247 Clinical value of cough swab samples, versus induced sputum samples in children with cystic fibrosis

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Introduction: Early detection and treatment of lower respiratory tract infections are essential in the management of patients with cystic fibrosis (CF), who often have signs or symptoms of respiratory infection without any pathogens from sputum or cough swab specimens.
Aim: To assess the efficacy and clinical value of obtaining sputum and oropharyngeal cough swab samples following induction with hypertonic saline (HS) in this group of patients.
Methods: Thirty-one outpatients with CF, mean age 6.2 years (range, 0.2–13.9 years), were recruited over a 6-month period. Nebulized salbutamol was administered, followed by 7.5% HS for 15 minutes. Sputum was obtained before and after HS induction. If the patient was not able to expectorate, oropharyngeal cough swab was taken instead.
Results: Pathogens were isolated from HS-induced samples, but not from their pre-induced specimens in four cases (12.9%). In three cases (9.6%) the treatment was modified according to the positive culture of pathogens only from HS-induced samples. The procedure was tolerated in all of the patients.
Conclusions: Cultures from induced sputum specimens provide additional microbiological information, which is of clinical value and may lead to changes in patient management.

248 Are exhaled and nasal NO measurements useful in CF adult patients?

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Introduction: Exhaled NO (FeNO) is elevated in inflammatory lung diseases such as asthma, but it has been found low to normal in CF. In addition nasal NO (nNO) is also thought to be decreased in CF. However, studies have provided controversed data, and the effect of low FEV1, of exacerbations and of colonization with *Pseudomonas aeruginosa* (Pa) on NO values are not clear.
Methods: we measured FeNO (316) and nNO (225) in 32 adults CF patients followed at our clinic over a 2.5 years period. Measurements were performed with a NIOX® analyzer. Mean age of the patients was 29.4±8 years and mean FEV1 was 66.5±3.7%. 23/32 patients were colonized with Pa.
Results: median FeNO value was 7.5 ppb in patients colonized with Pa vs. 9.2 ppb in patients not colonized (not significant) [normal 5–25]. Median nNO was 417 ppb in patients colonized with Pa vs. 306 ppb in patients not colonized ($p < 0.001$) [normal 827±320 ppb]. 69% of FeNO values but only 26% of nNO values were in the normal range. No correlation was found between FeNO and nNO and FEV1, but a significant correlation was present between FeNO and nNO levels ($p < 0.0001$). Three patients had FeNO values mostly over 30 ppb (up to 82 ppb) and presented mainly with a pancreatic form of the disease. Finally, 1 patient had a FeNO increase from 8 to 35 ppb because of asthma.
Conclusions: a low value of FeNO may suggest the diagnosis of CF but normal values are common. FeNO is not associated with Pa colonization or FEV1 decrease. In contrast, colonization with Pa is correlated with higher nNO levels. Interestingly, a high FeNO value may be suggestive of concomitant asthma or of a predominantly pancreatic form of CF. FeNO and nNO measurements might be useful in CF but more data are needed to clarify their interest in clinical practice.

249 Which quantitative measurement of lung function correlates best with clinical picture during treatment of pulmonary exacerbations in CF?

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Background: Several measurements are used to assess the response to treatment of acute pulmonary exacerbations (PEx) in CF. However, the best measurement of outcome of treatment has not been agreed upon. The magnitude of change of each parameter at the end of treatment has also not been prospectively evaluated.
Patients and Methods: A symptom score (SS) system was developed, consisting of the sum of scores of the 4 commonest respiratory CF symptoms: cough, sputum, breathlessness, fatigue. Each symptom was scored from 1–4, 4 being the worst.
50 adult patients (18 male, mean age 25.2 y) with a diagnosed PEx deemed to start antibiotic treatment underwent expiratory and inspiratory spirometry and impulse oscillometry (IOS) at the start, days 7 and 14 of treatment. SS was also calculated. The best spirometry values in the year prior to the study were recorded for comparison.
Results: Compared to the best values in the year prior to the study, PEF was the measurement that deteriorated the most at the start of a PEx. Comparing values at the start and end of a PEx, SS improved in 38/50 (76%) and PEF, FEV1 and FVC improved in 31/50 (62%).
The degree of improvement was greatest in SS (median change of 3 points), followed by PEF. The mean (SD) improvements of spirometry values in percentage predicted were: PEF 9.5% (15.5), FEV1 4.3% (8.0), FVC 5.9% (10.41). The major improvements were seen already on day 7.
Inspiratory values changed to a smaller extent compared to expiratory components. None of the IOS components changed significantly from start to end of a PEx.
Conclusions: On day 14 of treatment, changes were greatest in SS and PEF. The degree of changes in spirometry were surprisingly small. IOS and inspiratory parameters were not sensitive to change.

250* Lactate as a non-invasive marker of CF lung inflammation

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In CF patients, the efficacy of antiinflammatory and antiinfectious treatment has to be controlled. For this purpose stable substances are needed that can be collected non-invasively and repeatedly. We investigated, if lactate can serve as a marker substance. In 25 adult CF patients, sputum lactate concentrations were determined spectrophotometrically and gaschromatographically and correlated with lung function values. In seven additional CF patients with exacerbations, lactate was measured before and after antibiotic treatment. In purified neutrophils and in suspensions of *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Burkholderia cenocepacia in vitro* lactate production was investigated in order to identify its origin. In every single CF patient, lactate was detectable (mean ± SD: 3.0±3.1 mmol/L, range 0.2 to 14.1 mmol/L). Sputum lactate concentrations correlated negatively with FEV_1 ($r = -0.446$, $p = 0.043$). Sputum lactate in the exacerbated patients decreased from 5.0±3.2 mmol/L during exacerbation to 2.3±2.4 mmol/L after 2 weeks of i.v. antibiotic therapy ($p = 0.048$). Whereas neutrophils produce high amounts of lactate, bacterial contribution to sputum lactate concentrations is neglectable. Lactate can be determined using routine methods in sputum samples collected non-invasively and, thus, may well serve as a marker for treatment of CF lung inflammation.