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Prevalence of anaerobic bacteria in the lower respiratory tract of cystic fibrosis patients and the identification potential of MALDI - TOF MS

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Background: Lower respiratory tract infections (LRTI) are considered major cause of morbidity and of early mortality in patients with cystic fibrosis (CF). The role of aerobic and facultative anaerobic bacteria in CF is well documented. In contrast, little is known about the significance of strictly anaerobic bacteria in such infections. Anaerobic bacteria are not considered in the routinely microbiological diagnostic procedure.

Material/methods: Sputum of 53 CF patients (45 adults and 8 patients <18 years old) were tested for the prevalence of strictly anaerobic bacteria. The sputa were collected from the patients and immediately transported to the microbiology lab using the Port-A-Cul® transport system. The cultured anaerobic bacteria were identified using the Matrix Assisted Laser Desorption Ionization – Time of Flight mass spectrometry (MALDI-TOF MS; MALDI Biotyper Systems, Bruker). The results were compared with those of classical biochemical (rapid ID 32 A und api® 20 A) and 16s rRNA sequencing with regard to the identification's potential, turnaround time and expenses.

Results: Anaerobic bacteria were cultured from the sputa of 41 patients (77%). Monocultures were found in 71% of all cases. In total, 84 anaerobic bacteria were isolated. *Prevotella* was the most frequent genus, and *Prevotella melaninogenica* the most frequent species, followed by *Veillonella* spp.. Anaerobic bacteria were found in sputa of patients from all ages and both genders. The lung functions didn't affect the outcome. 16s rRNA sequencing possessed the highest ID potential on species level as compared to biochemical procedures and MALDI-TOF MS. However, it was significantly more expensive and more time consuming. Using Bruker MALDI-TOF MS (Biotyper 2.2; 2.3), 67 (80%) of the 84 isolated bacterial strains were identified at the species level, 14 (17%) at the

genus level. In one (1%) isolate the ID result was not reliable. Two (2%) isolates could not be identified. Notably, 95% of the species ID results of the MALDI-TOF MS were consistent with those of the 16s rRNA sequencing. The ID results of the biochemical procedures were inferior to and the procedure more expensive as compared to MALDI-TOF MS.

Conclusions: 1. Anaerobic bacteria might be considered in the routine microbiological diagnostic of CF using suitable transport and culturing procedures and, if indicated, in possible antibiotic therapy. 2. The MALDI-TOF MS is a reliable, fast and cost-effective technique for the identification of strictly anaerobic bacteria.