DIFERENCIES IN BISPHENOL A (BPA) SERUM LEVELS IN ONLINE HEMODIAFILTRATION HEMODIALYSIS (HDF) PATIENTS WITH TWO DIFFERENT MEMBRANES

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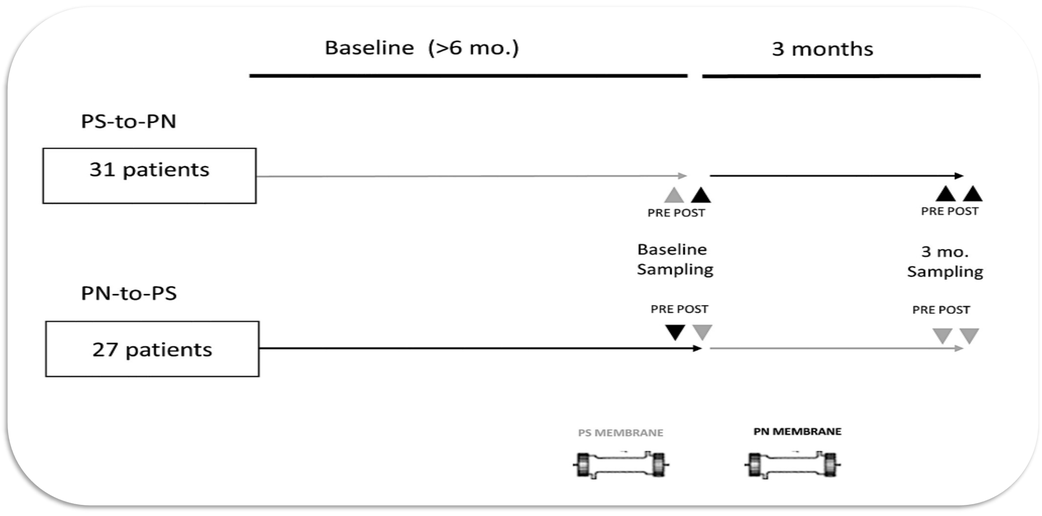
INTRODUCTION

In uremia, the environmental toxin Bisphenol A (BPA) accumulates bound to proteins. BPA-containing dialyzers contribute to increase plasma BPA concentration in conventional hemodialysis patients. Online hemodiafiltration (OL-HDF) more efficiently clears high molecular weight molecules, and this may improve BPA clearance. However, OL-HDF requires high infusion volumes of replacement fluid generated online by using BPA-containing membranes and, thus, can be a source of BPA load. Our aim was to assess plasma BPA levels in OL-HDF patients using BPA-free or BPA-containing dialyzers.

METHODS

In a prospective study, plasma BPA was assessed at baseline and 3 months after switching from baseline BPA-free to BPA-containing polysulfone (n=31) dialyzers, or from baseline polysulfone to polynephron (n=27) dialyzers in OL-HDF patients. Results were compared to a prior study on conventional hemodialysis.

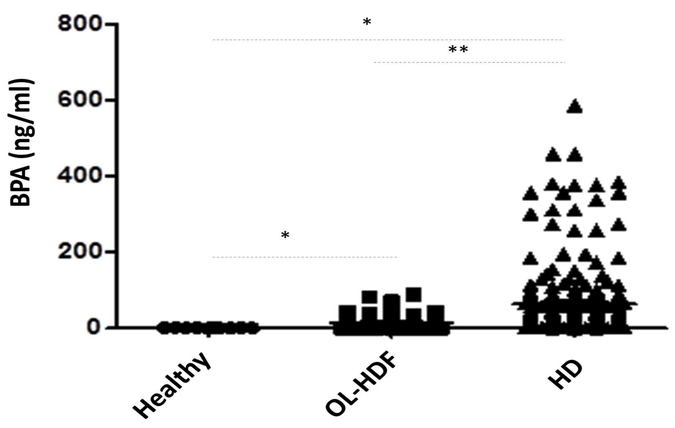
Study design: timing of plasma sampling for BPA assessment



RESULTS

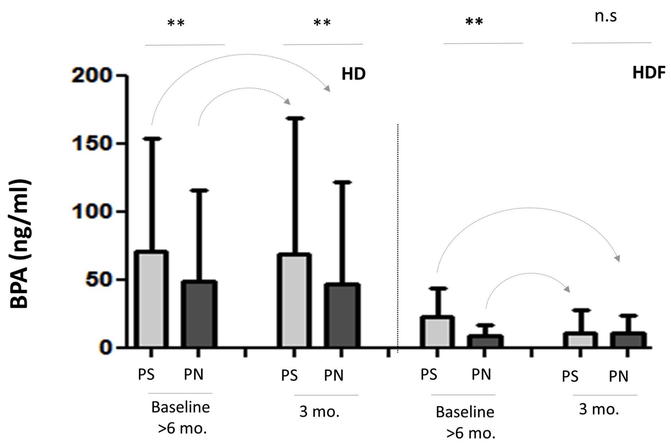
OL-HDF patients had lower plasma BPA than those in conventional hemodialysis (12.12±15.91 vs. 64.55±93.8 ng/mL) and both were several fold higher than healthy controls (<2 ng/ml). However, this was influenced by the dialysis membrane. Thus, baseline BPA was 8.79±7.97 ng/ml in patients dialyzed ≥6 months with polynephron versus 23.42±20.38 ng/mL with polysulfone. During the first single OL-HDF session with the switch membrane, BPA decreased in the polysulfone-to-polynephron group (pre-dialysis 23.42±20.38 ng/ml to post-dialysis 6.44±10.77 ng/mL), but remained unchanged in polynephron-to-polysulfone patients. After 3 months on polysulfone, BPA levels rose non-significantly from 8.79±7.97 to 11.02±16.17 ng/mL in the polynephron-to-polysulfone group, while they decreased 51% in the polysulfone-to-polynephron group.

Plasma BPA is lower in OL-HDF than in conventional hemodialysis patients



Plasma BPA concentration. Healthy subjects (n=10); patients on online **hemodiafiltration** (HDF) (n=58) and patients on **conventional hemodialysis** (HD)(n=69).

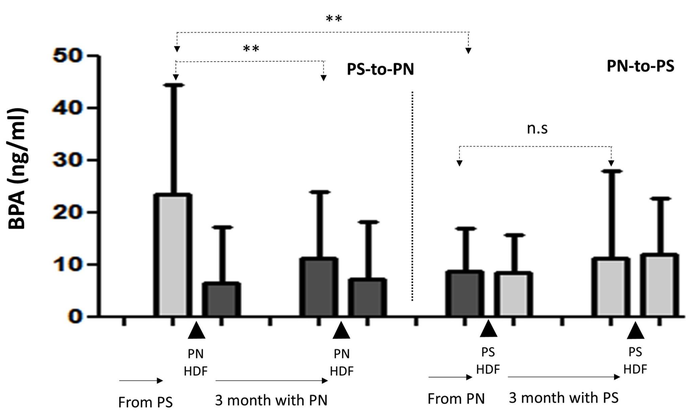
Plasma BPA concentration is affected by time of exposure to the different membranes



Influence of dialysis membrane on plasma BPA concentration. BPA concentration was assessed pre-dialysis at the baseline stage of the switch study (when patients had been >6 months on the same dialysis membrane and technique) and 3 months after the switch both in conventional hemodialysis (HD) or online hemodiafiltration (HDF) patients using polysulfone (PN) or polynephron (PN) dialyzers. Arrows indicate samples, from baseline (>6 months) to 3 months, corresponding to the same switch group.

The dialysis membrane composition has an impact on plasma BPA concentrations in OL-HDF

BPA elimination in a single OL-HDF session



Plasma BPA concentration in patients on OL-HDF with polynephron (PN) or polysulfone (PS) membranes. Pre- and post-dialysis measurements are shown for the first (baseline) and the last (3-month) session after the switch interval. Prior to the baseline pre-dialysis sample, patients had been on OL-HDF with the opposite membrane for >6 months. Thus, baseline pre-dialysis values represent values corresponding to >6 months OL-HDF with the opposite membrane and were used as baseline values for the switch study, while baseline post-dialysis values were already obtained after the first session with the switch membrane.

Lack of correlation of BPA with laboratory variables

Variable	Basal	3 mo.	Basal + 3 mo.
KTV	0.02 (0.911)	-0.03 (0.799)	-0.01 (0.876)
Leu	-0.03 (0.818)	-0.11 (0.418)	-0.08 (0.396)
Hb	0.05 (0.693)	-0.06 (0.639)	0.00 (0.991)
X25OHD	-0.20 (0.128)	-0.15 (0.274)	-0.19 (0.043)
Prot.T	-0.22 (0.099)	-0.07 (0.623)	-0.15 (0.120)
Albumin	-0.06 (0.660)	-0.09 (0.526)	-0.09 (0.346)
Ca	0.06 (0.663)	0.06 (0.639)	0.06 (0.520)
P	-0.17 (0.208)	-0.06 (0.672)	-0.11 (0.238)
Col	0.02 (0.877)	-0.05 (0.710)	0.02 (0.866)
TGD	-0.09 (0.491)	-0.06 (0.679)	-0.06 (0.548)
PCR	-0.01 (0.964)	0.04 (0.758)	0.03 (0.783)
PTH	0.00 (1.000)	-0.20 (0.127)	-0.12 (0.217)
Blood sugar	0.18 (0.171)	-0.10 (0.484)	0.07 (0.483)
BMI	-0.10 (0.482)	-0.15 (0.258)	-0.12 (0.194)
TSH	0.08 (0.543)	0.15 (0.251)	0.10 (0.303)
T3	0.13 (0.333)	-0.25 (0.066)	-0.14 (0.154)
T4	0.03 (0.823)	-0.05 (0.690)	-0.04 (0.672)
Cortisol	-0.01 (0.946)	0.04 (0.768)	0.02 (0.857)
Aldosterone	-0.15 (0.250)	0.18 (0.175)	0.06 (0.508)

Spearman's rank correlation coefficient between BPA and recorded clinical variables and its p value (brackets) fot patients in hemodiafiltration.

CONCLUSIONS

Optimal reduction in BPA levels is achieved by using OL-HDF with BPA-free dialyzer membranes. Attempts at optimizing net BPA clearance in OL-HDF are justified by the residual higher plasma BPA levels when compared to healthy control.

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