

From common colds to deadly lung diseases, one protein plays key role

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An international team of researchers has zeroed in on a protein that plays a key role in many lung-related ailments, from seasonal coughing and hacking to more serious diseases such as MRSA infections and cystic fibrosis.

The finding advances knowledge about this range of illnesses and may point the way to eventually being able to prevent infections such as MRSA.

The key protein is called MUC5B. It's one of two sugar-rich proteins, with similar molecular structure, that are found in the mucus that normally and helpfully coats airway surfaces in the nose and lung. The other is MUC5AC.

"We knew these two proteins are associated with diseases in which the body produces too much mucus, such as [cystic fibrosis](#), asthma, [pulmonary fibrosis](#) and COPD," said researcher Chris Evans, PhD, an associate professor in the University of Colorado School of Medicine. "We also knew that many patients with asthma or COPD have as much as 95 percent less MUC5B in their lungs than healthy individuals, so we wanted to see if one of these is the bad player in chronic lung diseases."

The researchers compared mice that lacked one or the other of the proteins. The animals without MUC5B got sick. Those that lacked MUC5AC were fine. The findings, in a paper co-authored by Evans, other CU faculty members and researchers from several other states as well as Mexico and England, were reported today in the journal *Nature*.

The paper also noted that the immune systems of the mice without Muc5b failed over time. That made the mice more vulnerable to infections including the MRSA "superbug," a major source of infections in hospitals and in the community, especially in people whose immune systems are compromised, such as cancer patients.

That has interesting implications for anyone with a runny nose. Getting rid of your mucus may make you more comfortable and may help patients with chronic lung diseases," Evans said. "But if you block it too effectively, this actually could be harmful in the long run. If a treatment gets rid of MUC5B, it may make people more vulnerable to additional infections."

An oddity of the proteins being examined is that they are encoded in a part of the human genome that is highly variable. Twenty percent of the population carries a DNA mutation that makes them produce about 30 times more MUC5B than normal.

More research is needed to learn whether people with that mutation are more or less susceptible to infections, including MRSA, said Evans, who is in the CU medical school's Division of Pulmonary Sciences and Critical Care Medicine. It's also unclear what's happening at a molecular level that allows MUC5B to help control certain infections.

"Knowing the key role of MUC5B allows us now to focus on how the [protein](#) works and, we hope, to find ways to help patients with these diseases," Evans said.

More information: Muc5b is required for airway defence, [DOI: 10.1038/nature12807](https://doi.org/10.1038/nature12807)

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