

PRELIMINARY RESULTS OF Dialysis STUDY: ACCURACY OF A SINGLE POOL VARIABLE-VOLUME CALCIUM KINETIC MODEL WITH DIFFERENT CALCIUM DIALYSATE CONCENTRATIONS

Authors: Salvatore Di Filippo¹, Vincenzo La Milia¹, Fabio Carfagna¹, Claudio Minoretti², Giuseppe Rombolà³, Carlo Schönholzer⁴, Giustina Casagrande⁵, Camilla Bianchi⁵, Domenico Vito⁵, Maria Laura Costantino⁵, Giuseppe Pontoriero¹ and Francesco Locatelli¹
Nephrology and Dialysis, A.O. Lecco (1), A.O. Como (2), A.O. Varese (3), Italy, Regional Hospital of Lugano (4), Switzerland, Department of Chemistry, Materials and Chemical Engineering "Giulio Natta" (5), Politecnico di Milano, Italy

OBJECTIVES

The work presented here is part of the international study DialysisIS (Dialysis therapy between Italy and Switzerland). Within the DialysisIS study, we compare the accuracy of a single-pool variable volume calcium kinetic model (SPVV-CaKM) using two different dialysate calcium concentrations (CaD).

METHODS

Pre- and post-treatment relevant variables of 34 patients treated with nominal CaD of 1.5 mmol/L and 46 patients with nominal CaD of 1.75 mmol/L were analyzed. The difference between end-dialysis ionized plasma water calcium concentration predicted by the kinetic model ($Ca^{2+}pwtP$) and measured value ($Ca^{2+}pwtM$) was considered the most useful variable in assessing the accuracy of the model along with mobilization of Ca^{2+} outside the extracellular fluid compartment (MCa^{2+}).

RESULTS

Dialysis sessions	$Ca^{2+}pwtP$ (mmol/L)	$Ca^{2+}pwtM$ (mmol/L)	p-value	$Ca^{2+}pwt$ (P-M) (mmol/L)	MCa^{2+} (mmol)	Dialysate Ca (mmol/l)
Group 1. n 181	1.32 ± 0.04	1.31 ± 0.04	NS	0.01 ± 0.02	0.07 ± 0.24	1.5
Group 2. n 60	1.34 ± 0.04	1.28 ± 0.06	<0.01	0.06 ± 0.05	0.6 ± 0.49	1.5
Group 3. n 45	1.58 ± 0.09	1.44 ± 0.10	<0.01	0.13 ± 0.05	1.23 ± 0.5	1.75

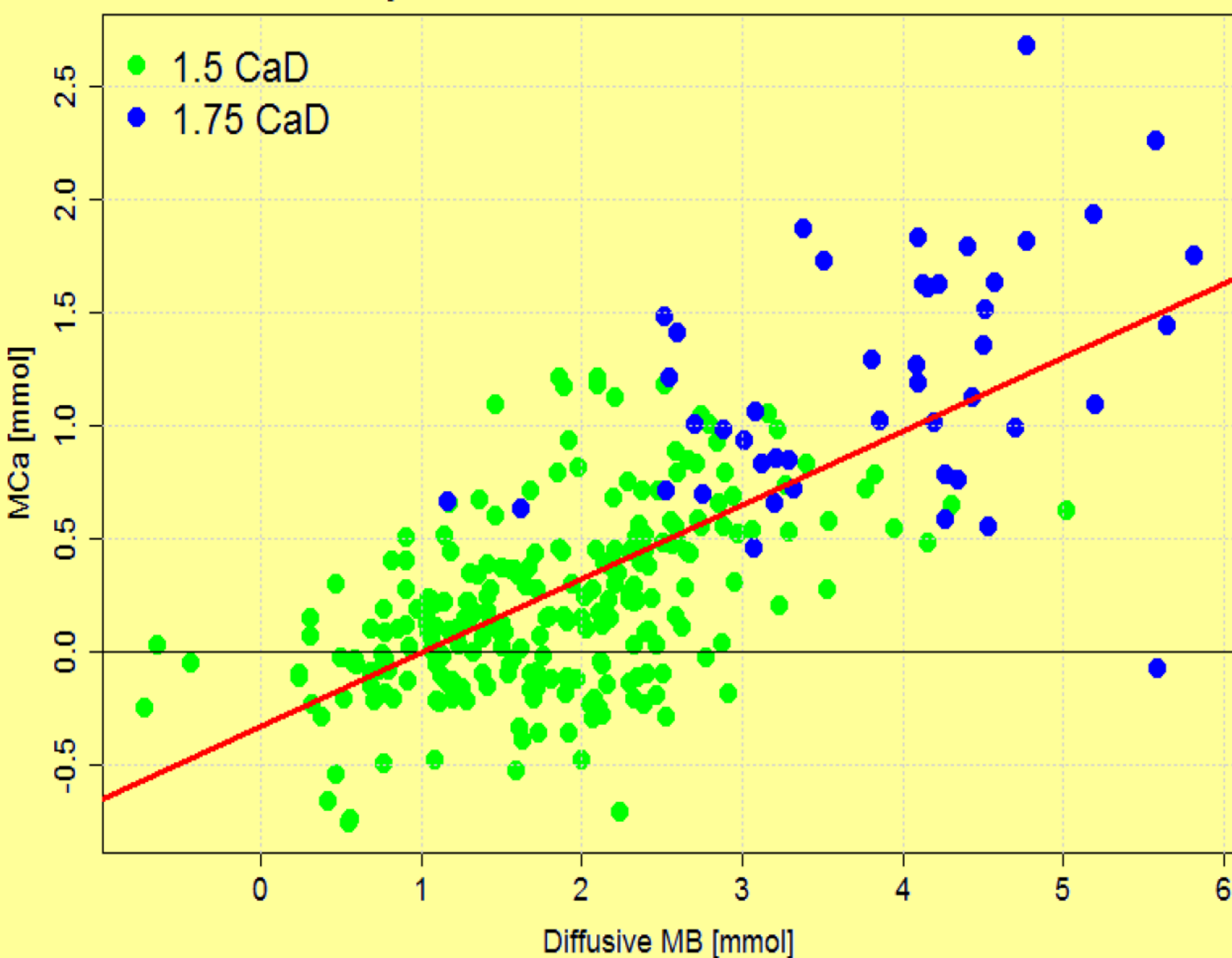
Table 1. End-dialysis predicted by the model ($Ca^{2+}pwtP$), measured ($Ca^{2+}pwtM$), difference between predicted and measured $Ca^{2+}pwt$ (P-M) and mobilization of Ca^{2+} from extracellular fluid compartment.

According to the variable $Ca^{2+}pwt$ (P-M), dialysis sessions were divided into three groups:

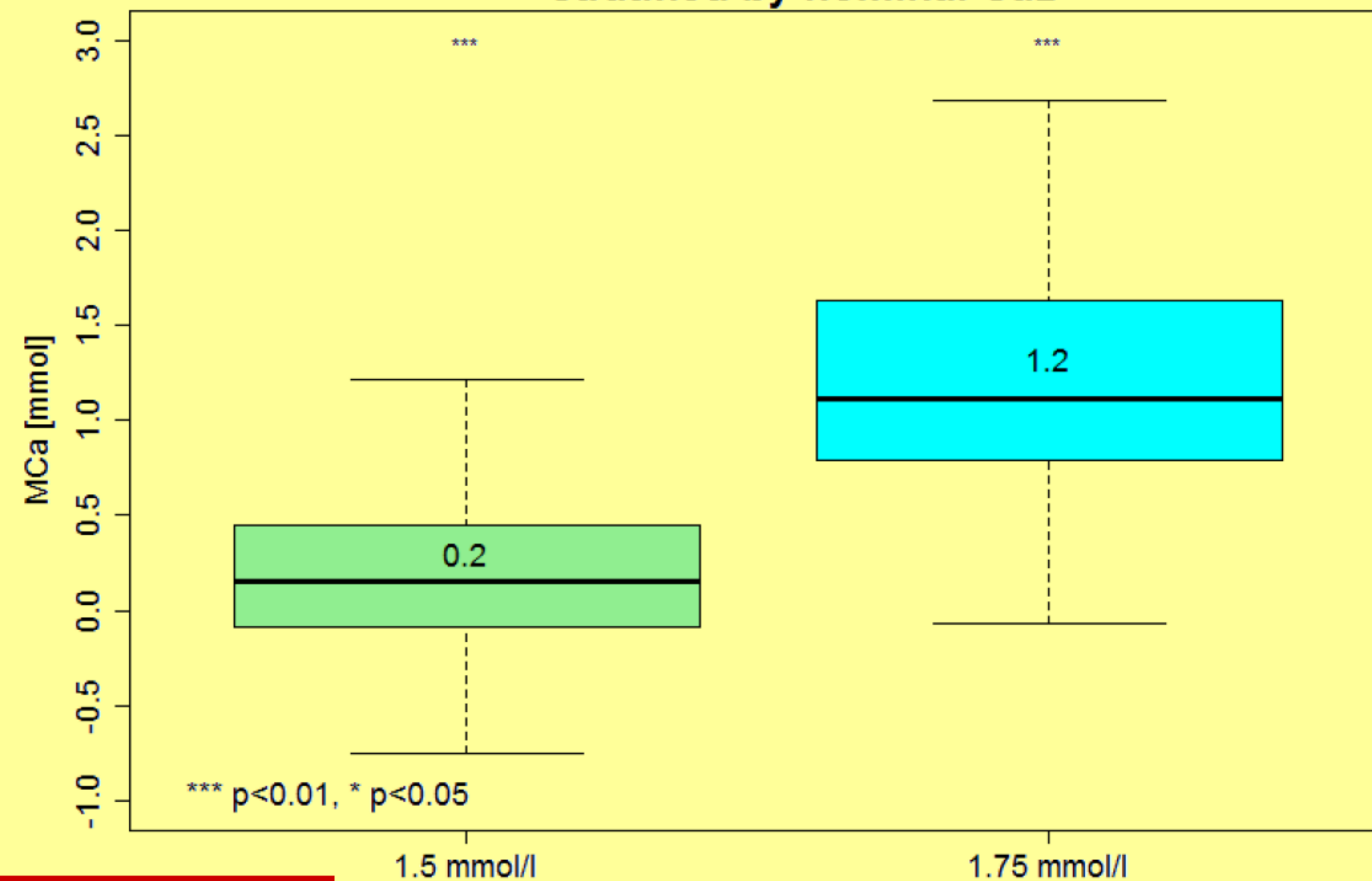
- Group 1 : $Ca^{2+}pwt$ (P-M) ≤ 0.05 mmol/L;
- Group 2 : $Ca^{2+}pwt$ (P-M) > 0.05 mmol/L with nominal CaD = 1.5 mmol/L;
- Group 3: $Ca^{2+}pwt$ (P-M) > 0.05 mmol/L with nominal CaD = 1.75 mmol/L.

In Group 2 and 3 $Ca^{2+}pwtP$ was significantly higher ($p < 0.01$) than $Ca^{2+}pwtM$ indicating a significant mobilization of Ca^{2+} from the extracellular fluid compartment (Table 1). Mean Global Ca^{2+} mass balance (CaMB) resulted negative in Group 1 ($-0.94 ± 1.32$ mmol) and Group 2 ($-0.53 ± 1.32$ mmol), positive in Group 3 ($0.41 ± 1.56$ mmol). Patients with negative CaMB, compared to patients with positive CaMB, show significant ($p < 0.01$) lower concentrations of pre-dialysis Ca^{2+} and lower ultrafiltration's volumes.

Calcium mobilization outside Extra cellular water stratified by nominal CaD in function of the Diffusive Mass Balance



Calcium mobilization outside Extra cellular water stratified by nominal CaD



CONCLUSIONS

Our findings show that it is possible to model and to predict calcium mass balance during dialysis, even though it varies widely in function of CaD, pre-dialysis Ca^{2+} , ultrafiltration and according to specific pharmacological treatments. These findings are in conflict with the idea that a single CaD could be appropriate for all HD patients. Mobilization of calcium from the extracellular fluid compartment is directly related to the entity of diffusive $Ca^{2+}MB$. Further test are required to better understand where this efflux of calcium from the extracellular compartment is going.

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Le opportunità non hanno confini.

