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Impact of divalent cation abnormalities on elderly incident hemodialysis patients

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Objectives: Divalent cations including Ca²⁺ and Mg²⁺ play important role in the immune, musculoskeletal, nervous and endocrine systems. In patients with chronic kidney disease, both calcium and magnesium homeostasis are commonly dysregulated by the changes of kidney function, dietary intake, and mineral-bone disease. This study aims to investigate the impact of either serum calcium or magnesium imbalance on all-cause mortality in elderly incident HD patients.

Methods: 1,038 incident HD patients aged >70 years were recruited from a retrospective cohort of the Korean Society of Geriatric Nephrology. Patients were divided into three groups by the levels of serum corrected calcium or magnesium (<8.5 mg/dL, 8.5-10.3 mg/dL, >10.3 mg/dL for corrected calcium, <1.6 mg/dL, 1.6-2.7 mg/dL, >2.7 mg/dL for magnesium). The impact of serum corrected calcium or magnesium levels on all-cause mortality of 1/5/10 year were analyzed using Cox regression univariate and multivariate analysis.

Results: For corrected calcium, high calcium group had higher all-cause mortality of 1 year compared with normal calcium group (hazard ratio [HR], 1.871; 95% confidence interval [95% CI], 1.041-3.360; *P* = 0.036). There were no significant differences in all-cause mortality of 5 year between calcium groups. Low calcium group had lower all-cause mortality of 10 year compared with normal calcium group (HR, 0.80; 95% CI, 0.661-0.967; *P* = 0.021). However for magnesium, the Cox regression univariate analysis showed that magnesium levels were not significant risk factor for all-cause mortality of 1/5/10 year.

Conclusions: In Korean incident HD patients aged > 70 years, high calcium levels were associated with higher all-cause mortality of 1 year and low serum calcium levels were associated with lower all-cause mortality of 10 year. Unlike the previously reported results, this study showed that serum magnesium levels were not risk factor for all-cause mortality of 1/5/10 year.

Figure 2. Overall survival curves in the different calcium groups