'Brush' offers clues to fighting lung disease

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In people with cystic fibrosis, mucus is not properly cleared from the lungs

Scientists say the discovery of an internal "brush" that helps clear lungs of unwanted matter could help them understand more about lung diseases.

A team from the University of North Carolina found that the brush-like layer pushes out sticky mucus and the foreign bodies it contains.

Writing in Science, it says that could help identify what goes wrong in cystic fibrosis, asthma and similar diseases.

UK lung experts said the work aided understanding of how lungs function.

The mucus, which helps collect inhaled pollutants, emerges as a runny nose and a wet cough.

Until now, most experts believed a watery substance acted as a lubricant and helped separate mucus from the cells lining airways.

But this did not tally with the fact that mucus remained in its own distinct layer.

The researchers used imaging techniques to examine what was happening within the lungs.

They were able to see a dense meshwork of human bronchial epithelial cell cultures.

The brush-like layer consists of protective molecules that keep sticky mucus from reaching the cilia and epithelial cells, thus ensuring the normal flow of mucus.

'Flood' risk

Dr Michael Rubinstein, who led the study, said: "The air we breathe isn't exactly clean, and we take in many dangerous elements with every breath.

"We need a mechanism to remove all the junk we breathe in, and the way it's done is with a very sticky gel, called mucus, that catches these particles and removes them with the help of tiny cilia."

"The cilia are constantly beating, even while we sleep.

“Start Quote

"Research such as this helps our understanding [of] how this system works, and of the complex mechanisms deep within our lungs which protect us from the atmosphere we breathe in"”

End Quote Professor Stephen Spiro, British Lung Foundation

"In a co-ordinated fashion, they push mucus, containing foreign objects, out of the lungs, and we either swallow it or spit it out.

"These cilia even beat for a few hours after we die. If they stopped, we'd be flooded with mucus that provides a fertile breeding ground for bacteria."

The team says the brush layer protects cells from the sticky mucus and acts as a "second barrier" in case viruses or bacteria penetrate the mucus.

But in conditions such as cystic fibrosis or chronic obstructive pulmonary disease (COPD), the "brush" fails to work properly, they suggest, becoming squashed and trapping mucus, which then becomes stuck to cells.

Dr Rubenstein said: "The collapse of this brush is what can lead to immobile mucus and result in infection, inflammation and eventually the destruction of lung tissue and the loss of lung function."

He said the findings should help inform new research into such lung conditions.

Prof Stephen Spiro, vice-chairman of the British Lung Foundation, said: "Mucus has a complex biological make-up and forms a vital part of the lungs' defence mechanism against potentially harmful or irritating substances, which are inhaled as small particles.

"Research such as this helps our understanding [of] how this system works, and of the complex mechanisms deep within our lungs which protect us from the atmosphere we breathe in."