Correspondence

Citrate in oral rehydration therapy

SIR,—We read with interest the recent paper by Islam *et al* (*Gut* 1984; **25:** 900–4). We would like to point out that 2·94 g/l of the tribasic salt of sodium citrate (the amount used by these workers) would result in a 10 mmol/l citrate solution and *not* a 30 mmol/l citrate solution. The latter would require 8·82 g/l of the tribasic salt. One must, therefore, conclude from their study that a 10 mmol/l citrate based oral rehydration solution (and not a 30 mmol/l citrate based solution) is as effective as a WHO oral rehydration solution (which contains 30 mmol/l bicarbonate) in correcting the acidosis and dehydration in their patients.

D D K ROLSTON, M J G FARTHING, M L CLARK and A M DAWSON

Department of Gastroenterology,
St Bartholomew's Hospital,
West Smithfield,
London EC1A 7BE.

SIR,—I read with interest the study (*Gut,* 1984; **25:** 900–4) on oral rehydration with citrate *vs* bicarbonate glucose-electrolyte solutions, but I believe that the formula presented is not correct. The authors note that 'tribasic' sodium citrate was used, and this, together with the total sodium content of the solution as quoted in mmol/l, suggests that trisodium citrate was used. If so, the citrate content would be 10 mmol/l, not 30 mmol/l as given, as citrate would have a valence of minus three. If, on the other hand, the monosodium form was used, then the sodium content given in the article would be mistakenly too low. I believe that this point should be clarified, because readers using the wrong formula on their patients could conceivably cause them harm.

The question of the correct formula raises another issue central to citrate's utility; was the anhydrous or hydrated form used? If the form used had the two water molecules of hydration, the shelf life would be unlikely to exceed that of the WHO bicarbonate-containing packet (up to three years). If anhydrous, the cost would greatly exceed that of bicarbonate. As these points relate to the central thesis for which the study was carried out, more detail would be valuable.

The first use of citrate in oral solutions for diarrhoea therapy was noted in the initial clinical study showing the reduction in intravenous therapy accompanying oral maintenance.[1] One group received potassium citrate instead of potassium chloride, and both of these groups received bicarbonate in the same solution. The citrate-bicarbonate group did as well as the bicarbonate-only group.

The present study adds much to our knowledge of citrate oral solutions, but the success rates are far lower in both groups than those reported for severely dehydrated patients or for moderately dehydrated patients in other series (75% success here *vs* 93–96% in several large published series). This is puzzling and merits explanation. The higher rates have been obtained[2 3] chiefly with glucose-electrolytes formulas such as the WHO solution. The references quoted in the citrate study (10 and 11) are not for the WHO formula as claimed, but deal with sucrose-containing formulas which tend to have lower success rates than glucose-formulas.

DAVID R NALIN

Merck, Sharp & Dohme Research Labs,
POB 2000, Rahway,
New Jersey,
USA 07065.

References

1 Nalin DR, Cash RA, Islam R *et al.* Oral maintenance therapy for cholera in adults. *Lancet* 1968; **2:** 370–3.
2 Nalin DR, Levine MM, Mata L *et al.* Oral rehydration and maintenance of children with rotavirus and bacterial diarrheas. *Bull WHO* 1979; **57:** 453–9.
3 Nalin DR, Levine MM, Mata L *et al.* Comparison of sucrose with glucose in oral therapy of infant diarrhoea. *Lancet* 1978; **2:** 277–9.

Reply

SIR,—Thank you for sending the comments of Dr Rolston and others on our recently published paper 'Oral rehydration therapy: efficacy of sodium citrate equals to sodium bicarbonate for correction of acidosis in diarrhoea'. We fully agree with their comments. Being tribasic salt, 2·94 g/l sodium citrate would provide 10 mmol/l of citrate solution. This amount, after conversion in the liver, would be equivalent to 30 mmol of bicarbonate/l. We are sorry for this typing error.

M R ISLAM

International Centre for Diarrhoeal Disease Research,
Bangladesh.