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Letter to the Editor

Immunoglobulin levels, cytology and microbiologic investigations of broncho-alveolar lavage in children with cystic fibrosis

Dear Editor,

Bronchoalveolar lavage (BAL) allows cells, pathogens and soluble components from the distal parts of respiratory tract to be examined. Herein we report our data from 36 children with cystic fibrosis (CF), aged 4–17 years, who underwent a fibrobronchoscopy with BAL aspiration. As a control group we examined BAL fluid (BALF) obtained from non-CF children. We used the modified Chrispin–Norman chest radiograph scoring system (CNS) to stage disease severity.[1]

BAL was performed with 10–15 mL warm physiological serum, 50–70% of which represents BALF. Tests were done using monospecific anti-A, anti-G, anti-M and anti-SC serum, light microscopy (for cytomorphological examination), and elective nutrient agars, cultures for viruses and immunofluorescence.

There were no anatomical abnormalities observed. Positive bacterial growth was obtained in 30 patients; organisms identified included *Pseudomonas aeruginosa* ($n = 21$) and *Staphylococcus aureus* ($n = 12$). Viruses were not detected either by immunofluorescence or culture. Early determination of inflammation in children with CF is crucial, as persistent bacterial infection leads to lung damage, long before objective drop of spirometric parameters. Patients with *P. aeruginosa* had higher scores in CNS ($r = 0.62$, $p < 0.05$). There was no correlation between IgG levels and presence of *P. aeruginosa* ($r = 0.16$, $p > 0.05$); however, a correlation was found between IgG levels and detection of *S. aureus* ($r = 0.43$, $p < 0.05$). Every pathogen isolated in these patients should be treated aggressively, for ceasing the vicious cycle (inflammation ↔ infection).[2]

Morphological changes of the epithelial cells were more obvious in patients with more severe clinical course of the disease (higher CNS). Large number of neutrophil leucocytes were detected in the cytogram, most of them showing degenerative features, deformed epithelial cells, some of them with methaplasia and high percentage of polymorph nuclear leucocytes (PML) – over 50%. With disease progression there is an increase of neutrophils, and this could be used in the follow up and response to therapy. However, in cases with neutrophils >80%, other inflammatory markers should be used.[3] PML in patients with CF are significantly more elevated. There was a positive correlation between CNS and number of PML ($r = 0.45$, $p < 0.05$).

Neutrophils in airways release high amounts of elastase overwhelming the local antiprotease shield. Thus, the very low level of α1-antitrypsin (AAT) observed in all CF children was not surprising. These data support the rationale for clinical trials with inhalation of AAT aiming at restoring the protease–antiprotease balance and attenuate airway inflammation.[4] We found a weak linear correlation between the CNS and low level AAT ($r = 0.32$, $p < 0.05$), and a good correlation between low levels of AAT and SIgA ($r = 0.547$, $p < 0.05$).

The immunoglobulin (Ig) levels, mainly SIgA, in bronchial secretion are considered to reflect the state of local immunity.[5] Ig levels in BALF in patients were determined by the type of endobronchial changes. IgG was the predominant immunoglobulin, followed by IgA and IgM. IgM levels were found only in 27 patients, all of them with severe diffuse purulent endobronchitis (PE). In these patients the SIgA levels in BALF were almost zero. Average blood IgM level in all patients was 165 ± 72.63 mg%. SIgA levels were highest in cases with catarrhal inflammation and significantly lower in PE. There was a correlation between SIgA levels and CNS ($r = 0.47$, $p < 0.05$). IgG levels were higher in patients with PE – 1567 ± 203.35 mg/dL. For the purpose of guiding treatment BAL was repeated in 21 children. Indication for a repeated BAL was the presence of diffuse PE. We can note, that as the clinical state of the child improves SIgA in BALF increases and IgG decreases.

Ig levels and cytological characteristic of BALF have significant clinical importance in estimating the state of bronchial mucosa, local immunity, and efficacy of the treatment. Our results demonstrate that BALF examination is helpful in the diagnosis and management of chronic lung disease in children. BAL appeared to be a safe procedure because none of the

examined patients experienced any clinically relevant side-effects during and after the procedure.

Conflict of interest

All authors declare to have no conflict of interest.

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