Bisphénol et Dialyse

Intérêt et difficulté d'un dosage plasmatique et d'effet cytotoxique du BPA chez les patients en insuffisance rénale terminale.

1958 FLORIDA @PhotosHistos

Dr Guillen Anaya Miguel Ange

Service Néphrologie Dialyse
EPICURA

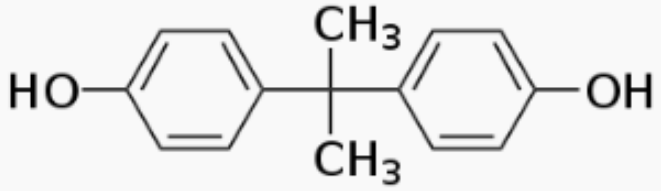
GLEM NEPHR-HAINAUT
09 / 2020

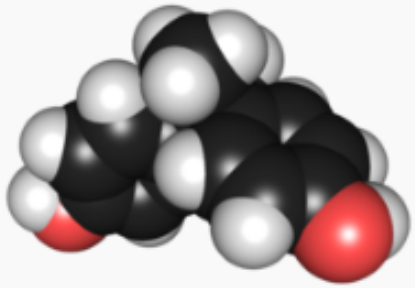
Plan

- BPA et Plasturgie .
- BPA et biologie .
- BPA et loi .
- BPA et dialyse .
- Question non résolue du BPA .
- N’y a t il que le BPA ?

BPA - PLASTURGIE

- Synthétisé en 1891 (C15H1602) PM228,3
- 1930 Œstrogène (>< DES)
- 1970 utilisé dans la fabrication de polymère
- 2006: : 3,8 million de tonne
  - 2/3 Polycarbonate
  - 1/3 Résine Epoxy
  - Autres polymères





Structure du bisphénol A

Plasturgie

- BPA est Ubiquitaire
  - Plastique Dure et résistant, Polycarbonate: produit de vie embalage, CA DVD, …
  - Automobile, Aéronautique, Equipement Médicaux
  - Membrane Polysulfone
  - Résine Epoxide pour résistance thermique et corrosion
- BPA: soit dans la composition du polymère soit lié de manière non covalente (relargage plus facile)

Perturbateur Endocrinien (OMS)

- Substance ou un mélange exogène susceptible de perturber le système hormonal dans un organisme intact chez ses descendants ou au sein de sous population.
- PE Avérés
- PE Présumés
- PE Suspectés

PE - Action

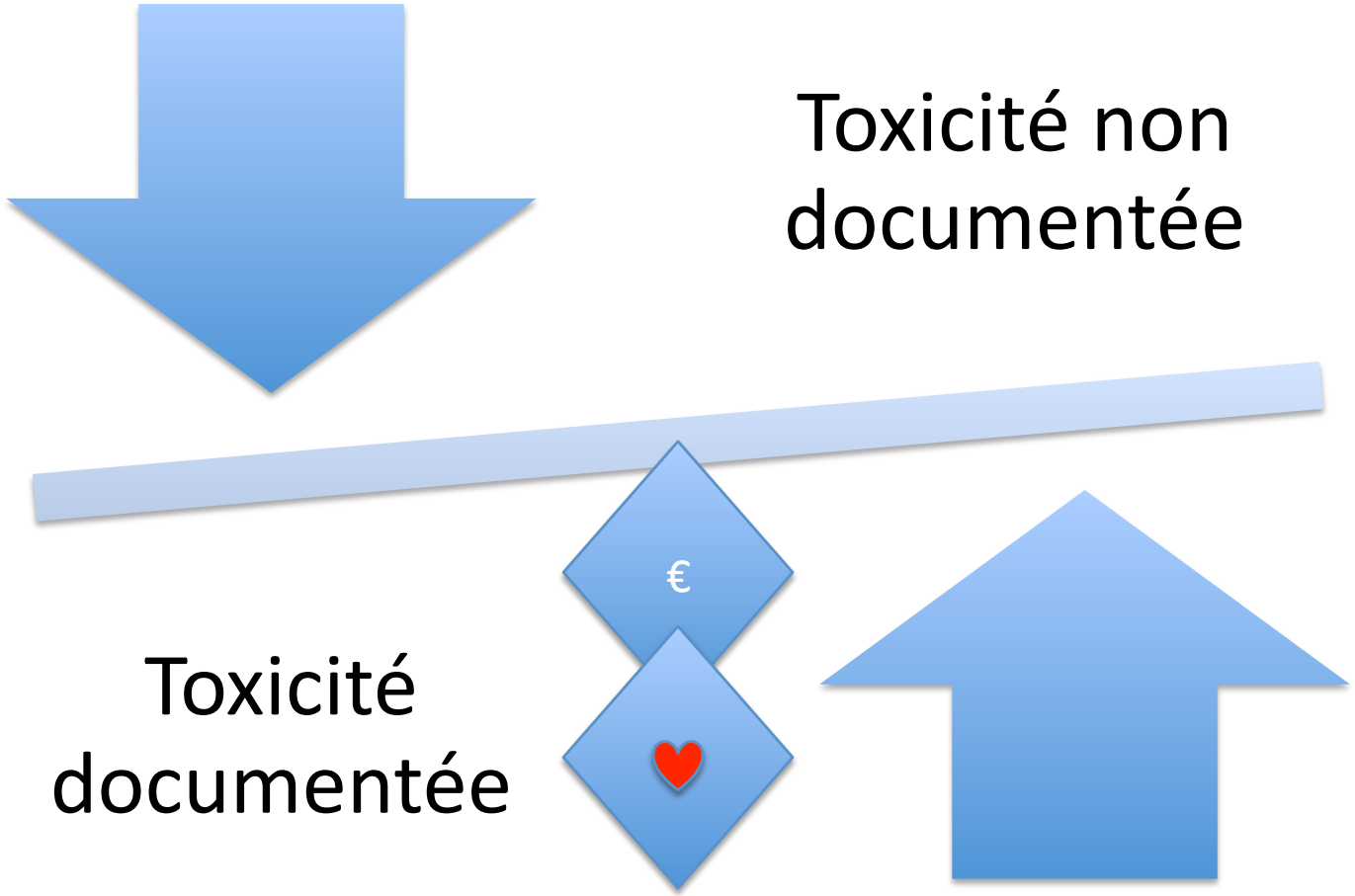
→ Mime l'action : Agoniste

→Bloque le récepteur: Antagoniste

→Agît sur la synthèse , le transport et le métabolisme des hormones.

→*Modification épigénétique, génétique*

Règlementation et Loi



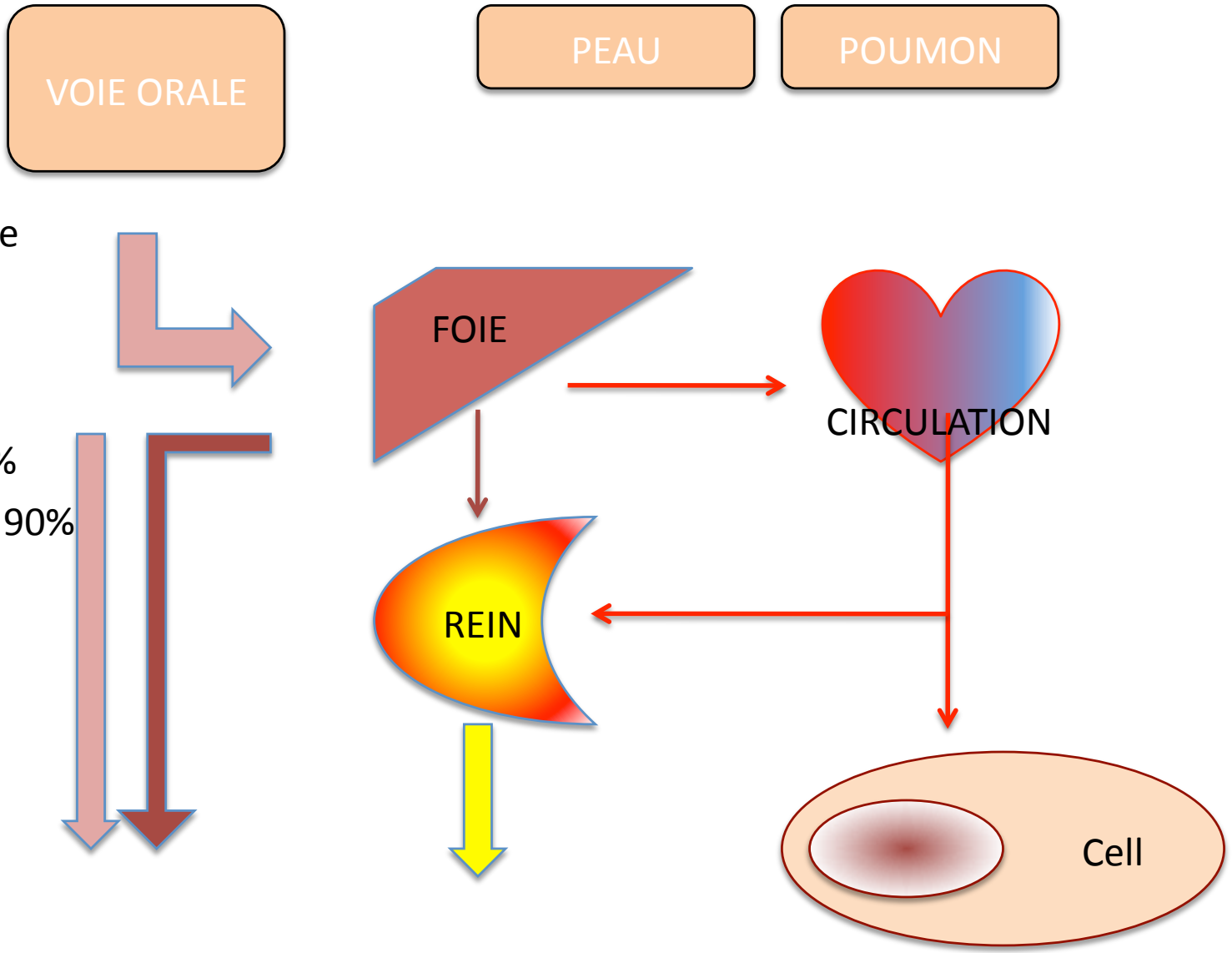
Recommandation Européenne 2014 EFSA

- En se basant sur de nouvelles données et de nouvelles méthodologies disponibles, l'EFSA a abaiss. le niveau de sécurité estime connu sous le nom de dose journalière tolérable (DJT), . **4 microgrammes par kilogramme de poids corporel par jour**. Cette valeur est douze fois et demie plus basse que le niveau précédent.
-
- Sur la base d'études sur les animaux, le BPA à hautes doses (plus de 100 fois supérieures de la DJT) est susceptible d'entrainer des effets indésirables pour les reins et le foie. Il est également susceptible d'avoir des effets sur les glandes mammaires des rongeurs. Les incertitudes entourant les effets sanitaires potentiels du BPA sur la glande mammaire, les systèmes reproductif, métabolique, neurocomportemental et immunitaire ont été quantifiés et pris en compte dans la DJT.
-
- Cette DJT est temporaire (DJT-t) dans l'attente des résultats d'une étude en cours long terme chez les rats qui étudie l'exposition prénatale et postnatale au BPA. Cette étude permettra de réduire les incertitudes qui subsistent sur les effets potentiels sur la santé

Diverses Loi

- 2017 l'agence Européenne des produits chimiques a enfin reconnu le caractère perturbateur endocrinien du BPA chez l'homme.
- → Biberon(2009 Fr)
- → 2011: Carte Bancaire et Ticket de Caisse (Be)

BPA et Connaissance médicale



BPA et Connaissance médicale

HPLC	ELISA
Eau	Eau
Urine	Urine
Sang	Sang
Tissu	~~Tissu~~

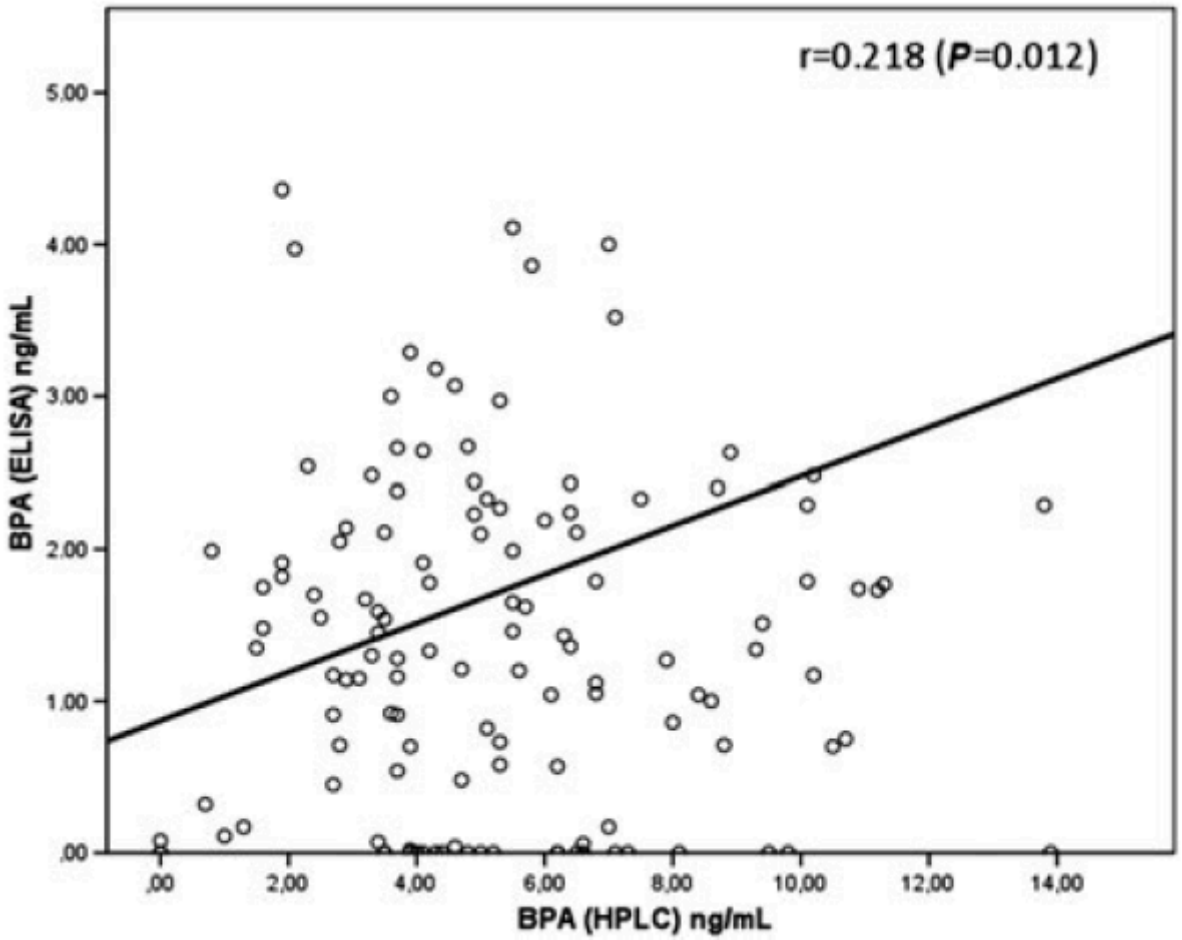
Okhma et al japan

Table 4 Correlation values of BPA between the proposed method and GC-MS method[a]

Sample	ELISA/ng mL^{-1}	GC-MS/ng mL^{-1}
1	5.0	6.3
2	10.0	9.6
3	85.5	106.6
4	18.0	13.8
5	7.7	11.9
6	1.8	2.4
7	2.8	4.2
8	12.1	10.3

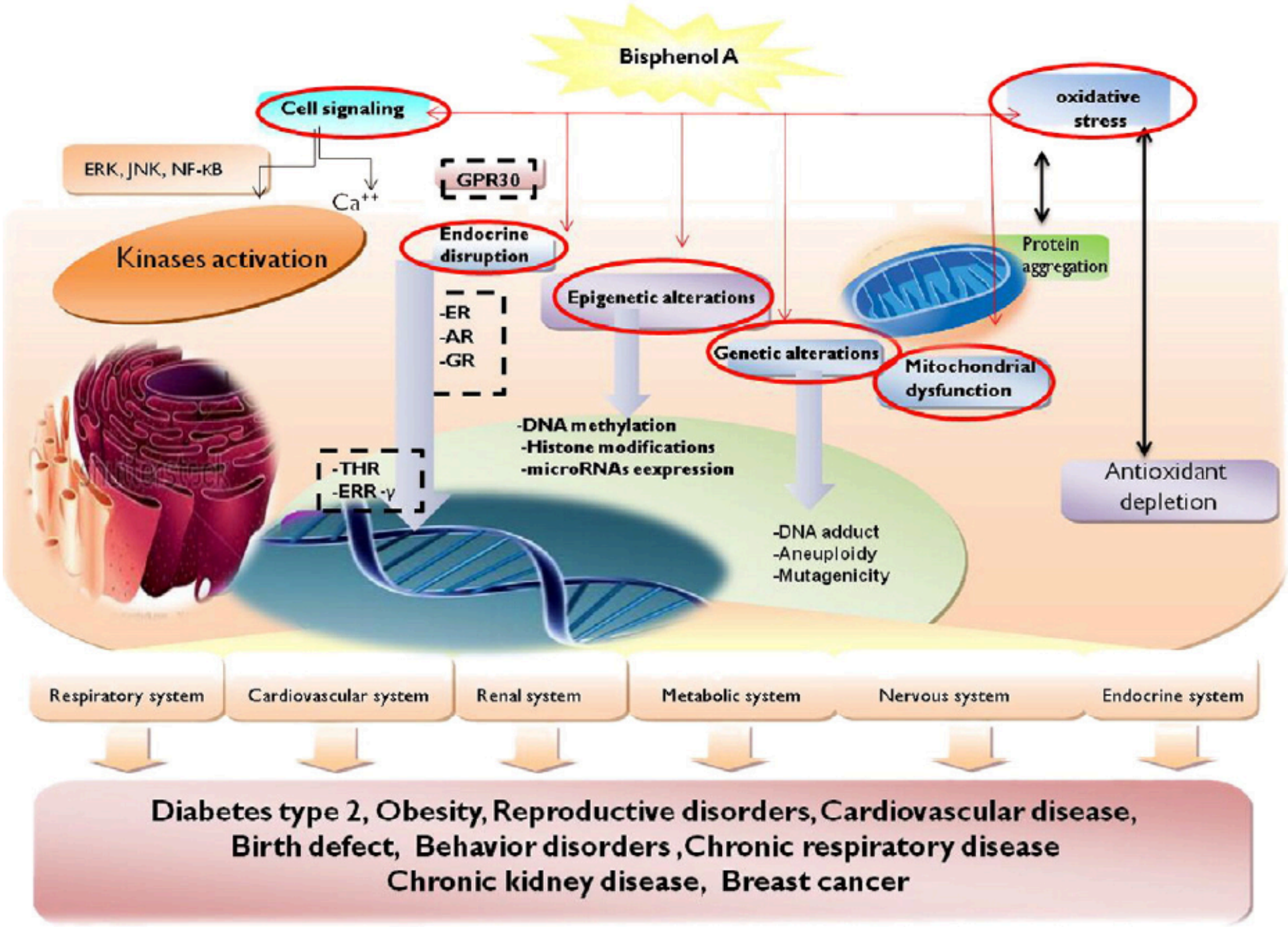
[a] The correlation test was carried out by the addition of one volume of antigen to four volumes of serum. The correlation between the BPA values obtained by the two methods was y(GC-MS) = 1.25x(ELISA) −1.67, r^2 = 0.990 (n = 8).

Bprja Quiroga, et al.	Th Aph Dialysis	ELISA IBL Japan	Madri SPain	2016



BPA et Biologie

PUBMED (19 Janvier 2020)	
Bisphenol A	13483
BPA and human	6037
BPA and kidney (Human)	157 (59)
BPA and dialysis	34
BPA and human and review	533
BPA and other animals and review	579
BPA and law	71


Bisphenol A
Cell signaling
oxidative stress
ERK, JNK, NF-κB
Ca++
GPR30
Kinases activation
Endocrine disruption
Protein aggregation
Epigenetic alterations
-ER
-AR
-GR
Genetic alterations
Mitochondrial dysfunction
-DNA methylation
-Histone modifications
-microRNAs eexpression
-THR
-ERR-γ
Antioxidant depletion
-DNA adduct
-Aneuploidy
-Mutagenicity
Respiratory system
Cardiovascular system
Renal system
Metabolic system
Nervous system
Endocrine system
Diabetes type 2, Obesity, Reproductive disorders, Cardiovascular disease,
Birth defect, Behavior disorders ,Chronic respiratory disease
Chronic kidney disease, Breast cancer

Diabète

- Question complexe et mulifactorielle
- BPA piste:
  - Insulin Resistance
  - Dysfonction Beta cell
  - Adipogenese
  - Inflamation
  - Oxydative Stress
- Etude épidémiologique + pour l'association comme F.R. indépendant des F.R. traditionels (JCEM/PLSOSONE)

Relationship between urinary bisphenol A levels and prediabetes among subjects free of diabetes

Charumathi Sabanayagam • Srinivas Teppala • Anoop Shankar

The current study is based on data from the National Health and Nutritional Examination Survey (NHANES) 2003–2008.

Table 3 Association between urinary bisphenol A and prediabetes by gender

Bisphenol A tertiles (ng/mL)	Sample size (prediabetes)	Age, sex-adjusted OR (95 % CI)*	Multivariable-adjusted OR (95 % CI)*,†
Men			
Tertile 1 (<1.3)	501 (175)	1 (referent)	1 (referent)
Tertile 2 (1.3–3.2)	580 (214)	1.48 (1.04–2.10)	1.46 (1.00–2.13)
Tertile 3 (>3.2)	581 (189)	1.30 (0.92–1.83)	1.24 (0.85–1.82)
p-trend‡		0.1	0.3
Women			
Tertile 1 (<1.3)	678 (202)	1 (referent)	1 (referent)
Tertile 2 (1.3–3.2)	586 (174)	1.38 (1.03–1.85)	1.36 (0.96–1.91)
Tertile 3 (>3.2)	590 (154)	1.50 (1.07–2.10)	1.49 (1.00–2.22)
p-trend‡		0.01	0.04

Acta Diabetol 1 may 2013
DOI 10.1007/s00592-013-0472-z

N 4792

Relationship between Urinary Bisphenol A Levels and Diabetes Mellitus

Anoop Shankar and Srinivas Teppala

Department of Community Medicine, West Virginia University School of Medicine, Morgantown, West Virginia 26506

TABLE 3. Association between urinary BPA and diabetes mellitus by BMI

	Normal weight		Overweight/obese	
BPA quartiles (ng/ml)	Sample size	Multivariable-adjusted, OR (95% CI)[a]	Sample size	Multivariable-adjusted, OR (95% CI)[a]
Quartile 1 (<1.10)	408	1 (referent)	713	1 (referent)
Quartile 2 (1.10–2.10)	276	2.75 (1.03–7.33)	629	1.27 (0.90–1.79)
Quartile 3 (2.11–4.20)	272	2.14 (0.79–5.81)	705	1.41 (1.00–1.98)
Quartile 4 (>4.20)	283	3.17 (1.23–8.18)	681	1.56 (1.09–2.24)
p-trend		0.03		0.01

[a] Adjusted for age (years), gender, race-ethnicity (non-Hispanic whites, non-Hispanic blacks, Mexican-Americans, others), education categories (below high school, high school, above high school), smoking (never, former, current), alcohol intake (never, former, current), systolic and diastolic blood pressure (mm Hg), urinary creatinine (mg/dl), and total cholesterol (mg/dl).

J Clin Endocrin Metabol 2011

BPA et Cardiovasculaire

- Risque Cardiovasculaire (prudence) chez l'être humain → indépendamment obésité /diabète ?

Bae S, Hong Y-C. Exposure to bisphenol A from drinking canned
beverages increases blood pressure randomized crossover trial.
Hypertension. 2015;65(2):313–9.
Randomized crossover trial
study showing that bisphenol A exposure from drinking canned
beverage increases elderly blood pressure

Urinary Bisphenol A Concentration and AngiographyDefined Coronary Artery Stenosis
David Melzer (UK: PLOS ONE 2012)

Lin C-Y, Shen F-Y, Lian G-W, Chien K-L, Sung F-C, Chen P-C, et
al. Association between levels of serum bisphenol A, a potentially
harmful chemical in plastic containers, and carotid artery intimamedia thickness in adolescents and young adults. Atherosclerosis. 2015;241(2):657–63.

Désordre Fonction reproductive

Li D, Zhou Z, Qing D, He Y, Wu T, Miao M, et al. Occupational exposure to bisphenol-A (BPA) and the risk of self-reported male sexual dysfunction. Hum Reprod 2010a;25:519**–27.**

Li DK, Zhou Z,MiaoM, He Y, QingD,Wu T, et al. Relationship between urine bisphenol-A level and declining male sexual function. J Androl 2010b;31:500**–6.**

Mok-Lin E, Ehrlich S, Williams PL, Petrozza J, Wright DL, Calafat AM, et al. Urinary bisphenol A concentrations and ovarian response among women undergoing IVF. Int J Androl 2010;33:385**–93.**

Pédiatrie néonat.

In utero exposure to bisphenol-A and anogenital distance of male offspring

Birth Defects Research (Part A) 91:867–872, 2011.

Table 2
Parental BPA Exposure in Relation to Anogenital Distance of Male Offspring

Group	N	Mean ± SD (mm)	Coefficient[a]	*p* value
All subjects				
Unexposed	97	87.44 (19.39)	Reference	
Father exposed only	38	81.84 (19.84)	−2.87	0.15
Mother exposed[b]	18	71.94 (8.60)	−8.11	0.003
Among boys <8 years old				
Unexposed	68	78.71 (11.22)	Reference	
Father exposed only	27	71.48 (10.27)	−3.78	0.07
Mother exposed[Δ]	17	70.88 (7.55)	−7.65	0.002

[a]Adjusted for age and weight of male offspring.
[b]Three boys with both mother and father exposed were included in the mother-exposed group. BPA, bisphenol-A.

Et Cancer, peu de donnée 2014

Smith-Bindman R. Environmental causes of breast cancer and radiation from medical imaging: findings from the Institute of Medicine report. Arch Intern Med 2012;172:1023**–7.**

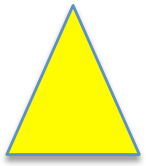
Epigenetic

Weng YI, Hsu PY, Liyanarachchi S, Liu J, Deatherage DE, Huang YW, et al. Epigenetic influences
of low-dose bisphenol A in primary human breast epithelial cells. Toxicol Appl Pharmacol 2010;248:111–**21.**

BPA and Brain

Trends in neurodevelopmental disability burden due to early life chemical exposure in the USA from 2001 to 2016: A population-based disease burden and cost analysis

Abigail Gaylorda, Gwendolyn Osborneb, Akhgar Ghassabianc,d, Julia Malitsc, Teresa Attinad,
Leonardo Trasandea,c,d,e,f,*

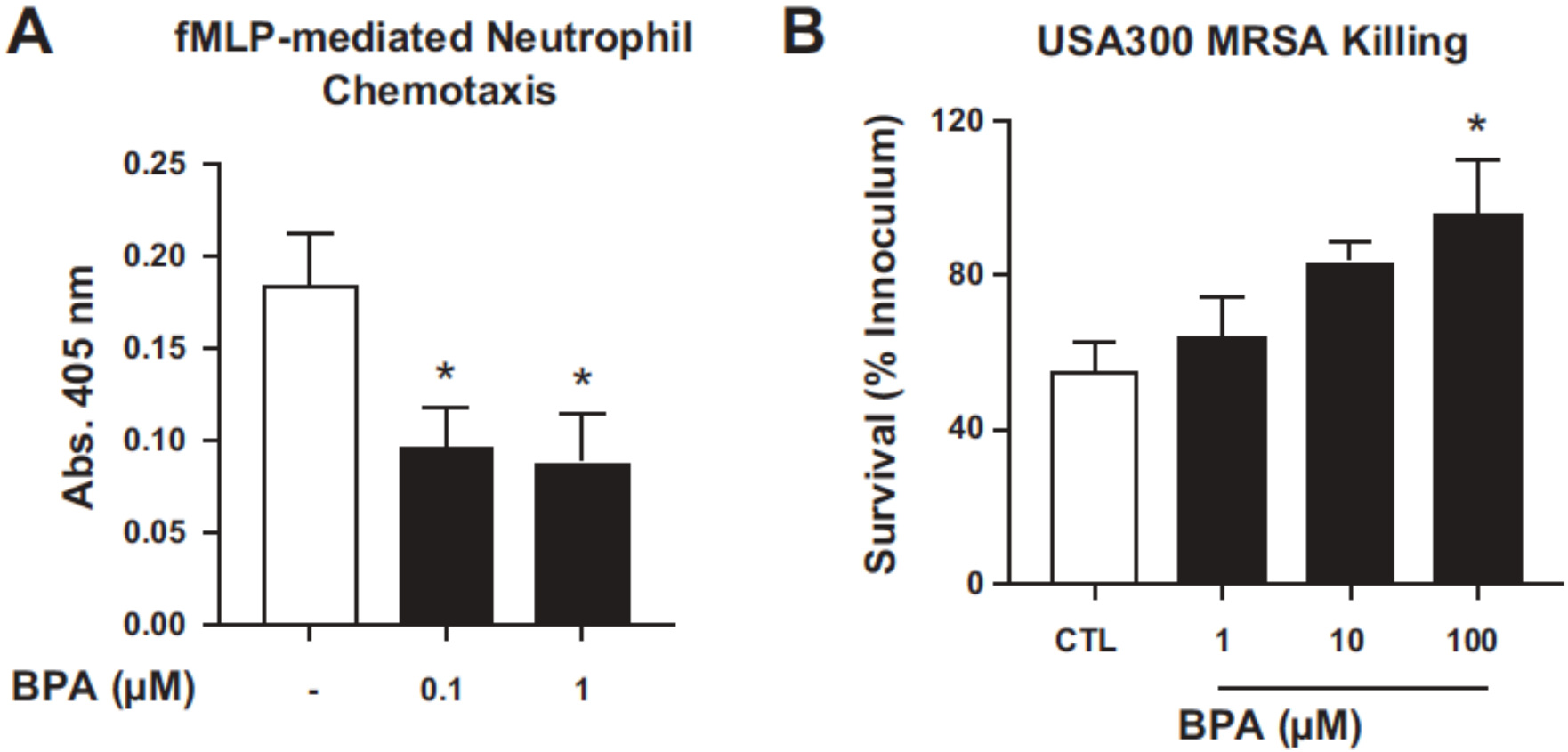


Int J Mol Sci. 2019 Dec 9;20(24).
Assessment of the Effects of Bisphenol A on Dopamine Synthesis and Blood Vessels in the Goldfish Brain.

The results of this work provide insights into the biological effects of BPA on dopamine synthesis and blood vessels in goldfish brain and could lay a foundation for future BPA neurotoxicity studies.

Annu Rev Physiol. 2019 Nov 18. doi: 10.1146/annurev-physiol-021119-034555. [Epub ahead of print]
Gestational Exposure to Common Endocrine Disrupting Chemicals and Their Impact on Neurodevelopment and Behavior.
Nesan D1, Kurrasch DM1.

BPA et Immunité (66)

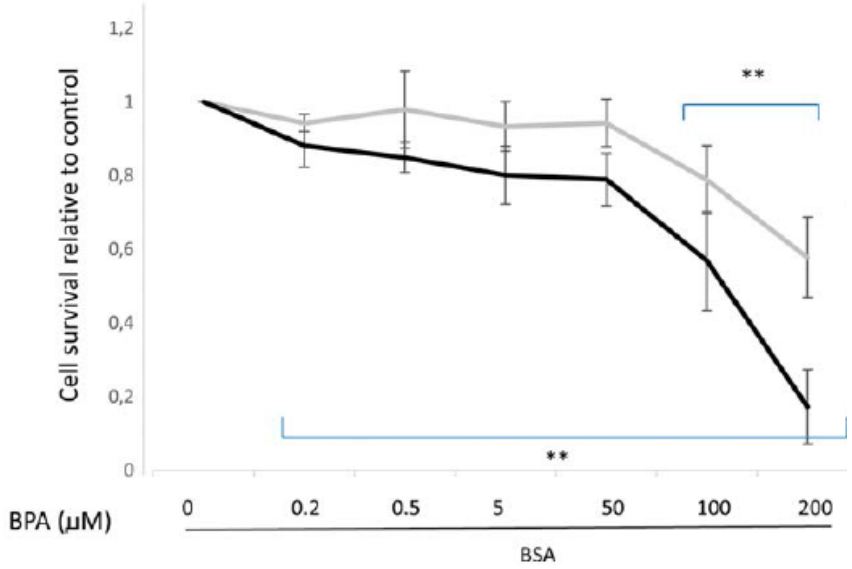


Am J Physiol Cell Physiol 315: C636 –C642, 2018.

BPA et Néphrologie

Bisphenol A is an exogenous toxin that promotes mitochondrial injury and death in tubular cells

Enrique Bosch-Panadero1* | Sebastian Mas1,2* | Esther Civantos2 | Pedro Abaigar3 | Vanesa Camarero3 | Alberto Ruiz-Priego1 | Alberto Ortiz1,4,5,6 | Jesus Egido1,2,4,5 | Emilio Gonzalez-Parra1,4,5,6



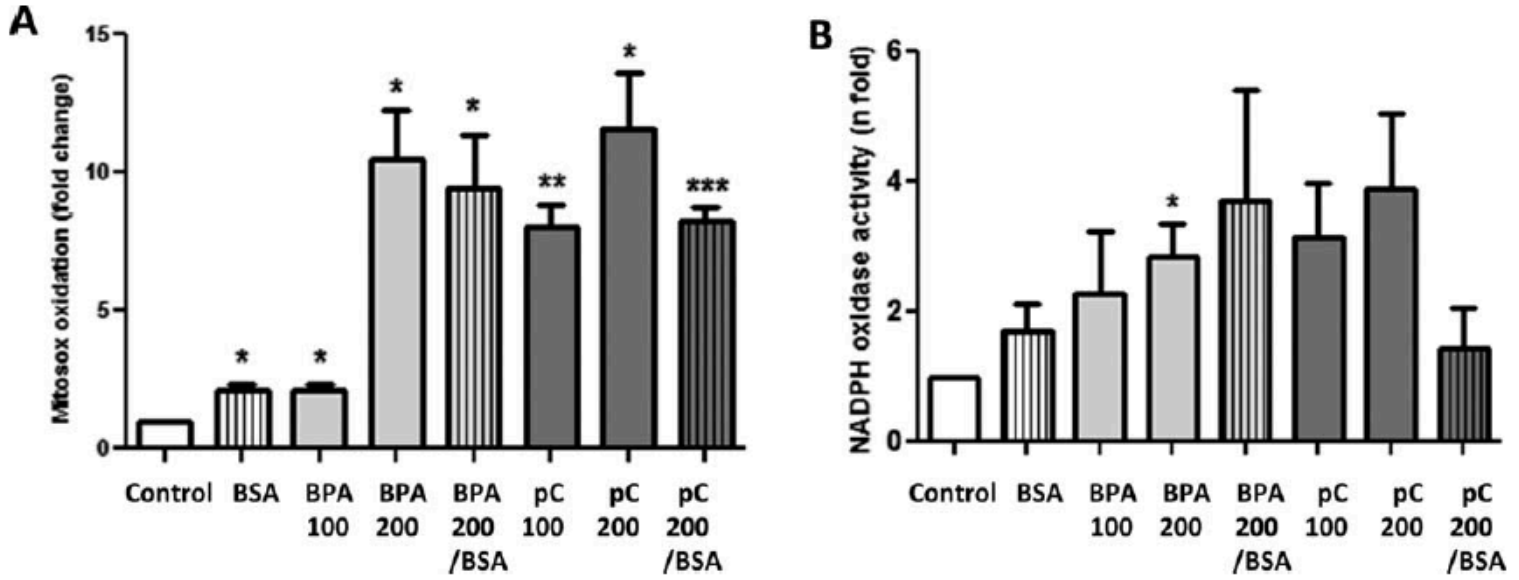


FIGURE 4 BPA induces oxidative stress. Oxidative stress was assessed following stimulation for 24 hours. A, MitoSOX sta ining quantitation. BPA concentrations expressed in μM. B, NADPH oxidase quantitation. Mean ± SEM. *$P < .05$ and **$P < .01$ versus control

BPA et Dialyse

Dosa Journalière Maximale

- 4 microgramme /Kg/J orale.
- Elimination Urinaire.

Dose Journalière maximale ?

- ??? Intraveineux par les dispositifs sanguin.
- Oligurie – Anurie : Elimination ?

BPA ET DIALYSE RESUME

ETUDE	JOURNAL	METHODE DOSAGE	PAYS	HD nombre DP 35
KANNO et al 2007	Th Aph Dialysis	ELISA Cosmic Corps.	JAPAN	45
KRIETER et aL 2013	Artificial Organ	ELISA EIKEN JAPAN	GERMANY and France (montpellier)	53
BOSH PANADERO et al.	JASN	ELISA Anova	Madrid	69
GUIROGA et al. 2016	Th Aph Dialysis	ELISA IBL Japan	Madrid SPain	22
TURGUT et al. 2016	Blood Purif.	HPLC	TURQUIE	47
ASTRID BACLES 2017 - 2019	These + Biomolécules	HPLC	FRANCE	6
Shen et al. 2019	EES	HPLC	Chine Shangai	48 35

ETUDE	METHODE	Valeur sanguine ng/ml	PAYS	HD nombre DP / 35
KANNO et al 2007	ELISA	5	JAPAN	45
KRIETER et aL 2013	ELISA	8 – 18	GERMANY and France (montpellier)	53
BOSH PANADERO et al.	ELISA	46 – 70	Madrid	69
GUIROGA et al. 2016	ELISA	3 à 6,5	Madrid SPain	22
TURGUT et al. 2016	HPLC	2,5 à 5	TURQUIE	47
ASTRID BACLES 2017 - 2019	HPLC	? – 65	FANCE	6
Shen et al. 2019	HPLC	2-40	Chine Shangai	48

Yoshihiko Kanno et al 2007

- 45 HD avec des patients > 10y, 43 DP et certains patients plus de > 5 Y
- ELISA

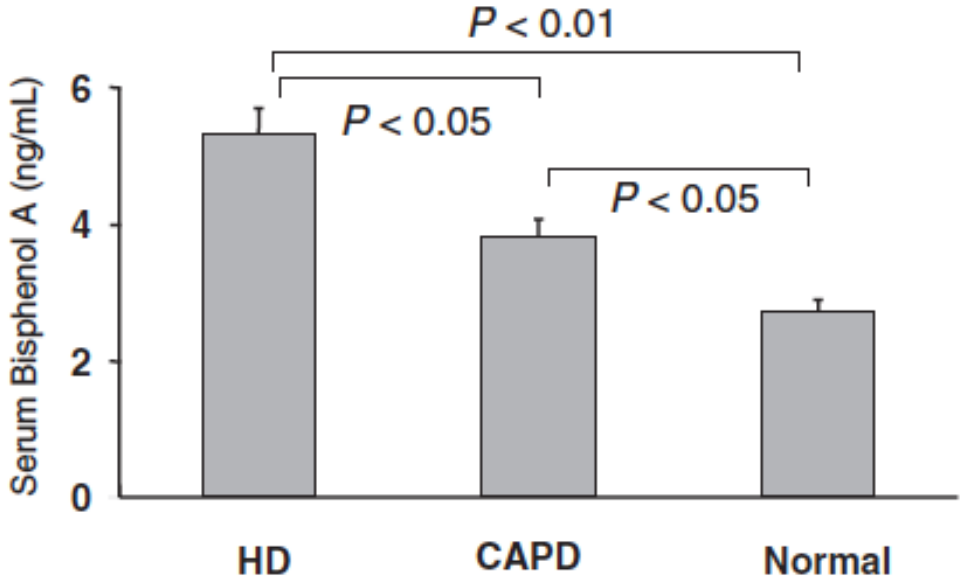
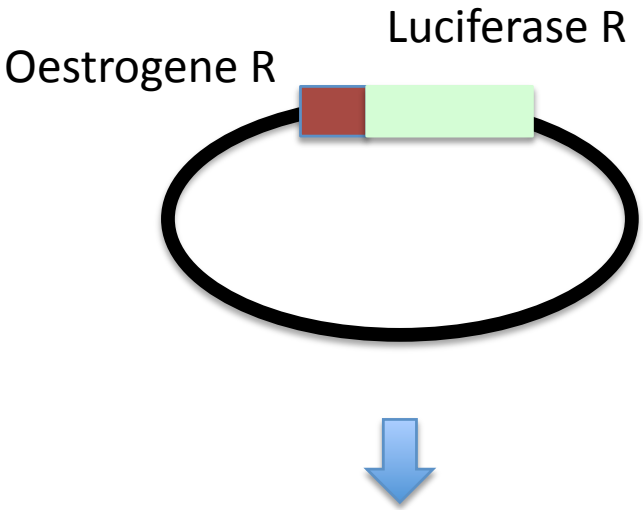


FIG. 1. Serum bisphenol A (BPA) concentrations in dialysis patients. Serum BPA levels were significantly higher in hemodialysis ($P < 0.01$) and peritoneal dialysis ($P < 0.05$) patients compared to healthy controls. Furthermore, BPA levels in hemodialysis patients were significantly higher than in peritoneal dialysis patients ($P < 0.05$).

Therapeutic Apheresis and Dialysis 11(4):262–265

Séra



MCF-7 cells

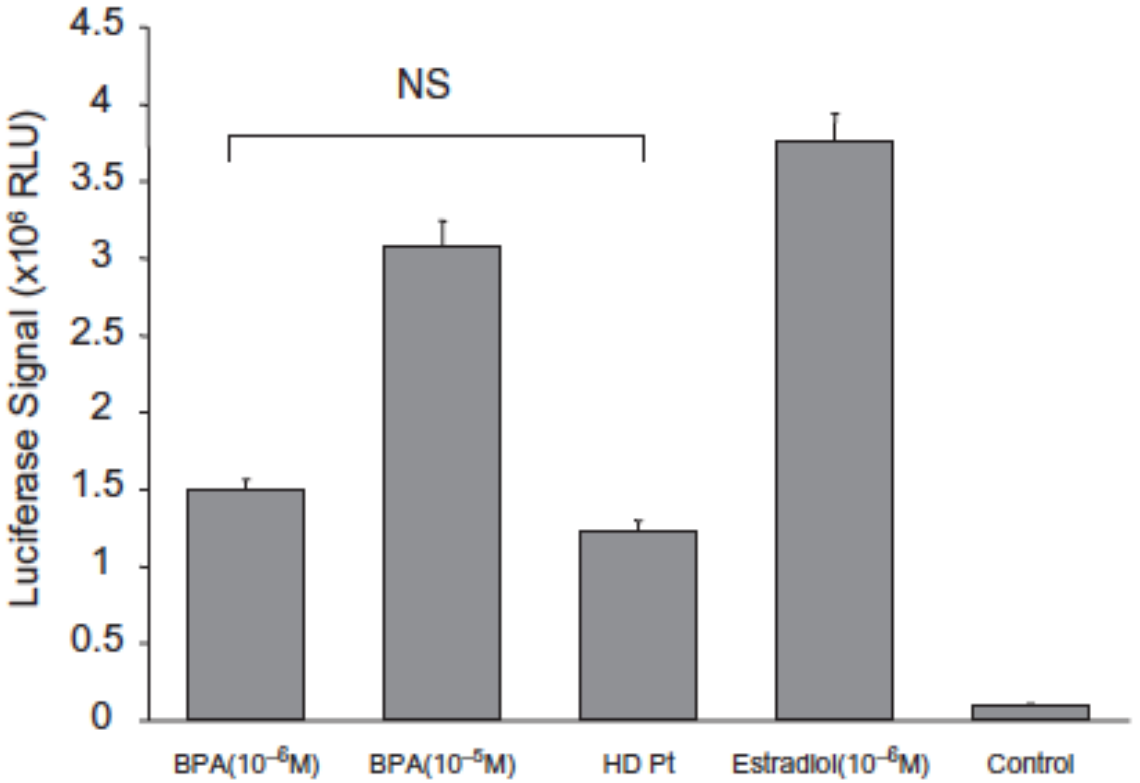
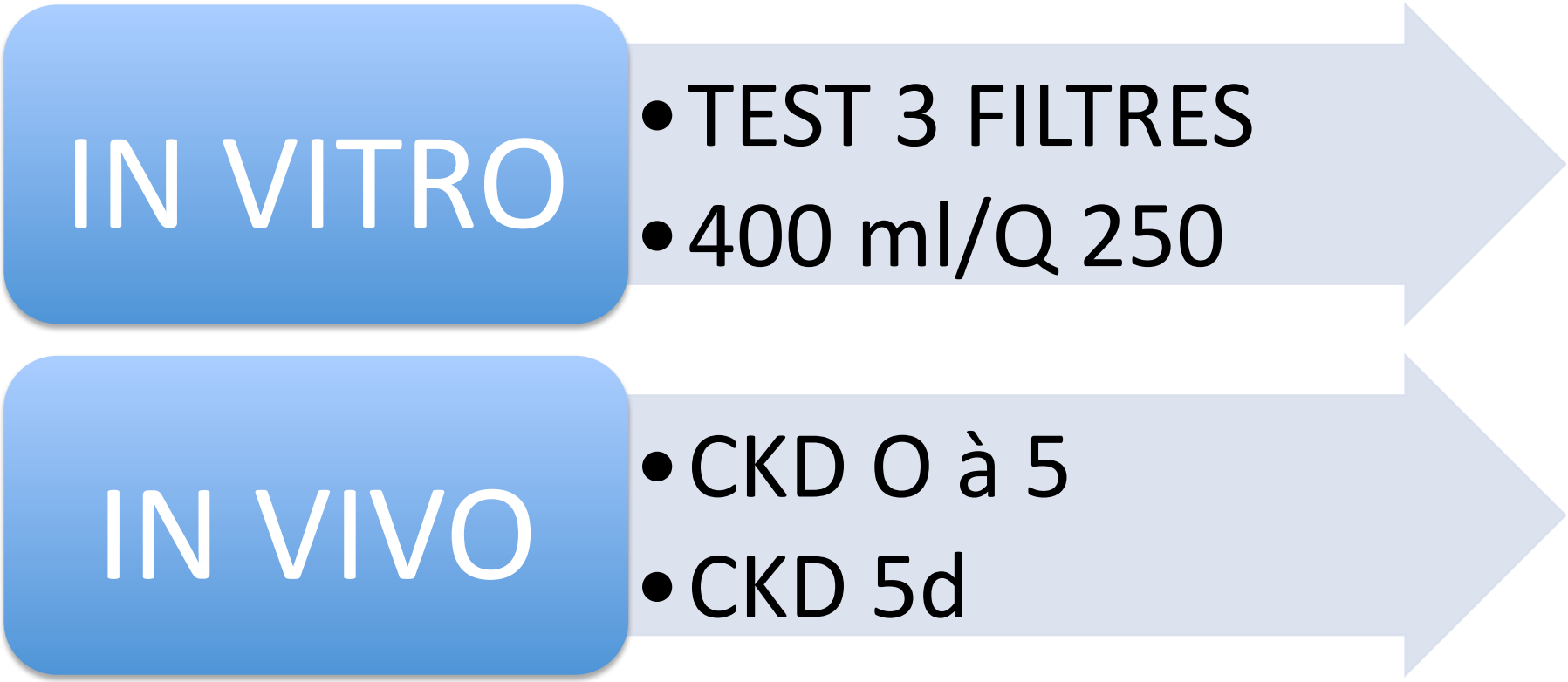


FIG. 3. The effects of BPA on estrogen receptor gene expression: Sera from HD and peritoneal dialysis (PD) patients induced higher levels of estrogen response element (ERE) transcription than did the same dose of BPA; serum BPA levels in our dialysis patients ranged between 10^{-8} and 10^{-7} M. There were significant differences ($P < 0.01$) between all comparative pairs except between the HD patients' serum and BPA (10^{-6} M). NS, not significant; RLU, relative light unit.

Bisphenol A in Chronic Kidney Disease

Krieter et al.Artificial Organs 2013, 37(3):283–290



BPA ELISA
"Eiken," Eiken Chemical Co. Ltd., Tokyo, Japan

IN VITRO 3 DIALYSERS

DIALYZER	COQUE	MB	
NIPRO 170 H (1,7)	PC	PES	H Flux
FRESENIUS F 60 6 (1,3)	PC	PS	Low Flux
FRESENIUS 6 HPS (1,3)	PC	PS	High Flux

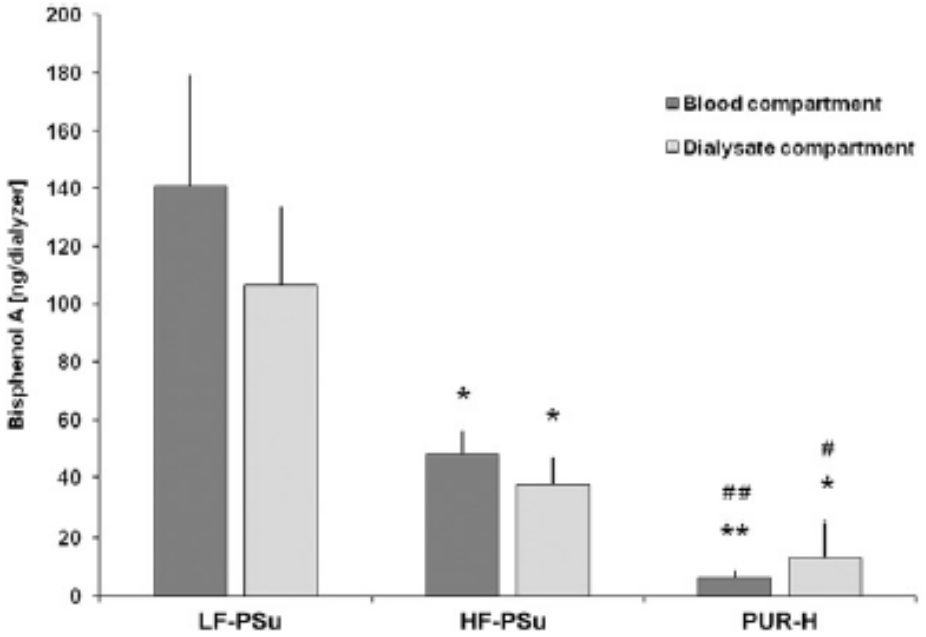
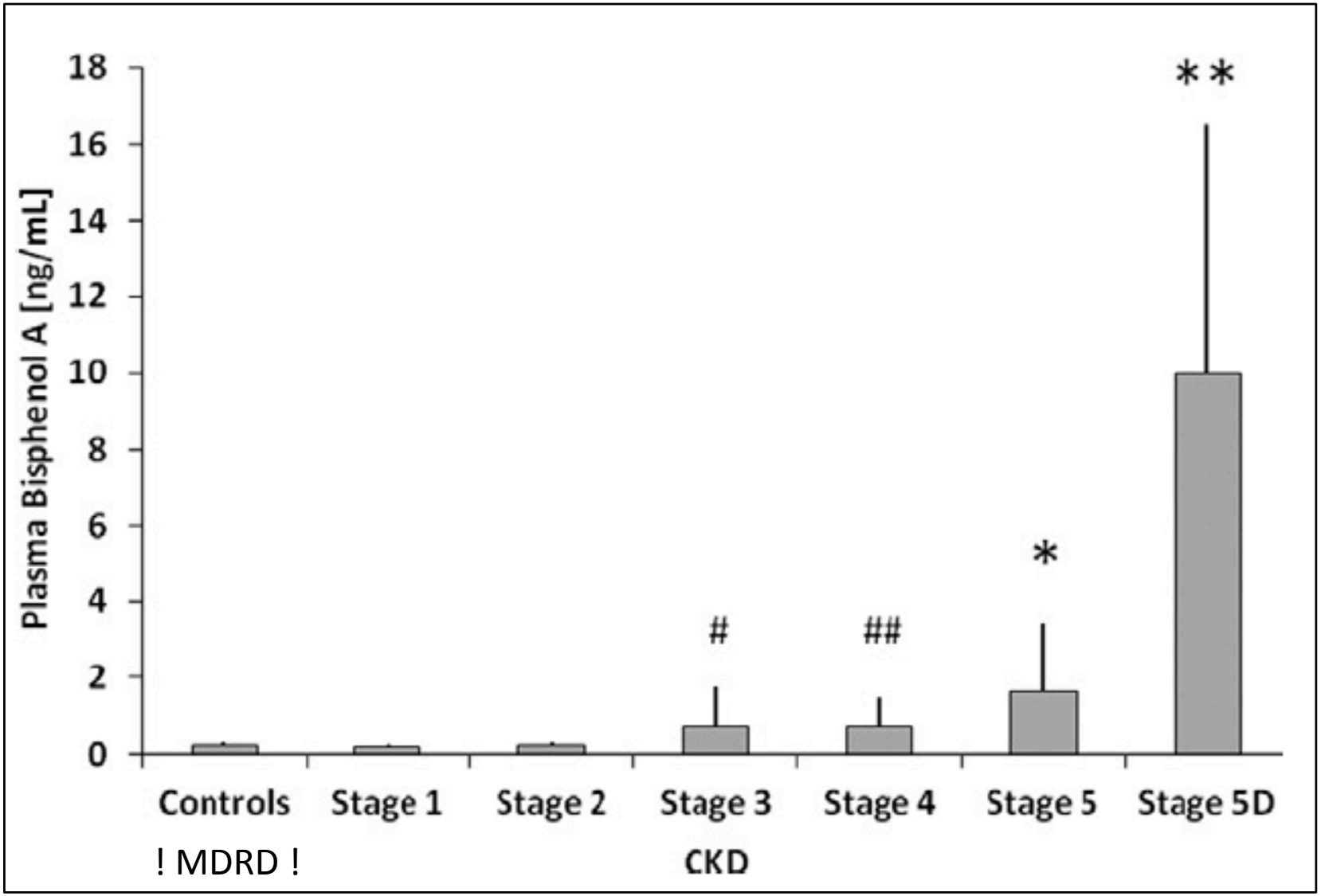


FIG. 2. Eluted BPA per dialyzer ($n = 6$) separated for blood and dialysate compartment. Elution was performed by recirculation of sterile water. The mass of eluted BPA differed significantly between the three dialyzers. LF-PSu, low-flux polysulfone, 1.3 m^2; HF-PSu, high-flux polysulfone, 1.3 m^2; PUR-H, PUREMA H, 1.7 m^2. $^{*}P < 0.01$ versus LF-PSu; $^{**}P < 0.001$ versus LF-PSu; $^{\#}P < 0.01$ versus HF-PSu; $^{\#\#}P < 0.001$ versus HF-PSu.

400 ML - 250 ML/MIN 37° - 180 min

In Vivo no CKD et CKD sans dialyse.



In Vivo no CKD et CKD sans dialyse.

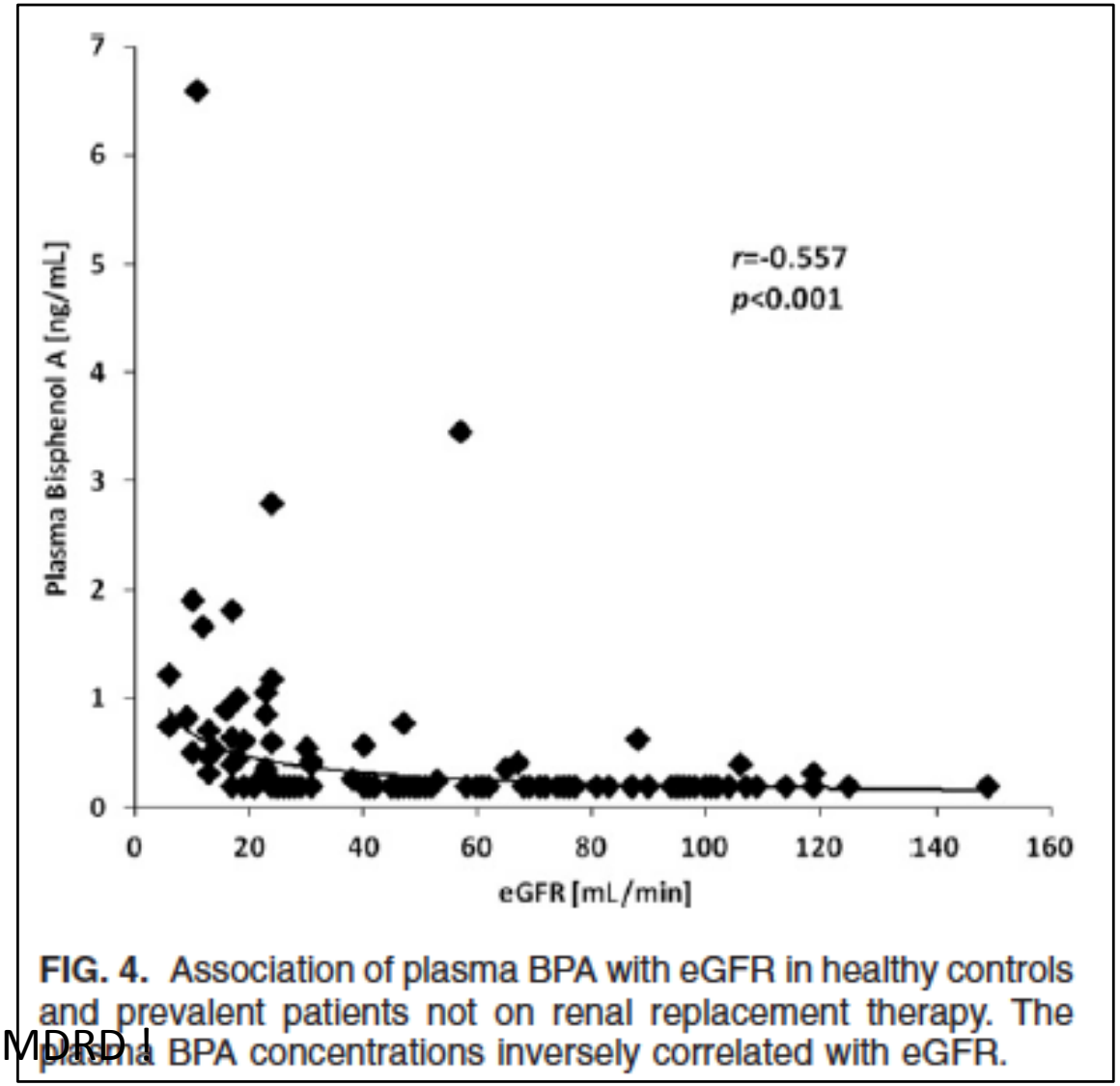


FIG. 4. Association of plasma BPA with eGFR in healthy controls and prevalent patients not on renal replacement therapy. The plasma BPA concentrations inversely correlated with eGFR.

! MDRD !

In Vivo CKD Vd

- 18 patients ramdom pour une des trois filtres pendant 4 semaines avec dosage Pré Post Dialyse 0 et Dialyse 12 . Ils étaient tous Trois mois préalable sous ployflux Gambro. 17 FAV. Diurèse résiduelle chez 12 patients

TABLE 1. *Characteristics of the delivered dialysis treatment. Data represent mean values ± standard deviation*

	LF-PSu	HF-PSu	PUR-H
Blood flow rate (mL/min)	385 ± 30	381 ± 36	383 ± 28
Dialysate flow rate (mL/min)	500 ± 0	500 ± 0	500 ± 0
Ultrafiltration volume (L/session)	2.78 ± 1.78	2.62 ± 1.41	2.51 ± 1.20
Session duration (min)	268 ± 15	268 ± 15	268 ± 15
eKt/V	1.48 ± 0.3	1.42 ± 0.3	1.45 ± 0.2

IN VIVO 3 DIALYSERS

DIALYZER	C	MB	KTV
NIPRO 170 H	PC	PES	1,45
FRESENIUS F 60 6 (1,3)	PC	PS	1,48
FRESENIUS 6 HPS (1,3)	PC	PS	1,42
Polyflux Gambro H			

400 ML - 250 ML/MIN 37° - 180 min

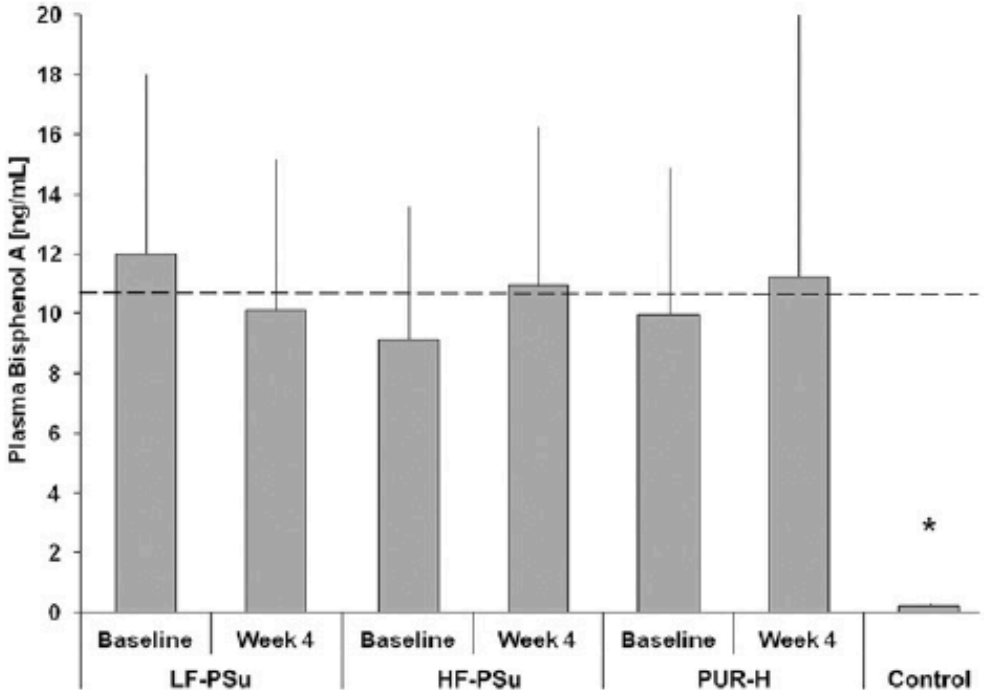


FIG. 7. Plasma BPA at baseline and after a period of 4 weeks of hemodialysis ($n = 18$) with the three different dialyzers compared with healthy controls ($n = 24$). With none of the dialyzers, a change of plasma BPA concentrations was noted after 4 weeks of thrice-weekly hemodialysis. Plasma BPA prior to the study period is indicated by the dotted line (10.6 ± 3.7 ng/mL). At that time, all patients were on high-flux maintenance hemodialysis with Polyamix dialyzers. LF-PSu, low-flux polysulfone; HF-PSu, high-flux polysulfone; PUR-H, high-flux polyethersulfone PUREMA H. *$P < 0.001$ versus LF-PSu, HF-PSu, and PUR-H at baseline and week 4.

Discussion

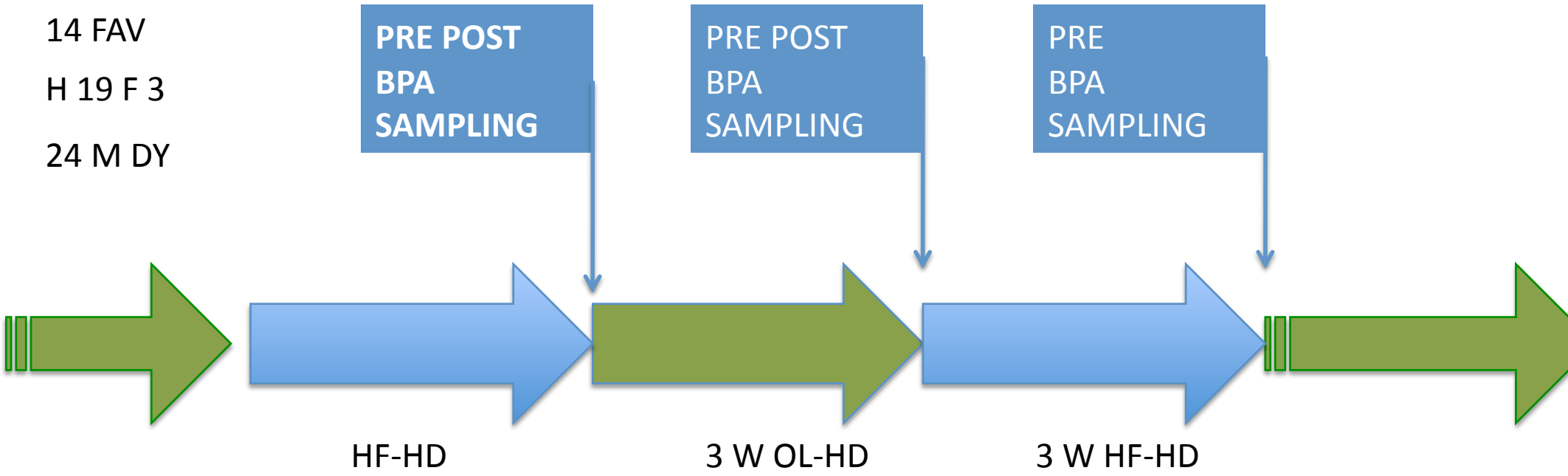
- Level BPA Dialyse 50 % de ce qui est trouvé dans l'étude de Kriter et al .Chez Japan : pourquoi ?
- Analyse de la liaison Protidique chez le dialysé: 70%

Guiroga et al BPA ET OL – HDF 2016

14 FAV

H 19 F 3

24 M DY



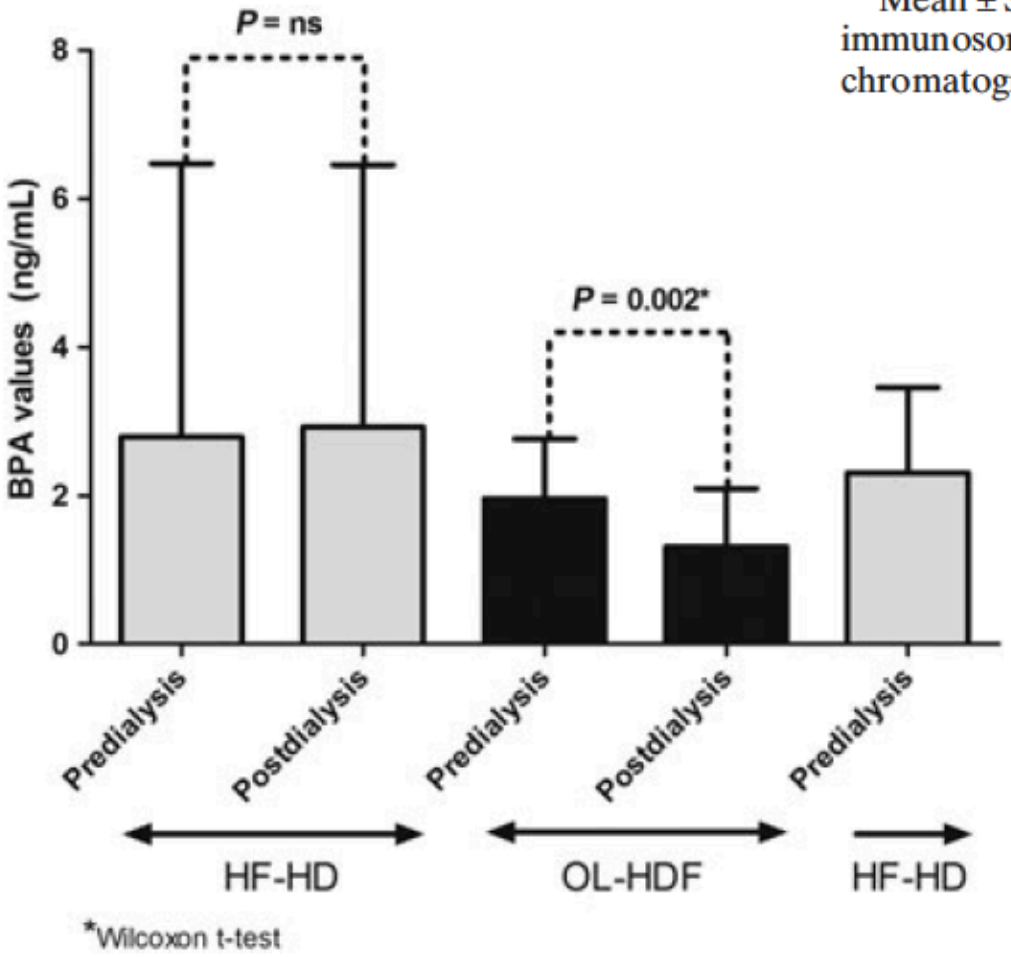
DIALYZER	COQUE	MB	nombre
		PS	9
		PAN	12
		AN	1

Résultats

TABLE 2. *Bisphenol A (BPA) 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. ELISA, enzyme linked immunosorbent assay; HPLC, High performance liquid chromatography.



Finally, the assays to measure BPA have not been widely validated so we used HLPC
and ELISA to achieve better accuracy.

Turgut t al

Higher Serum Bisphenol A Levels in Diabetic Hemodialysis Patients

- Dosage 1x avant Dialyse
- Evaluer l'impact d'un cession de dialyse.
- Evaluer caractérisitque patients par rapport au dosage e.a. diabète
- N =47, 40 FAV
- Low Flow Fresenius Polysulfone Turquie
- HPLC 0.05–1 µg/ml

Blood Purif 2016;42:77–82

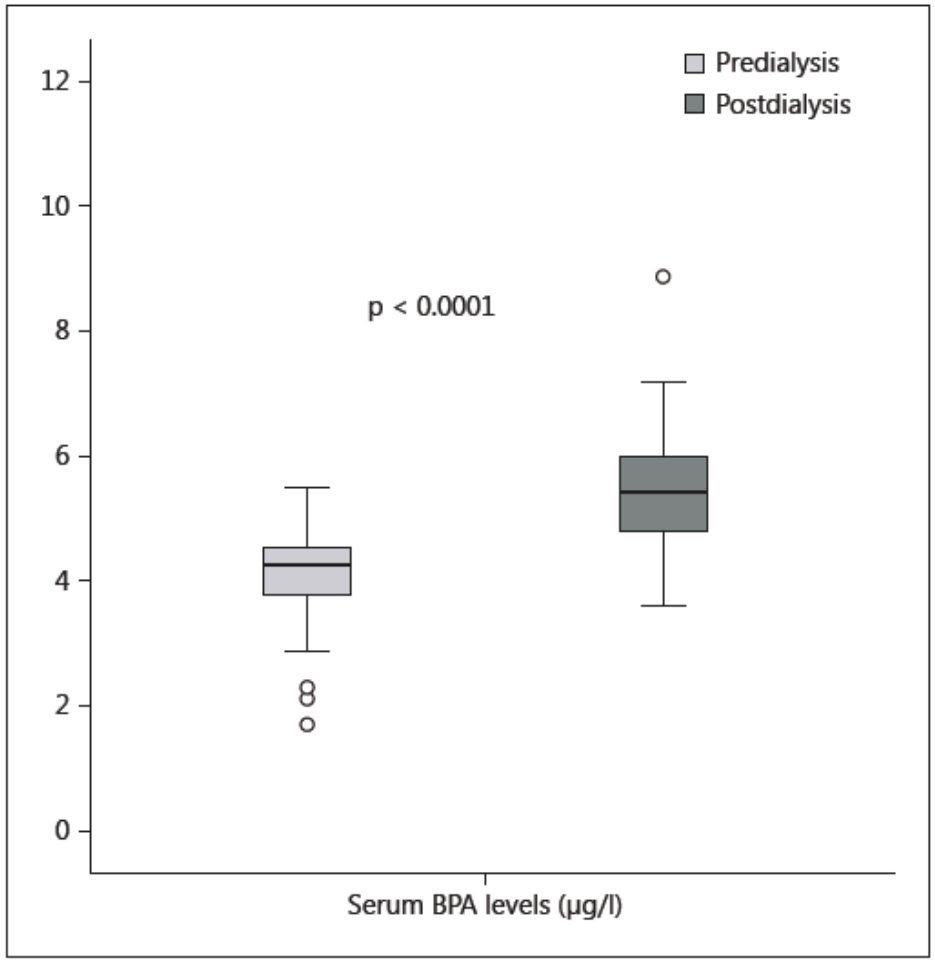


Fig. 1. Pre- and postdialysis serum BPA levels in hemodialysis patients. $p < 0.0001$ compared with predialysis serum BPA levels.

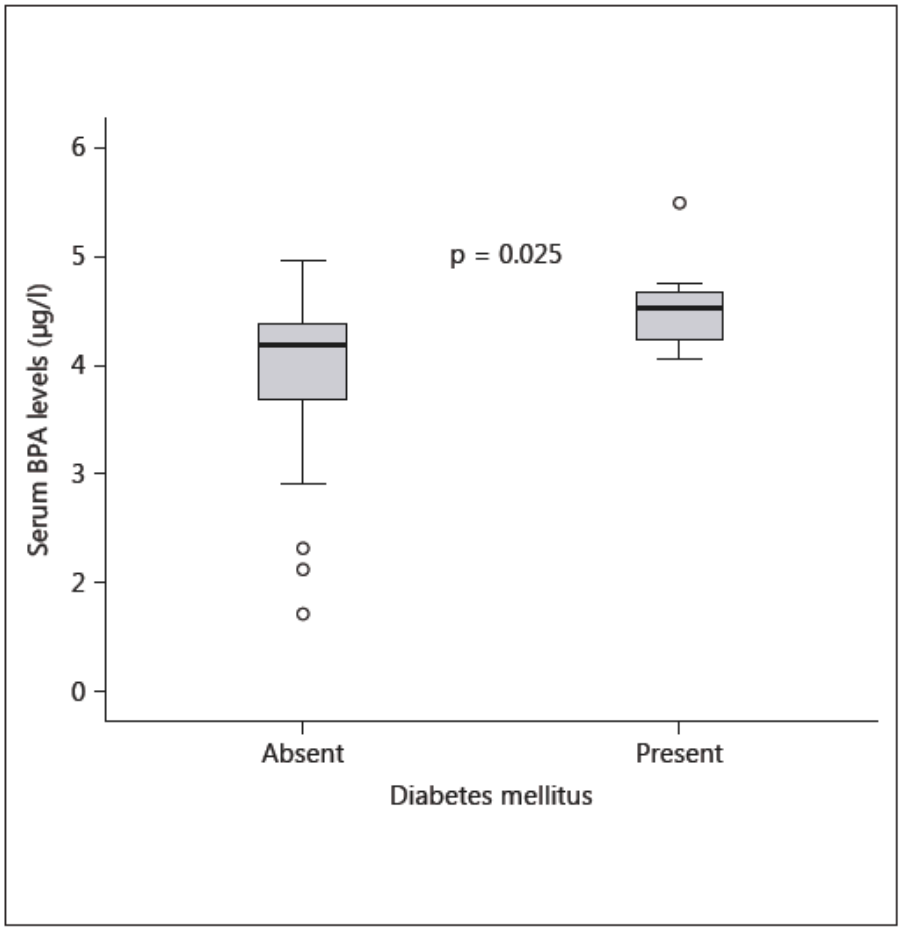
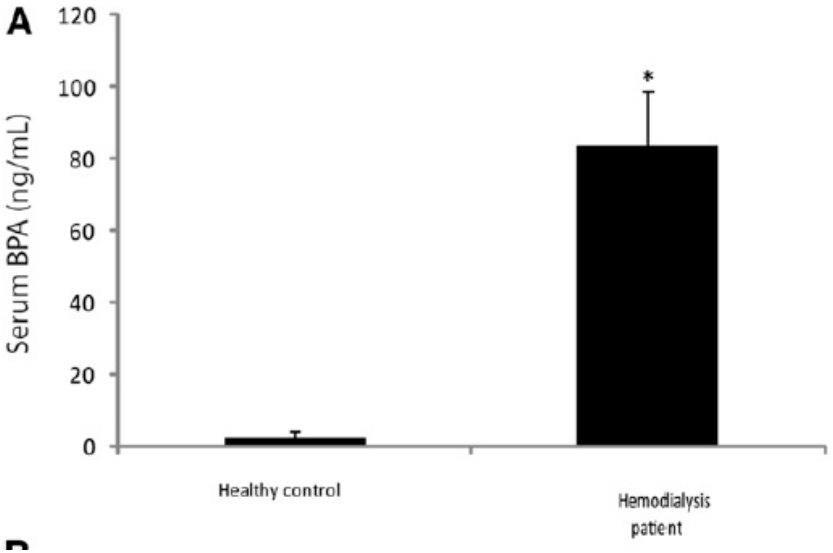
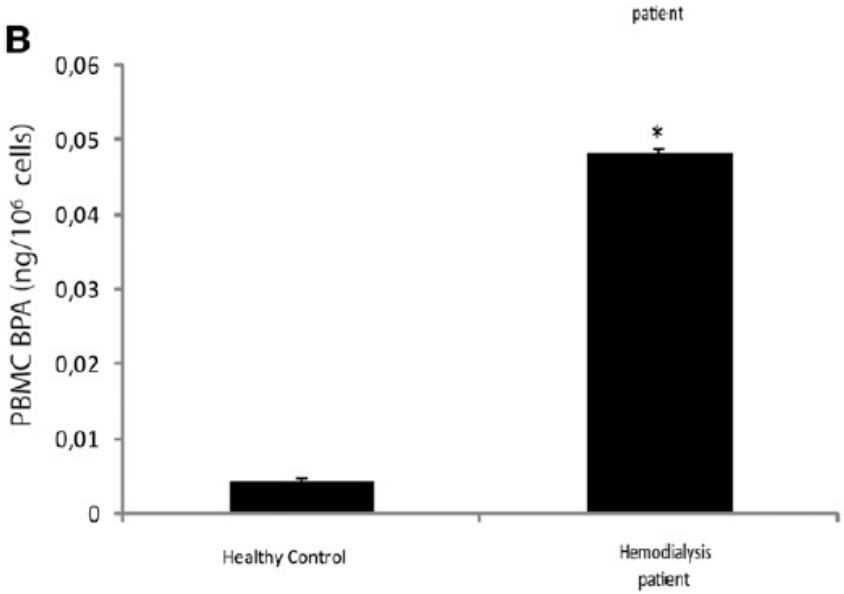


Fig. 2. Predialysis serum BPA levels in diabetic and non-diabetic hemodialysis patients. $p = 0.025$ compared with non-diabetic hemodialysis patients.

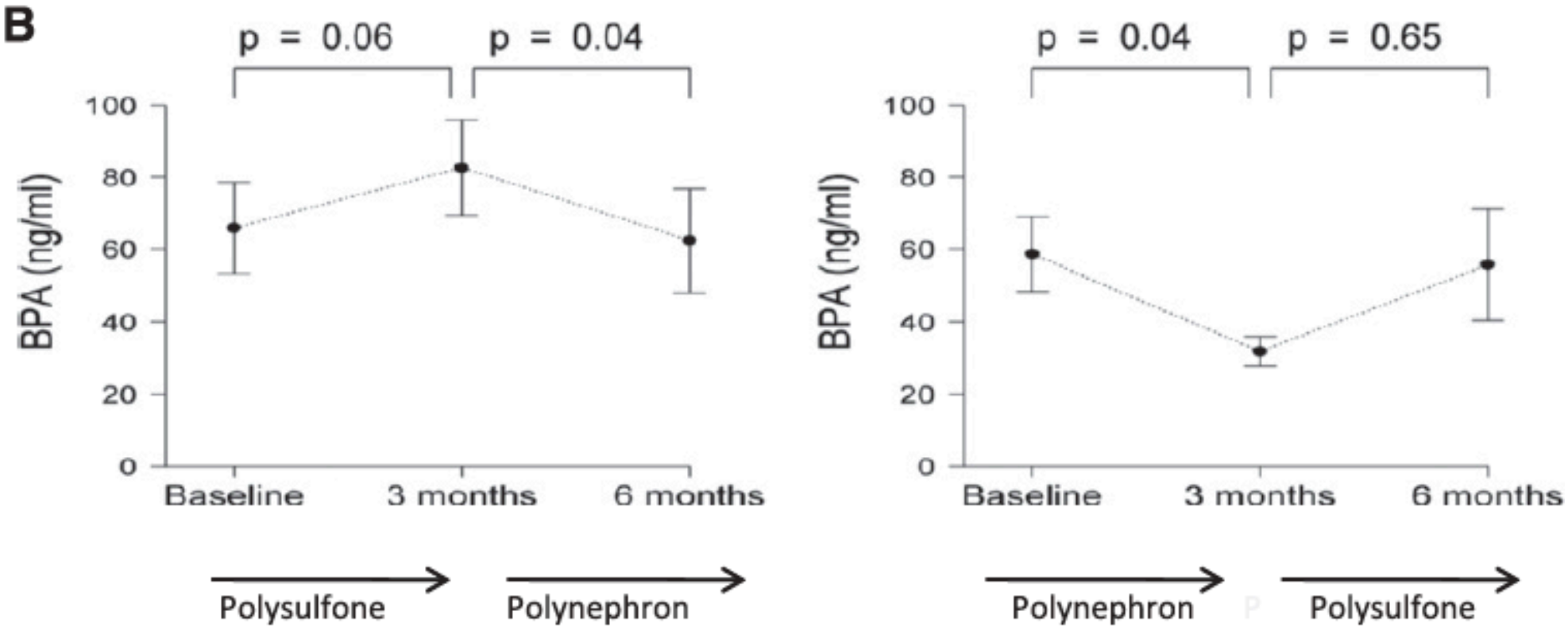
The Choice of Hemodialysis Membrane Affects Bisphenol A Levels in Blood





J Am Soc Nephrol 2015 27 BOSH PANADERO et Al

The Choice of Hemodialysis Membrane Affects Bisphenol A Levels in Blood



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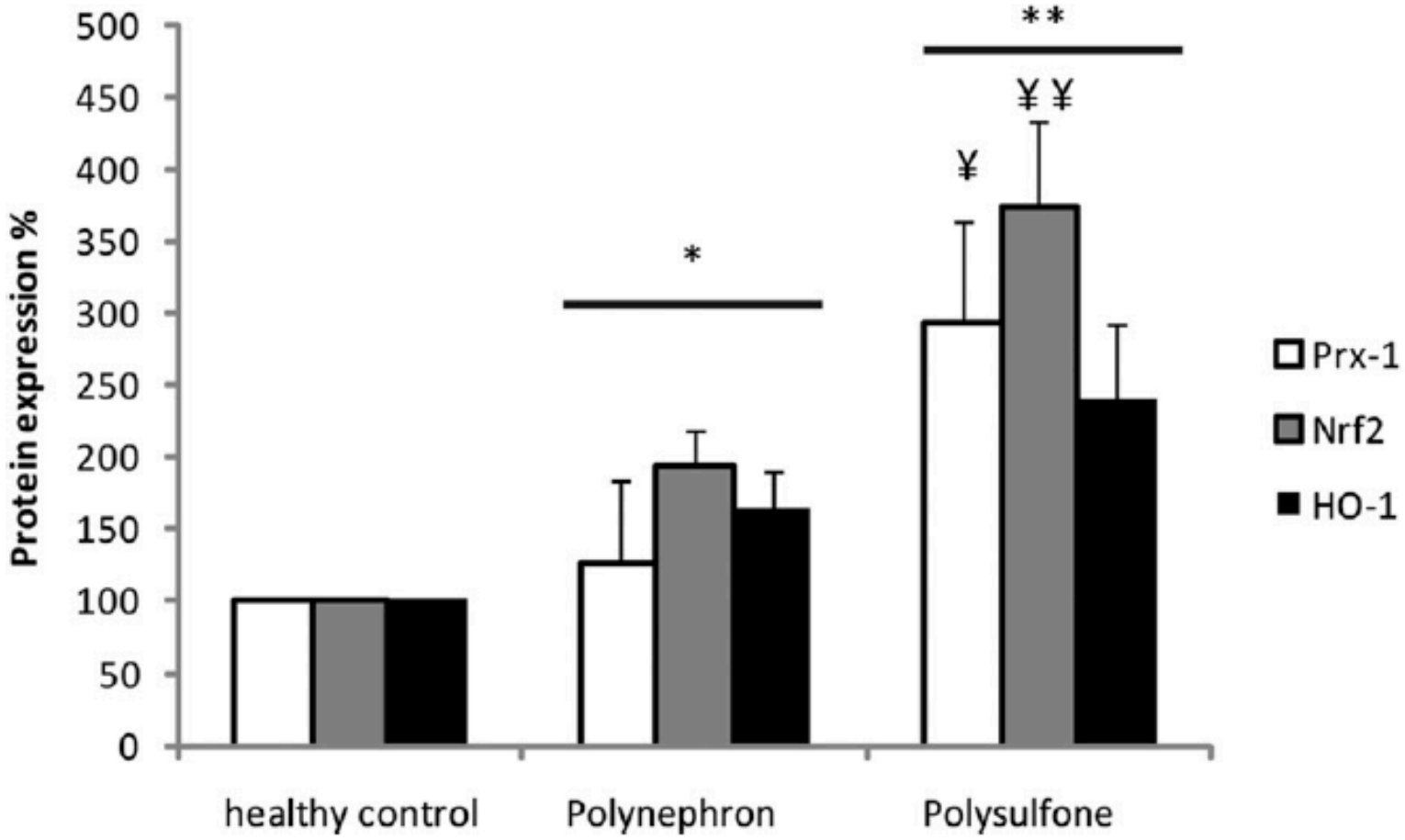
The Choice of Hemodialysis Membrane Affects Bisphenol A Levels in Blood



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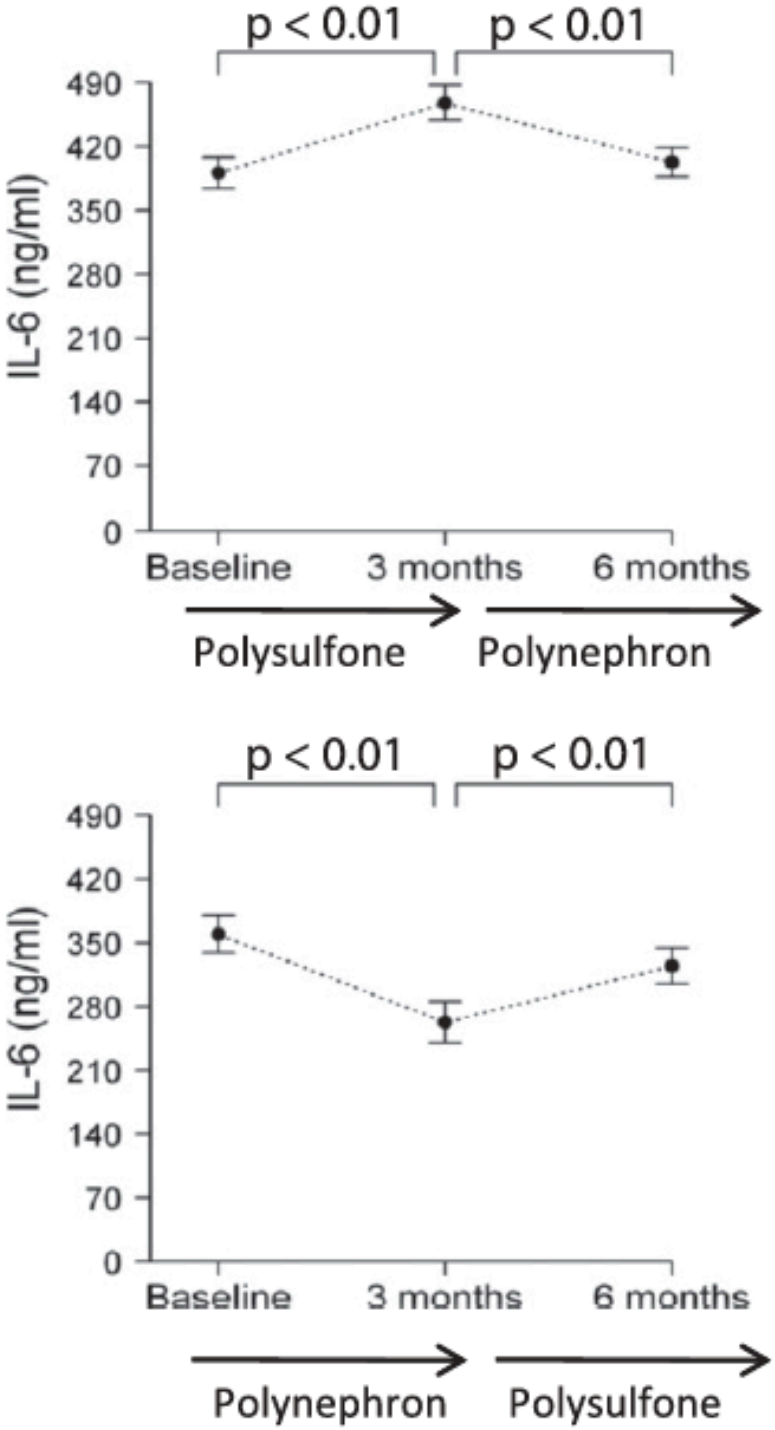
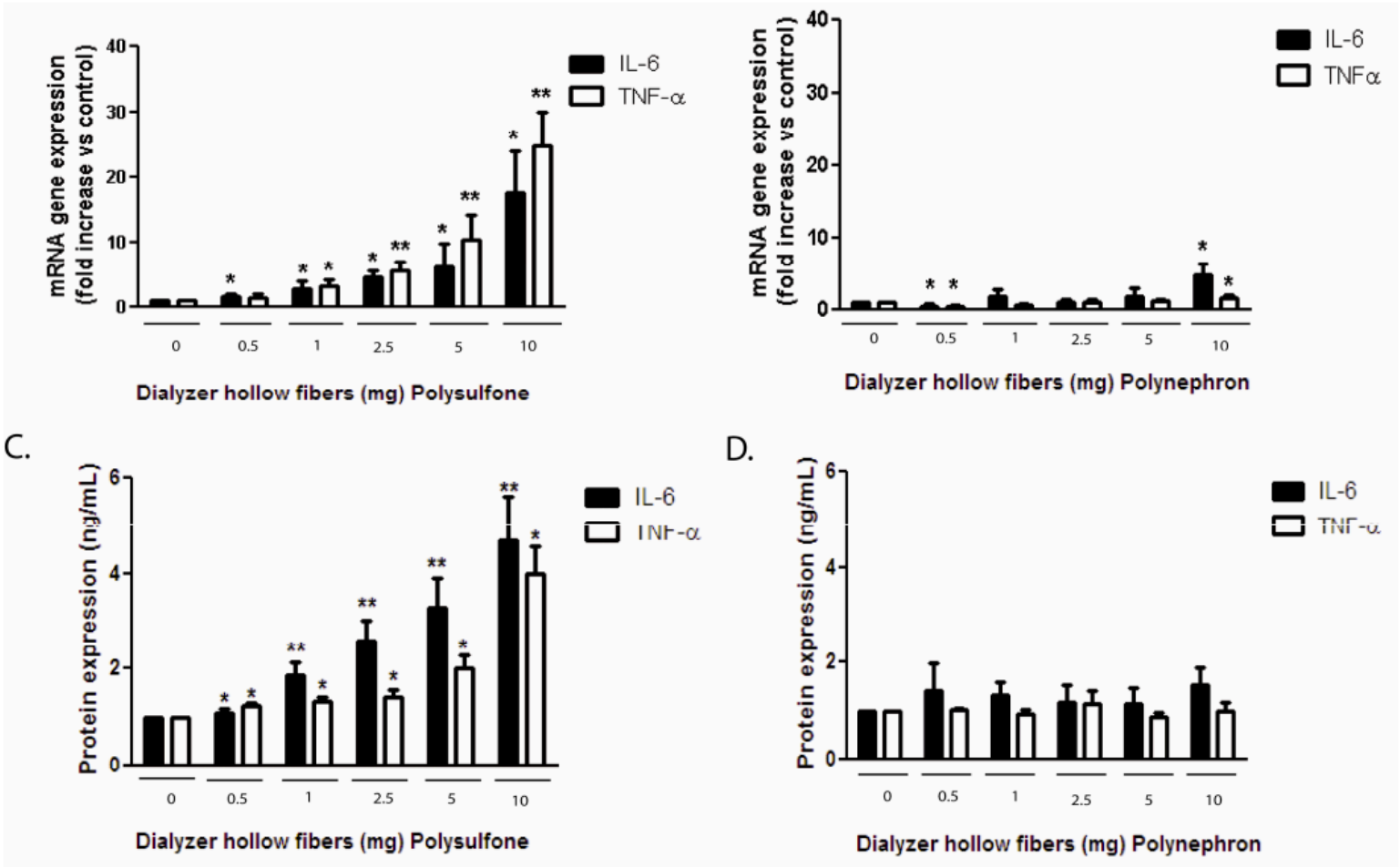
The Choice of Hemodialysis Membrane Affects Bisphenol A Levels in Blood



J Am Soc Nephrol 2015 27 BOSH-PANADERO et Al

The Choice of Hemodialysis Membrane Affects Bisphenol A Levels in Blood



J Am Soc Nephrol 2015 27 BOSCH PANADERO et Al

Yue Shen1 et al Shangai China

Bisphenol A analogs in patients with chronic kidney disease and dialysis therapy

High-performance liquid chromatography (HPLC)-grade methanol and acetonitrile

The dialysis filters of the polysulfone (PSF) membrane, polyamide (PA) membrane, and polyethersulfone (PES) membrane (10 mg) were ground thoroughly with liquid nitrogen. The membrane powder was then dissolved in dimethyl sulfoxide, volatilized, and dissolved in acetotrile under cryogenic conditions. The contents of the four BPs were sequentially assayed by HPLC.

In total, 58 patients with CKD, 66 patients on dialysis [18 with peritoneal dialysis (PD) and 48 HD patients] in one center, and 30 age- (**p=0.096) and gender- (p=0.977) matched healthy volunteers were** enrolled in the cross-sectional study.

Ecotoxicology and Environmental Safety 185 (2019) 109684

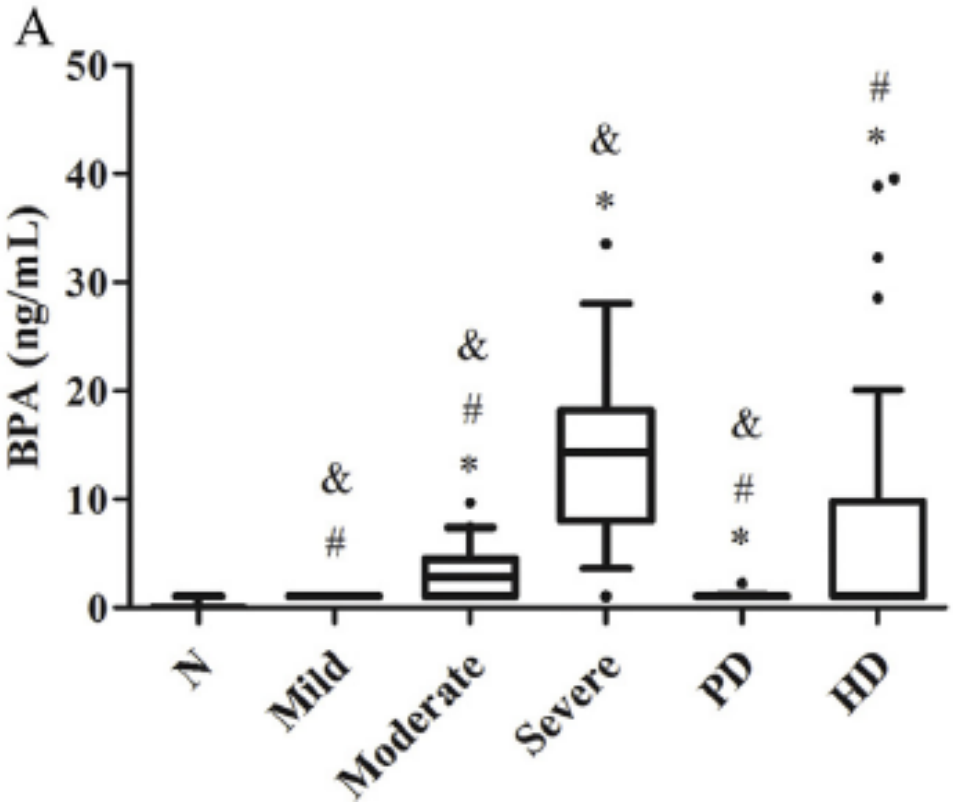
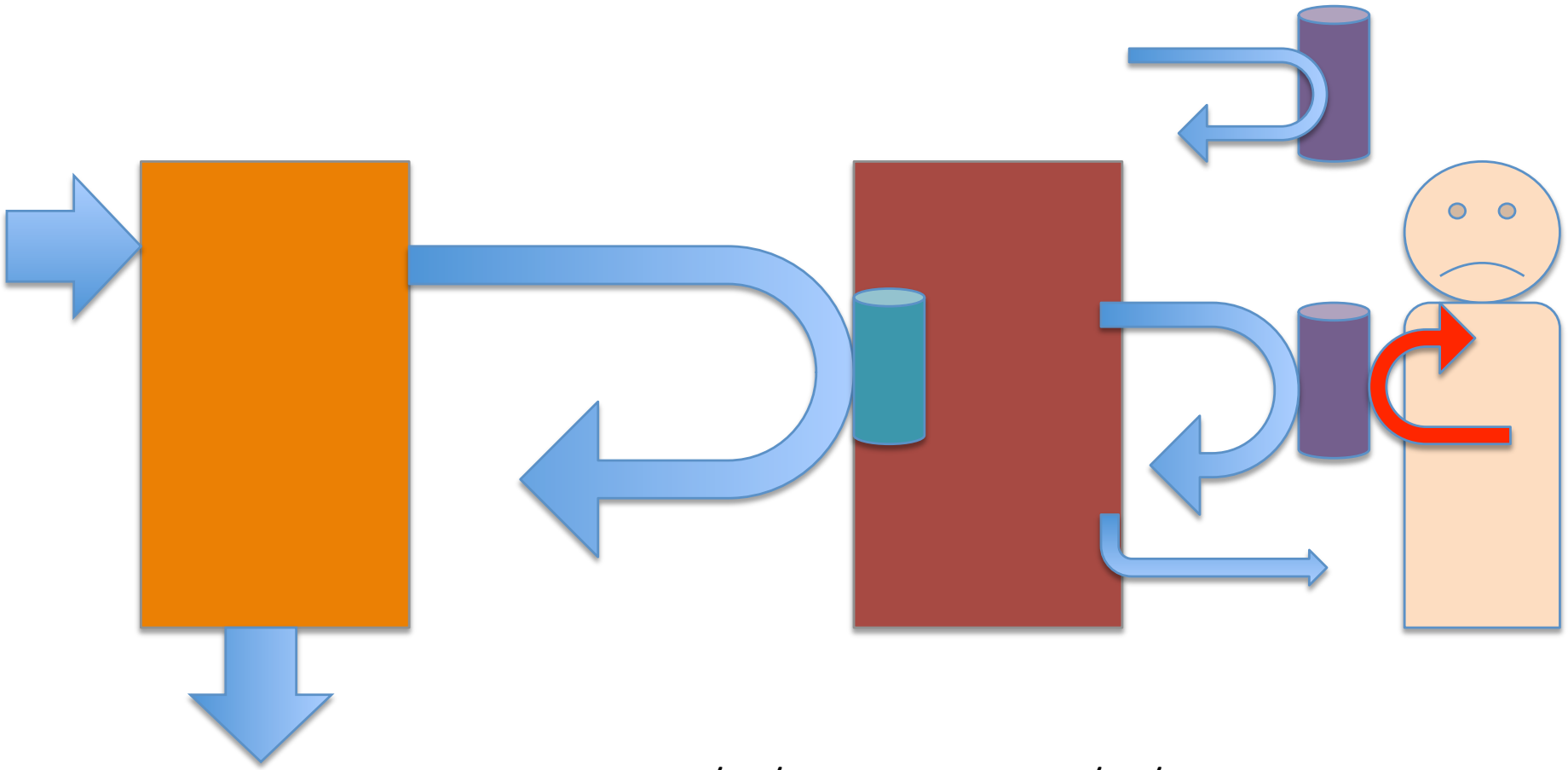


Table 4
Association between serum BPA and BPS concentration with eGFR in 58 CKD patients and 30 healthy individuals by multivariate logistic regression model.

Clinical variables	BPA		BPS	
	Partial *r*	*p* value	Partial *r*	*p* value
Age (year)	0.179	0.569	0.043	0.697
Hb (g/L)	−0.667	0.028*	−0.395	0.290
Plt (*10^9/L)	−0.177	0.104	−0.174	0.154
Alb (g/L)	−0.231	0.752	−0.26	0.139
eGFR mL/(min·1.73 m^2)	−0.746	< 0.001*	−0.433	< 0.001*

Abbreviation: Hb: hemoglobin; Plt: platelet; Alb: albumin; eGFR: estimated

Pas seulement le filtre aussi les différentes parties de notre traitement d'eau.



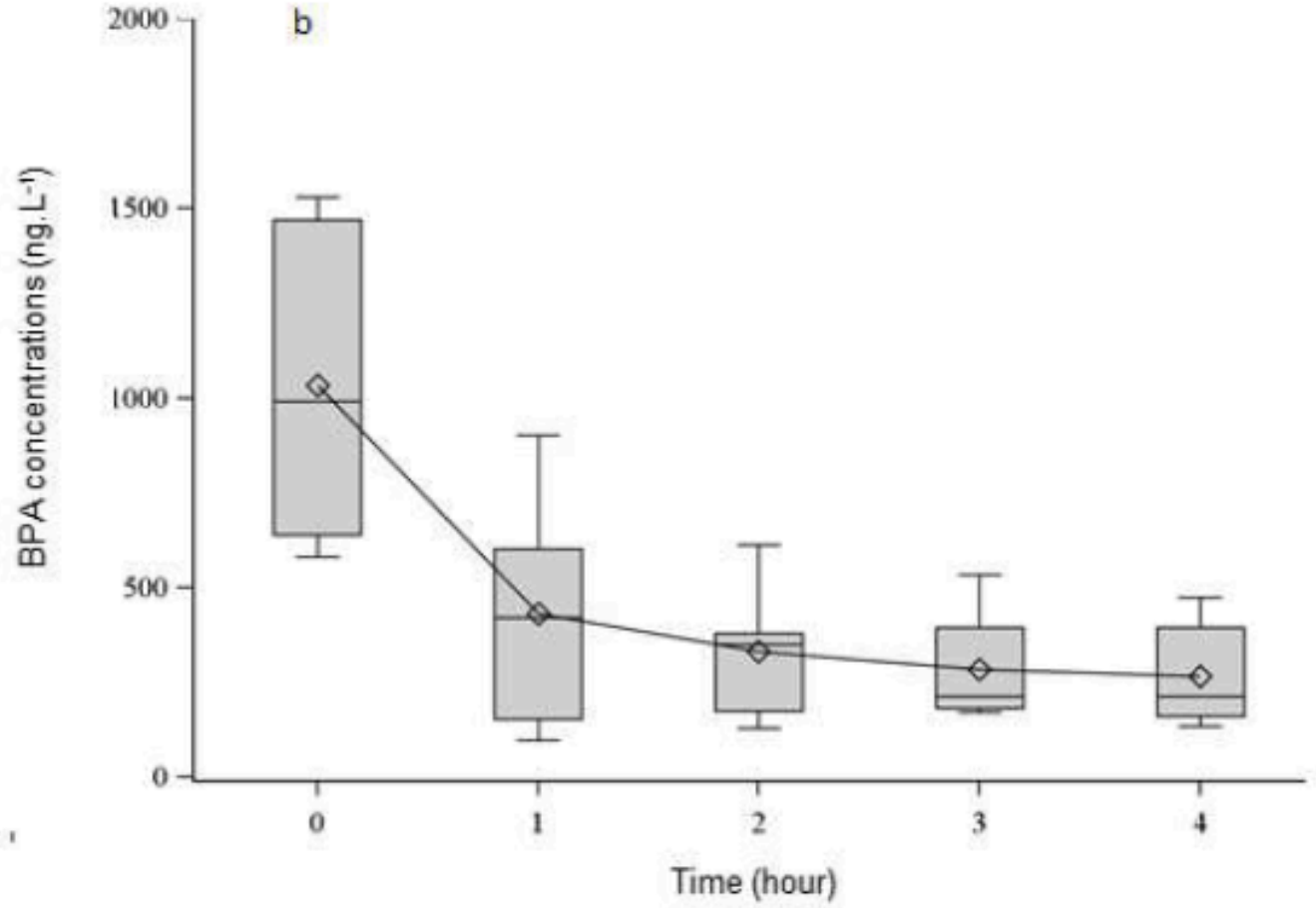
140 ng/Kg/J en HD us 442 ng/Kg/J en HDF , IV

ASTRID BACLE HDF

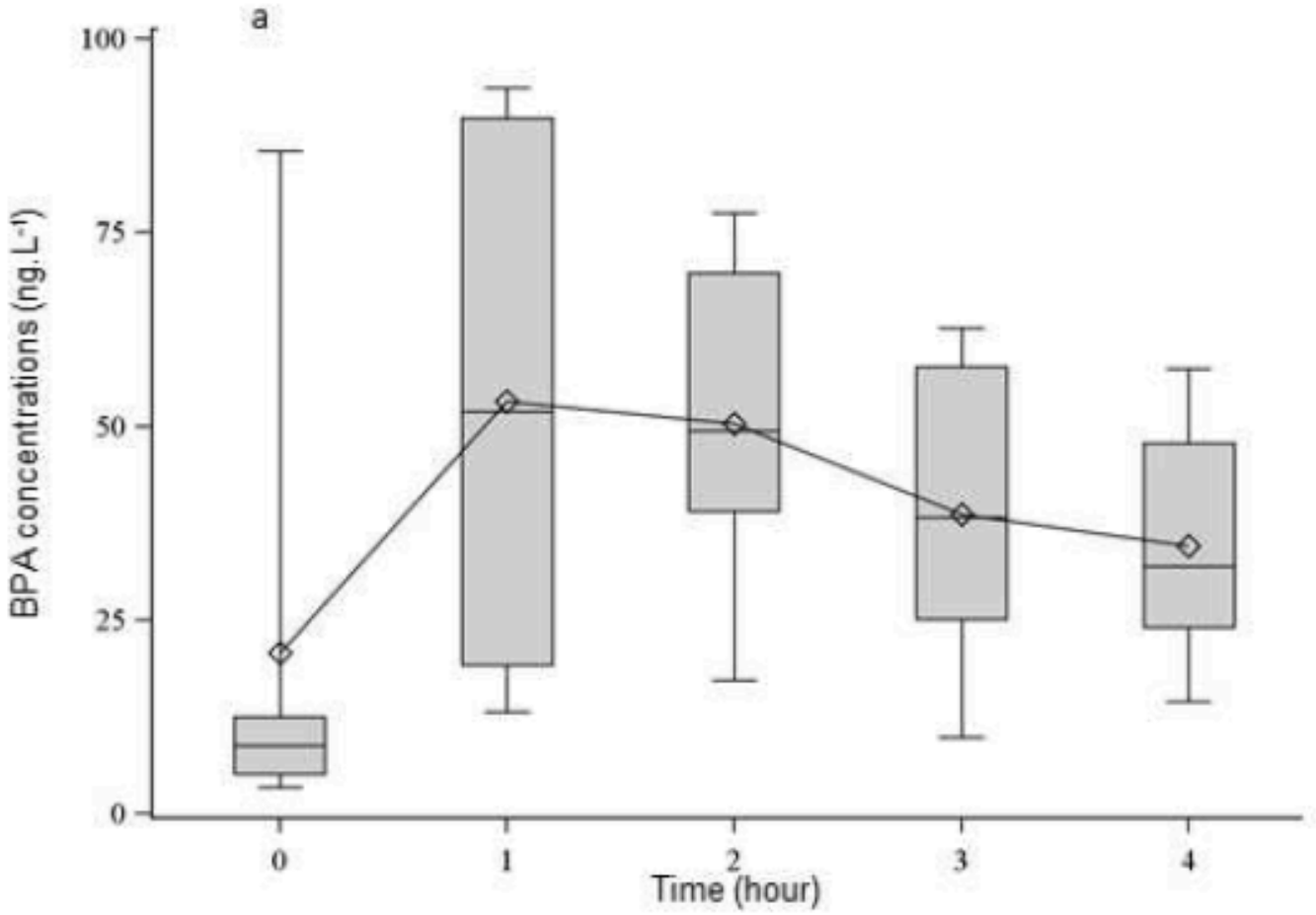
Table 4| Amount of BPA released from the dialyzers used in OI-HDF. Median and interquartile range (IQR, 25th-75th percentile) are presented.

Dialyzers	Compartment	BPA (ng/dialyzer)
TS-2.1 SL	Rinsing solution	378,80 (236,20-502,1)
	Simulating blood	0,80 (0,40-0,85)
	Dialysate	0.90 (0,85-0,95)
Polyflux 210H	Rinsing solution	314,40 (238,40-367,40)
	Simulating blood	1,50 (1,35-1,55)
	Dialysate	1,20 (1,15-4,20)
Vie-21A	Rinsing solution	511,00 (369,00-547,10)
	Simulating blood	16,60 (14,45-51,55)
	Dialysate	13,80 (13,15-18,05)
Elisio-21H	Rinsing solution	97,00 (84,70-131,37)
	Simulating blood	3,90 (3,55-4,00)
	Dialysate	3,10 (2,85-3,20)

ASTRID BACLE HDF



ASTRID BACLE HDF



ASTRID BACLE BP- Cl

Table 4. Concentration of bisphenol A chlorinated derivatives in ultrapure water and at the beginning of ultrapure dialysate and replacement fluid production. Mean ± standard deviation is presented.

	Ultrapure Water ($ng \cdot L^{-1}$)	Ultrapure Dialysate ($ng \cdot L^{-1}$)	Replacement Fluid ($ng \cdot L^{-1}$)
MCBPA	0.4 ± 0.9	1.6 ± 1.7	3.4 ± 3.2
DCBPA	6.5 ± 1.2	12.8 ± 5.9	42.5 ± 22.1
TCBPA	1.8 ± 1.3	1.3 ± 0.7	1.3 ± 0.6
TTBPA	1.4 ± 0.9	0.7 ± 0.6	0.5 ± 0.4

MCBPA = monochlorobisphenol A; DCBPA = dichlorobisphenol A; TCBPA = trichlorobisphenol A; TTCBPA = tetrachlorobisphenol A.

Tableau 5 : Concentrations plasmatiques de BPA dans les échantillons issus d'une population témoin et d'une population traitée par hémodiafiltration en ligne (HDF-OL)

Patients témoin	Concentrations en BPA ($ng.mL^{-1}$)	Patient traité par HDF-OL	Concentrations en BPA ($ng.mL^{-1}$)
1	LOD> x <LOQ	1	pré-dialyse : LOD> x <LOQ post-dialyse : 65,0
2	< LOD		
3	< LOD	2	pré-dialyse : LOD> x <LOQ post-dialyse : LOD> x <LOQ
4	< LOD		
5	< LOD	3	pré-dialyse : LOD> x <LOQ post-dialyse : LOD> x <LOQ
6	< LOD		
7	LOD> x <LOQ	4	pré-dialyse : LOD> x <LOQ post-dialyse : LOD> x <LOQ
8	< LOD		
		5	pré-dialyse : 21,9 post-dialyse : 53,9

(LOD= Limite de détection, LOQ= Limite de quantification).

Conclusion

HEMODIALYSE

- BPA s'accumule chez les patients en Hémodialyse et Hémodiafiltration
- La dose journalière emprunte une voix intraveineuse et non orale
- Il existe des dérivés de BPA complexifiant la question (BPs / BP-Cl)
- L'effet Biologique cytotoxiques a été partiellement démontré

Conclusion

D.PERITONEALE

GREFFE RENALE

- Existe t il un différence avec nos patients en D.P. (donnée limitée à 2 études
- BPA quid effet sur l'immunité et risque de carcinogénèses en Greffe rénale
- Temps d'élimination post greffe
- Quid pour nos patients en âge de procréer

Conclusion

LABORATOIRE

- Améliorer le stockage des échantillons.
- Améliorer le dosage des BPA: Méthode HPLC us ELISA
- Améliorer l'étude de l'effet cytotoxique

Conclusion

POPULATION

- Nurse Staff and BPA: → Urine

- Filière Déchet Dialyse

MERCI DE VOTRE ATTENTION

Clinical spectrum, prognosis and estimated prevalence of *DNAJB11*-kidney disease

Vitamin B12 and folic acid alleviate symptoms of nutritional deficiency by antagonizing aryl hydrocarbon receptor

Daniel J. Kim[a], Arvind Venkataraman[a], Priyanka Caroline Jain[a], Eleanor P. Wiesler[a], Melody DeBlasio[a], Jonathan Klein[a], Stephanie S. Tu[a], Seohyuk Lee[a], Ruslan Medzhitov[a,b], and Akiko Iwasaki[a,b,1]

Acute Kidney Injury Induces Remote Cardiac Damage and Dysfunction Through the Galectin-3 Pathway