

Sodium chloride 0.3% in 3.3% dextrose ('two-thirds/one-third')

Contains 50 mmol Na⁺/litre.

Maintelyte

Contains 35 mmol Na⁺, 400 kcal (1675 kJ), 25 mmol K⁺ and 2.5 mmol Mg⁺⁺/litre.

Regimes for parenteral nutrition (see Chapter 24)

Include water and electrolytes for maintenance requirements.

These are solutions used to replace normal losses of water and electrolytes in sweat, expired air, faeces and urine. These losses amount to about 2500 ml/24 h in an average adult, and contain about 100 mmol of sodium (Na⁺) and 60 mmol of potassium (K⁺). A solution to replace this normal loss will therefore contain about 100 mmol Na⁺/2.5 litres (40 mmol/litre). Such a solution would have a lower osmotic pressure than extracellular fluid (which contains 140 mmol Na⁺/litre), and so maintenance solutions are usually made roughly isotonic by the addition of dextrose. As 0.9% sodium chloride solution (containing 150 mmol Na⁺/litre) and 5% dextrose are both isotonic, mixtures of these solutions in any proportion are also isotonic.

Thus, one-fifth normal saline in four-fifths normal dextrose (0.18% sodium chloride + 4% dextrose) is an isotonic solution containing 30 mmol Na⁺/litre, and 2500 ml will meet the normal daily requirements of sodium and water.

'Two-thirds/one-third' is a mixture containing two-thirds 0.9% sodium chloride and one-third 5% dextrose and therefore contains 50 mmol Na⁺/litre. Thus, 2500 ml of this solution will contain slightly more than the daily requirement of sodium, but the excess is not usually significant.

A common, but possibly less satisfactory method of giving maintenance water and sodium requirements is to give normal sodium chloride interspersed with units of 5% dextrose. A frequent prescription in the UK is 1 litre of normal saline plus 2 litres of 5% dextrose every 24 h. This is

ing small losses at the operation site.

Solutions for maintenance are available which contain potassium, the daily requirement being about 60 mmol. Solutions containing about 20 mmol/litre are therefore suitable.

Extra carbohydrate in the form of 10% dextrose is available in some formulations (e.g. Maintelyte). They are somewhat hypertonic and irritant to some veins but are tolerable in large peripheral ones. Two-and-a-half litres of 10% dextrose supplies 4200 kJ or 1000 kcal. This is not adequate for total parenteral nutrition but will reduce tissue catabolism over a few days.

Regimes for total parenteral nutrition provide (in addition to maintenance quantities of water, sodium and potassium) and adequate input of nitrogen, energy sources, vitamins and electrolytes.

Replacement Solutions

Hartmann's solution (compound sodium lactate BP), lactated Ringer's solution

This solution, widely known as Hartmann's, is probably more correctly known as lactated Ringer's solution. For convenience, and in the hope of offending nobody, it will be called Hartmann's (R/L) solution in this book.

It contains sodium, potassium and calcium chlorides, and sodium lactate. The ionic concentrations are:

Na⁺, 131 mmol/litre;

K⁺, 5 mmol/litre;

Ca⁺⁺, 2 mmol (= 4 meq)/litre;

lactate equivalent to bicarbonate (HCO₃⁻), 29 mmol/litre.

This solution is considered to be an acceptable substitute for extracellular fluid (ECF), and is widely used as such. It can be criticised on the grounds of its acidity (its pH is 6.1). The lactate, after it is metabolised in the liver to bicarbonate, buffers the acidity, but it is possible to replace the