



# ENDOCRINE DISRUPTORS

**DATABOOK 2024**

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Endocrine disruptors are substances likely to interact with the endocrine system, causing an impact on health, in particular the development of cancers or human reproductive disorders. They can be found in many everyday consumer goods, including cosmetics. They raise much concern and give rise to multiple reactions, both from the general public and political and health authorities. All this implies many uncertainties as regards a number of ingredients widely used in cosmetics formulas. This dossier provides an update on what should be known about endocrine disruptors.

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# What we know about endocrine disruptors

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When we first started to hear about endocrine disruptors, very little was known about them. It was soon widely acknowledged that they were likely to be harmful for human and animal health and for the environment. But through which action processes, in what quantities, under which conditions, for what type of populations... that was much more confused. Little by little, the knowledge was refined. Update on what we know today.

# ENDOCRINE DISRUPTORS: WHY DO THEY RAISE SO MUCH CONCERN?

**Endocrine disruptors are substances which can affect the endocrine system. Some of them have the ability to mimic the action of hormones or block their receptors. Others hamper their transport, production, or degradation in the body. The possible consequences of these interactions are most worrying, because they vary a lot from one substance to another, from one exposure dose to another, and even from one individual to another... Be it as it may, it is now commonly believed that endocrine disruptors are harmful for health...**

Let's be clear straightaway: the substances that act as endocrine disruptors are most varied, and we are not dealing with heavy chemistry here. Indeed, if some of them are synthetic, others are most natural: soya is actually frequently described as a botanical endocrine disruptor.

And the problem is not really the fact that a substance can have an influence on the endocrine system (many women find the pill very useful), it is rather that today, we are all exposed to many endocrine disruptors, whether we want it or not.

Many of them have already been identified, like alkylphenols, phthalates, Bisphenol A, polychlorinated or organochlorine compounds... which can be found in plastic materials – like in feeding bottles, for Bisphenol A – pesticides, gas emissions from different industries, contaminated water, but also food, sometimes drugs... and a few cosmetics.

At the end of the day, the problem is that nobody is really familiar with this cocktail of interactions and its effects, which it was eventually discovered that they were far from being desired. ### Deleterious effects It is known that the effect of endocrine disruptors is particularly harmful during the embryonic period and early childhood: during this phase, the development and the function-to-be of organs can be disrupted, in particular causing serious malformations and/or disorders in the sexual organs. They are also believed to be responsible for the considerable fertility decline currently observed in more and more Western countries or of the 'wave' of early puberties in little girls. Bees – whole hives are regularly decimated – are also allegedly among the casualties because of the pesticides poured on the flowers they gather pollen from.

Of course, it seems that after the critical embryonic and childhood periods, the body proves much less sensitive to these substances, even when it is exposed at high doses. But, once again, in the first stages of human life, their effects can be terrible, both for the children themselves and for future generations: a study conducted on rats showed that if the mother had been in contact with endocrine disruptors during a critical period, these effects could be detected in her descendants down to the fourth generation...

## **Regulations tricky to implement**

It should be known that the security doses set out to authorize the use of these substances are (just like for all chemical or natural substances) calculated for each of them, independently of the others, and that we all come in contact with several endocrine disruptors on a daily basis – even a considerable number of them, generally speaking.

As a matter of fact, as far as they are concerned, all the usual toxicology principles are jeopardized. For example, it is not really the dose that makes the poison: one given substance can have harmful effects at very low doses, none at medium doses, and then be harmful again at high doses! On the other hand, taken separately, an endocrine disruptor can seem neutral and devoid of any effect. But if it is associated with other endocrine disruptors, together, they have an impact that can prove disastrous. That is the 'cocktail effect' environmental associations have been denouncing for years and scientists are increasingly able to measure today.

Given these most specific properties, it proves much difficult to set up regulations. Assessment strategies have been defined, in France or in Europe. But despite all the research work done and the progress made by scientists, there are still more questions than answers today as regards which substances should be restricted or prohibited, how, and in which product types.

The starting points of all regulations (the famous criteria that help identify an endocrine disruptor the European Commission was to publish) triggered so many controversies and debates that there is now a two-year delay compared to the deadlines initially set out. To date, there is still no clear consensus and nothing specific for cosmetics.

In short, they are still poorly known, their effects are serious and more and more certain, and protective measures are a long time coming: here is the perfect cocktail for them to be scary and rejected by everyone.



# ENDOCRINE DISRUPTORS: A FIRST SUM UP OF THE CURRENT SCIENTIFIC KNOWLEDGE

**The 9th Congrès Parfums et Cosmétiques of the Cosmetic Valley (Conferences on Perfumes and Cosmetics), held in Chartres on 23 and 24 November 2011, is the time for professionals to look at the regulatory environment. A wide topic: the regulatory environment includes very different points, such as animal tests, the registration of raw materials on the European level, marketing claims, packaging ingredients or the sanitary and toxicological safety of products ... Many of the topics regularly in the headlines of media have been talked about during two days; among them, endocrine disruptors.**

Endocrine disruptors, especially Bisphenol A, are said to be dangerous for the human health, in our food or in baby bottles.

Cosmetics are not exempt from this problem. Parabens or phthalates are also questioned about their harmfulness. Legislators and scientists shall provide consumers with, for the former, a regulatory frame assuring the consumers of their safety, for the latter, elements to support political and legislative actions.

It is a major project, yet far from finished. Nevertheless, the due date is already given by the European Cosmetics Regulation, which will apply in lieu of the current Directive in July 2013. In its Article 15, it is written, *“when Community or internationally agreed criteria for identifying substances with endocrine-disrupting properties are available, or at the latest on 11 January 2015, the Commission shall review this Regulation with regard to substances with endocrine-disrupting properties.”*

Nowadays, the problem is to agree on a definition of endocrine disruptors, needed to write a thorough regulation. Indeed, very different substances are involved, with different and poorly known actions and effects on the human body. Nevertheless, our knowledge is increasing, as Robert Barouki, the Manager of the UMR-S 747 (Toxicology, Pharmacology and Cellular Signals) Department of the French Inserm (the French Institute for Health and Medical Research) has shown in Chartres.

## **What is an endocrine disruptor?**

In a didactic manner, Pr Barouki first gave some basics to let us understand better what endocrine disruptors are. He reminded us that, when toxicology is the “science of poisons”, there are poison and poison:

- “historical” poisons: some groups of substances, with acute, easy-to-see and dramatic effects, which are efficient at high doses,
- “modern” poisons: many different groups of substances, which induce chronic and often not very specific effects, and that are efficient at low doses or when mixed together.

It is often quite easy to find the cause for acute pathologies (infections, poisoning...). It is far more difficult with chronic pathologies (allergies, cancers, fertility modification, neurologic or metabolic diseases, fetal or infant development impairment...). Thus, a proof of the link between an exposure to a given substance and a pathology is of the utmost importance. This is the topic of many scientific studies currently performed on endocrine disruptors.

Brought up as soon as 1962 in a book by the biologist Rachel Carson, *Silent Spring*, these substances have been more and more understood along the second half of the 20th century. In 1991, Theo Colborn, a specialist of environmental health, quoted, *“a large number of man-made chemicals as well as a few natural ones have the potential to disrupt the endocrine system of animals, including humans.”*

In 1995, the American Environmental Protection Agency (EPA) gave another definition: *“an exogenous*