

# Microbiologists uncover clues to clustering of lethal bacteria in CF patients' lungs

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Gregory G. Anderson, PhD, Associate Professor of Biology, Indiana University-Purdue University Indianapolis. Credit: Indiana University Communications

Individuals with cystic fibrosis, or CF, have a high risk of chronic pneumonia because the thick, sticky mucus that builds up in their lungs

provides an environment conducive to the growth of pneumonia-causing bacteria. Once chronic pneumonia develops, it is nearly impossible to cure and can become deadly. The most common bacterium responsible for chronic pneumonia in CF patients is *Pseudomonas aeruginosa*, or *P. aeruginosa* for short

In a study published in the *Journal of Bacteriology*, Indiana University-Purdue University Indianapolis researchers led by microbiologist Gregory G. Anderson of the School of Science examine the role of a protein present in *P. aeruginosa*, the magnesium transporter MgtE. MgtE plays a crucial role in signaling bacteria when and where to form biofilms, clusters of bacteria that produce "slime" to shield themselves from the CF patient's immune system as well as from antibiotics, thus making the bacteria clusters extremely difficult to attack and kill.

MgtE activity in *P. aeruginosa* appears to be influenced by the bacterium's chemical surroundings, including the abnormal mucus in CF patients. Specifically, MgtE responds to fluctuations in magnesium levels.

"We know quite a lot about the regulatory signaling that is involved in the bacterium telling itself to form a biofilm, but we haven't had much knowledge about the molecular signals that tell these organisms that it's an appropriate time and place to cluster," said Anderson, corresponding author of the new study. "Specifically, we haven't known what signals bacteria are receiving from the environment—in this case, the mucus in CF patients' lungs—to tell them to form biofilms.

"We have now tied MgtE, a protein in the membrane of bacteria, with known biofilm signaling networks. I think this is one of the first times such a link between an external signal and biofilm regulation has been identified. We are adding to the body of knowledge of biofilm formation with the ultimate goal of finding better ways to disrupt that

formation, leading to improved treatments for the chronic pneumonia in CF patients."

Infections in [cystic fibrosis](#) patients cause breathing difficulties resulting in serious strain on the lungs, cardiovascular system and heart.

**More information:** "The *Pseudomonas aeruginosa* Magnesium Transporter MgtE Inhibits Type III Secretion System Gene Expression by Stimulating rsmYZ Transcription" *Journal of Bacteriology* (2017).

Provided by Indiana University-Purdue University Indianapolis School of Science

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