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Dear Sir,

Over the last few years, the use of calcium salts has become an alternative method to phosphate binders containing aluminum in the control of hyperphosphatemia in dialysis patients, hypercalcemia being the main limitation to this therapeutical approach [1]. On this basis, a reduction in the calcium dialysate (CD) concentration has been proposed in order to prevent the appearance of hypercalcemia [2, 3]. However, the use of low CD concentrations may have negative effects on cardiovascular stability during hemodialysis (HD) [4, 5].

In a recent study, Fabrizi et al. [6] examined the acute clinical consequences of lower CD levels. They found that the percent reduction in blood pressure (BP) after HD sessions was significantly greater with low CD (2.5 mEq/l) than with standard CD (3.5 mEq/l), and concluded that an optimal BP control and intradialytic tolerance can be achieved in chronic HD with a reduced calcium dialysate concentration, although the results show that cardiovascular stability is better with a CD concentration of 3.5 mEq/l.

Recently, we reported our experience after 1 year of using a low CD [7] in HD patients not receiving vitamin D. We reduced the dialysis fluid calcium level in 26 patients on maintenance HD with standard CD, and gradually increased the oral dose of calcium carbonate and reduced the dose of aluminum hydroxide to maintain the serum calcium and phosphate levels in the adequate range. Thus, after 1 year of HD with a low CD, the dose of calcium carbonate increased from 3.5 ± 2.6 to 9.2 ± 5.6 g/day ($p < 0.001$). In order to evaluate the tolerance to low CD, we measured BP before and after dialysis, and controlled the hypotensive episodes and cramps during the HD sessions 3 months before lowering the CD level and compared the results with those during the first 3 months of the study. The tolerance to

Intradialytic Cardiovascular Stability with Low Calcium Dialysate Levels

Table 1. Systolic and diastolic blood pressure (SBP and DBP), and prevalence of hypotensive episodes and cramps during hemodialysis (HD) with standard and low calcium dialysate (CD)

	Standard CD	Low CD	p
Pre-HD SBP, mm Hg	143 ± 20	144 ± 9	NS
Post-HD SBP, mm Hg	124 ± 21	123 ± 15	NS
Pre-HD DBP, mm Hg	80 ± 9	79 ± 10	NS
Post-HD DBP, mm Hg	72 ± 12	72 ± 8	NS
Hypotensive episodes	10 ± 14	7 ± 12	NS
Cramps	6 ± 8	7 ± 7	NS

NS = Not significant.

the low CD was excellent (table 1). Pre- and post-dialysis BP remained stable, and the prevalence of hypotensive episodes and cramps during the HD session did not change after the modification of CD. In a similar way, there was no modification in BP during the interdialytic period.

In conclusion, these results show that the reduction of CD from 3.5 to 2.5 mEq/l is well tolerated, without variations in BP or in the intradialytic symptoms. The intake of calcium supplements in our patients significantly increased during the study. It is possible that the administration of high doses of calcium carbonate favors a positive calcium mass balance with a significant contribution to cardiovascular stability.

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