

# Bisphenol A, from Science to Policy

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# Overview

- 1. Is the bisphenol A concern a live one ?**
- 2. Are humans exposed to bisphenol A ?**
- 3. Should we merely focus on contaminated food ingestion ?**
- 4. What do the scientists recommend ?**

## **1.1 Belgian newspapers**

**Productie papflessen met bisfenol A verboden  
[De Morgen]**

**Chemische stof uit babyflesjes maakt meisjes  
agressief [De Standaard]**

**Les billets nous exposent aussi au bisphénol A  
[Le Soir]**

**Bisphénol A : pas de menace pour la santé  
[L'Écho]**

## **1.2 Newspapers in neighbouring countries**

**Le 27 septembre , le coup de tonnerre de l'Agence française [Le Monde]**

**Packing chemical may “increase heart disease risk” [The Times]**

**Wie Gift immer wieder auf dem Tisch kommt [Die Welt]**

## **1.3 Science Daily [27 hits in 2011]**

**Environmental Toxin Bisphenol A (BPA) Can Affect Newborn Brain, Mouse Study Shows**

**Unexpected Action of Bisphenol A on the Inner Ear of Certain Vertebrates**

**Chemical in Plastic, BPA, Exposure May Be Associated With Wheezing in Children**

## **1.4 Food Production Daily [45 hits 2011]**

**Bisphenol A in can linings - a storm is brewing**

**Human exposure to Bisphenol A underestimated  
- study**

**Race is on to find bisphenol A substitutes, says  
NAMPA**

## 1.5 Journal de l'Environnement [27 septembre 2011]

**Geneviève De Lacour , Bisphénol A : l'Anses reconnaît le danger des faibles doses**

*... Non seulement elle reconnaît les dangers du BPA sur la santé humaine mais, pour la première fois, elle admet **les effets nocifs des faibles doses** à certaines périodes critiques de la vie, comme la gestation et la puberté ...*

## 1. 6 Few recent examples from the scientific literature

**Marquet et al. [2011]. In vivo and ex vivo percutaneous absorption of [ 14C]-bisphenol A in rats: a possible extrapolation to human absorption? *Archives of Toxicology* 85, 1035**

**Audebert et al. [2011]. Use of the  $\gamma$ H2AX assay for assessing the genotoxicity of bisphenol A and bisphenol F in human cell lines, *Archives of Toxicology* 85, 1463**



# 1.7 Directorate General for Health & Consumers

**John Dalli [2011]**

*... June 1 is a milestone in our efforts to better protect the health of EU citizens, in particular the health of our children. Due to the fact that there are **uncertainties concerning the effect of the exposure** of infants to Bisphenol A, the Commission deemed it both necessary and appropriate to take action. The aim is to further reduce the exposure of the most vulnerable part of our population ...*

# 1. 8 Is the bisphenol A concern a live one ?

**Yes !!!**



**Decisionmakers should be informed**



**They should undertake action and communicate risks in an era of growing public distrust**

## 2.1 First reports on human exposure to BPA

Calafat et al. [2004] Environmental Health Perspectives 113, 391  
Calafat et al. [2007] Environmental Health Perspectives 116, 39

*... This study provides the first reference range of human internal dose levels of BPA and NP. The higher frequency of detection of BPA than of NP in urine suggests that **human exposure to BPA is more prevalent** ...*

*... Our data suggest that exposure to BPA in the United States is widespread ... significant differences in BPA concentrations across selected **demographic and income groups** ...*

## 2.2 Confirmations of the earlier observed exposure

Vandenberg et al. [2010] Environmental Health Perspectives 118, 1055

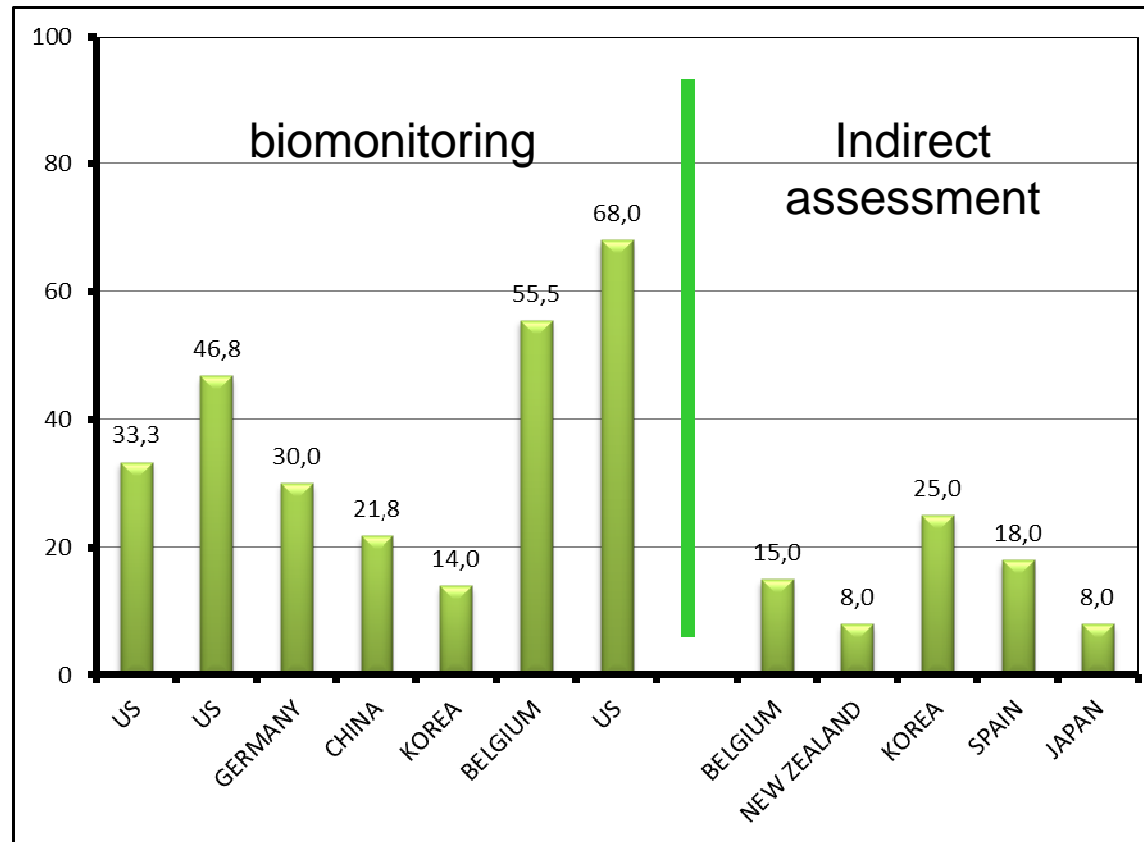
*... The > 80 biomonitoring studies examined included measurements in thousands of individuals from **several different countries**, and these studies overwhelmingly detected BPA in individual adults, adolescents, and children ...*

## 2.3 Is food ingestion the major exposure route ?

The introductions of most manuscripts start with :  
“ ... *Bisphenol A (BPA)* is used to manufacture *polycarbonate plastic and epoxy resins ... baby bottles ... protective coatings in food containers ...* ”

**This suggests packed food and beverages are a major exposure pathway and sometimes other exposure pathways are (too) easily forgotten**

## 2.4 Biomonitoring and indirect exposure approaches



## **3.1 Is contaminated food ingestion the only exposure pathway ?**

**Biphenol A is known to be a high volume production chemical**

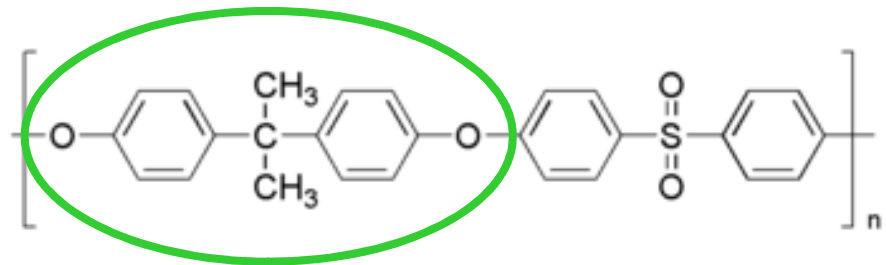
**Biomonitoring results > Results from indirect assessment**

**Scientific literature mentions non food exposure routes**

## 3.2 BPA present in some hollow-fiber dialyzers used in hemodialysis

**Murakami et al. [2007]  
Accumulation of Bisphenol A  
in Hemodialysis Patients,  
Blood Purification 25, 290**

*... In patients who were  
using **PS dialyzers**, the BPA  
level significantly increased  
after a dialysis session ...*

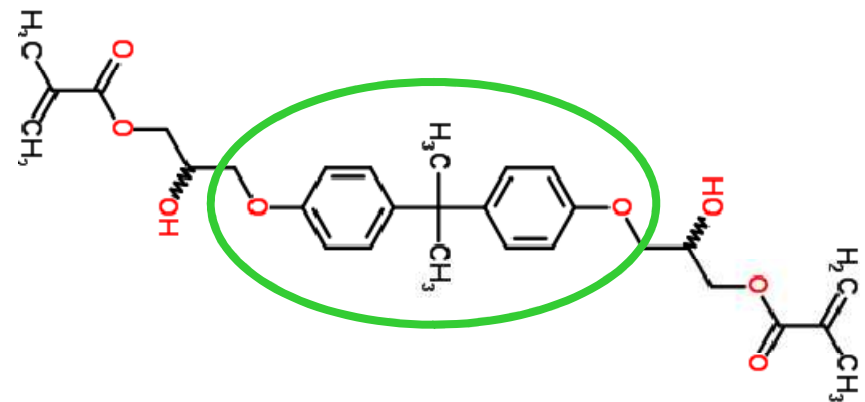




## 3.3 BPA present in some dental materials

Fleisch et al. [2010] Bisphenol A and Related Compounds in Dental Materials, Pediatrics 126, 760

*BPA is released from dental resins through **salivary enzymatic hydrolysis** of BPA derivatives, and BPA is detectable in saliva for up to 3 hours after resin placement.*



## 3.4 Thermal printer paper and paper currencies

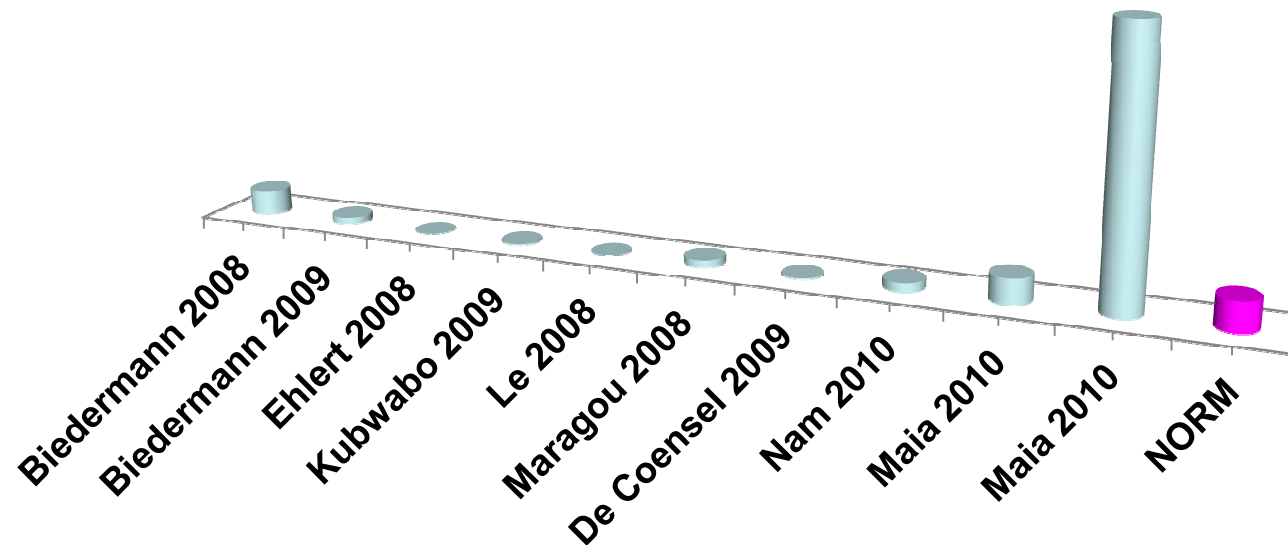
**Biedermann et al. [2010]  
Transfer of bisphenol A from  
thermal printer paper to the  
skin, Analytical and  
Bioanalytical Chemistry 398,  
571**

*... BPA can probably be  
considered safe ... but it should  
be reconsidered more carefully  
once "low dose" effects are  
taken into account ...*

**Liao & Kannan [2011] High  
Levels of Bisphenol A in Paper  
Currencies from Several  
Countries, and Implications for  
Dermal Exposure,  
Environmental Science and  
Technology 45, 6761**

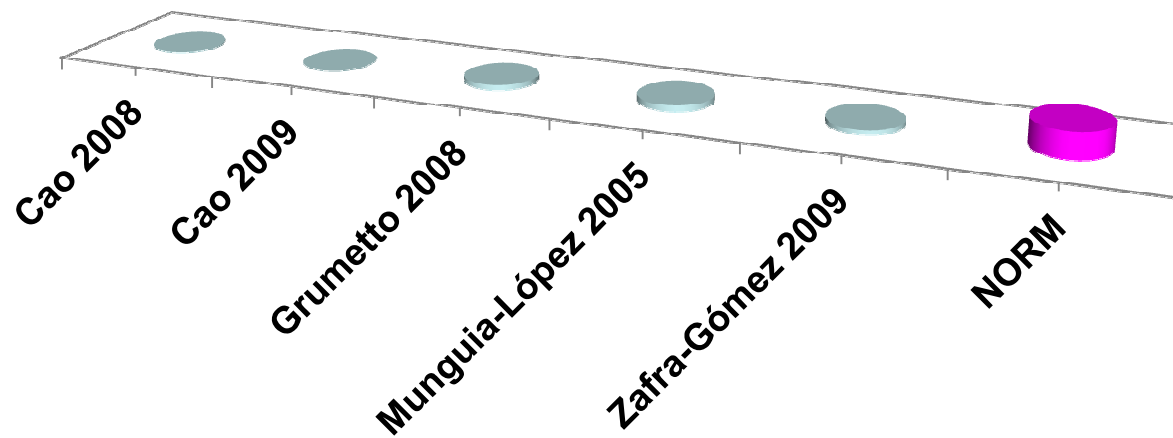
*... The estimated daily intake of  
BPA through dermal absorption  
from handling paper currencies  
was on the order of a few  
nanograms per day ...*

## 3.5 Polycarbonate food contact materials



The specific migration limit amounts to  $600 \mu\text{g kg}^{-1}$

## 3.6 Epoxy resin food contact materials



# 4.1 Those major conditions determine our policy - 1

## **BPA is ubiquitous**

**Humans are exposed to extremely complex contaminant cocktails**

**The bioavailability of BPA is poorly known**

**BPA is a recognized endocrine disruptor**

**Several exposure routes have already been identified**

## **BPA is readily metabolized**

**Determining the toxic threshold of one single chemical might not be very helpful**

**An optimal sampling approach is not well defined**

**Endocrine disruption is not seen as a predominant health effect**

**Well validated methods as well as models are required**

## **4.2 Those major conditions determine our policy - 2**

**The BPA issue has a social dimension**

**Contaminating objects are multifold and their use is highly variable**

**Currently many alternatives for BPA are used**

**The selection of a target population is difficult**

**Experimental procedures should take into consideration many parameters**

**The alternatives are generally very poorly characterized**

## 4.3 An overview published in 2007

Vom Saal et al. [2007] Chapel Hill bisphenol A expert panel consensus statement: Integration of **mechanisms**, effects in **animals** and potential to impact **human health** at current levels of exposure, Reproductive Toxicology 24, 131

*... The published scientific literature on human and animal exposure to low doses of BPA in relation to in vitro mechanistic studies reveals that human exposure to BPA is within the range that is predicted to be biologically active in over 95% of people sampled ...*

## 4.4 Today's recommendations - 1

**Focus on biomonitoring and/or epidemiological research, with special emphasis on fetuses, infants and young children**

**Focus on optimization and validation of toxicological test in order to convince authorities as well as industrial parties of the risks inherently related to endocrine disruption**



## 4.5 Today's recommendations - 2

Focus on the importance of **non-food sources** or **non-oral exposure**, without forgetting about the high numbers of **alternative** chemicals in this field

Development, optimization and validation of fast and cheap **screening** analyses

## 4. 6 Communication and research are inherently linked

**Lofstedt [2011] Communicating Food Risks in an Era of Growing Public Distrust: Three Case Studies, Risk Analysis  
doi: 10.1111/j.1539-6924.2011.01722.x**

*... should invest more time and resources into building credible allies to help support and **explain regulatory science** to provide accurate input to the decision process and message development ...*

*... they should avoid wearing lab coats, however, and instead let the scientists, who do this for a living, keep doing it ...*

# Thank you !

**La vérité est toujours servie par les grands esprits, même s'ils la combattent** (The truth is always served by great minds, even when they fight it)

**Jean Rostand [1939] Pensées d'un biologiste**