**Bacterial detection with a new sensitive method in children with cystic fibrosis**

**Rikke M. Sandvik, Hatice N. Cömert, Marianne Skov, Tacjana Pressler, Frederik Buchvald, Helle K. Johansen, Fatima A. Alatrakchi & Kim G. Nielsen**

**CF Centre, Copenhagen University Hospital, Rigshospitalet**

**Objective:** Infection with Pseudomonas aeruginosa (PA) can be critical for patients with cystic fibrosis (CF) as it is difficult to eradicate and often leads to chronic infections and a critical decline in lung function. A method using electrochemical detection of pyocyanin, a toxin produced exclusively by PA, has been shown to have high sensitivity and specificity for detecting PA. We therefore hypothesized that pyocyanin in sputum and urine can be used as an early marker for airway infection with PA.

**Methods**: This was a cross-sectional pilot study for first 1 week (sputum samples) and then a period of 4 weeks using both sputum and urine samples from children with CF. All samples were analyzed for pyocyanin with the electrochemical sensors, conventional bacterial culture and lastly with HPLC (high-performance liquid chromatography), a technique for separating and detecting different components in a sample, in this case pyocyanin.

**Results:** The first pilot study included 18 patients with CF. All 18 sputum samples were negative using the electrochemical sensor, but 3 of them were positive using HPLC – but with a very low concentration of pyocyanin – under the detection limit of the sensor. 4 samples were spiked with previously grown PA – 2 of these were positive for pyocyanin.

In the second pilot study 78 children with CF were included. 8 children had 2 visits during the 4-week period. In total 86 sputum samples and 59 urine samples were analyzed. Pyocyanin was not detected in any of the sputum samples with the electrochemical sensor. However, pyocyanin was detected in 14 (24%) urine samples. Bacterial detection of PA was negative in all urine samples, and positive in 2 sputum samples. One of the patients with pyocyanin in sputum were also positive in the urine. The other patient had a negative urine sample (the bacteria from this patient did also test negative for pyocyanin in study 1). Data from HPLC analysis is still awaiting.

**Conclusion and future:** We have shown that some, but not all PA bacteria produce pyocyanin, which is also known from the literature. We have also shown that despite very low concentration of pyocyanin in sputum samples it is still detectable in urine, why we hope that this might be a better and less invasive method for detection of very early infections with PA.

In case the HPLC detection of pyocyanin confirms the sensor results, a prospective longitudinal study will follow.