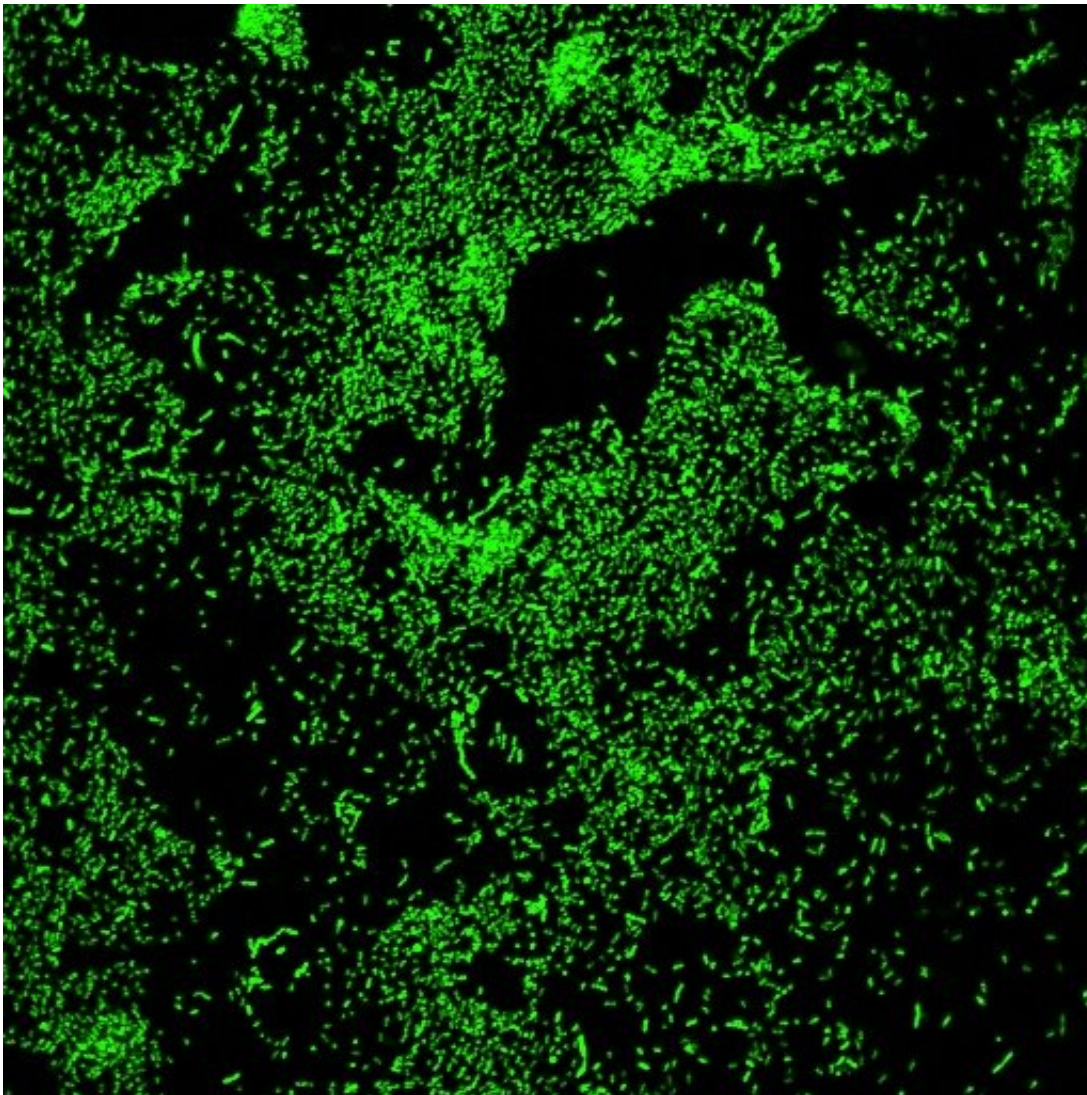


# Scientists discover curious clues in the war between cystic fibrosis bacteria

August 7 2020, by Mark Derewicz

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*Burkholderia dolosa*. Credit: Cotter lab

Several kinds of bacteria can cause lung infections in people with cystic fibrosis (CF). *Pseudomonas aeruginosa*, which can cause pneumonia, typically infects infants or young children and persists for life, while *Burkholderia cepacia* complex species only infect teenagers and adults. Although *Burkholderia* infections are rare, when they do take hold, they are deadly. Now, UNC School of Medicine scientists led by Peggy Cotter, Ph.D., professor in the UNC Department of Microbiology and Immunology, have discovered a reason for this pathogen's apparent age discrimination.

This research, published in the journal *Cell Host & Microbe*, shows that both *Pseudomonas* and *Burkholderia* use toxic weaponry, called Type VI Secretion Systems (T6SS), to compete with and establish dominance over each other. It's possible that scientists could target, or mimic, this weaponry to defeat the bacteria before they cause irreparable harm to lungs of patients.

Scientists have wondered for a long time why *Burkholderia* does not infect infants and young children. First author and former Cotter Lab graduate student Andrew Perault, MPH, Ph.D., designed and conducted experiments to show that *Pseudomonas* bacteria isolated from infants and young children use their harpoon-like T6SS to fire toxins at, and kill, competitor bacteria, including *Burkholderia*.

"This may be one of the reasons *Burkholderia* does not take root in young patients," Cotter said. "Andy showed that although *Burkholderia* also produce T6SSs, they cannot effectively compete with *Pseudomonas* isolates taken from young CF patients."

However, as those *Pseudomonas* bacteria adapt to living in the lungs of CF patients, they lose their ability to produce T6SSs and to fight with *Burkholderia*. The *Burkholderia*, using their own T6SSs, are then able to kill the *Pseudomonas* and establish [infection](#).

"We believe the findings of our study, at least in part, may explain why Burkholderia infections are limited to older CF patients," Perault said. "It appears that as at least some strains of Pseudomonas evolve to persist in the CF lung, they also evolve to lose their T6SSs, and hence their competitive edge over Burkholderia, which are then free to colonize the respiratory tract."

The scientists think the Burkholderia T6SS is an important factor promoting the ability of these pathogens to infect CF patients. Therefore, researchers could potentially develop therapeutics to target these secretion systems to prevent infections.

Moreover, assessing the T6SS potential of resident Pseudomonas populations within the CF [respiratory tract](#) may predict susceptibility of patients to potentially fatal Burkholderia infections.

**More information:** Andrew I. Perault et al. Host Adaptation Predisposes Pseudomonas aeruginosa to Type VI Secretion System-Mediated Predation by the Burkholderia cepacia Complex, *Cell Host & Microbe* (2020). [DOI: 10.1016/j.chom.2020.06.019](https://doi.org/10.1016/j.chom.2020.06.019)

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