Discovering how treatments for emphysema might lead to infections

Smoking related lung diseases include emphysema and chronic obstructive pulmonary disease (COPD). Smokers are also at increased risk of pneumonia – bacterial infections of the lung. Together COPD and pneumonia are ranked as the 3rd and 4th leading causes of mortality worldwide. A common treatment for the symptoms of COPD is an inhaler which contains steroids. These can help reduce the number of 'exacerbations' or 'lung-attacks' that people who suffer from COPD get each year. However recently doctors have begun to realise that people who take these inhalers are at greater risk for pneumonia. Are the treatments we give making some people worse, and if so how?

To answer these questions scientists at University Hospital Southampton have been exploring the role of a newly-discovered type of white-blood cell called a 'MAIT' cell. These are found in the lung and can help spot bacteria causing infections in the lung by spotting tiny amounts of vitamin B produced by the bugs. This helps the body spot an infection early on, so the immune system has time to fight the infection before it causes too much damage.

Researchers studied fragments of human lung tissue left over after cancer surgery, as well as samples taken by volunteers who underwent a bronchoscopy: a flexible fibre-optic camera test to take samples from deep inside the lungs. Their cutting-edge research has shown that steroid inhalers can damp down the numbers of these essential MAIT cells, making them less good at their job. And so the MAIT cells become less good at fighting-off bugs like non-typeable *haemophilus influenza*e: the number-one cause of chronic bronchitis, and an important cause of pneumonia. This important finding is a step towards explaining what causes this important side effect of steroid inhalers.

So are these inhalers all bad? Certainly not. These inhalers are used to improve the symptoms of hundreds of thousands of people across the world, but this research underlines the importance of targeting carefully those patients that are likely to benefit most from the treatment, and of developing alternative new treatments where possible.

One of the volunteers made this public engagement video of his participation in this study as I performed the bronchoscopy.

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Timothy SC Hinks

Clinical and Experimental Sciences, University of Southampton Faculty of Medicine, Sir Henry Wellcome Laboratories, Southampton University Hospital, Southampton, SO16 6YD, UK
NIHR Southampton Respiratory Biomedical Research Unit, Southampton University Hospital, Southampton, SO16 6YD, UK
Peter Doherty Institute, University of Melbourne, Victoria 3000, Australia

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