Correspondence

Intraventricular haemorrhage and alkali therapy

Sir,

We should like to comment on the paper by Wigglesworth *et al.* (Archives, 1976, 51, 755) which reached different conclusions from our own (Robertson and Howat, 1975) on the relationship between intraventricular haemorrhage (IVH) and bicarbonate therapy.

Whenever discussing the use of bicarbonate therapy it is important to make some judgement on the severity of the illness in those infants who receive bicarbonate compared with infants who do not, and also to try and assess whether the bicarbonate was given *after* the IVH developed and was therefore not causative. The data Wigglesworth *et al.* provide are not sufficient to answer the question whether the increased dose of alkali administered was justified. The lowest pH, or lowest arterial Po_2 recorded, or even the duration of these abnormal values are poor guides to the severity of illness, since modern neonatal intensive care is designed to avoid such adverse levels. A more accurate indicator of the severity of illness are the measures necessary to keep the infant in satisfactory condition.

Our own data show that infants with hyaline membrane disease (HMD) and IVH did in fact have more prolonged acidemia and hypoxaemia than even the sickest survivors of respiratory distress syndrome. Infants with HMD + IVH spent 17% of their life with a pH < 7.10 compared with only 1% in infants with HMD only. Furthermore, the HMD + IVH infants spent 23% of their life with a PaO_2 of < 40 torr compared with 14% in infants with HMD only. The difference between the groups is even more striking when the ventilator pressures and oxygen concentrations used in an attempt to keep the blood gas values normal are compared (Table I). These infants

before 24 hours of age compared with 25% in our study; 25% of our infants survived beyond 72 hours compared with only 6% in the Hammersmith data. The mortality rates of infants weighing 1000 and 1500 g were also different (Table 2). Both sets of data suggest that infants

Table 2 Mortality rate/1000 live births in infants 1001-1500 g

	Hammersmith series	Oxford series
IVH alone	82	18
HMD alone	118	18
HMD + IVH	173	109

at Hammersmith were doing less well than the infants at Oxford, and in particular had a very high rate of IVH *without* HMD. Though this might be due to the over-exuberant use of sodium bicarbonate, it is unlikely for the following reason. It is possible to estimate the average total dose of bicarbonate given to the infants in Wigglesworth's study if one assumes that the infants upon whom their Table IV is based lived for 48 hours. (This is probably an overestimate.) In their infants with HMD + IVH the total dose of alkali received was approximately 18 mmol/kg (0.3 mmol/kg $\times$ 48) and this is very similar to the dose of bicarbonate administered to our infants with HMD + IVH. As we pointed out in the first paragraph of this letter, we believe that dose was justified since the infants were sicker, and furthermore it is not significantly different from the dose of bicarbonate received by our fatal cases of HMD who did not have an IVH.

We feel therefore that the conclusions reached in our paper are still valid. Rapid infusion of sodium bicarbonate is undoubtedly to be avoided, and its use can be minimized by maintaining the infant's blood volume and keeping his arterial Po_2 normal. However, in infants with severe metabolic acidemia whose cardiac output or surfactant synthesis may be compromised, we still think it is important to correct that acidemia and that it is safe to infuse babies at the rate of 1 mEq/min.

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Table 1 Measures used in therapy

	Dead infants with HMD + IVH	Dead infants with HMD only	Infants with HMD requiring IPPV
% of life requiring IPPV > 35 cm H_2O	45		5
% of life requiring > 80% O_2	73	26	17
Dose of bicarbonate	17.8 mmol/kg	16.3 mmol/kg	7.9 mmol/kg

also receive more alkali therapy than survivors. These data therefore suggest that infants in our study who had an IVH in addition to HMD were sicker.

There are two other differences between the infants in the two studies. Infants in our study lived longer. Approximately 60% of the Hammersmith infants died

Dr. J. S. Wigglesworth and co-workers reply as follows:

In their comments on our findings and the data they present to support their own conclusions, Robertson and Howat insult the intelligence of your readers by failing either to provide sufficient information for statistical analysis or to compare like with like. The data given in Table 1 and in the second paragraph of their letter are