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Cystic Fibrosis Research News

Title:

One time quantitative PCR detection of *Pseudomonas aeruginosa* to discriminate intermittent from chronic infection in cystic fibrosis.

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What was your research question?

Whether a molecular PCR test (qPCR) that measures the amount of *Pseudomonas aeruginosa* could distinguish intermittent infection from chronic infection in the lungs of people with cystic fibrosis (CF).

Why is this important?

People with CF have a high risk for developing chronic airway infections with the bacterium *P. aeruginosa* and these infections result in reduction of lung function, increasing frequency of hospital admissions and decreased survival. Infection with *P. aeruginosa* typically starts with an alternating appearance of the bacterium (“intermittent”) before the infection becomes long-lasting and stable (“chronic”). Early *P. aeruginosa* infections are typically still responsive towards antibiotic treatment, whereas in chronic infection the bacterium has often developed new survival strategies and therapies to get rid of the bacterium fail. Thus, a good diagnostic tool to discriminate intermittent from chronic infection is needed.

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What did you do?

So far, distinction between chronic and intermittent infection relies on repeated detection of *P. aeruginosa* by the microbiology lab, the precise appearance of the bacterium when grown and detection of specific antibodies. All diagnostic measures currently depend on repeated sampling. Using a protocol established by other researchers, we analyzed by qPCR *P. aeruginosa* in throat samples and sputa from CF patients with previously known intermittent or chronic infection. We specifically studied whether a one-time measure by qPCR would be sufficient.

What did you find?

We observed a large increase of the amount of *P. aeruginosa* in throat and sputum samples from patients with chronic compared to intermittent infection. Furthermore, we observed that molecular detection in throat samples corresponded to detection of *P. aeruginosa* by culture in the sputum. Finally, we show, that detection by qPCR in some patients allowed an earlier detection of infection with *P. aeruginosa* as compared to classical microbiology. We determined diagnostic performance indicators which prove that *P. aeruginosa* detection by qPCR is a valuable tool to differentiate intermittent from chronic infection.

What does this mean and reasons for caution?

Detecting *P. aeruginosa* by qPCR was more sensitive than the bacterial growth appearance observed by classical microbiology and allowed the distinction of chronic from intermittent infection within a single sample at one time. Moreover, the finding that detection by qPCR in throat swabs corresponds to detection in sputum will be of special interest in young CF patients that often cannot produce sputum and for which the molecular test in throat samples might be helpful. Based on our findings we propose a diagnostic scheme for the assessment of *P. aeruginosa* airway infection that includes the molecular qPCR test.

What's next?

The proposed procedure will have to be tested for advantages in clinical care of CF patients within a larger cohort. It may help to better discriminate the stage of *P. aeruginosa* infection and thus allow a more precise therapy.

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