprised to find PZP in the lungs, but this might explain why people with chronic lung disease cannot clear these infections easily. We believe that the bacteria are 'hijacking' the body's natural processes during pregnancy, activating the production of PZP and shielding themselves from the immune system.

"It might feel a bit strange to think that the bacteria are tricking the body into thinking that the lungs are pregnant, but this seems to be an effective strategy to avoid being destroyed by the immune system.

"These findings present a new opportunity to treat those people with the most severe types of chest infection, by kickstarting the body's natural defense mechanisms and helping break the vicious cycle of chest infections."

The Dundee team took samples from 124 people with bronchiectasis and 40 patients with COPD and analyzed the concentrations of PZP in their phlegm and blood. They found that PZP was present in phlegm samples from people with COPD or bronchiectasis, but was not present in healthy people. The researchers also found that higher levels of PZP were correlated with increased severity of infections and that it reduced when patients were given antibiotics.

This unexpected finding will help researchers to develop personalized treatments for COPD, which affects around 130,000 people in Scotland, and bronchiectasis, which affects around 39,000 people in Scotland.

The research is published online in the *American Journal of Respiratory and Critical Care Medicine*.

More information: Simon Finch et al. Pregnancy Zone Protein is Associated with Airway Infection, Neutrophil Extracellular Trap Formation and Disease Severity in Bronchiectasis, *American Journal of Respiratory and Critical Care Medicine* (2019). DOI: 10.1164/rccm.201812-2351OC