30. UNWANTED SIDE EFFECTS OF NUTRITIONAL THERAPY FOR PATIENTS WITH CHRONIC RENAL FAILURE

S. GIOVANNETTI

PROTEIN MALNUTRITION

It is widely believed that protein malnutrition is a serious risk, if not an inevitable consequence, of low-protein diets (LPDs). This is, in fact, one of the main obstacles to its widespread use. This conviction is particularly deep-rooted in countries whose eating habits involve high nitrogen ingestion. In countries where meat and protein (PR) of high biological value (HBV) in general were traditionally—or even still are—eaten only rarely, this prejudice is not a problem.

Reports of patients with CRF who suffered severe PR malnutrition while on a LPD often tend to be taken as confirmation of this opinion. The possibility that it may have been caused by contraindications to the dietary therapy, by poor compliance with the recommended calorie intake, by concomitant catabolic conditions, or by mistakes in the dietary restrictions is usually not given due weight.

Two questions bring into focus the real nature of the problem:

1. Are adverse reactions connected with wrong use of the nutritional therapy or with its use despite contraindications?
2. Does the nutritional treatment still cause malnutrition if applied correctly and when there are no contraindications?

The answer to the first question is obviously affirmative (see Chapter 19). As for any other therapeutic measure, the wrong use of nutritional therapy in
CRF or its use in the presence of contraindications may be deleterious and PR malnutrition may be induced.

In answer to the second question, a distinction must be made between a conventional low-nitrogen diet (CLND) for patients with early CRF and the more restricted diets needed by patients with severe CRF (see Chapter 20). Patients with early CRF (CRCl > 20 ml/min) are prescribed a CLND to slow the progression and prevent the onset of hormonal and metabolic abnormalities. These patients have no catabolic condition related to uremia and no other uremic manifestations, with the exception of anemia. The recommended daily PR intake is 0.6 g/kg mostly of HBV (see also Chapter 34).

The minimum PR intake required to maintain the nitrogen balance, determined repeatedly in normal persons and CRF patients, has been found to be 0.5–0.6 g/kg/day if the biological value is elevated [1, 2] and even lower in optimal conditions, i.e., when the protein is of HBV and the energy requirement is fully met [1, 3, 4]. Studies on nitrogen metabolism indicate that in normal persons and CRF patients, adaptation to the PR restrictions occurs, leading to more efficient utilization of nitrogen for anabolic purposes and less nitrogen metabolized and excreted as urea [5–7].

Rigorous investigations have been made to detect possible manifestations of protein malnutrition after years of CLND, but results have been negative [8, 9].

Patients with severe CRF (CRCl < 20 ml/min) are in a different condition and require different treatment; they are often in a catabolic state. Several factors are recognized as responsible for this: secondary hyperparathyroidism (HPTH) [10, 11], hyperglucagonemia [12, 13], metabolic acidosis [14, 15], retention of proteases [16], retention of metabolites inhibiting PR synthesis [17], and, finally, low calorie intake due to the anorexia and vomiting of the uremic condition.

It is impossible to reverse the catabolic state of severe CRF simply by increasing PR intake, although the opposite is true. It has in fact been found that the negative nitrogen balance of severe CRF patients may become positive when PR intake is reduced from 1.2 to 0.6 g/kg/day [7]. This is not surprising considering that in patients on conservative therapy, an increase in PR intake is followed by worsening of the uremic syndrome, with the appearance of anorexia and vomiting and with a further increase in metabolic acidosis which, however, is reversed by a LPD [18, 19].

Two requirements are produced by severe CRF as far as protein metabolism is concerned: a) to correct the uremic state, thus removing the catabolic factors and b) to give nitrogen in the right amounts and of the right quality to satisfy the needs of the patient. Both requirements must be met simultaneously, since neither is sufficient alone, and this cannot be achieved with only natural foods. Supplements are necessary and the first attempt to reach this result was made in 1963 by Giordano [20], who attained equilibrium of the nitrogen balance with a very-low-PR intake supplemented with essential amino acids (EAAs).