



## Pollutants and xenobiotics: what kind of impact do they have on our health?

### 1 Presentation Information

Humans are constantly exposed to molecules present in the environment referred to generally as xenobiotics, which include food contaminants, synthetic compounds, environmental pollutants and drugs. The accumulation of these substances in the body is harmful. The metabolism of xenobiotics, through metabolic enzymes and xenobiotic transporters, allows their elimination by converting these lipophilic compounds into hydrophilic compounds, which can then be excreted in biological fluids. The metabolism of xenobiotics, including environmental pollutants, can lead to the formation of highly toxic or reactive intermediate metabolites. Thus, products resulting from pesticide metabolism can lead to the onset of various pathologies such as cancers, neurological and neurodegenerative diseases, reproductive disorders, behavioural disorders in children.

**Keywords:** Xenobiotics, Transport and metabolism, Interindividual variability, Cytochromes P450, Pharmacokinetics, Drug, Toxicokinetics, Toxicodynamics, Receptors, Nuclear, Detoxification, Physiopathology, Regulation, Endocrine disruptors.

**2 Prof. Patrice PONZO**  
**Email:** patrice.ponzo@orange.fr  
 Naturopathic Medicine Professor, International Speaker, Founder of the Institut Français des Sciences de l'Homme (France), chemical and pharmaceutical industries professional licence - area of expertise: clinical trials and validations (2008-2009), environmental health (Université de Bordeaux - France)

### 3 Title of the Presentation

Pollutants and xenobiotics: what kind of impact do they have on our health?

### 4 Abstract description

**Introduction**  
 An example of toxicity: banana trees from Guadeloupe (French West Indies)  
 A study published in March 2009 addresses the link between soil pollution in the Caribbean by pesticides and the onset of prostate cancer. (1)  
 As a result, Martinique has the highest annual incidence rate of prostate cancer (standardized world) in the world, ahead of Norway and France according to the latest statistics from the World Cancer Research Fund International.  
 According to doctors and specialists, the origin of this sorrowful first place in the world is due to the insecticide chlordane used exclusively to eradicate the banana weevil. Years later, the International Agency for Research on Cancer classified chlordane as a «potential carcinogen» for humans. A study conducted by INSERM and the University Hospital of Pointe-à-Pitre establishes a link between exposure to the molecule and the risk of prostate cancer. The presence of this pesticide would also explain the high prevalence rate of breast cancer in Martinique, the most common cancer among women on the island, according to the World Cancer Research Fund International.

(1) Prostate cancer as an environmental disease. An ecological study in the French Caribbean Islands, Martinique and Guadeloupe Prof. Belpomme and collaborators. International Journal of Oncology volume 34 pp 1037.

### Keywords

- Definition of xenobiotics
- Main list of xenobiotics
- Understanding of terms: danger, risk and exposure to pollutants
- Explanation of the following words: intoxication and exposure
- Symptoms and diseases caused by xenobiotics
- Mode of action of endocrine disruptors
- The three types of toxicity of xenobiotics:
  - acute toxicity
  - subacute toxicity
  - long-term toxicity
- The absorption pathways of toxic and xenobiotic substances:
  - digestive tract: oral, sublingual, gastrointestinal, parenteral
  - respiratory tract: pulmonary
  - dermal or transdermal route
- Xenobiotic metabolism
- The body's barriers to pollutants
- From mother to child and from child to mother
- A «key» organ in detoxification: the liver
- Pharmacokinetics of phase I enzymes, known as functionalization: CP450 intervention (Fig.1)
- Pharmacokinetics of phase II enzymes, known as conjugation: intervention of enzymes of conjugation (Fig.1)
- Role of sulforaphane, a stimulant of Phase II enzyme genes: plants
- Role of antioxidants and natural anti-inflammatories against oxidation and xenobiotics: plants
- Toxicological role of adipose tissue: «More adipose tissue, more storage, more pollutants»
- Sources of variability in xenobiotic metabolism
- Genetic factors
- Epigenetic factors
- Environmental factors
- Toxicological consequences of metabolism: example of pesticides
- Conclusion

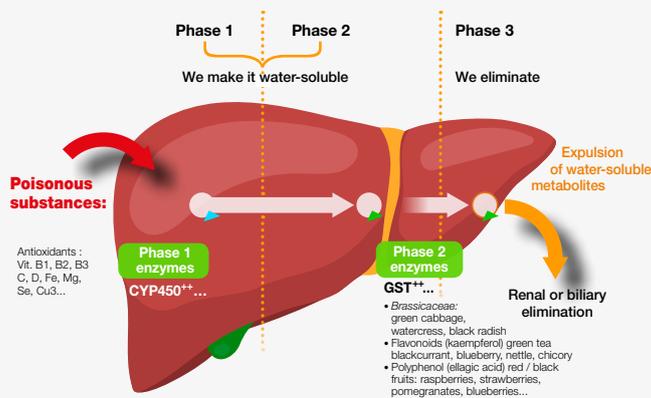
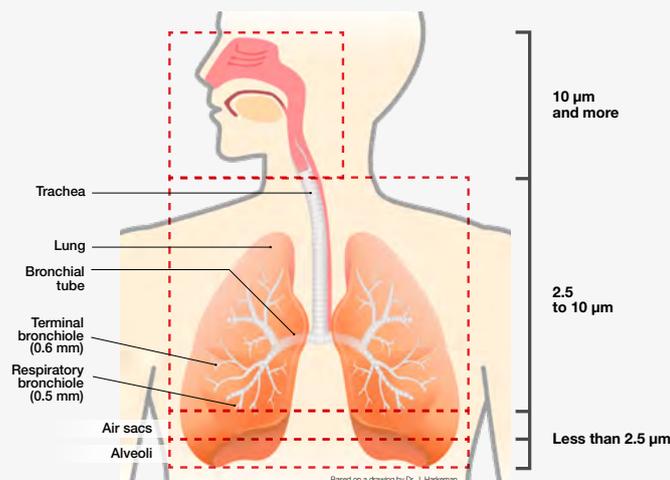
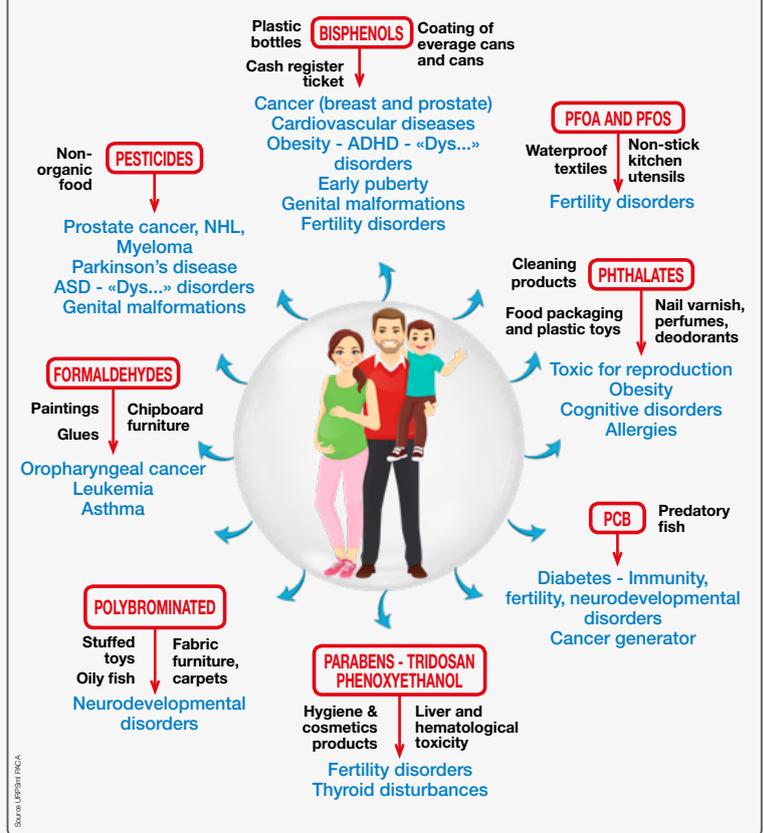


Fig. 1 - In naturopathy, the liver is an essential organ for detoxification



Outdoor air particles are particularly toxic, even carcinogenic, depending on their composition and size. The thinner the particles (nanoparticles), the more they are able to penetrate deep into the pulmonary tree structure and pass through the bloodstream to other organs.

### CHEMICAL CONTAMINATION AND ENDOCRINE DISRUPTERS RISK FACTORS & POSSIBLE CONSEQUENCES



### 5 Learning objectives, treatment solutions, case studies and references

In terms of pollution and intoxication, prevention in Naturopathy remains the most reliable mean, reducing the pollutant or even eradicating the toxic, pathogenic agent, when possible.

Food modification in quantity and especially in quality remains the major element to avoid health risks.

Food reform will have to be individualized according to the identified toxic components. Professionals subject to occupational hazards, exposed to a daily pollutant, must be monitored by a health professional and be subject to specific controls and biological examinations: oxidative stress, homocysteine, vitamin dosage.

Associated with plants, micro-nutritional supplementation is part of the practitioner's therapeutic arsenal: vitamins, minerals... chelators and traps for toxic substances. A sustained action of the hepatic emunctory must always be considered in its phase II, at the level of Cytochromes P450, to boost the enzymatic and detoxification function, with herbal therapy and micronutrition.

Herbal therapy will use plants that contain sulforaphane, stimulating genes of Phase II enzymes with black radish, broccoli, rosemary, silymarin and plants with antioxidant and anti-inflammatory properties such as turmeric.

Kall MA, Vang O, Clausen J. Effects of dietary broccoli on human drug metabolizing activity. Cancer Letters. 1997 Mar 19; 114 (1-2) : 169-7  
 Dosz EB, Jeffery EH. Modifying the processing and handling of frozen broccoli for increased sulforaphane formation. J Food Sci. 2013 Sep;78(9):H1459-63.  
 Chuang SE, Kuo ML, Hsu CH, Chen CR, Lin JK, Lai GM, Hsieh CY, Cheng AL. Curcumin-containing diet inhibits diethylnitrosamine-induced murine hepatocarcinogenesis. Carcinogenesis. 2000 Feb;21(2):331-5.

### Case study 1



**Mr. Pierre, 58, is consulting for the following symptoms:**

migraines, tinnitus, loss of balance and discomfort. He has a treatment composed of antidepressants and thymoregulators.

The hair analysis reveals the following contaminants: Pb, Hg, Cd, due to his active smoking (2 packs of cigarettes per day).

Further anamnesis reveals a patient exposed to halogenated solvents: perchloroethylene, tetrachloroethylene due to his job, in the dry cleaning shop.

**A detoxification protocol through herbal therapy and micro-nutrition is implemented.**

### Case study 2



**P. Antoine, 45** has been suffering for 8 years from the following symptoms: cognitive problems, immediate memory loss, mind blanks, all signs that are reminiscent of Alzheimer's disease.

A biological check up is required: oxidative stress, neurotransmitter profile, fatty acid status, heavy metal rate, all of which come back negative.

**An herbal and nutritional therapy is implemented:**

- Desmodium-Milk thistle complex in herbal medicine to support the detoxifying action of the liver.
- alpha-lipoic acid, sulphurous acid, to induce a response to oxidative stress, being both lipophilic and hydrophilic.

The patient is seen again three months later with a significant improvement in the symptoms previously observed.