hypertension can be brought under control by hyperventilation.

Figure Relation between end tidal carbon dioxide and arterial carbon dioxide in 17 children with lung disease (open circles) and 42 children with radiologically normal lungs (closed circles). The line of identity is shown.

Fifteen observations hidden. Data courtesy of D P Heaf.

Synchronising breathing and positive pressure ventilation

Sir,

The paper by Field *et al*¹ shows what we have observed during artificial ventilatory support: shorter inspiratory times and faster respiratory rates result in more synchronised breathing, decreasing the need for sedation or paralysis.

Greenough *et al*² incriminated asynchronous breathing in the genesis of pneumothorax and referred to 'active expiration against the ventilator' as being the main factor. We would suggest that 'deep inspiration with the ventilator' is more likely to be the problem. It is at this time in the ventilator cycle that the additive effect of ventilator pressure and negative pleural pressure results in a large transpulmonary pressure and maximal alveolar distension. Active expiration against the ventilator results in a smaller transpulmonary pressure and less alveolar distension: an unlikely time for alveolar rupture. Both of these effects can be seen in Fig. 1 of Field's paper.

In addition to its disruptive effect on ventilation and its relation to pneumothoraces, breathing out of synchrony also results in the type of fluctuations in the cerebral and systemic circulations that have been associated with an increased risk of intraventricular haemorrhage by Perlman *et al*.³

Synchronised breathing achieved by higher rates and

shorter inspiratory times would also have the advantage over paralysis of better distribution of ventilation through the continued action of the diaphragm.

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Immunoregulatory treatment for minimal change nephrotic syndrome

Sir,

It is likely that the mechanism of action of levamisole in the treatment of minimal change nephrotic syndrome as reported by Mehta¹ and Tanphaichitr² is specific suppression of excessive suppressor T cell function.

All drugs used in the treatment of minimal change nephrotic syndrome, including glucocorticoids, cyclophosphamide, nitrogen mustard, and azathioprine, have profound immunosuppressive actions except levamisole, which as shown in the Mehta study and in others is an immunostimulant. There are two paradoxes that need explanation:

(a) The treatment of a disease in which immunosuppression is an intrinsic part with drugs that suppress the immune system further.

(b) The successful treatment of minimal change disease with several immunosuppressive drugs and one immunostimulant drug.

The answers to these paradoxes can be found by more detailed study of the cellular actions of levamisole. Levamisole achieves its immunostimulant effects by specifically suppressing suppressor T lymphocytes.^{3,4} The other drugs suppress T lymphocytes non-specifically along with other lymphocyte subgroups.

Excessive suppressor T lymphocyte function in untreated minimal change nephrotic syndrome might cause both the disease through release of a lymphokine, which disrupts anionic binding sites, and the observed depression of immune function. Further investigation of this interesting treatment is most certainly appropriate, both to give insight into the disease and to develop a more specific form of treatment.

References

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