

Cystic Fibrosis Research News

Title:

Host Response to *Staphylococcus aureus* Cytotoxins In Children with Cystic Fibrosis

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What was your research question?

We investigated the immune response to *Staphylococcus aureus* in children with cystic fibrosis (CF) who were experiencing pulmonary exacerbations. Specifically, we were interested in the body's immune response to important toxins that *S. aureus* produces during infection, because these toxins might serve as targets to treat or prevent disease in the future.

Why is this important?

S. aureus is one of the first bacteria to colonize the lungs of patients with CF. Over the past decade, methicillin-resistant *Staphylococcus aureus* (MRSA) colonization has increased, resulting in important consequences for patients. Little is known about how the body fights *S. aureus* in patients with CF. Therefore, improving our understanding of the body's immune response will aid in the development of better ways to diagnose and treat infections caused by *S. aureus*.

What did you do?

We investigated the body's immune response to *S. aureus* colonization and disease in children with CF. We enrolled fifty patients and followed them for 12 months, sampling



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blood at key intervals to define the frequency of specific anti-staphylococcal antibodies (i.e. antibodies produced by the body to fight *S. aureus*); determine how antibody levels go up and down; and determine whether acute pulmonary exacerbations (i.e., pneumonia) lead to an antibody response to certain *S. aureus* toxins. Our focus was on staphylococcal toxins that have been targeted for vaccine development and are considered important for the development of pneumonia. We also assessed how well these antibodies protect the body from toxins produced by *S. aureus*.

What did you find?

We found an important link between the antibody response to a toxin called LukAB and the presence of *S. aureus* grown from patient respiratory samples. We also noted that the presence of antibodies in blood could potentially be used as a way to detect staphylococcal related disease. Lastly, we demonstrated that these antibodies protect the body's immune cells well from the effects of staphylococcal toxins. To date, this study represents the largest cohort of pediatric patients with CF where the immune response to staphylococcal toxins was characterized.

What does this mean and reasons for caution?

Taken together, we hope these data will advance our understanding of staphylococcal immunity and disease in children with CF. Our findings suggest that antibodies against *S. aureus* toxins may be capable of reducing the severity of disease related to this organism. In addition, detection of these antibodies in the blood may provide a new way to identify the presence of *S. aureus* in the lungs of patients with CF, however, this theory needs further testing before it could be used in patients.

What's next?

The findings of this study have generated new ideas for future studies. We plan to further investigate the potential use of these anti-toxin antibody levels as a method to detect MRSA in the lungs of children with CF. In addition, the role of the toxin LukAB and other *S. aureus* toxins requires further study, as we do not yet understand the complex relationship between bacteria and the lung of a patient with CF.

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