ACID - BASE BALANCE

Metabolic Acidosis

Metabolic acidosis occurs with chronic renal failure because the kidney cannot excrete the body's daily acid load via its buffering systems:

$NH_3 + H^+ \rightleftharpoons NH_4^+$ (ammonium)

$H_2PO_4^- + H^+ \rightleftharpoons H_3PO_4$ (acid phosphate)

Clinical Presentation

Fast respiration rate and perhaps congestive heart failure. Slow heart rate and hypotension may also be present.

Treatment

a. DIET
- the principle source of acid is dietary protein therefore acidosis may be controlled with diet
- acute renal failure patient - restrict protein to 0.6-0.8 g/kg/day
- because some protein is lost during dialysis, daily protein intake can be increased

    hemodialysis patient - increase protein to 1-1.4 g/kg/day
    peritoneal dialysis patient - increase protein to 1-1.5 g/kg/day

b. DRUGS: SODIUM BICARBONATE - 2-6g/day (24-72mEq/day) (e.g.1200mg QID)
- indicated if serum bicarbonate falls below ~15 mEql/L
- note: sodium content: 12mEq Na+ /g $NaHCO_3$ (ie. low risk of volume overload)

c. DIALYSIS
- alkali is delivered in hemodialysate bath in form of bicarbonate and in the peritoneal dialysate as lactate

Acid-Base Balance and Hyperkalemia: Useful References

1. Ateshkadi A, Johnson CA. Chronic renal failure. In. Young LY, Koda-Kimble MA (eds). Applied therapeutics: the clinical use of drugs, 6th ed. Vancouver WA: Applied Therapeutics, Inc.;1995:30-1-20.
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