ONLINE HEMODIAFILTRATION REDUCES BISPHENOL A.



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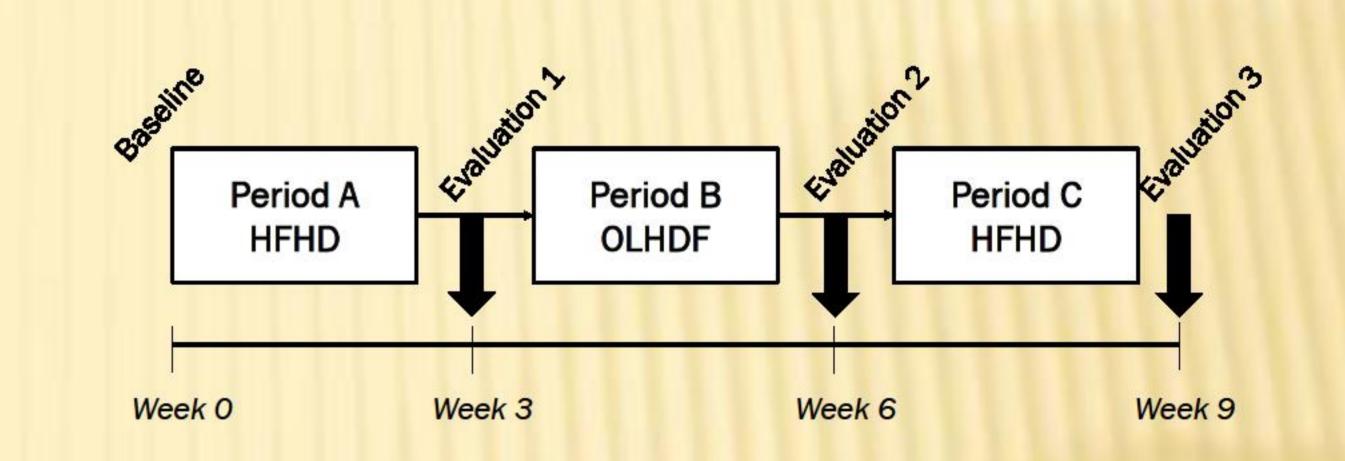
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INTRODUCTION.

Several uremic toxins have been identified and related to higher rates of morbi-mortality in dialysis patients. Bisphenol A (BPA) accumulates in patients with chronic kidney disease (especially in those on dialysis) due to insufficient renal excretion. The aim of this study is to demonstrate the usefulness of online hemodiafiltration (OL-HDF) in reducing BPA levels.

METHODS.

Thirty stable hemodialysis patients were selected to participate in this paired study. During three periods of three weeks each, patients were switched from high-flux hemodialysis (HF-HD) to OL-HDF, and back to HF-HD. BPA levels were measured in the last session of each period (pre- and post-dialysis) using ELISA and HPLC. Reduction rates of BPA were measured in each period.

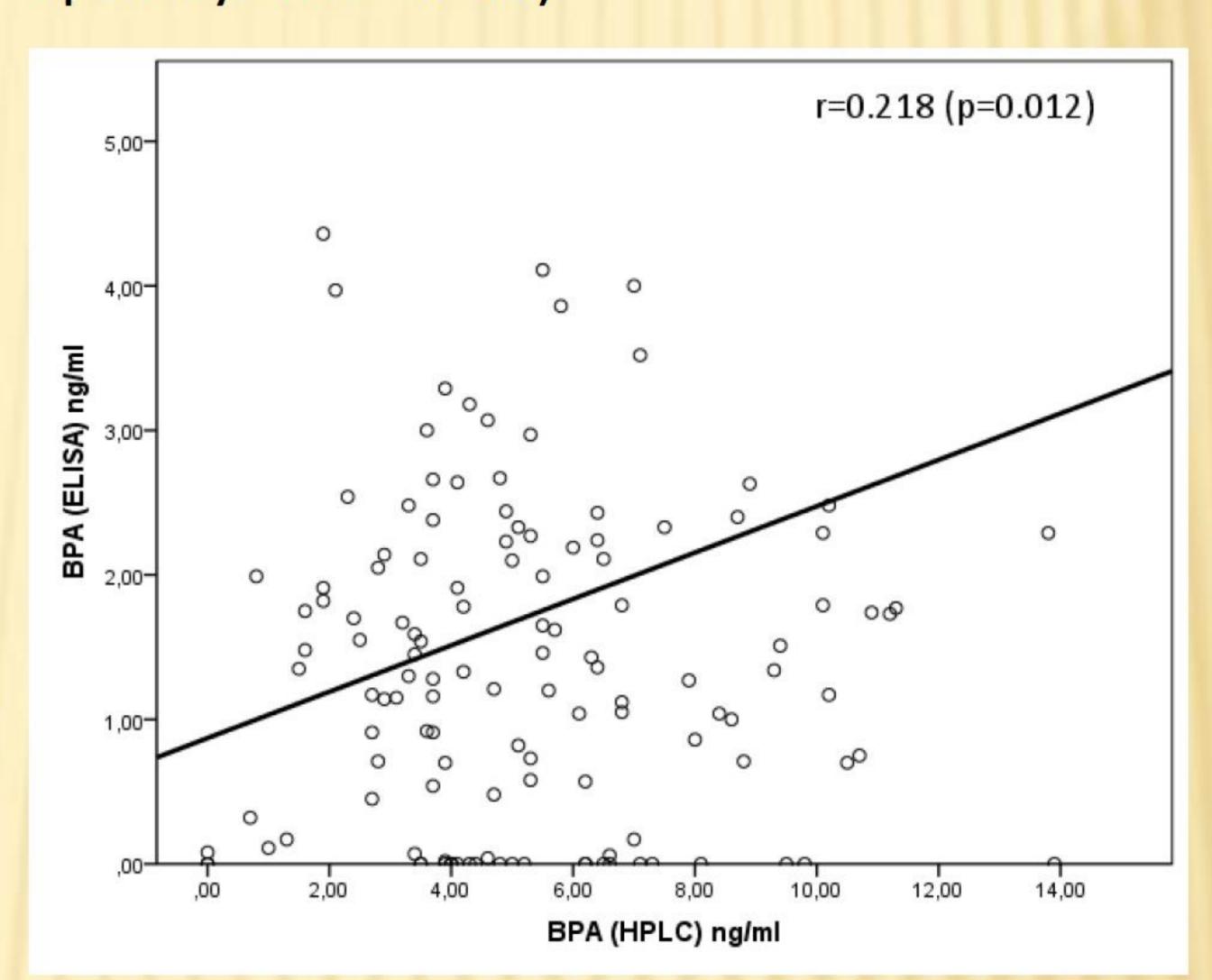


RESULTS.

Baseline characteristics.

N (%) Sex (male)	Baseline characteristics.	
Age (years) Dialysis vintage (months) Etiology of CKD - Vascular disease - Glomerulonephritis - Diabetes mellitus - Interstitial nephritis - Others - Unknown Diabetes mellitus Hypertension Dyslipidemia Ho (72.7) History of cardiovascular disease - Autologous - PTFE - Catheter Kt/V Convective volume (litres) Blood flux (ml/min) 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (24-67)# 51 (4.5) 52 (2.7) 4 (18.2) 4 (18.2) 2 (9.1) 2 (9.1) Diabetes mellitus 9 (40.1) Hypertension 19 (86.4) Dyslipidemia 16 (72.7) History of cardiovascular disease 13 (59.1) Vascular access - Autologous - Autologous - 14 (63.6) - PTFE - 1 (4.5) - Catheter - 7 (31.8) Kt/V - Convective volume (litres) - 24 ± 4* Blood flux (ml/min)		N (%)
Dialysis vintage (months) Etiology of CKD - Vascular disease - Glomerulonephritis - Diabetes mellitus - Interstitial nephritis - Others - Unknown - Unknown Diabetes mellitus - Unknown Diabetes mellitus - Unknown Diabetes mellitus - Unknown Diabetes mellitus - Unknown Dyslipidemia - 16 (72.7) History of cardiovascular disease - Autologous - Autologous - PTFE - Catheter - Catheter - T (31.8) Kt/V Convective volume (litres) - 24 ± 4* Blood flux (ml/min) - 5 (22.7) 5 (22.7) 5 (22.7) 5 (22.7) 6 (18.2) 5 (22.7) 6 (18.2) 7 (9.1) 19 (86.4) 19 (86.4) 19 (86.4) 19 (86.4) 10 (72.7) 11 (4.5) 7 (31.8) 11 (4.5) 7 (31.8)	Sex (male)	19 (86.4)
Etiology of CKD - Vascular disease - Glomerulonephritis - Diabetes mellitus - Interstitial nephritis - Others - Unknown - Unknown Diabetes mellitus Hypertension Dyslipidemia - 16 (72.7) History of cardiovascular disease - Autologous - Autologous - PTFE - Catheter Kt/V Convective volume (litres) Blood flux (ml/min) 5 (22.7) 5 (22.7) 5 (22.7) 6 (22.7) 6 (22.7) 6 (18.2) 6 (18.2) 6 (9.1) 7 (9.1) 7 (9.1) 7 (9.1) 7 (18.2) 7 (31.8) 7 (31.8) 7 (31.8) 7 (31.8)	Age (years)	73 ± 14*
- Vascular disease 5 (22.7) - Glomerulonephritis 5 (22.7) - Diabetes mellitus 4 (18.2) - Interstitial nephritis 4 (18.2) - Others 2 (9.1) - Unknown 2 (9.1) Diabetes mellitus 9 (40.1) Hypertension 19 (86.4) Dyslipidemia 16 (72.7) History of cardiovascular disease 13 (59.1) Vascular access - Autologous 14 (63.6) - PTFE 1 (4.5) - Catheter 7 (31.8) Kt/V 1.7 ± 0.2* Convective volume (litres) 24 ± 4* Blood flux (ml/min) 369 ± 33*	Dialysis vintage (months)	51 (24-67)#
- Glomerulonephritis 5 (22.7) - Diabetes mellitus 4 (18.2) - Interstitial nephritis 4 (18.2) - Others 2 (9.1) - Unknown 2 (9.1) Diabetes mellitus 9 (40.1) Hypertension 19 (86.4) Dyslipidemia 16 (72.7) History of cardiovascular disease 13 (59.1) Vascular access - Autologous 14 (63.6) - PTFE 1 (4.5) - Catheter 7 (31.8) Kt/V 1.7 ± 0.2* Convective volume (litres) 24 ± 4* Blood flux (ml/min) 369 ± 33*	Etiology of CKD	
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Dyslipidemia 16 (72.7) History of cardiovascular disease 13 (59.1) Vascular access 14 (63.6) - Autologous 14 (63.6) - PTFE 1 (4.5) - Catheter 7 (31.8) Kt/V 1.7 ± 0.2* Convective volume (litres) 24 ± 4* Blood flux (ml/min) 369 ± 33*	Diabetes mellitus	9 (40.1)
History of cardiovascular disease Vascular access - Autologous - PTFE - 1 (4.5) - Catheter Kt/V Convective volume (litres) Blood flux (ml/min) 13 (59.1) 14 (63.6) 1 (4.5) 7 (31.8) 1.7 ± 0.2* 24 ± 4* 369 ± 33*	Hypertension	19 (86.4)
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- PTFE	Vascular access	
$ \begin{array}{lll} \textbf{- Catheter} & 7 (31.8) \\ \textbf{Kt/V} & 1.7 \pm 0.2 * \\ \textbf{Convective volume (litres)} & 24 \pm 4 * \\ \textbf{Blood flux (ml/min)} & 369 \pm 33 * \\ \end{array} $	- Autologous	14 (63.6)
Kt/V $1.7 \pm 0.2^*$ Convective volume (litres) $24 \pm 4^*$ Blood flux (ml/min) $369 \pm 33^*$	- PTFE	1 (4.5)
Convective volume (litres) 24 ± 4* Blood flux (ml/min) 369 ± 33*	- Catheter	7 (31.8)
Blood flux (ml/min) 369 ± 33*	Kt/V	1.7 ± 0.2*
	Convective volume (litres)	24 ± 4*
	Blood flux (ml/min)	369 ± 33*
Membrane	Membrane	
- Polysulfone 9 (40.9)	- Polysulfone	9 (40.9)
- Polyacrylonitrile 12 (54.5)	- Polyacrylonitrile	12 (54.5)
- Acrylonitrile 1 (4.5)	- Acrylonitrile	1 (4.5)
Residual diuresis 4 (18.2)	Residual diuresis	4 (18.2)

Correlation between BPA levels with ELISA and HPLC (Regression equation: y = 0.871 + 0.160X).



Bisphenol A levels at the end of each period.

	HF-HD	OL-HDF	P
Total BPA (HPLC)	7.5 ± 3.5	6.7 ± 2.5	0.34
Conjugated BPA (HPLC)	6.2 ± 3.1	5.7 ± 2.3	0.10
Free BPA (HPLC)	1.3 ± 0.8	0.9 ± 0.6	0.58
Free BPA (ELISA)	2.6 ± 3.4	1.6 ± 1.0	0.23

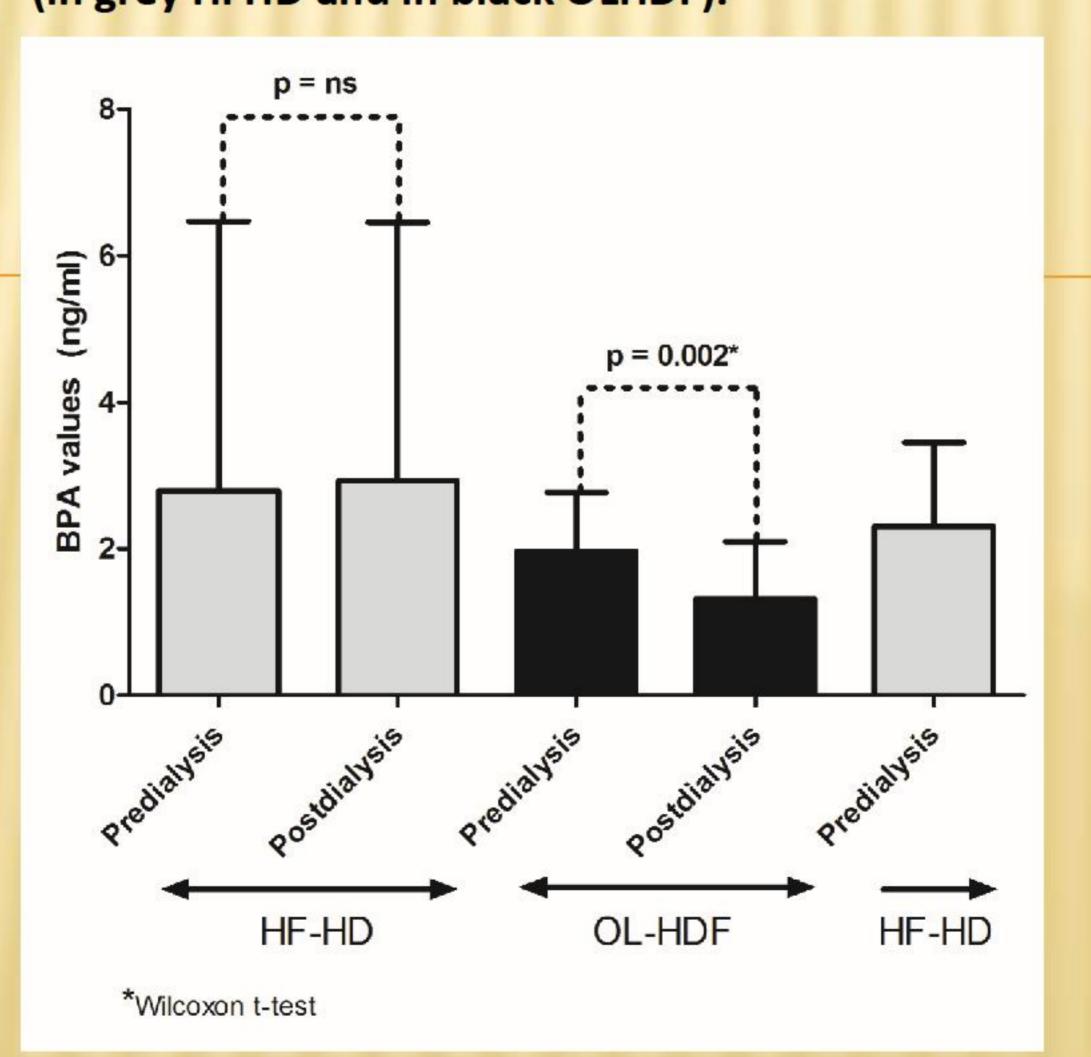
Mean ± SD (ng/ml). Wilcoxon test.

Bisphenol A

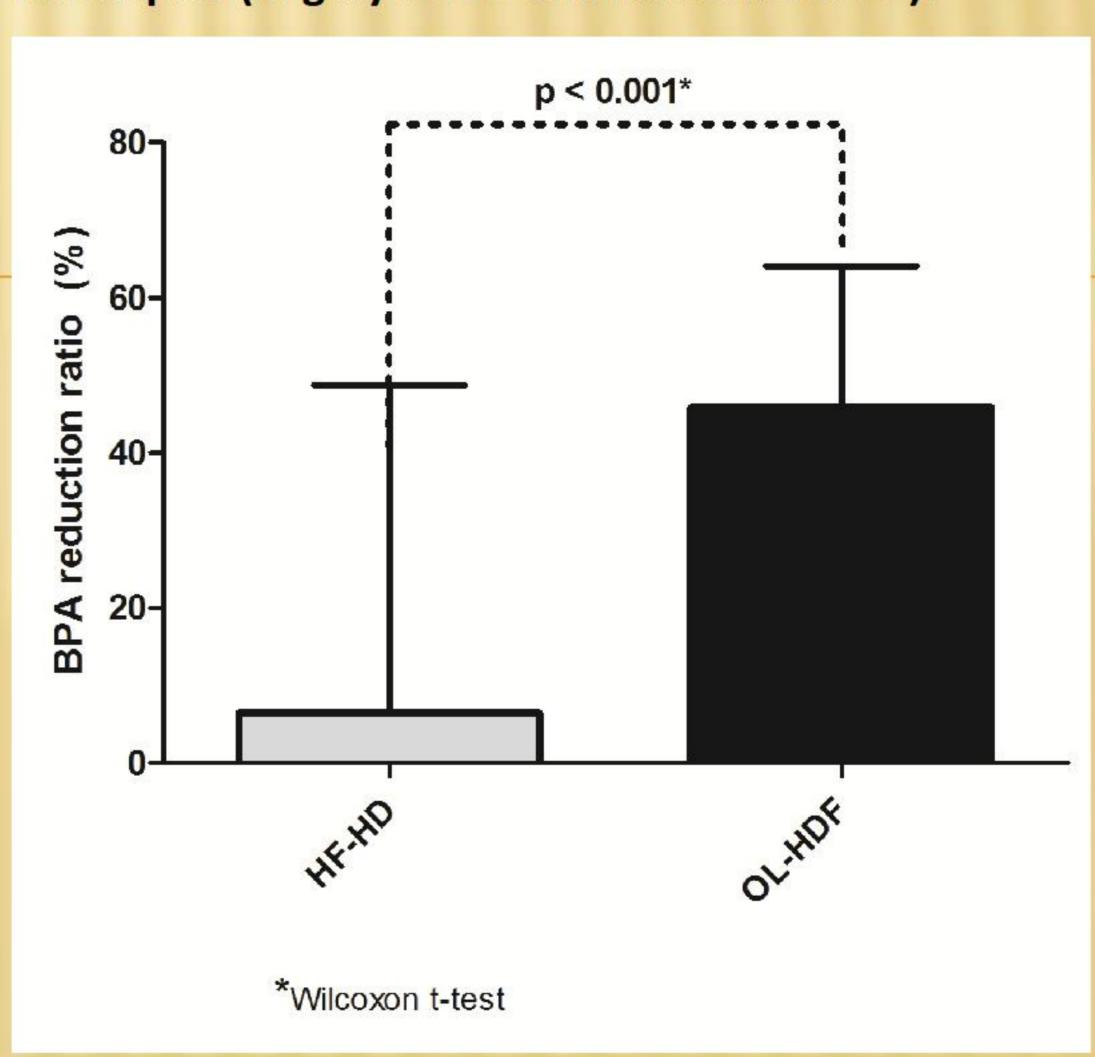
reduction with

dialysis.

Free BPA levels with different dialysis techniques (in grey HFHD and in black OLHDF).



Reduction percentage of free BPA with different dialysis techniques (in grey HFHD and in black OLHDF).



CONCLUSIONS. hemodialysis patients have high levels of BPA that can be reduced with OL-HDF. Prospective studies must be conducted in order to elucidate the impact of these findings on the prognosis of hemodialysis patients.







^{*}Mean (standard deviation), # Median (interquartile range)