BODY WATER CONDITIONS THE EFFICACY OF CONVECTIVE TRANSPORT IN HIGH-FLUX HEMODIALYSIS

Nicolás Macías, Almudena Vega, Soraya Abad, Ana García Prieto, Tania Linares, Inés Aragoncillo, Jose Luño, Juan Manuel López Gómez.
Hospital Gregorio Marañón, Madrid, Spain.

INTRODUCTION

Conventional hemodialysis (HD) using high flux membranes leads to convective transport by internal filtration and allows the removal of middle molecules. In online hemodiafiltration (OL-HDF), which also combines diffusive and convective transport, body composition influences the efficacy in middle molecules elimination[1]. Urea distribution volume has been used to standardize diffusion dose in HD, but Kt/V insufficiently represents a good marker for dialysis adequacy with convective therapies.

OBJECTIVES

The purpose of this study is to determine body composition parameters that influences medium-sized uremic toxins elimination in high-flux HD.

METHODS

We collected demographic data, anthropometric measurements and body composition by pre-dialysis bioimpedance spectroscopy in 21 patients in maintenance hemodialysis. A four-hour high-flux HD session using the same 1.8 m^2 surface helixone membrane (FX80®, FMC) was performed in every patient with similar dialysis conditions: effective blood flow 400 ml/min, dialysate flow 700 ml/min, dialysate temperature 35.5ºC and constant ultrafiltration rate. Urea, creatinine, phosphorus, beta-2 microglobulin, cystatin C, myoglobin and prolactine were obtained pre-dialysis, at one hour of dialysis and post-dialysis to assess the elimination of different molecular weight uremic toxins along the session. At last, we analyzed the relation of patients features and their body composition with dialysis efficacy.

RESULTS

Age was 57.3±18.6 years, 61.9% were male, with 11 (5.5 – 48) months on dialysis.

Table 1. Body composition parameters

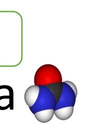
	x	SD
Height (cm)	168,4	9,3
Weight (Kg)	74,8	24,2
BMI (Kg/m2)	26,1	7,0
Body surface (m2)	1,83	0,30
Overhydration (L)	1,40	1,98
UDV by BIS (L)	39,1	11,3
UDV Watson (L)	38,1	9,1
TBW (L)	40,5	11,0
ECW (L)	18,7	4,6
ICW (L)	22,3	7,2
LTI (Kg/m²)	16,1	4,8
FTI (Kg/m²)	9,3	7,4
LTM (Kg)	46,3	16,3
FM (Kg)	19,6	15,9
ATM (Kg)	26,6	21,7
BCM (Kg)	26,8	11,2

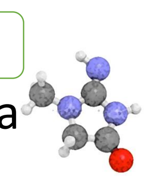
Table 2. Reduction rates of different molecular weight uremic toxins along the session

	Final RR (at 4 hours)		RR at 1 hour		RR in the last 3 hours	
	x	SD	x	SD	x	SD
Urea RR (%)	80,7	7,1	48,2	11,9	32,5	7,9
Creatinine RR (%)	73,5	7,9	45,2	7,6	28,3	4,4
Phosphorus RR (%)	52,5	14,3	46,2	7,1	6,2	11,5
Beta-2micro RR (%)	71,7	8,9	47,2	8,2	25,4	6,0
Cystatin C RR (%)	67,0	7,4	44,0	7,4	23,8	5,0
Myoglobin RR (%)	42,0	9,4	25,0	6,7	17,7	6,7
Prolactin RR (%)	39,0	11,0	23,3	7,6	16,5	7,1

Every RR at four hours were associated with RR at one hour (p<0.001), Phosphorus, myoglobin and prolactin RR were also correlated with their RR in the last three hours (p<0.001).

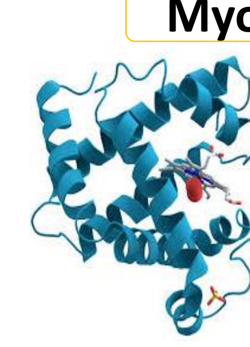
Reduction rates (RR) of low molecular weight solutes at four hours were negatively correlated with height, weight, BMI, body surface area, urea distribution volume, total, extracellular and intracellular water, lean tissue and body cell mass.

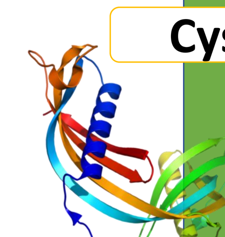


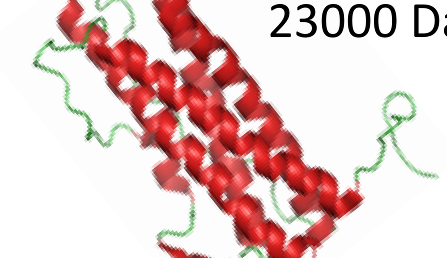


Total body water got the strongest correlation with **urea and creatinine RR (-0.922, p<0.001** and **-0.888, p<0.001**).

RR at 4 hours of beta-2 microglobulin, cystatin C and prolactin were negatively correlated with body weight, total, extracellular, intracellular water







Extracellular water got the strongest correlation with **beta-2 microglobulin (-0.817, p<0.001), cystatin C (-0.836, p<0.001) and prolactin RR (-0.734, p<0.001).**

Prolactin RR in the last three hours were also negatively correlated with body composition, with the strongest correlation with extracellular water.

Kt/V was correlated with urea, creatinine, beta-2 microglobulin, cystatin C and prolactin RR at the end, and with prolactin RR in the last three hours, while Kt did not correlate with middle molecules elimination

CONCLUSION: Body composition have a determinant role in the efficacy of convective transport in high-flux HD with similar dialysis conditions. Total body water and extracellular water can be used for high-flux HD adequacy as in OL-HDF. The standardization of dialysis dose with patient features could also be helpful to monitor the efficacy of convective transport in high-flux HD and to prescribe individualized therapies.

REFERENCESJ
1. Macías N, et al. Importance of Body Water in the Efficacy of Convective Solute Transport in Online Hemodiafiltration. Ther Apher Dial. 2017 Feb;21(1):88-95.