Nutritional Aspects of Peritoneal Dialysis

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A large proportion of uremic patients dermonstrate signs of protein-energy malnutrition due to disturbances in protein and energy metabolism, hormonal derangements, infections and other superimposed illnesses, and poor food intake because of anorexia, nausea and vomiting, caused by uremic toxicity.

With maintenance dialysis therapy, some of these factors, but far from all, can be partly or fully corrected. On the other hand, the hemodialysis (HD) procedure may induce protein catabolism, peritoneal dialysis is associated with protein losses into the dialysate (5~15 g/24 h), and both dialysis methods are associated with dialytic losses of amino acids (2~4 g/24 h), vitamins, and other essential small solutes. These factors may have serious consequences in the form of aggravated malnutrition, susceptibility to infection, anemia, cardiovascular dysfunction, progressive neuropathy, hyperlipidemia, failure of rehabilitation, and increased morbidity and mortality.

Signs of malnutrition are reduced muscle mass assessed by anthropometric methods, low concentration of albumin, transferrin, and other liver-derived proteins, a low alkali-soluble protein content in muscle in relation to DNA, abnormal plasma amino acid and intracellular amino acid profiles, similar to those found in untreated uremia, indicating that dialysis does not reverse these abnormalites.

The most extensive evaluation of nutritional status in CAPD patients included 224 patients from six centers in Europe and North-America. In this study, a subjective nutritional assessment based on 21 variables derived from history and clinical examinations, showed that 41% of the patients had mild (33%) or severe (8%) malnutrition. The variables that were most correlated with the subjective nutritional assessment score and with another included: albumin, midarm muscle circumference (MAMC), signs of muscle wasting, loss of subcutaneous fat, and history of anorexia? Malnutrition was more common in females than in males and in diabetics vs non-diabetics. Patients with severe malnutrition had minimal or no residual renal function and were either older or had been on CAPD longer than other patients.

The safe protein requirement in CAPD patients appears to be increased to about twice that of normal individuals. Thus, about 1.2 g protein/kg/day may be required to obtain a positive nitrogen balance in CAPD patients; however, some patients are in neutral balance with as low protein intake as 0.7 g/kg/day. The nitrogen balance is strongly dependent on the energy intake which often is lower than 35 kcal/kg/day in CAPD patients.

CAPD patients generally have a lower protein intake than HD patients, but may have lower average protein requirements than HD patients. In HD the dialytic procedure is a strong intermittent stimulus of net catabolism. On the other hand, the protein losses by the dialysate in CAPD patients are unparallelad in the HD patients. Peritonitis, when present, is a strong catabolic stimulus. Anorexia with low protein and energy intake results from a variety of factors of which underdialysis with insufficient control of uremic toxicity seems to be a major one. The

daily dose of dialysis is of critical importance for the intake of protein in HD was well as in CAPD patients.

The relationship bertween the dose of dialysis expressed as Kt/V for urea and the protein intake (assessed from urea appearance) is different between HD and CAPD patients, suggesting that control of potential uremic toxins which cause anorexia is better in CAPD patients than in HD patients, at the same Kt/V dose of dialysis.

Underdialyzed CAPD patients may enter a vicious circle of low protein and energy intake and enhanced protein catabolism, leading to progressive malnutrition and muscle wasting and a fatal outcome. To break this vicious circle the intensity of dialysis should be increased, acidosis corrected and measures should be taken to increase the supply of energy and protein.