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Bisphenol A serum concentrations and type 2 diabetes risk in the European Prospective into Cancer and Nutrition cohort in Spain

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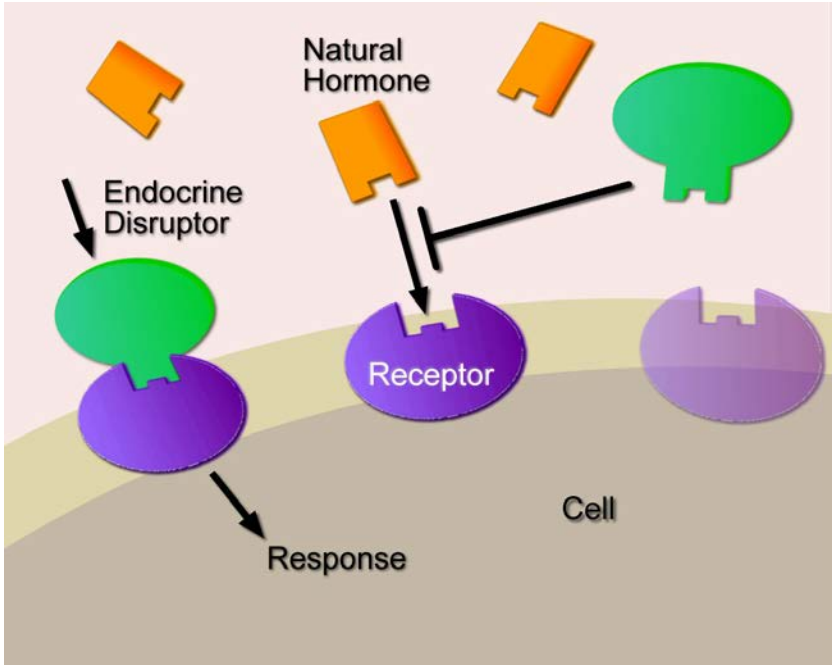
Background

Endocrine disruptors (EDs) are chemical substances with the ability to:

- Act as hormones
- Interfere in the function of some hormones.
- Change the production and secretion of hormones
- Interfere in the elimination of hormones



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Background

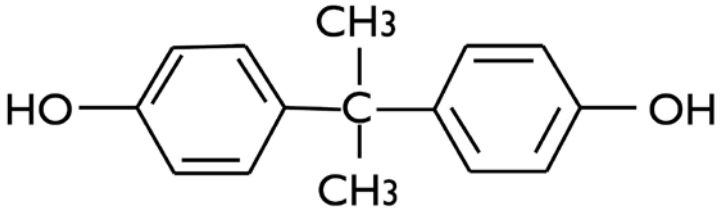
Bisphenol A (BPA) is an ED and is present in products we use many everyday (polycarbonate plastic, food containers, dental sealants, incubators, thermal paper, etc.)

- 6 million tons of BPA were manufactured in 2012

- The main route of human exposure is diet

- Evidence in rats: BPA acts like estrogens and alters the reproductive system.

- Numerous studies warn of its possible harmful effect in human health



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Background

The EFSA (European Food Safety Authority) reduced the tolerable daily intake of BPA in 2015:

from 50 µg/kg per day  4 µg/kg per day

A re-evaluation is

being prepared

for 2020

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Background

EPIC is a multicenter prospective cohort study that recruited 41,000 subjects in Spain between 1992 and 1996.

I.A.R.C
W.H.O

European Prospective Investigation into Cancer and Nutrition

Sample numbers in the main EPIC-Europe cohort

Country	Number of questionnaires	Number of blood samples collected	Individuals that developed cancer
Spain	41.440	39.579	5.795
Italy	47.749	47.725	6.529
United Kingdom	87.940	43.138	17.212
The Netherlands	40.072	36.318	5.396
France	72.996	20.725	12.976
Germany	53.094	50.679	6.317
Greece	28.572	28.500	1.636
Sweden	53.830	53.755	11.660
Denmark	57.054	56.131	17.828
Norway	37.231	9.197	4.584
Total	**519.978**	**385.747**	**89.933**

EPIC. Sample numbers are from February 2016.

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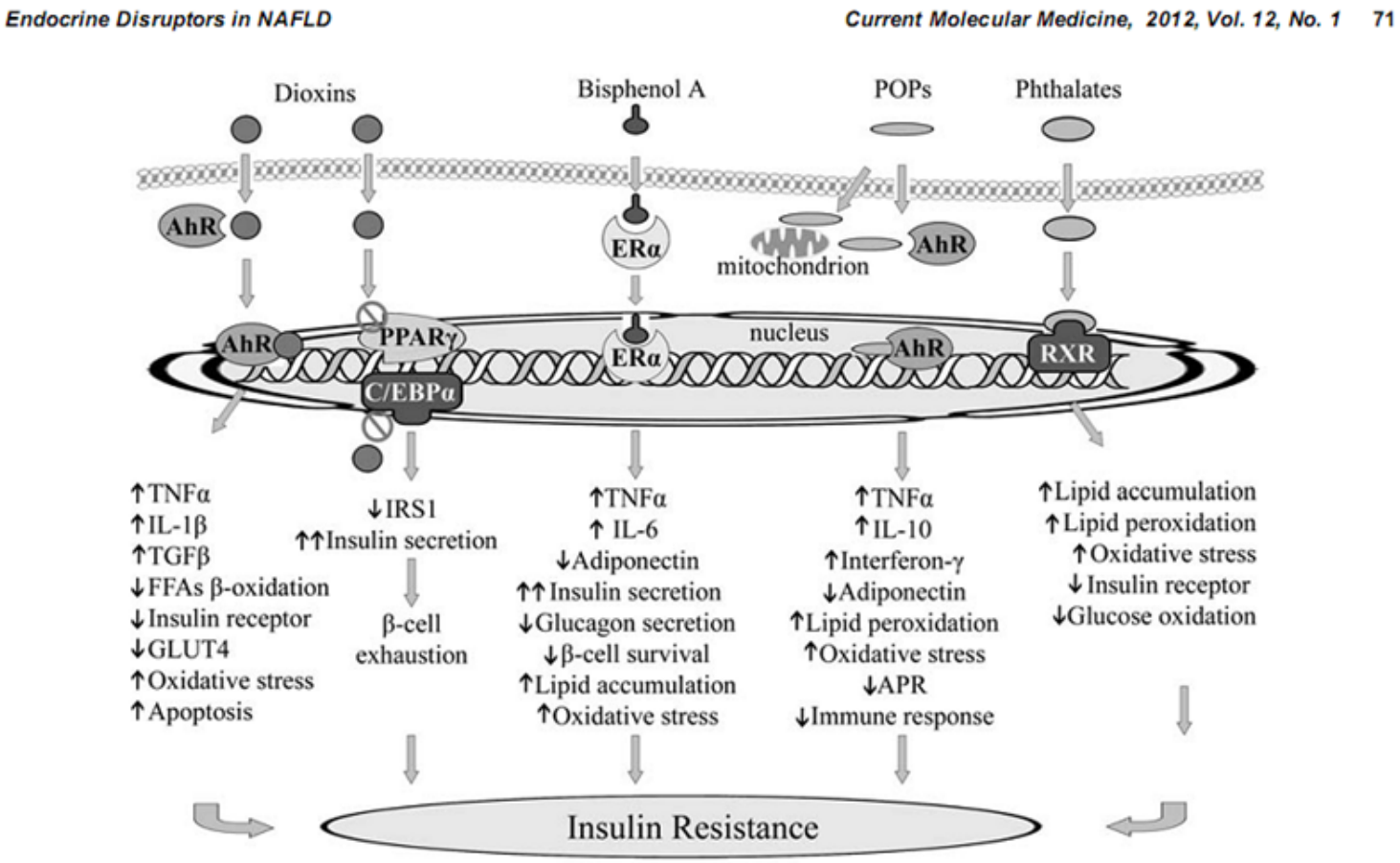
Background

Biological Mechanisms of BPA and Insulin resistance:



Polyzos et al. 2012

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Aim

To analyze the potential associations of serum levels of BPA with the risk of incident type 2 diabetes (T2D) in the EPIC cohort in Spain.

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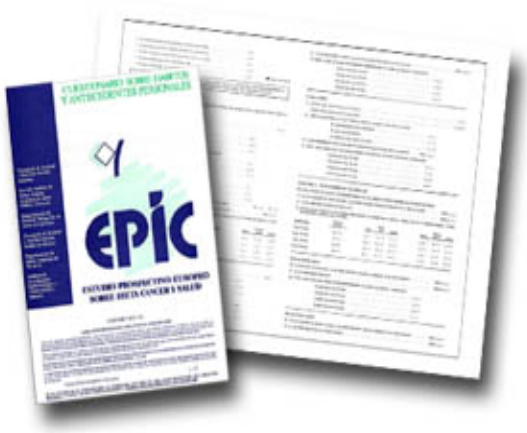
Methods



Design: Cross-sectional study in the EPIC-Spain cohort (Gipuzkoa, Granada, Murcia y Navarra), n=3,553

Covariates were gathered during a personal interview at recruitment (year 1992), by means of a validated questionnaire of 662 food items, anthropometric measures and lifestyle variables.

Data on Diabetes incidence over ≥21 years was retrieved from the patient´s clinical records.

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Methods

Chemical analysis:

Serum concentrations of bisphenol A were quantified in serum samples extracted at the recruitment, using UHPLC-MS/MS.

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Preliminary Results

Sample Descriptive

	n	%
Total	3.553	100
Centre		
Guipuzkoa	909	25,6
Granada	807	22,7
Murcia	934	26,3
Navarra	903	25,4
Sex		
Male	1.728	48,6
Female	1.825	51,4
Age group		
<45	679	19,1
45-49	572	16,1
50-54	757	21,3
55-59	687	19,3
60+	858	24,1
Study levels		
None	1.405	39,8
Primary school	1.242	35,2
Professional school	281	7,9
Secondary school	206	5,8
University	392	11,1

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Preliminary Results

Percentage of detectable BPA values

	% > LOD	p value
Total	69,7	
Centre		< 0,001
Guipuzkoa	57,6	
Granada	82,0	
Murcia	69,7	
Navarra	70,7	
Sex		0,521
Male	70,2	
Female	69,2	
Age group		0,886
<45	68,0	
45-49	70,1	
50-54	70,0	
55-59	70,4	
60+	69,8	
Study levels		0,337
None	71,1	
Primary school	68,7	
Professional school	65,8	
Secondary school	72,3	
University	69,1	

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Preliminary Results

BPA levels
(Geometric mean)

	n	GM ng/ml	CI 95%	p value
Total	3.553	1,19	1,12-1,25	
Centre				< 0,001
Guipuzkoa	909	0,67	0,61-0,75	
Granada	807	1,83	1,64-2,04	
Murcia	934	1,1	0,99-1,22	
Navarra	903	1,54	1,36-1,73	
Sex				0,01
Male	1.728	1,27	1,17-1,38	
Female	1.825	1,11	1,03-1,20	
Age Group				0,03
<45	679	1,04	0,92-1,18	
45-49	572	1,31	1,13-1,52	
50-54	757	1,31	1,15-1,48	
55-59	687	1,23	1,08-1,39	
60+	858	1,1	0,98-1,23	
Study levels				0,24
None	1.405	1,24	1,14-1,36	
Primary school	1.242	1,19	1,08-1,31	
Professional school	281	0,98	0,80-1,20	
Secondary school	206	1,26	1,00-1,59	
University	392	1,09	0,92-1,29	

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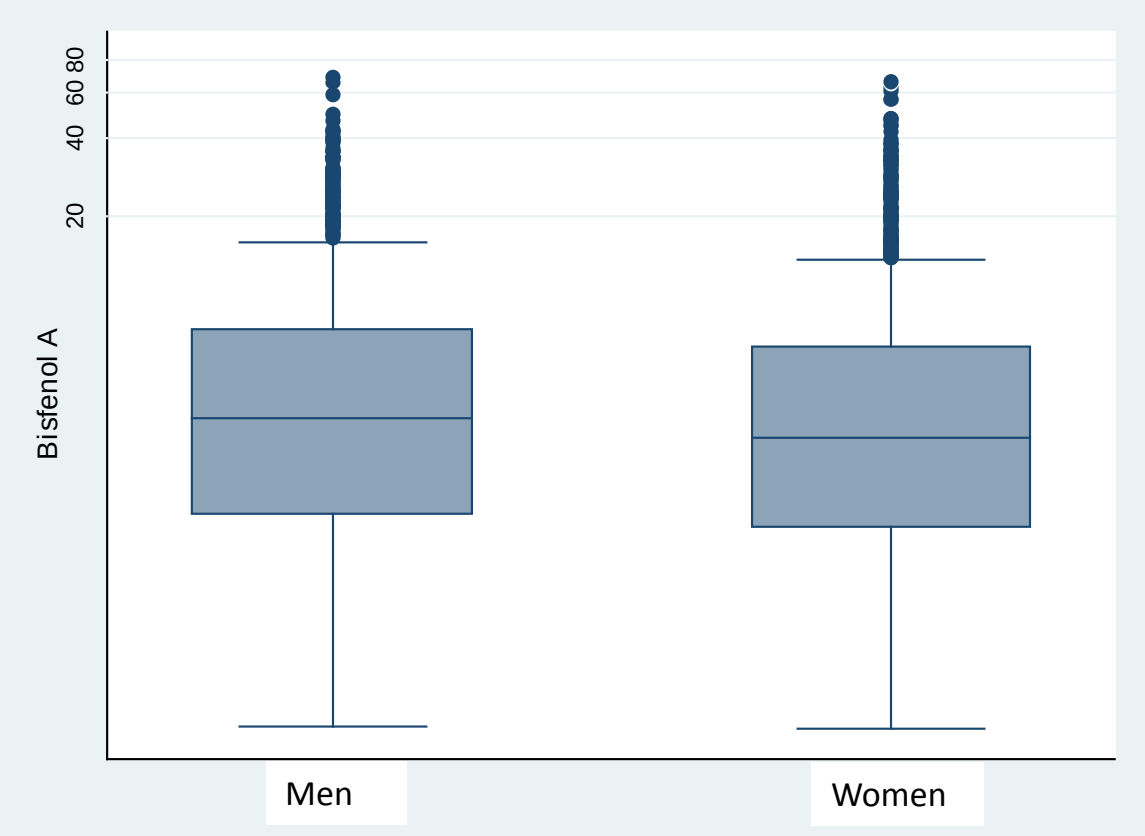
Preliminary Results

By sex, the percentages were similar (p = 0.52) but with higher levels in men (1.27 vs 1.11 ng / ml, p = 0.03).



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Preliminary Results

Centre	Diabetes No		Yes		total
Gipuzkoa	855	94.1%	54	5.9%	909
Granada	740	91.9%	65	8.1%	805
Murcia	855	91.8%	76	8.2%	931
Navarra	871	96.5%	32	3.5%	903

Currently: 26,7%

Ongoing analysis… studying associations between BPA and diabetes

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Discussion

The geometric means of the levels found in serum are lower, except in some cases, to those observed in other international studies

	GM (ng/ml)
EPIC-Spain (1996)	1,19
Thailand (Aekplakorn 2015)	0,34
China (Ye 2017)	2,30
USA (Padmanabhan 2008)	5,9
Japan (Yamada 2002)	2,24
Japan (Kuroda 2003)	0,46
Japan (Takeuchi 2004)	1,17
Italy (Cobellis 2009)	2,91
China (He 2009)	2,84

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Conclusions

69.7% of the subcohort had detectable BPA values in the blood.

The highest levels were found in men and in the south of the country.

The levels found are lower than those observed in other international studies, taking into account the year of the sample

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