Cystic Fibrosis Research News

Title:

Early detection using qPCR of *Pseudomonas aeruginosa* infection in children with cystic fibrosis undergoing eradication treatment

Authors:

Ana C. Blanchard[1], Ashley M. Rooney[2], Yvonne Yau[3], Yu Zhang[2], Patrick J. Stapleton[3], Eric Horton[4], Michelle Klingel[4], Sanja Stanojevic[4], Felix Ratjen[4], Bryan Coburn[2], Valerie Waters[1]

Affiliations:

[1]Division of Infectious Diseases, Department of Pediatrics, The Hospital for Sick Children, University of Toronto, 555 University Avenue, Toronto, Canada M5G 1X8.
[2]Division of Infectious Diseases, Department of Medicine, University Health Network, University of Toronto, 101 College St, Toronto, ON M5G 1L7.
[3]Division of Microbiology, Department of Pediatric Laboratory Medicine, The Hospital for Sick Children, University of Toronto, 555 University Avenue, Toronto, Canada M5G 1X8.
[4]Translational Medicine Research Program, Division of Respiratory Medicine, Department of Pediatrics, The Hospital for Sick Children, University of Toronto, 555 University Avenue, Toronto, Canada M5G 1X8.

What was your research question?

One of the bacteria that can cause lung infections in children with CF is *Pseudomonas aeruginosa*. In some children, *Pseudomonas* infection does not clear despite inhaled antibiotic treatment such as tobramycin. We wondered if those children might have a progressive infection for months before the sputum culture finally becomes positive (which usually indicates when an infection has taken place). We used a test to look at whether those children have higher levels of *Pseudomonas* DNA (genetic material) in the 12 months before they had a positive culture, compared to children in whom antibiotics clear the infection.

Why is this important?

This is important for people with CF and the healthcare professionals involved in CF care because antibiotic eradication therapy fails to clear Pseudomonas aeruginosa infection in some patients. Therefore, we wanted to see if using a molecular test called PCR to detect the quantity of DNA could lead to earlier diagnosis and more successful treatment of infection.

Cystic Fibrosis Research News

What did you do?

We used an experimental PCR test to detect *Pseudomonas* DNA from frozen sputum samples of 47 patients taken in the 12 months before their tests indicated they had a bacterial infection. This gave us measurements of the quantity of Pseudomonas DNA for each patient. We then looked at whether they had cleared the infection or not after receiving inhaled tobramycin for 28 days.

What did you find?

We found no significant difference in the quantity of *Pseudomonas* DNA between the 32 patients in whom antibiotic eradication therapy succeeded compared to the 15 patients for whom it failed. In addition, there was no significant increase in *Pseudomonas* DNA even right before the sputum culture turned positive, indicating infection was present.

What does this mean and reasons for caution?

This means that although PCR can detect Pseudomonas DNA while the culture is still negative, the amount of DNA is not significantly different between those patients who do not clear the infection and those that do, after a trial of inhaled tobramycin. Therefore, implementing the use of PCR for diagnosis may not help improve the final outcome after treatment. It's important to note that this study had limitations: if the study was repeated with a higher number of patients or with a different PCR test, differences may have been found. We also only used sputum samples (not throat swabs), which can only be collected in older children.

What's next?

For now, bacterial cultures of sputum samples remain the main diagnostic methodology for CF clinics. More research regarding the use of PCR (looking at specific genes) and other advanced molecular tests, such as whole genome sequencing (looking at all the genes), may be beneficial in the diagnosis of bacterial lung infections in CF.

Original manuscript citation in PubMed

http://www.cysticfibrosisjournal.com/article/S1569-1993(18)30031-6/fulltext?cc=y=

cfresearchnews@gmail.com