LETTERS TO THE EDITOR

Bronchoalveolar lavage as a research tool

I enjoyed the timely review of bronchoalveolar lavage by Drs E H Walters and P G Geddes (November 1991, 46:613-8) but take exception to several of their conclusions. They referred to their earlier work in which H2O was incorporated into the blood or airspace fluid and its movement between these compartments was measured. From this they calculated that 39% of the aspirated fluid flowed into the airspaces from the blood. I would argue that exchange of H2O between these compartments is driven by concentration differences and would occur regardless of whether or not there was any net movement of fluid.

Net movement of fluid from the blood into the airspaces would dilute solutes present in the airspaces and the authors cite decreases in methylene blue concentrations seen by themselves and others to support their hypothesis. They did not, however, rule out diffusion of this small solute out of the airspaces or its reduction to colourless derivatives. Decreases in airway concentrations of 99mTc colloid, which they also observed, may be related to sedimentation or adherence of this indicator to epithelial membranes. When soluble macromolecules (labelled albumin or labelled dextran) have been instilled into the airspaces by several different investigators, no decreases in concentrations were detectable (see, for example, ref 2).

Bulk movement of water across the pulmonary epithelium is constrained by the high reflection coefficients of the epithelium to both small and large solute molecules, and movement of electrolytes and 99mTc urea across the epithelium is too slow to suggest significant movement of fluid between these compartments during lavage. It can be calculated from these reflection coefficients that ultrafiltration of solute free fluid into the airspaces would require extreme pressures, which are not generated during lavage (> 5000 mm Hg).

RICHARD EFFROS
Division of Pulmonary and Critical Care Medicine,
Medical College of Wisconsin,
9200 West Wisconsin Avenue,
Milwaukee, Wisconsin 53226, USA

AUTHOR’S REPLY I am grateful for the comments on our editorial on bronchoalveolar lavage from Professor Effros.

Professor Effros perhaps assumes that the clinical technique of bronchoalveolar lavage is essentially the same as his elegant in vitro model of the fluid filled, perfused animal lung preparation. I don’t believe that this is really the case, and calculations and assumptions based on the latter are unlikely to apply to the former. Our data would suggest that bronchoalveolar lavage distorts the epithelial barrier in the bronchopulmonary segment studied, either by more extreme local inflammation at the time of injection of fluid or at the time of aspiration, or both, resulting in the opening up of “unphysiological” intercellular pores with much lower reflection coefficients than those found by the dynamic stimuli on relatively undisturbed whole lungs. In our studies of water and solute “fluxes” at bronchoalveolar lavage to which he refers (his ref 1) the large influxes of water into the lavage fluid at aspiration were remarkably similar whether calculated indirectly by dilution of methylene blue or large molecular colloid “markers” or directly measured from bidirectional movements of tritiated water. It is difficult to imagine the sorts of potential artefacts which Professor Effros quite reasonably mentions could give such consistency. Our studies with tritiated water were precipitated only by the finding that larger molecular weight markers were diluted to a degree that could not reasonably be explained merely by incorporation of the putative lung epithelial lining fluid.

In addition to the recent work in our laboratory indicates that relatively large influxes of urea as well as water occur into bronchoalveolar lavage fluid at aspiration, even after minimal dwell time. This again emphasises that the assumptions that Professor Effros has built up from his studies on relatively stable pulmonary epithelial membranes, and even in his more recent whole lung lavage model in rats (his ref 4), don’t seem to apply to the alveoli and potentially locally disruptive procedure of bronchoalveolar lavage, which seems to induce some process of filtration across the bronchopulmonary epithelium, as well as movements due to the latter alone.

Finally, however, I need to point out that our emphasis has not really been on trying to define the mechanisms by which water and solutes move between blood stream and lavage fluid during the procedure, which are likely to be complex and multifactorial. Without better data on the surface area-volume-pressure relationships these are likely to remain somewhat speculative. We have been more interested in merely pointing out that relatively large movements of water and solutes between blood and lavage fluid do seem to be occurring at bronchoalveolar lavage and that conventional assumptions about the dilution and calculation of epithelial lining fluid are likely to be highly over-simplistic.

E H WALTERS
Chest Clinic and Regional Units for Occupational Lung Disease,
Newcastle General Hospital,
Newcastle upon Tyne NE4 6BE

Reply

We disagree that Lange was describing COP because in his two cases the disease evidently was affecting all orders of bronchioli and reached as far proximally as to take in small bronchi. It is fairly clear that Lange’s patients would have had an obstructive pattern of disease whereas COP/BOOP is characterised by a restrictive defect, being largely limited to alveoli, alveolar ducts, and only the smaller bronchioli. We are quite sure, however, that German pathologists before Lange described all the pathological features of COP in patients dying with resolving bacterial pneumonia. The feature that distinguishes COP/idioopathic BOOP is the cryptogenic/idiopathic nature of the condition.

It appears that an error occurred in the final draft of the article as the name Lange was omitted from reference 2 and the word “anonymous” inserted in error.

With regard to the site at which the granulation tissue plugs attach to the interstitium in COP/BOOP, the alveolar ducts may be lost to the periphery of the acinus, well away from the supplying bronchiole. It therefore seems unlikely that they would not have an alveolar attachment. Review of our cases confirms that they did indeed attach to alveolar walls.

DM GEDDES
Consultant Physician
B CORRIN
Professor of Thoracic Pathology
Royal Brompton and National Heart Hospital,
London SW3 6HP

Vertebral fractures in steroid dependent asthma and involutional osteoporosis: a comparative study

We read with some interest the study by Dr M Lengo and colleagues (November 1991; 46:803-6).

In this study the authors suggest that, in the presence of corticosteroid associated osteoporosis, bone densitometry is less useful for detecting patients at risk of decortical vertebral fracture than in involutional (postmenopausal) osteoporosis. This is contrary to our own experience with dual energy x ray

BOOP and COP

I read with interest the editorial on obliterative bronchiolitis organising pneumonia and cryptogenic organizing pneumonia (BOOP and COP) by Dr D M Geddes (August 1991; 46:454-7) and agree with his conclusion that BOOP and COP are essentially the same condition. I would like to point out one error in his references. Reference 2 in Dr Geddes’s editorial was not “anonymous” but by the German pathologist W Lange, who described the pathological lesion of BOOP or COP as early as 1901 in his paper entitled ‘Über eine eigenthümliche Erkrankung der kleinen Bronchien und Bronchien’ (Bronchitis et Bronchiolitis obliterans)’ (Dtsh Arch Klin Med 1901;70:342-64). He reported on two patients who presented with a pulmonary illness with fever, cough, increasing dyspnoea, and cracks on auscultation. The postmortem findings were described by Lange in detail, and he found organising exudates with plugs of granulation and young connective tissue that were located within small bronchi, bronchioi, and alveoli. These were exactly the features of the lesion now called BOOP or COP. Lange already recognised that the plugs always extend from the walls of bronchioles into the alveolar lumen, and never grow from the alveolar wall itself.

Department of Pneumology and Allergy,
Klinikum Ruhrlandklinik,
D-4000 Essen 16, Germany