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 Title : SERUM ALBUMIN CHANGES DURING NUTRITIONAL SUPPORT
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Introduction. Changes in serum albumin have been used as an indicator of the efficacy of nutritional support regimens. However, patients in positive nitrogen balance occasionally show no change or even a decrease in the serum albumin level. This study aims to reconcile the lack of correlation between albumin levels and nitrogen balance by examining the concurrent alterations in body weight, sodium balance and water balance (as indicators of changing body fluid compartments) during nutritional depletion and repletion.

Methods. Twelve patients that required total parenteral nutrition (TPN) on medical grounds were admitted to the study. The details of the experiments, including risks, were explained to each patient and then written consent was obtained. The protocol of this study had been approved by the Columbia University Institutional Review Board. Procedures for nitrogen (N), electrolyte and water balance have been previously described (1). Serum albumin levels were sampled from venous blood every 2-3 days. Changes in extracellular fluid (ECF) was estimated from body weight and sodium balance (2). Six of the 12 patients were maintained on 5% Dextrose solution prior to institution of parenteral nutrition. These patients were in negative N balance and were considered to reflect nutritional depletion. Patients receiving total parenteral nutrition were in positive N balance and were considered to reflect nutritional repletion.

Results. Figure 1 shows the changes in cumulative nitrogen (N) balance, ECF, body weight and serum albumin during depletion and repletion over a two week period. During nutritional depletion (D) the patients were in marked negative N balance and lost weight. Their ECF was increased and their albumin levels decreased. During nutritional repletion two distinct groups of patients were observed. The first group (R₁) was in positive N balance but continued to lose weight. Their ECF decreased and albumin levels increased. The second group (R₂) was in positive N balance and gained weight. Their ECF increased and their albumin levels remained virtually unchanged. These patients had either an element of infection or depletion of unusual severity (body weight 40% below predicted).

Discussion. Serum albumin level alone is not an accurate indicator of nutritional status. Patients in negative nitrogen balance tend to increase their ECF which masks, to some degree, the loss of lean body tissue. These patients all have decreased serum

albumin concentrations.

During repletion, as evidenced by positive nitrogen balance, two patterns of response were observed. The first, and usual response (R₁) is a decreasing ECF which is greater than the increasing lean body tissue and, therefore, results in weight loss. These patients had an increasing serum albumin. The second group (R₂) had depletion of unusual severity or were infected during repletion. These patients responded differently during the initial period of repletion by continuing to increase their ECF and, therefore, gain weight. The serum albumin levels in these patients did not increase significantly.

The normal response during nutritional repletion evidenced by a positive N balance is a paradoxical weight loss with a rise in serum albumin. This is associated with a reduction in ECF. Weight gain during the initial period of repletion reflects an increase in ECF. Under these circumstances patients may be in positive N balance with no rise in serum albumin. Thus, under these circumstances albumin levels are not a good indicator of the efficacy of a nutritional support regimen.

References.

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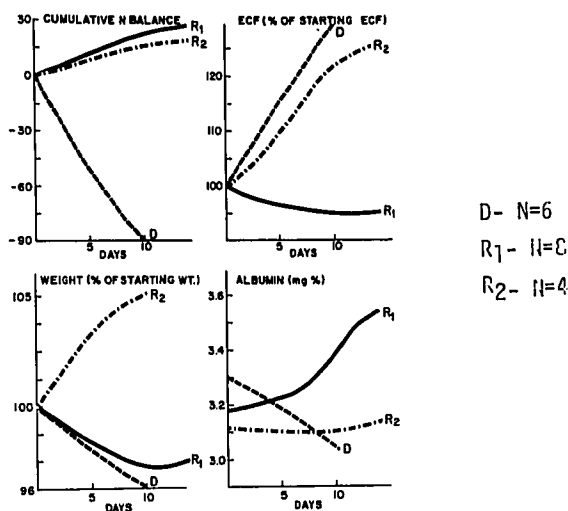


Figure 1