



**Università degli Studi di Salerno**  
Dipartimento di Medicina, Chirurgia ed  
Odontoiatria «Scuola Medica Salernitana»  
Scuola di Specializzazione in Neurologia



# **Bisphenol A metabolism in patients with Parkinson's Disease**

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Regionale SIN Campania  
Salerno, 14 dicembre 2018



bisphenol A



Food containers



Water bottles  
Infant bottles



Food cans



Water pipes



Digital media



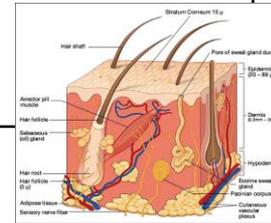
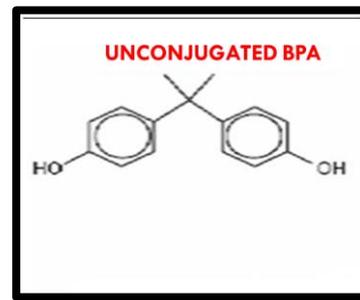
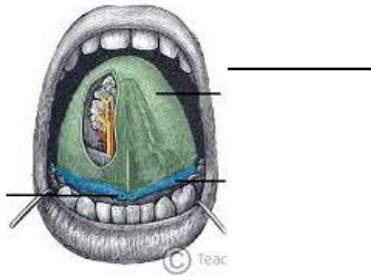
Dental sealants



Register  
receipts



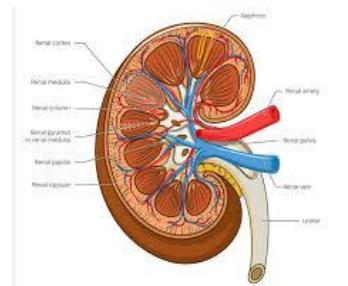
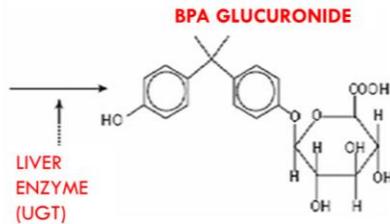
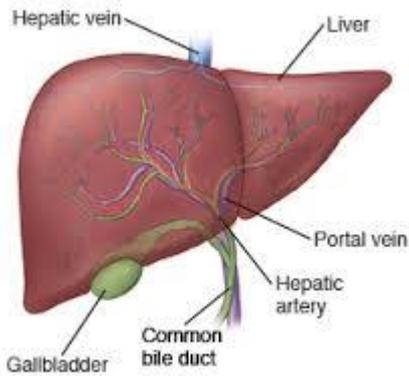
**OTHER**



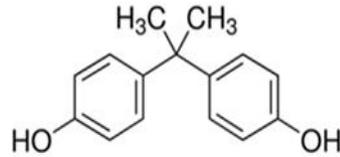
**Systemic circulation**

**Lipophilic tissues**

**Stomach  
Small intestine**



**HALF-LIFE: 6 Hrs.**



Bisphenol A

Binding to Estrogen Receptors

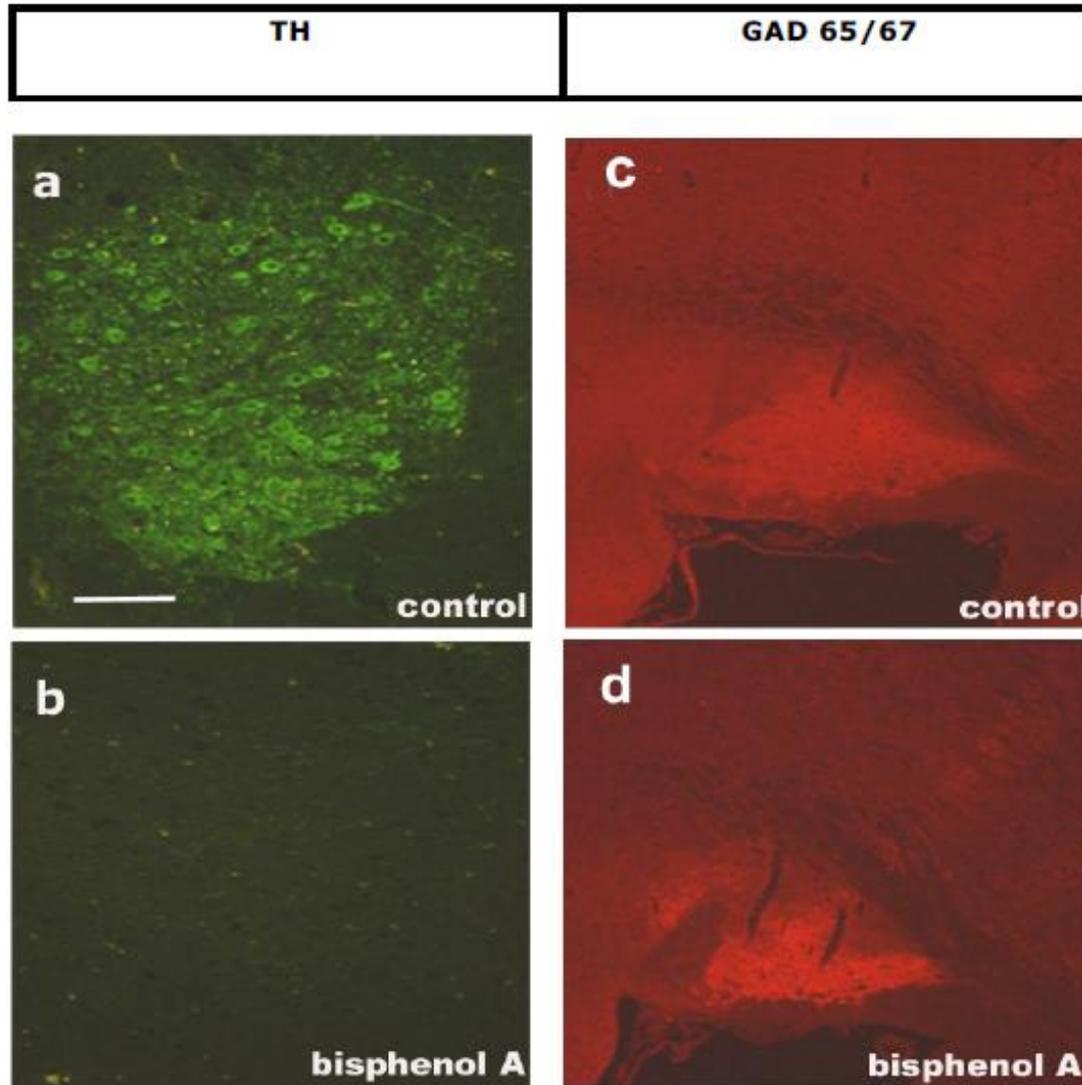
Increased dopamine release

Decreased Tyrosine Hydroxylase expression in DA neurons

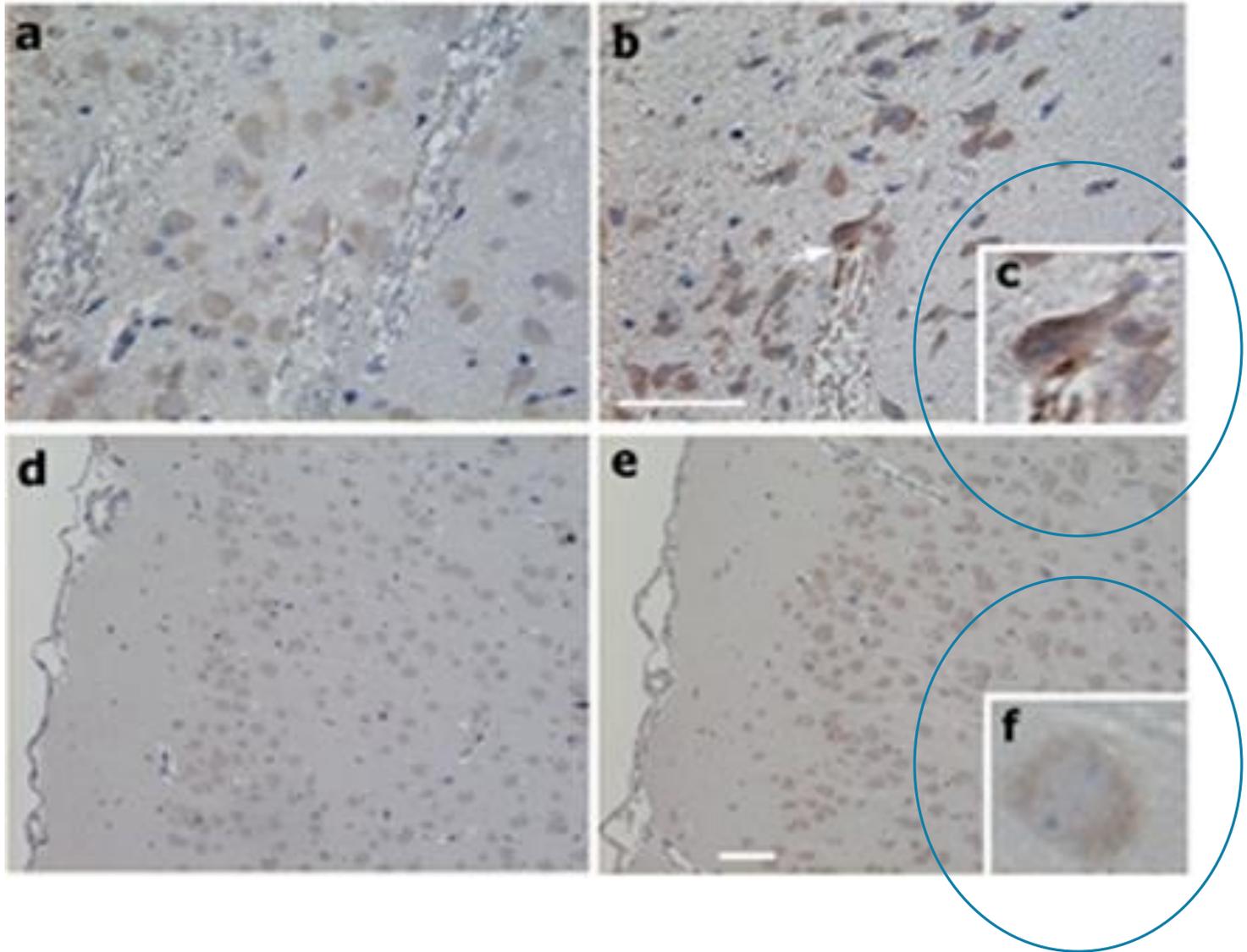
DAT-mediated dopamine efflux

Increased MAO A/B mRNA

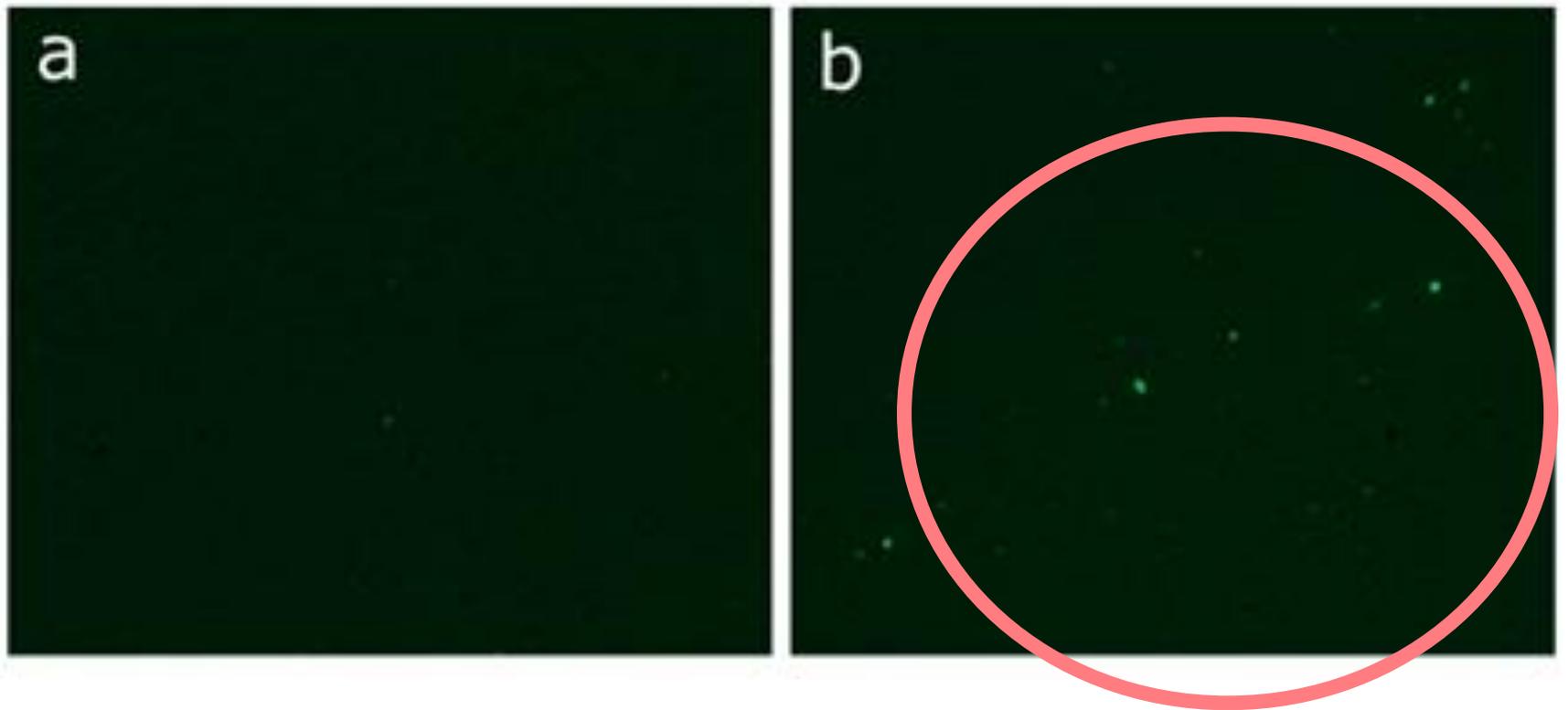
ROS generation



Ishido, M., Masuo, Y., 2014. Temporal effects of bisphenol A on dopaminergic neurons: an experiment on adult rats. *Open Environ. Sci.* 8 (9), 9.



Ishido, M., Masuo, Y., 2014. Temporal effects of bisphenol A on dopaminergic neurons: an experiment on adult rats. *Open Environ. Sci.* 8 (9), 9.



Ishido, M., Masuo, Y., 2014. Temporal effects of bisphenol A on dopaminergic neurons: an experiment on adult rats. *Open Environ. Sci.* 8 (9), 9.

**Typical appearance of Parkinson's disease**



CUWord

**Recruitment of  
Parkinson Disease  
patients and controls**



**BPA dosage on  
entire blood**

# STUDY DESIGN

PD Patients (n.86)  
Controls (n.42)

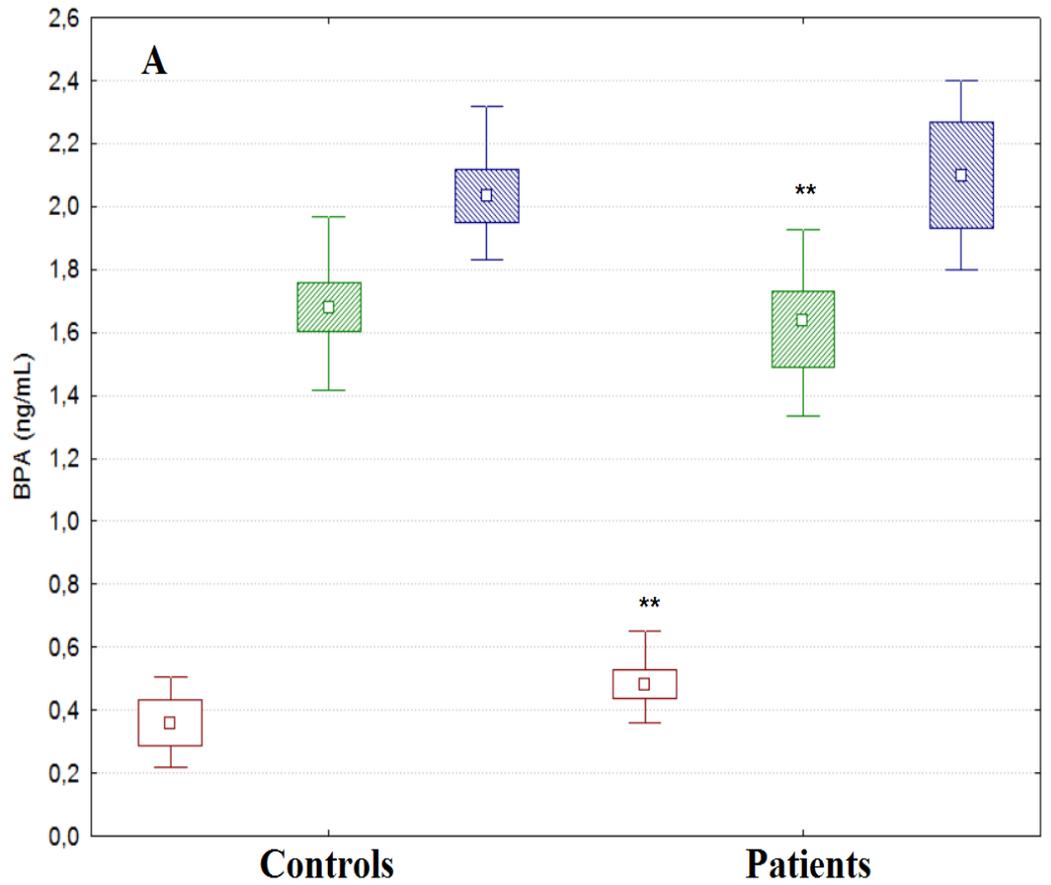


- Whole blood BPA dosage
- Structured interview about known BPA sources

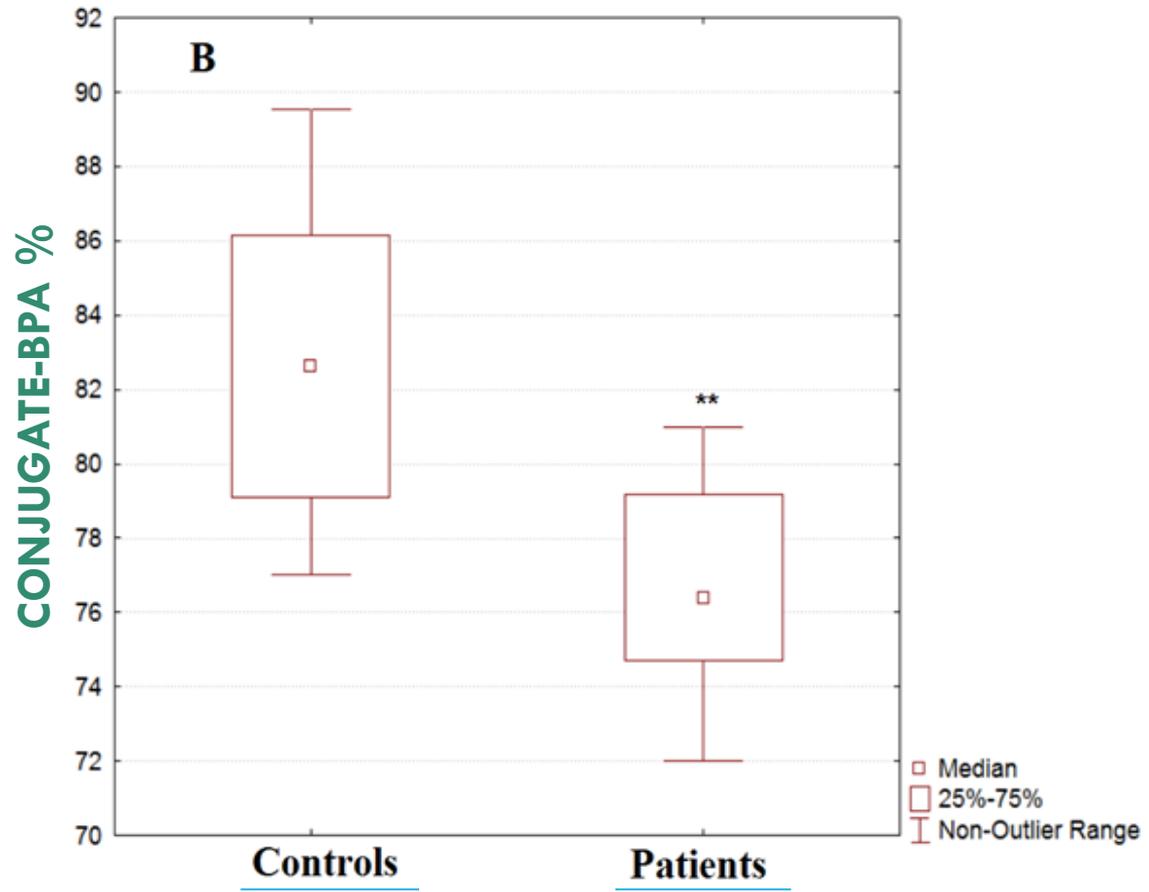


- Age
- Duration of disease
- Height, Weight, BMI
- UPDRSIII
- H&Y stage
- Drugs (LEDD)

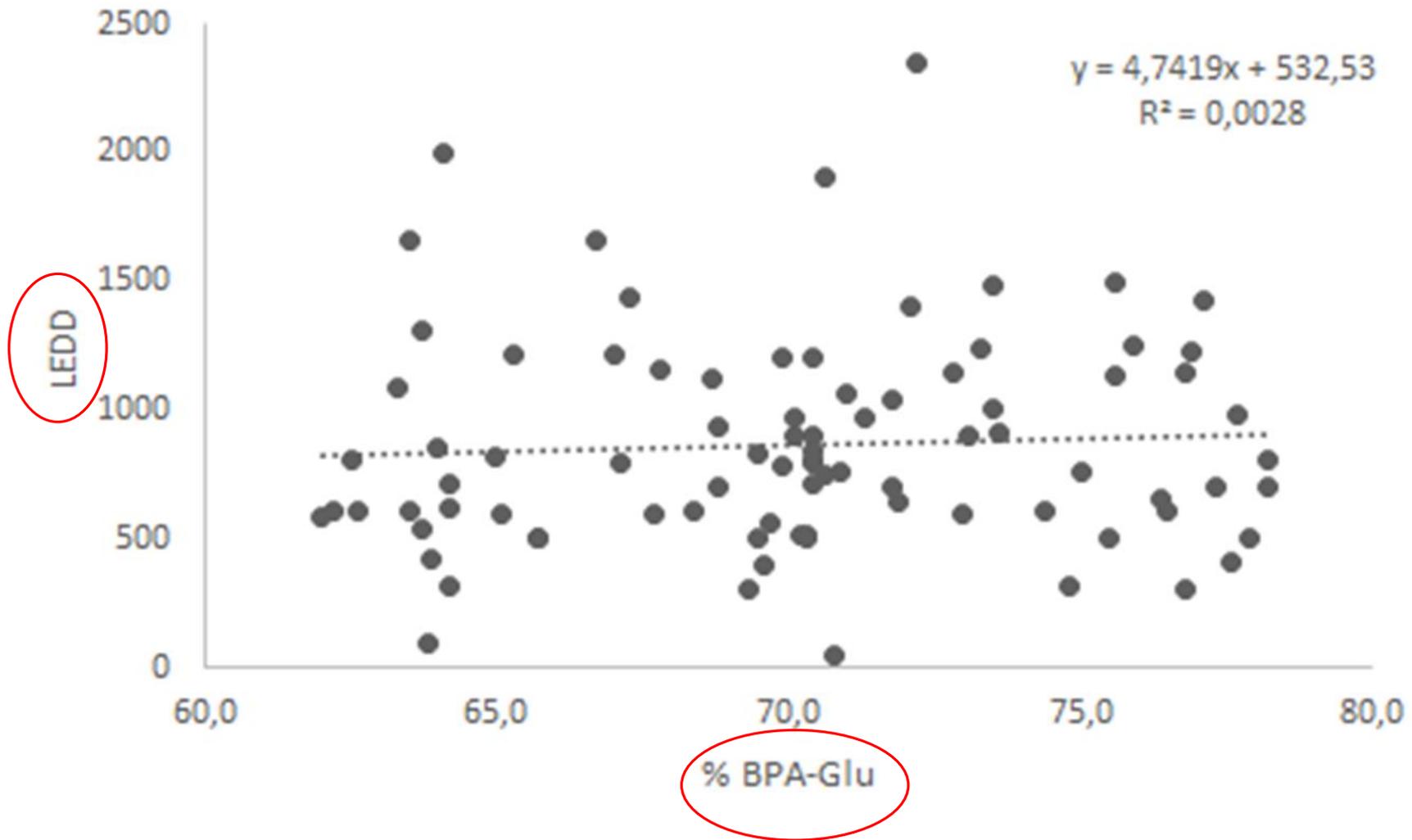
Questions	Reference	Patients	Controls
Smoking	Lakind and Naiman (2011)	Yes = 15.1% No = 84.9%	Yes = 21.4% No = 78.6%
Ex-Smoker	Lakind and Naiman (2011)	Yes = 22.1% No = 77.9%	Yes = 23.8% No = 76.2%
Passive Smoker	Lakind and Naiman (2011)	Yes = 31.4% No = 68.6%	Yes = 26.2% No = 73.8%
White dental Sealants	Vandenberg et al (2007)	Yes = 22.1% No = 77.9%	Yes = 31.0% No = 69.0%
Dialysis	Krieter et al. (2013)	Yes = 0.0% No = 100.0%	Yes = 0.0% No = 100.0%
Canned tuna – Canned fish°	Lorber et al (2015)	Yes = 69.7%* No = 30.3%*	Yes = 53.8%* No = 46.2%*
Canned tomato°	Lorber et al (2015)	Yes = 81.7%* No = 18.3%*	Yes = 67.5%* No = 32.5%*
Canned legumes, soups, sauces°	Lorber et al (2015)	Yes = 44.7% No = 55.3%	Yes = 33.3% No = 66.7%
Canned meat°	Lorber et al (2015)	Yes = 16.7% No = 83.3%	Yes = 12.8% No = 87.2%
Food storage in "hard plastic" (i.e. polycarbonate) containers°	Mikolajewska et al. (2015)	Yes = 81.2% No = 18.8%	Yes = 71.8% No = 28.2%
Microwave heating of "hard plastic" containers°	Mariscal-Arcas et al. (2009)	Yes = 21.0% No = 79.0%	Yes = 18.0% No = 82.0%
Take away pizza°	EFSA CEF Panel (2015)	Yes = 51.8% No = 48.2%	Yes = 51.3% No = 48.7%
Canned drinks°	EFSA CEF Panel (2015)	Yes = 31.4% No = 68.6%	Yes = 23.1% No = 76.9%
Water in plastic bottles°	EFSA CEF Panel, 2015)	Yes = 85.8% No = 14.2%	Yes = 87.2% No = 12.8%
Use of a plastic food processor/mixer	EFSA CEF Panel (2015)	Yes = 33.7% No = 66.3%	Yes = 47.6% No = 52.4%
Frequently manipulate thermal paper (occupational exposure)	EFSA CEF Panel (2015)	Yes = 2.3% No = 97.7%	Yes = 9.5% No = 90.5%
Worked in the field of plastics, or correlated chemical products	Kouidhi et al. (2017)	Yes = 3.5% No = 96.5%	Yes = 9.5% No = 90.5%
Occupational exposure to chemicals	Racette et al (2012), van der Mark et al. (2012)	Yes = 26.7%* No = 73.3%	Yes = 19.0% No = 81.0%



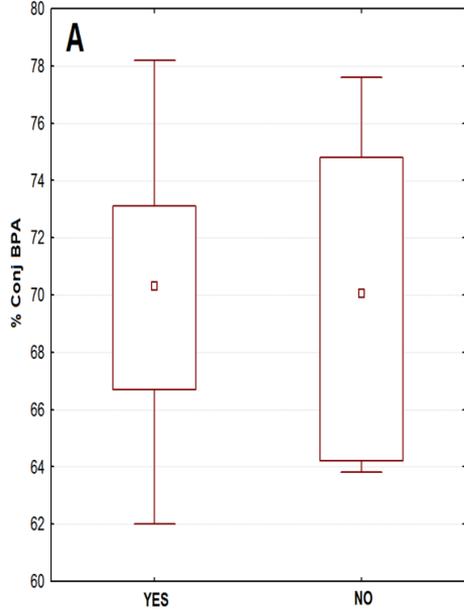
\*\* :  $p < 0.01$



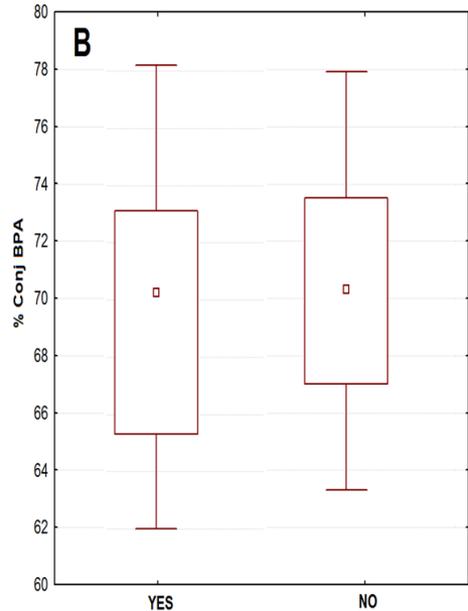
\*\* :  $p < 0.01$



**CORRELATION BETWEEN BPA CONJUGATE PERCENTAGE AND LEVODOPA EQUIVALENT DAILY DOSE**

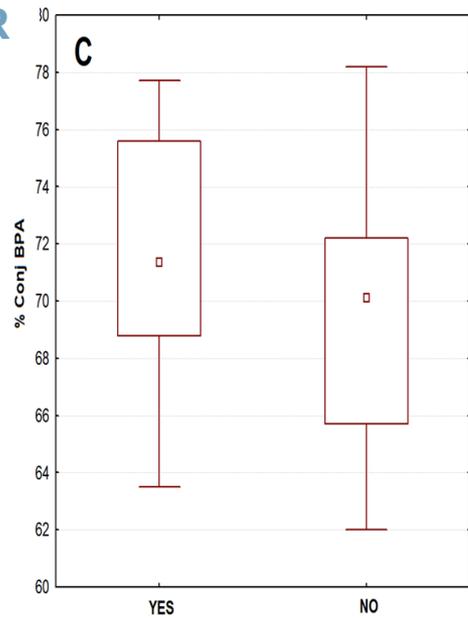


**LEVODOPA**

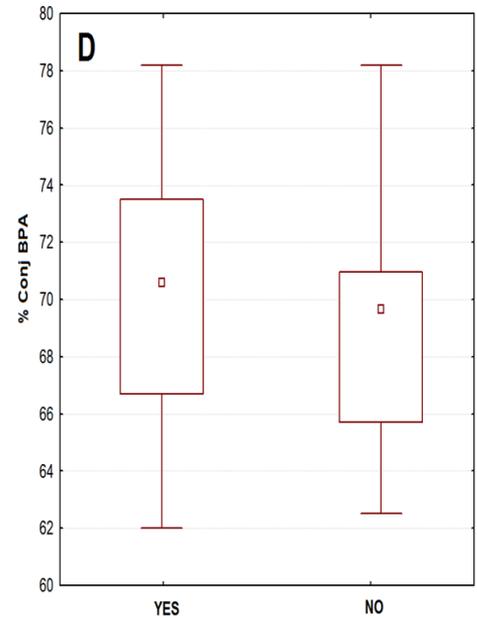


**MAO  
INHIBITOR**

- Median
- ▭ 25%-75%
- I Non-Outlier Ra
- Outliers
- \* Extremes



**COMT INHIBITOR**



**DOPAMINE AGONISTS**

# Key points:

- ❖ BPA metabolism may be associated with PD neurodegeneration.
- ❖ The mechanisms underlying BPA metabolization in PD patients need to be confirmed on a larger cohort and elucidated.
- ❖ Bisphenol A metabolism may also represent a way to study hepatic metabolism in PD patients. At present, no other study has been conducted on hepatic xenobiotic metabolization in PD patients. To do this, it would be necessary to extend analysis to drug-free PD patients, in order to test any possible interference by therapeutic pharmaceuticals.
- ❖ Due to the documented effects of BPA on dopaminergic transmission, we cannot exclude that BPA may play a role in dopaminergic toxicity and, as such, in the etiopathogenesis of Parkinson's Disease.



*Thank you*

