Parathormone Activity and Rate of Progression of Chronic Renal Failure in Patients on Low-Protein Diet

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Dear Sir,

Low-protein diet (LPD) exerts a nearly constant de-toxicating action in uremic patients complying with their dietary treatment, but the effect of such a diet on renal function depends on the underlying factors responsible for the progression of renal failure [1]; therefore, markers of the response to the dietary treatment are desirable.

Recent reports emphasized the influence of parathormone (PTH) on the rate of progression of chronic renal failure (CRF) [2, 3]. We have assessed the relationship between PTH activity and the outcome of renal function in 90 patients with advanced renal failure (creatinine clearance lower than 25 ml/min). All patients received a LPD supplemented with ketoanalogues (Ketosteril, Fresenius, FRG). This diet provides daily 0.3 g of protein, 3–5 mg of inorganic phosphorus and approximately 35 kcal/kg body weight. Ketoanalogues were given at the daily dose of one tablet 5 kg body weight, each tablet providing 50 mg of calcium. Calcium carbonate supplement was given at the dose of 1–2 g/day in mineral form. No other phosphate binders or vitamin D were prescribed. The mean duration of dietary treatment ranged from 7 to 47 months (mean, 23.1). The rate of progression of renal failure was estimated from the monthly decrease in creatinine clearance. Serum calcium, serum phosphorus and PTH activity (intact hormone) were estimated every month.

According to the serum levels of PTH at the end of the study, patients were divided into three groups: PTH levels were, respectively, below 1 ng/ml in 39 patients, between 1 and 2 ng/ml in 28 patients and over 2 ng/ml in 23 patients. Renal function at the start of the study and mean duration of follow-up were nearly identical in all three groups. Characteristics of patient groups are reported in table 1.

At the end of the study, PTH activity and serum phosphorus were significantly reduced in the first group Table 1. Characteristics of patient group at the start of the study

3rd group
Table 2. Outcome of biological data in patients on LPD

<table>
<thead>
<tr>
<th>Patients PTH, ng/ml</th>
<th>SCa, mmol/l</th>
<th>SP, mmol/l</th>
<th>Progression of CRF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n creatinine</td>
<td>BE</td>
<td>B</td>
</tr>
<tr>
<td>1st group 39</td>
<td>1.3 ± 0.08</td>
<td>0.57 ± 0.04***</td>
<td>2.26 ± 0.44</td>
</tr>
<tr>
<td>2nd group 28</td>
<td>2.03 ± 0.11</td>
<td>1.40 ± 0.04*</td>
<td>2.23 ± 0.39</td>
</tr>
<tr>
<td>3rd group 23</td>
<td>2.98 ± 0.13</td>
<td>4.14 ± 0.13***</td>
<td>2.23 ± 0.43</td>
</tr>
</tbody>
</table>

Data are mean ± SEM. *p < 0.02; **p < 0.01; ***p < 0.001. SCa = Serum Ca; SP = serum P; B = before starting LPD; E = end of the study.

and to a lower extent in the second group, whereas PTH activity increased significantly in the last group (table 2). At the same time, the mean decreases in creatinine clearances were, respectively, 0.21 ± 0.6, 0.5 ± 0.65 and 0.6 ± 0.65 ml/min/month for the three groups.

Differences between the first and the two other groups are significant: p < 0.001 with the third group and p < 0.02 with the second group. There was no significant difference between the second and the third group.

Whenever its role has been appreciated, PTH has appeared to be one of the most important among the potential factors affecting the spontaneous progression rate of renal failure as well as its response to dietary treatment. As a matter of fact, Tessitore et al. [4] reported that in patients with early renal failure put on a reduced dietary intake of phosphate for more than 2 years, 1,25-(OH)2 D3 concentrations significantly increased and PTH remained unchanged in 11 patients where renal function did not change; on the other hand, serum PTH significantly increased and serum vitamin D metabolites remained low in 6 patients where renal function declined. Frohling et al. [2] analyzing the relationship of PTH and the progression rate of CRF during 1,311 patient months of experience concluded that poorly controlled hyper-parathyroidism was one of the most important risk factors for accelerated progression of this condition. Massry et al. [3] examined the rate of progression of renal failure by using the slope of 1/Scr in uremic patients divided among three groups according to their serum levels of PTH. The data showed that the higher the level of PTH, the steeper the slope of 1/Scr. In our patients as in the preceding studies, the relationship between the outcome of PTH activity and the rate of progression of CRF was highly significant.

Either by participating directly in the progression of renal insufficiency through the reduction of glomerular filtration rate [5] and/or calcium deposition in the kidney [6] or simply as an indicator, PTH course appears to be the most valuable marker of the response of the progression rate of renal failure to LPD.
References


