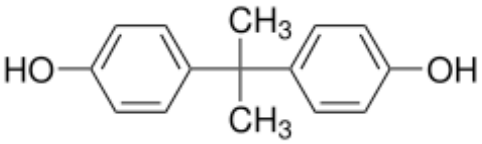
Bisphenol A (BPA): Potential Risks As Determined by Research and Studies

Composition and Risk Factors

Bisphenol A (BPA) is a carbon based synthetic compound with the formula $(CH_3)_2C(C_6H_4OH)_2$.



It is an endocrine disruptor, a xeno-estrogen (non-human estrogen). It is used frequently to make polycarbonate plastic containers and resin lining of cans. BPA is also used in many medical devices.

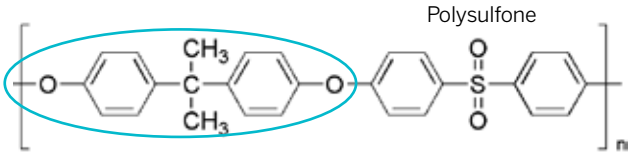
Increased urinary BPA concentrations have been associated with [1]cardiovascular disease, diabetes and liver enzyme abnormalities. Exposure to BPA has also been linked to [2]thyroid hormone disruption and [3]obesity promoting effects.

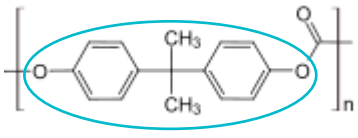
There have been multiple studies done with mice and rats that show the effects of BPA[4].

BPA EFFECTS IN MICE & RATS (> 300 published low-dose studies)	HUMAN HEALTH TRENDS (> 60 published studies)
CANCER	
Prostate hyperplasia & cancer	Stimulates prostate cells
Mammary hyperplasia & cancer	Breast cancer gene profile
MALE AND FEMALE REPRODUCTIVE SYSTEM	
Abnormal urethra / Obstruction	Hypospadias
Sperm count decrease	Sperm count decrease
Ovarian cysts / Uterine fibroids	PCOS / Uterine fibroids
Abnormal oocyte chromosomes	Miscarriage
METABOLIC DISEASE	
Body weight increase	Obesity
Glucose intolerance	Glucose intolerance
Insulin resistance	Type 2 diabetes
Cardiovascular changes	Coronary heart disease
BRAIN AND BEHAVIOR	
Hyperactivity / Impaired learning	ADHD

Dialyzers and BPA

Some dialyzers are manufactured with polycarbonate housing and polysulfone (PS) membranes. Both items contain BPA.

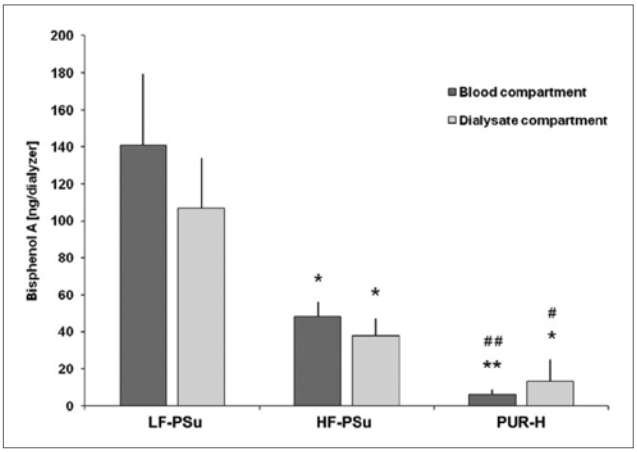




Polycarbonate

In in-vitro studies done by [5]Krieter et.al, it is observed that higher amounts of BPA leached out from polysulfone dialyzers.

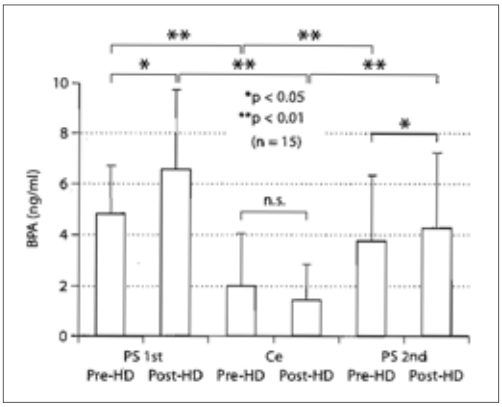
Mean values ± standard deviation of BPA concentrations eluted from the blood and dialysate compartment of LF-PS, HF-PS and PUR-H during in vitro recirculation.



*p<0.01 vs. LF-PS; ** p<0.001 vs. LF-PS; #p<0.01 vs. HF-PS; ##p<0.001 vs. HF-PS.

NIPRO

In-vivo studies performed by [6]Murakami et.al showed that serum BPA level increased significantly after dialysis with a polysulfone dialyzer. A cross-over test was done. 15 patients were dialyzed using a PS dialyzer for three months, followed by a cellulose dialyzer for one month, then back to a PS dialyzer for a month.



ELISIO-H Dialyzers: Not Made With BPA

The ELISIO-H dialyzers from Nipro, are made with housing and fibers that are not made with BPA or Bis (2-ethylhexyl) phthalate (DEHP), thereby minimizing risk for endocrine disruption and safeguarding public health. Housing material is polypropylene (PP) and the membrane is POLYNEPHRON, a polyethersulfone (PES) material, made exclusively by Nipro.

This results in:

1. Benefits to patients. BPA has been linked to negative health effects which would be especially challenging for patients with End Stage Renal Disease, undergoing hemodialysis. It has been demonstrated that deterioration of renal function may cause accumulation of BPA[5].

2. Lower CO_2 emissions (resin production & incineration).

- PP when made from naphtha : 1071 g-CO_2/kg (c.f. 1200 g/kg for PC)
- PP when burnt : 1366 g-CO_2/kg (c.f. 2770 g/kg for PC)

3. Energy savings in manufacture of PP compared to PC. PP can be molded at 100°C lower than PC (melting point of PP is 140°C, while that of PC is 250°C).

4. Less electricity is consumed by the molding machine as PC requires annealing process of preheating at 120°C for 3 minutes.

5. Reduced resin waste in molding process. When molding identical parts, PP resin consumption is 25% less in volume than PC resin.

6. Lighter and more compact dialyzers made with PP – less petroleum is needed for delivery.

References

1. Lang IA, Galloway TS, Scarlett A, et al. Association of urinary bisphenol A concentration with medical disorders and laboratory abnormalities in adults. JAMA. 2008;300(11):303-1310.
2. Moriyama K, Tagami T, Akamizu T, et al. Thyroid hormone action is disrupted by bisphenol A as an antagonist. J Clin Endocrinol Metab. 2002;87(11): 5185-5190.
3. Newbold RR, Padilla-Banks E, Jefferson WN, Heindel JJ. Effects of endocrine disruptors on obesity. Int J Androl. 2008;31(2):201-208
4. BISPHENOL A (BPA): URINARY DYSFUNCTION AT HUMAN EXPOSURE LEVELS. Frederick vom Saal, Division of Biological Sciences, University of Missouri-Columbia, USA. Presented at ASN 2012.
5. D. H. Krieter, B. Canaud, H. D. Lemke et al., "Bisphenol A in chronic kidney disease," Artificial Organs, vol. 37, no. 3, pp. 283–290, 2013.
6. K. Murakami, A. Ohashi, H. Hori et al., "Accumulation of bisphenol A in hemodialysis patients," Blood Purification, vol. 25, no. 3, pp. 290–294, 2007.

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