Table 1. – BAL cytology in collagen vascular diseases

Disease	With ILD	Without ILD	Ref.
Progressive systemic sclerosis	neutrophils eosinophils	neutrophils eosinophils	[38, 70–72, 74, 75, 86]
Rheumatoid arthritis	neutrophils lymphocytes	lymphocytes (CD4+, T5/9)	[76, 79, 83, 85, 86, 90] [78]
Primary Sjögren syndrome	neutrophils, lymphocytes (CD8+)	lymphocytes (CD4+)	[86–88, 100]
Systemic lupus erythematosus	neutrophils, lymphocytes	lymphocytes	[92]
Dermatopolymyositis	neutrophils	neutrophils	[86, 99]
Mixed connective tissue disease	neutrophils	neutrophils	[86]
Secondary Sjögren syndrome	neutrophils, lymphocytes (CD8+)	neutrophils, lymphocytes (CD8+)	[86, 88]

Presence of ILD is judged by clinical and radiological findings.

lung disease (infection, pulmonary haemorrhage, alveolar proteinosis *etc.*) or of drug-induced lung disorder [96–98]. BAL may also be useful to assess the activity of acute or chronic ILD in patients with scleroderma or with dermatopolymyositis [72, 82, 99]. In general, when increased numbers of lymphocytes are present in BAL fluid, lung disease is associated with a relatively good prognosis, whereas the presence of a predominantly neutrophilic or eosinophilic alveolitis is associated with a higher risk of functional and radiographic deterioration.

The role of BAL in therapeutic decision in symptomless patients with CVD is unclear since its prognostic value is still controversial. Preliminary data suggest that: 1) lymphocyte alveolitis is of good prognosis; 2) neutrophil alveolitis is associated with progressive deterioration of pulmonary function test (PFT) over a 1 yr follow-up in untreated patients. However, corticosteroid treated patients can improve their PFT while the alveolar neutrophilia persists.

In summary:

1) BAL may be useful for the diagnosis of lung complications in CVD; there is as yet no convincing evidence that BAL provides any help in the diagnosis and the management of chronic ILD-CVD.

2) BAL may be useful in the clinical management of acute ILD-CVD .

The value of bronchoalveolar lavage in the diagnosis and prognosis of sarcoidosis

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There is a consensus that BAL changes in sarcoidosis reflect the pathological process [101–110]. Furthermore by analysis of CD4/CD8 lymphocytes BAL can be of benefit in distinguishing sarcoidosis from other granulomatous diseases, such as hypersensitivity pneumonitis [111, 112]. Whether BAL can be used diagnostically and/or prognostically depends, however, on two factors. Firstly, for lavage analysis to be diagnostic, features have to be recorded that together with clinical investigation represent a unique picture of this disease and discriminate it from other interstitial lung diseases. Secondly, there has to be a clear clinical understanding of the level of disease "activity" for the features identified in lavage to be measured against. This second condition is somewhat difficult to satisfy as there appears to be no easy clinical measure of activity. It is only when patients have advanced to fibrotic forms of disease that clear clinical reflections of disease outcome are observed. The values of BAL to diagnosis and prognosis are commented on in tables 1 and 2. Emphasis on the prognostic value of a mere increase of the BAL lymphocyte count, interpreted as high intensity alveolitis [109] weakened as it was made obvious that even advanced cases may show a normal BAL lymphocyte count [113, 114]. BAL lymphocyte counts appear too unreliable as a single investigative tool to be of help regarding therapeutic decisions in patients receiving corticosteroid treatment [115].

A characteristic pattern of BAL macrophage phenotypes identified by monoclonal antibodies

(RFD7+/RFD1-) have been described being predictive for prognosis [116, 117]. However, since those monoclonal antibodies so far are not commercially available, their use has not been included in our clinical recommendations.

Cells and soluble factors not mentioned in these tables have not as yet been investigated sufficiently to make any comment.

Conclusions

No single feature in BAL is diagnostic of sarcoidosis. The combination of parameters listed below would be consistent with sarcoidosis in an appropriate clinical setting:

1. Lymphocytosis;
2. CD4:CD8 ratio >3.5;

Biochemical profiles of lavage constituents might be of value if reliable and reproducible methods can be found to measure the *in situ* concentrations.

The prospect of using lavage analysis to determine prognosis is promising but standardization of lavage method and better clinical definitions of disease activity are required before this could be routinely used. There are, however, features in BAL that are associated with progression to fibrosis.

Table 1. – Lavage factors in the diagnosis of sarcoidosis

Substance/cells	Comment	Clinical value	Ref.
A.C.E.	Raised in >60% of cases	Not established	[118]
Procollagen III peptide	Raised in many cases but not specific for sarcoidosis	Not established	[119]
Hyaluronic acid	Raised in many cases but not specific for sarcoidosis	Not established	[120]
T-cells	T-cell lymphocytosis is a consistent BAL feature in sarcoidosis although odd cases may show normal lymphocyte proportions	Helpful in the appropriate clinical setting	[103, 109, 110, 121]
CD4:CD8	Raised ratios in the presence of lymphocytosis show high specificity for sarcoid	Possible adjunct to diagnosis	[121]
$01^+/07^+$ macrophages	Cousistently >20% in sarcoidosis, but reagents not yet commerically available	Helpful if combined with other parameters	[116]

Table 2. – Lavage factors in the prognosis of sarcoidosis

Cell type*	Comment	Ref.
T-lymphocyte	Too variable to act as a prognostic indicator. Advanced cases can show no increase in lymphocytes	[114]
CD4:CD8 ratio	Some correlation has been shown between raised ratio and poor prognosis. Patients with high ratios should be followed closely	[122, 123]
Neutrophils	Raised neutrophils may indicate move to fibrosis. Not specific for sarcoidosis but may be of value in appropriate clinical setting	[43]
Mast cells	There is some evidence that raised mast cells in BAL is a prognostic sign. These cells may be involved in the initiation of fibrosis. Technical difficulties in identifying mast cells (*i.e.* appropriate fixation) should be noted	[124, 125]

*: no soluble factors in lavage have been shown to be of prognostic value.