Department of Internal Medicine and Nephrology

Hemodialysis and Hemodiafiltration Improve Serum Calcification Propensity

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Introduction

Calciprotein particles (CPPs) may play an important role in the calcification process. The formation of CPPs is a two step process (*see figure 1 below*). The transformation time (T_{50}) from primary to secondary CPPs, is thought to reflect the calcification propensity of serum and is highly predictive of all-cause mortality in chronic kidney disease patients. Whether T_{50} is therapeutically improvable, by high-flux hemodialysis (HD) or even further by high-volume hemodiafiltration (HDF), has not been studied yet.

Methods

In this cross-sectional single center study we included stable prevalent HD and HDF patients treated on a 4 hours three times weekly schedule. We included patients with a dialysis vintage of at least 3 months and a vascular access providing a blood flow rate of at least 300ml/min in both groups. The serum T_{50}, was measured using time resolved nephelometry *(figure 1)*.

Results

- We included 64 patients, mean age 70 years, 53.1% male, dialysis vintage 50 months.
- 53.1% post-dilution HDF with a mean convection volume of 23.6L (±3.2L).
- T_{50} levels improved in both groups after dialysis with a mean improvement of 26.3% in the HD and 22.0% in the HDF group (P=0.61) (*see figure 2 below*).
- Delta values of calcium, phosphate and serum albumin were equal in both groups.
- Baseline T_{50} was negatively correlated with phosphate and positively correlated with serum magnesium and Fetuin-A levels.
- The delta T_{50} was most influenced by the delta phosphate (r^2 0.280; P=0.01 in the HD group and r^2 0.239; P=0.02 in the HDF group).

Conclusion

HD and HDF patients present with same baseline vascular calcification risk values pre-dialysis. Calcification propensity is significantly improved during both HD and HDF sessions. T_{50} might be a useful guide to optimize renal replacement strategy to improve the individual calcification risk in dialysis patients.

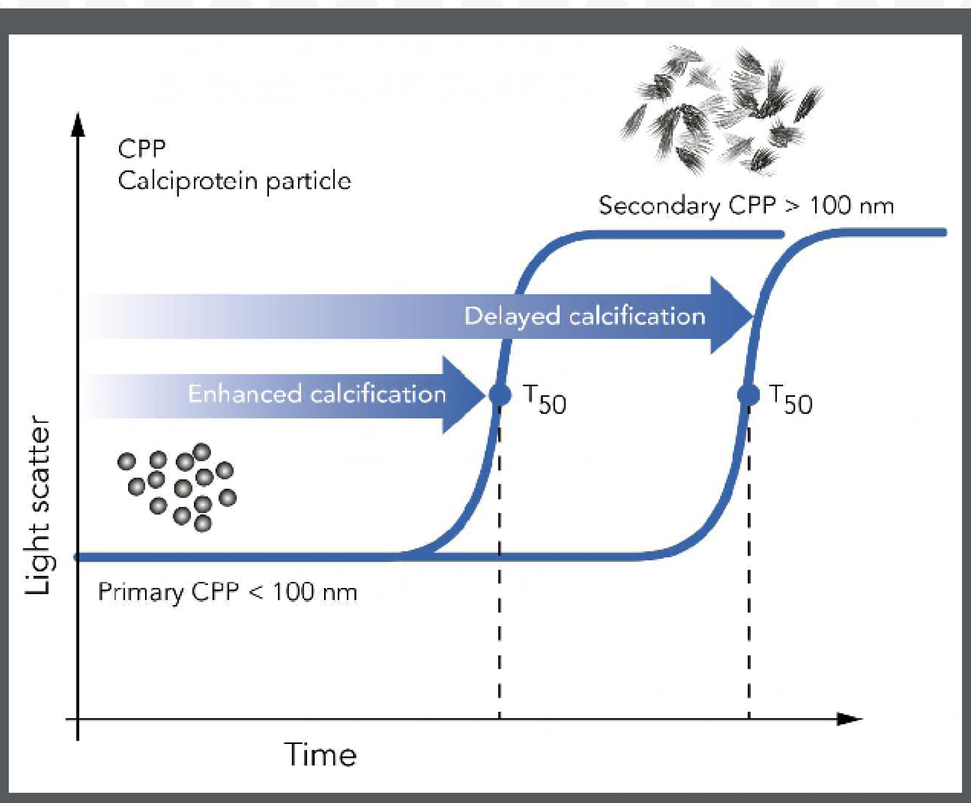

Figure 1: Transformation time between primary to secondary CPPs. Pasch et al. 2012

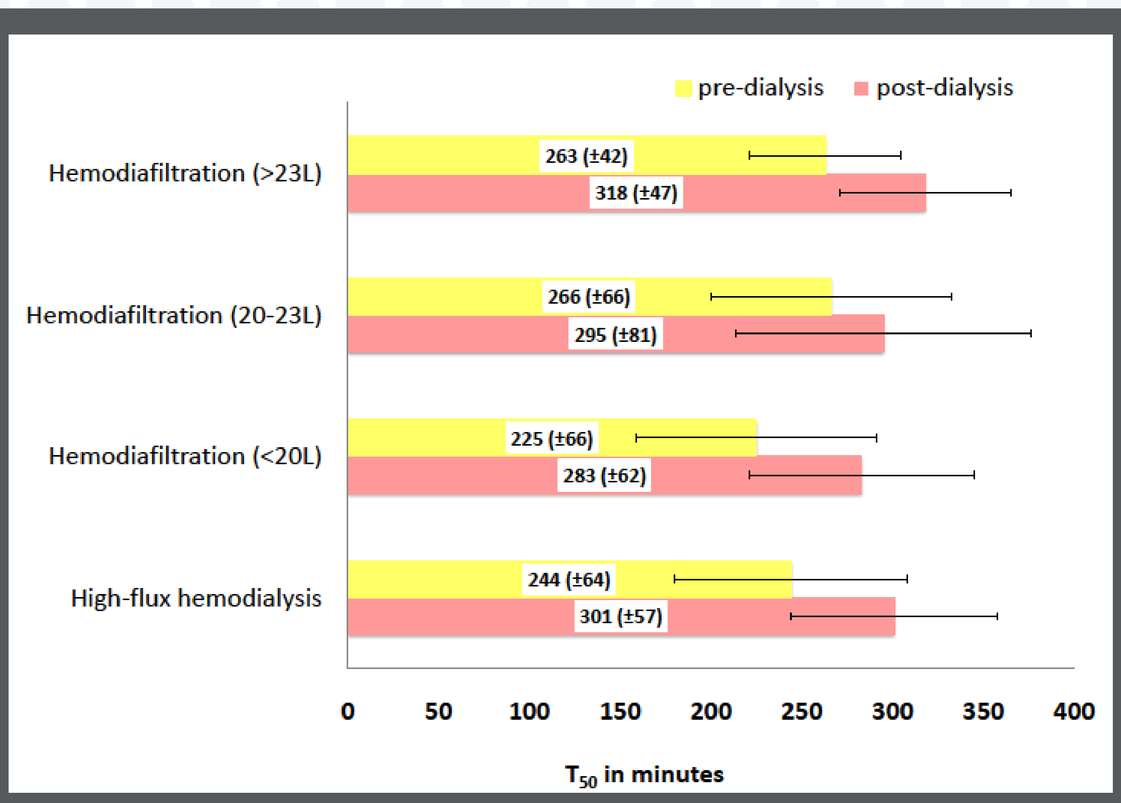

Figure 2: Change in T_{50} after hemodialysis and hemodiafiltration in separate convection volumes, presented as mean (±SD) .

52 ERA
544--SP
L3) Dialysis. Cardiovascular complications.
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DOI: 10.3252/pso.eu.52era.2015
ePosters supported by F. Hoffmann- La Roche Ltd.
52nd ERA-EDTA CONGRESS London 2015 UNITED KINGDOM MAY 28
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