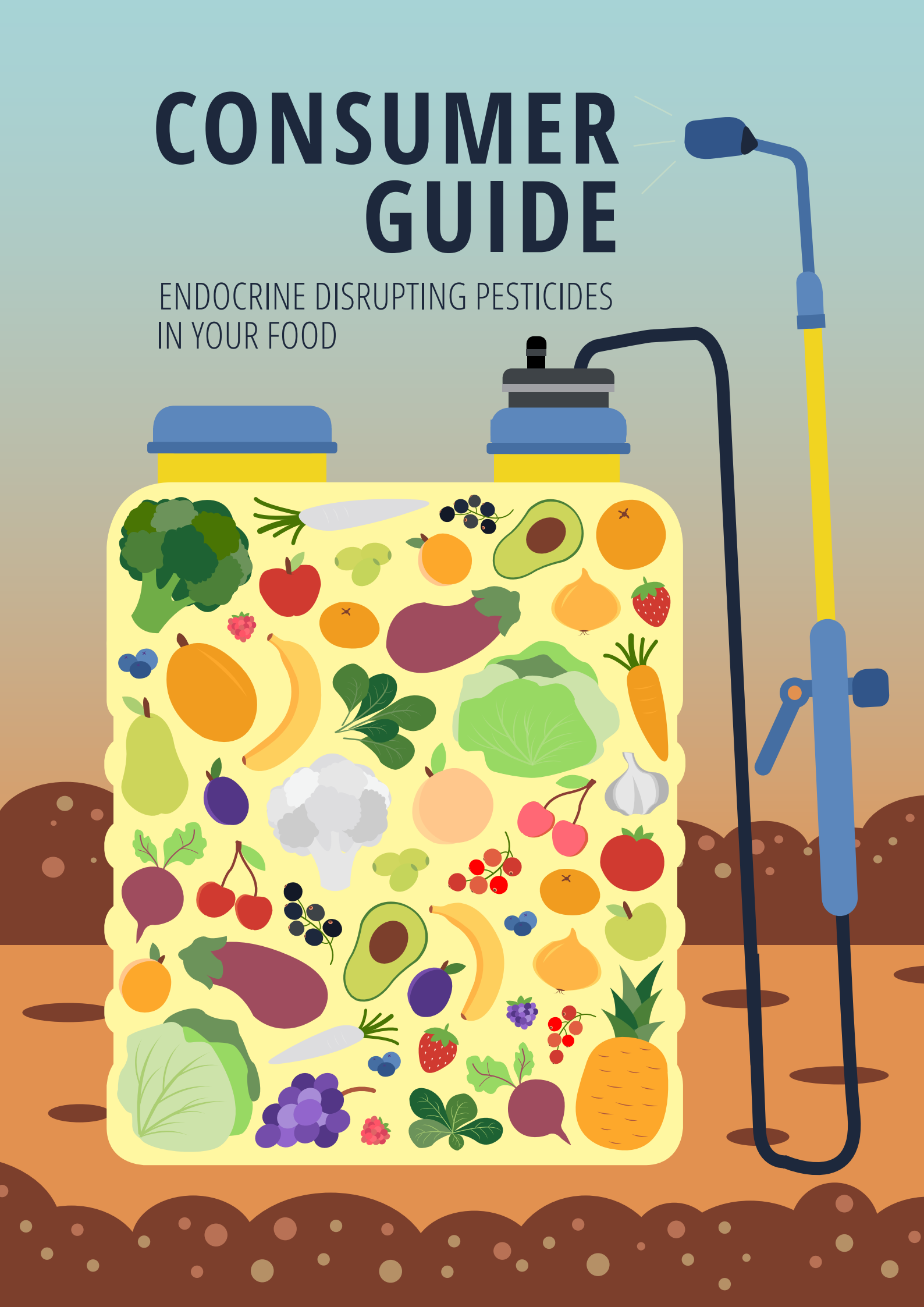
CONSUMER GUIDE

ENDOCRINE DISRUPTING PESTICIDES IN YOUR FOOD



SUMMARY ADVICE

TO AVOID GETTING EXPOSED TO ENDOCRINE DISRUPTING PESTICIDE (EDP'S) RESIDUES

The by far best way to avoid getting exposed to EDP's is eating organic products or products from your own garden.

Washing is always a good idea but generally doesn't help much in reducing pesticides in your food.

Peeling products is good for the part of the pesticides that are on the skin of the products (citrus), but doesn't help for the pesticides that are present inside the product.

If getting hold of organic product is a problem, red-list products should be avoided in all instances (see list in Chapter 7 below) and substituted by products from the green list. For the yellow list we recommend substitution by products from the green list, if possible, as well.

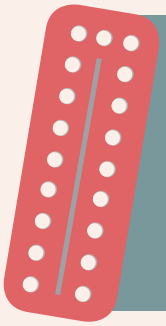
Also take a look at the country of origin (see tables in Chapter 7). There are quite a lot of differences between the countries of origin and the worst performing countries should be avoided.

For the foetus exposure to even the tiniest amount of EDP can be a problem. The foetus is protected by a membrane of course, but this is not designed in the evolution to stop synthetic chemicals unfortunately. Many chemical pass on to the foetus. Our advice is a full zero-tolerance for the unborn (and thus the pregnant woman).

LET'S START WITH SOME EXPLANATION ABOUT THIS ENDOCRINE DISRUPTION THING

HORMONES, ENDOCRINES, WHAT ARE THEY?

Some human hormones are well-known, for example the masculine hormone "**testosterone**". Cheating cyclists take testosterone to be able to ride faster.



To avoid pregnancy, the contraception pill is taken with female-type of hormones such as **oestrogens** and also **progesterone**.

Hormones sound like a miracle and they are. They are synthesised by living organisms to maintain balance in their bodies and ensure that the organism functions well. The human body contains hundreds of hormones to control virtually every element of development, growth and metabolism and play a key role connecting the three main communication systems of the body: the nervous system, the immune system and the endocrine system. Hormones are signal substances and their production gives a signal to copy DNA sections (called genes) and produce proteins that play their role in maintaining a healthy body. Scientists like to refer to the hormones of the endocrine system as chemical messengers.

WHY IS THERE A **CONCERN** **WITH HORMONES?**

The hormone or endocrine system is a very complex system, and the glands are the main organs that produce hormones. For instance the thyroid gland is located in the front of the neck and produces thyroid hormones that are involved in the control of metabolism, cardiovascular system and development.

Testis and ovary are other examples of endocrine glands, that produce sex-steroid hormones that control the development of reproductive organs, reproduction, neural function and metabolic processes. Hormones are also produced in other organs such as the brain, adipose tissue and muscles, among others.

Hormones are produced in tiny amounts and have a highly specific function at very low doses. During the early development of humans, at the stage of a foetus, at the right time, at the right level, the hormones are responsible for crucial tasks in the development of our bodies and all its elements. If something goes wrong with the hormone signals, the foetus can develop sexual abnormalities or other developmental problems or could, later in life, appear to have brain defects and problems with cognition, motility or behaviour.

SO THE BALANCED FUNCTION OF THE HUMAN HORMONES IS CRUCIAL. THEY ARE PART OF AN EXTREMELY SOPHISTICATED SYSTEM DEVELOPED THROUGHOUT MILLIONS OF YEARS OF EVOLUTION. AS LONG AS THE SYSTEM IS UNDISTURBED THEY SMOOTHLY KEEP US HEALTHY.

ENDOCRINE DISRUPTING PESTICIDES AND OTHER CHEMICALS

Humans started synthesising hormones because of their interesting properties, such as for pregnancy prevention or for disrupting the growth of weeds in agricultural fields (so-called growth regulators). But humans also made thousands of other synthetic chemicals that had unintended hormone properties. This went terribly wrong for example with the synthetic Diethylstilbestrol (DES), used as a pharmaceutical for women around 60 years ago to relieve pregnancy symptoms. It turned out (decades later) that many of their daughters who had been exposed as a foetus to DES would develop reproductive organ deformities and cancer.

The notorious pesticide DDT caused egg-shell thinning and massive dying of birds of prey, also by endocrine disruption.

Well known is also a plastic-component, Bisphenol A, that can be found in many consumer goods. These chemicals mimic or interfere the function of human hormone oestrogens. This way they can disrupt the endocrine system causing health problems and disease and therefore called endocrine disruptors. Ultimately these chemicals disturb the function of the finely-tuned endocrine system and 'can create havoc'.

For the around 500 pesticides on the EU market we don't have a good idea of how many of them have endocrine disrupting properties. Industry was not required to test them so far and even if they provide such information, it is unlikely they will share it with the public or EU Regulators, as their priority is to protect their profits. EU Commission seems to hesitate to require industry to do all the available relevant testing for endocrine disruption and helps to keep the safety assessment costs for industry low. **But for around 50 pesticides independent scientists from the academic sectors have already published research providing evidence that they disturb the endocrine system of humans and other animals.**

AND **WHERE ARE** THE POLITICIANS THAT THE PUBLIC VOTE TO **PROTECT US?**

Endocrine disruption is a phenomenon that is widely recognised by scientists from before the 90-ies. As always, bad news takes a long time to be incorporated in the political agenda. Decades went by before action was taken against asbestos, radiation, smoking, DDT and other irresponsible production by profit-generating companies. On endocrine disruptors politicians in EU, driven by a push from the European Parliament, agreed on a Regulation in 2009 to ban all human exposure to endocrine disrupting pesticides as well as exposure to non-target organisms. A "no exposure" policy that is unique in the world. The 28 national governments (except the UK), and especially their ministries of agriculture, were less helpful to endorse these rules, but they did in the end.

SO EVERYTHING IS FINE AND **ALL** ENDOCRINE DISRUPTING **PESTICIDES (EDPS)** HAVE BEEN BANNED?

Unfortunately no. While the Regulation is clear, the implementation of the rules has not yet been fulfilled, not even 10 years after the establishment of the Regulation. The process in fact has turned into a nightmare. The reason for this delay is the unprecedented lobby from industry sector, EU trade partners like US and Australia, and even part of the Commission services themselves. The Commission's Secretary-General acted in a very undermining role for the EDP policy and several EU Commission services such as Trade, Enterprise and Agriculture as well. In the end, this impressive force of destruction to promote trade interests over the health of EU citizens did not succeed to completely destroy the legal mandate. Due to the fact that EU parliament kept on resisting, the legal mandate to ban EDPs is still there, but the 'dark forces' managed to water down the rules to make it more difficult to ban endocrine disrupting pesticides (EDPs). As a result, at this moment, many endocrine disrupting pesticides are still on the market and in the food in our (super)markets. The legal mandate, "no exposure to EDPs" is still pending and therefore the consumers are still subject to big risks.

WHAT ARE THE **DANGERS**
OF ENDOCRINE DISRUPTING PESTICIDES (EDPS)?

Since EDP's have the capacity to disrupt the function of the endocrine system, they may trigger adverse effects. The table below gives an impression of what health effects EDPs and endocrine disruptors in general may cause. These serious health effects linked to EDPs justify the rules imposed by our politicians to decide against any exposure to these chemicals. The biggest danger is for the developing foetus. Interfering with hormone signalling can result in irreversible harm to the foetus, where dysfunction later in life that cannot be repaired anymore. The protection of the foetus therefore should be the number one priority. Foetuses are generally exposed to the endocrine disrupting chemicals via their mothers as the placenta is not a sufficient barrier for these chemicals.

OVEVIEW OF HUMAN DISEASES ASSOCIATED WITH ENDOCRINE DISRUPTION

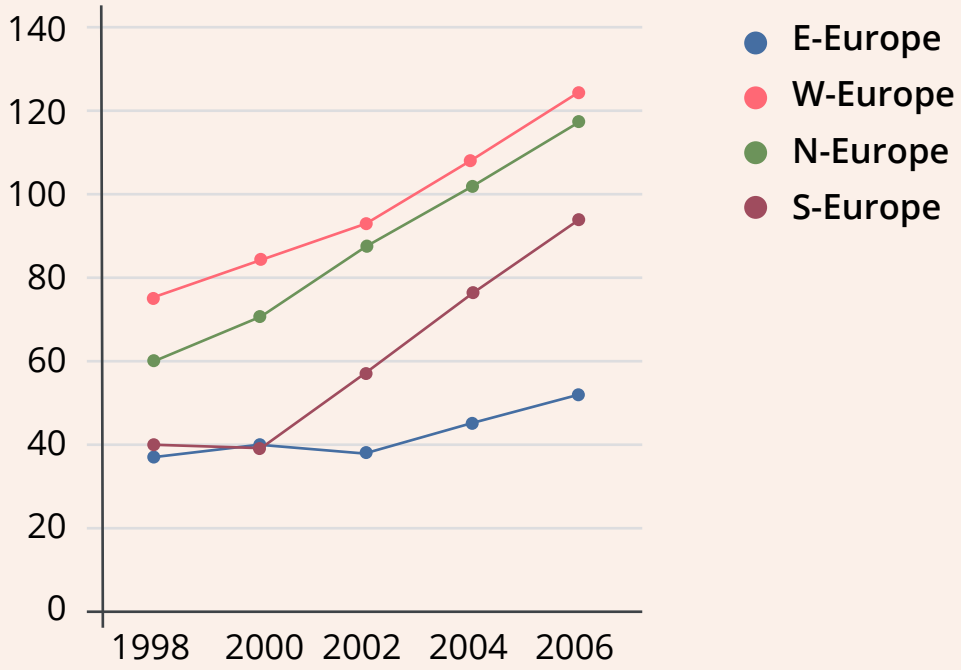
ADVERSE OUTCOMES	SPECIFIC OUTCOMES
Male Reproductive Health	Reduced semen quality and function
	Cryptorchildism
	Hypospadias
	Benign Prostatic Hyperplasia (BPH)
Male and Female Reprodictive Health	Impotence for both sexes
Female Reproductive Health	PCOS
	Uterine fibroids
	Endometriosis
	Precocious puberty
	Fecundity
	Adverse pregnancy outcomes
	Menoppause-related
Hormone cancer	Female breast cancer
	Male breast cancer
	Prostate cancer
	Testis cancer
	Thyroid cancer
	Ovarian cancer
	Endometrial cancer
	Fallopian cancer
	Liver cancers (Steroid induced)

Metabolic dysfunction	Obesity
	Diabetes
	Metabolic syndrome
Neuro development	Hypothyroxinemia
	Autism
	ADHD
	Neural defects
	Cortisol Axis (potential)
	Mental health
	Neurodegenerative Disease / Peripheral neurophaty
	Altered stress response
Immune, Autoimmune and Inflammatory disorders	Hashimoto
	Immune dysfunction
	Autoimmune
	Chronic inflammation
	Immune suppression
	Asthma
	Allergies
Retinoid Target Malformations	Craniofacial / cleft palate
Other	Cardiovascular disease
	Respiratory disease
	Osteoporosis
	Blood pressure
	Tachycardia

Hormone-related cancers, such as breast cancer for woman and prostate cancer for man, are also a prime concern. These types of cancer rise at an incredible speed, much more than can be explained by aging of the population. The only explanation is that environmental pollution with synthetic hormones causes the rise in these types of cancer.

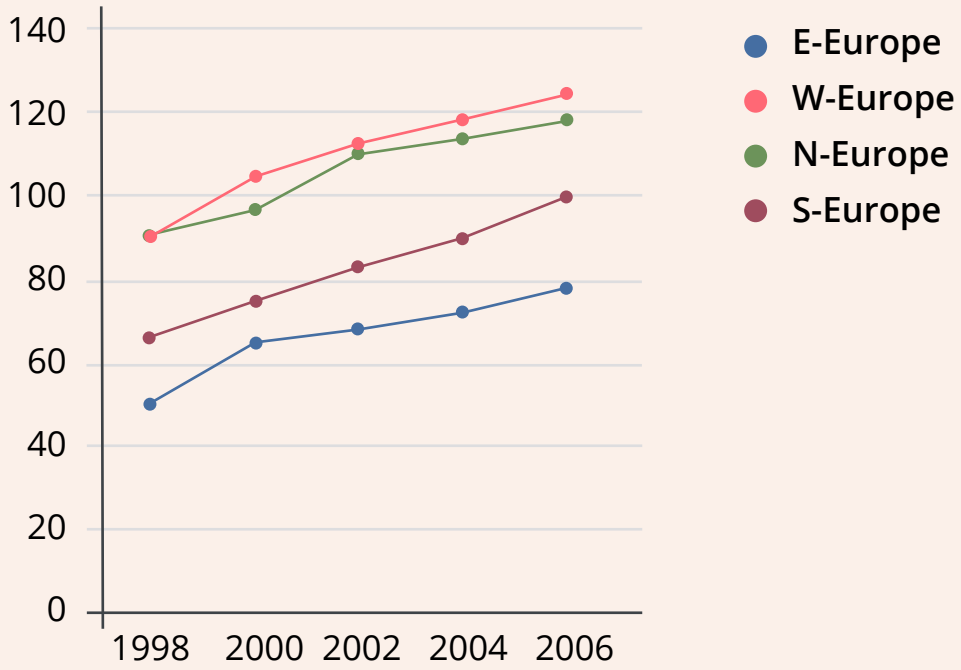
PROSTATE CANCER CASES

(standardised for age; cases per 100.000)



BREAST CANCER CASES

(standardised for age; cases per 100.000)



OUR ADVICE ON HOW TO AVOID THESE **DANGEROUS CHEMICALS**

What food items contain EDPs?

It is sad to note that European fruit and vegetables in the (super)markets still contain EDPs. Your politicians already in 2009 decided that people should not be exposed to EDP's. And they did this for a good reason, to protect your health!

Since EU Commission and a range of EU countries at the implementation stage of the rules appeared to care more about profits from companies, the situation is that EDPs are present in your food. This means, for the time being, you have to protect yourself.

Based on monitor data of food sampled in supermarkets and other food outlets in all European member states, published by Food Authority EFSA in Parma and data taken from an analysis of JRC, the European Joint Research Centre, we can derive what food products are high or low on EDP's. We thus made a "red list" of products to be avoided in (super)markets and other outlets, an "green list" of products that can be safely eaten, at least for adults, even if it comes from industrial agricultures with pesticide spraying, and a "yellow list" of intermediate concern. The most recent data are from 2017 (EFSA) but will still give a good picture of the risks.

RED LIST OF FRUIT AND VEGETABLES

40-70% of the product with EDP's, with the most polluted country of origin and highest cocktail of EDP's

Product	Average % of EDP's analysed	Highest % of EDP's of some origins	Highest nr of EDP's analysed in one product
Lamb's lettuce	67%	Belgium 94% Germany 77%	6
Baby leaf crops	66%	Spain 69% Italy, 62%	3
Parsley roots	60%	Poland 46%	6
Currents	56%	Germany 90%	7
Cherries	50%	Chili 100% France 93%	7
Pears	49%	Belgium 92% Portugal 84%	7
Kales	45%	Spain 74%	3
Peaches	42%	Chili 94% South Africa 73%	9
Strawberries	41%	Belgium 95% Greece 85% Netherlands 80%	5
Apricots	40%	Greece 66% France 63%	7

YELLOW LIST OF FRUIT AND VEGETABLES

10- 40 % of the product with EDP's

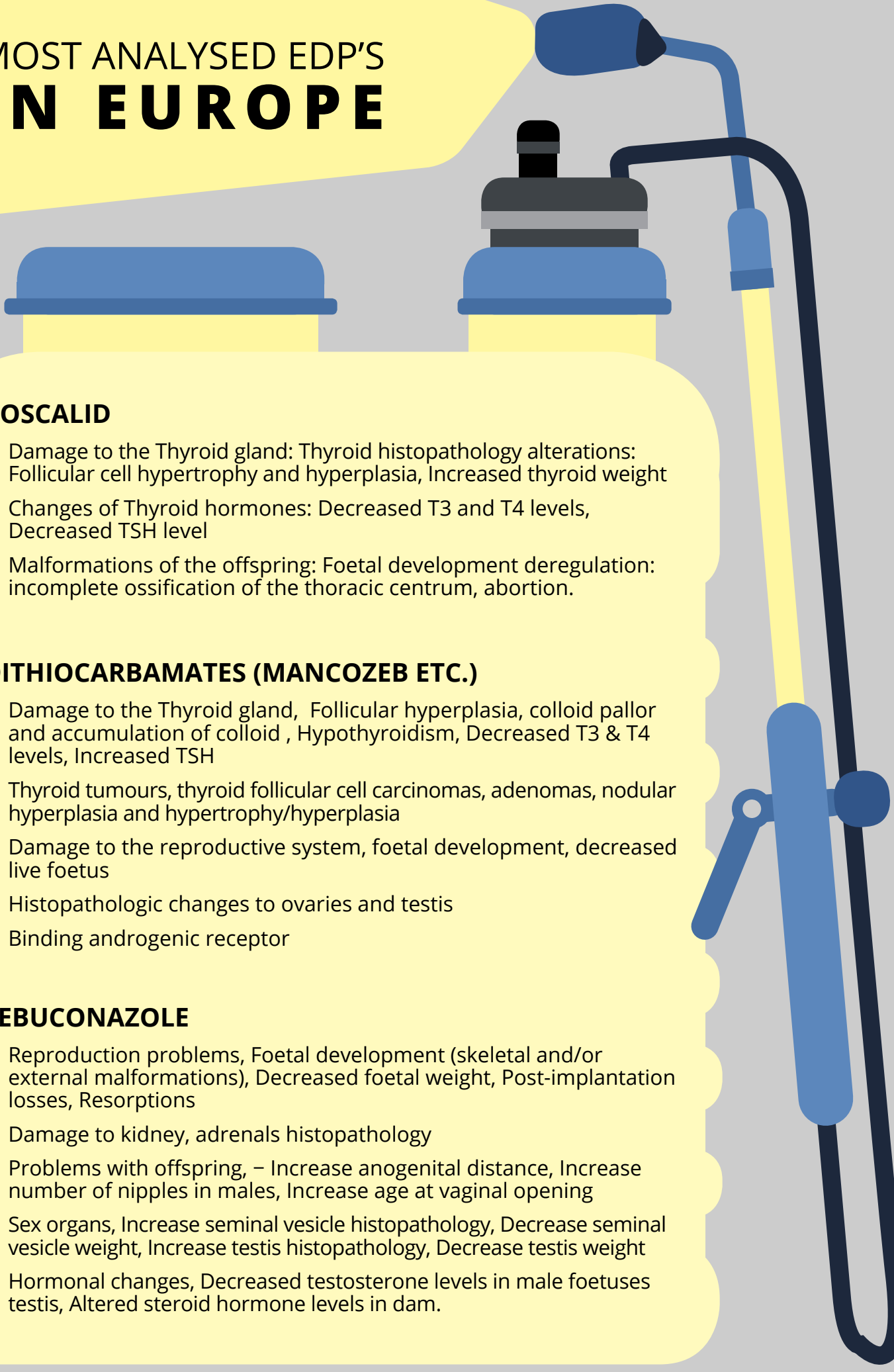
Product	Average % of EDP's analysed	Highest % of EDP's of some origins	Highest nr of EDP's analysed in one product
Blackberries	37%	Germany 86%	4
Table grapes	34%	Chili 88%, Peru 86%	8
Carrots	32%	Portugal 52%, Belgium 45%	6
Parsley	30%	Portugal, Spain 64%	8
Apples	28%	Brazil 100%, UK 88%	8
Lettuce	27%	France 93%, Netherlands 54%	10
Blueberries	25%	Spain 38%	1
Plums	24%	Poland 53%, Chili 43%	7
Celeries	23%	Spain 65%	5
Radishes	19%	Netherlands 42%	3
Raspberries	17%		
Spinach	17%	Netherlands 32% Portugal 32%	5
Tomatoes	16%	Dominican Rep. 85% Portugal 78%	8
Oranges	4%	Argentina 100% Marocco 90% South Africa 86%,	8
Kiwi	14%	Portugal 27%	5
Beans with pod	14%	Portugal 58%, UK 46%	4
Sweet pepper	12%	Marocco 38%, Spain 35%	5
Bananas	12%	Panama 100%, Costa Rica 90% Suriname 80%	4

GREEN LIST OF FRUIT AND VEGETABLES

less than 10% of the product with EDP's

Product	Average % of EDP's analysed	Highest % of EDP's of some origins	Highest nr of EDP's analysed in one product
Head cabbage	9%	Austria 26%, Czech 26%	4
Broccoli	9%	Spain 15%	4
Garlic	8%	France 24%	2
Rice	7%	Portugal 85%, UK 72%	4
Aubergine	7%	Italy 20%	5
Mandarins	7%	Morocco 98%, Peru 96% S-Africa 88%	7
Cucumbers	7%	Portugal 53% Greece 51%	6
Cauliflower	6%	Portugal 60%	5
Courgettes	6%	Spain 29%	5
Mangoes	5%	Peru 69%	4
Onions	5%	Peru 70%, Portugal 44%	4
Watermelons	3%	-	1
Pineapples	3%	Ghana 55%, Costa Rica 35%	1
Maize	1%	France 12%	2
Cereals	0%	-	
Olives	0%	-	
Potatoes	0%	Portugal 64%	2
Avocados	0%	-	

MOST ANALYSED EDP'S IN EUROPE



BOSCALID

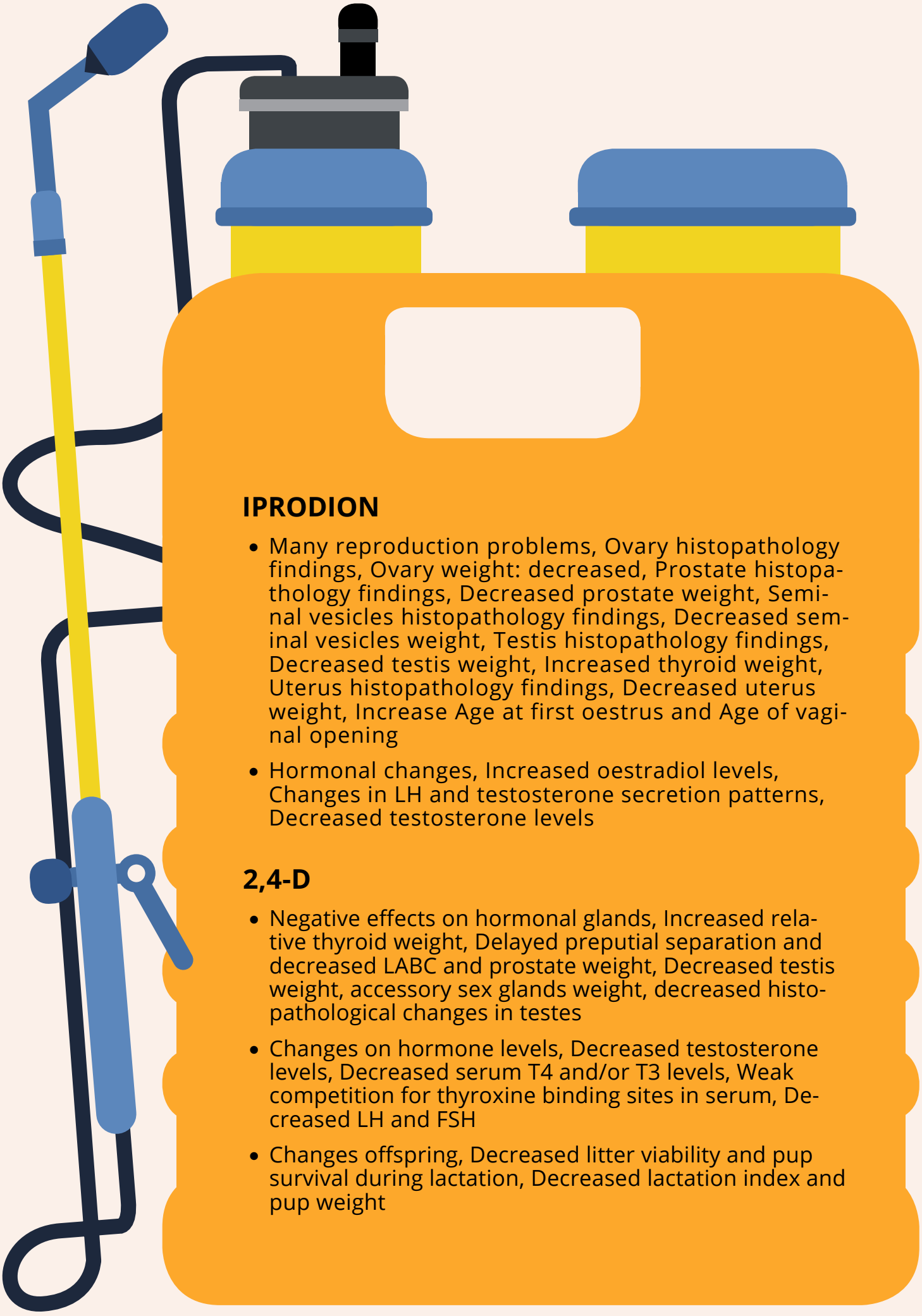
- Damage to the Thyroid gland: Thyroid histopathology alterations: Follicular cell hypertrophy and hyperplasia, Increased thyroid weight
- Changes of Thyroid hormones: Decreased T3 and T4 levels, Decreased TSH level
- Malformations of the offspring: Foetal development deregulation: incomplete ossification of the thoracic centrum, abortion.

DITHIOCARBAMATES (MANCOZEB ETC.)

- Damage to the Thyroid gland, Follicular hyperplasia, colloid pallor and accumulation of colloid , Hypothyroidism, Decreased T3 & T4 levels, Increased TSH
- Thyroid tumours, thyroid follicular cell carcinomas, adenomas, nodular hyperplasia and hypertrophy/hyperplasia
- Damage to the reproductive system, foetal development, decreased live foetus
- Histopathologic changes to ovaries and testis
- Binding androgenic receptor

TEBUCONAZOLE

- Reproduction problems, Foetal development (skeletal and/or external malformations), Decreased foetal weight, Post-implantation losses, Resorptions
- Damage to kidney, adrenals histopathology
- Problems with offspring, − Increase anogenital distance, Increase number of nipples in males, Increase age at vaginal opening
- Sex organs, Increase seminal vesicle histopathology, Decrease seminal vesicle weight, Increase testis histopathology, Decrease testis weight
- Hormonal changes, Decreased testosterone levels in male foetuses testis, Altered steroid hormone levels in dam.



IPRODION

- Many reproduction problems, Ovary histopathology findings, Ovary weight: decreased, Prostate histopathology findings, Decreased prostate weight, Seminal vesicles histopathology findings, Decreased seminal vesicles weight, Testis histopathology findings, Decreased testis weight, Increased thyroid weight, Uterus histopathology findings, Decreased uterus weight, Increase Age at first oestrus and Age of vaginal opening
- Hormonal changes, Increased oestradiol levels, Changes in LH and testosterone secretion patterns, Decreased testosterone levels

2,4-D

- Negative effects on hormonal glands, Increased relative thyroid weight, Delayed preputial separation and decreased LABC and prostate weight, Decreased testis weight, accessory sex glands weight, decreased histopathological changes in testes
- Changes on hormone levels, Decreased testosterone levels, Decreased serum T4 and/or T3 levels, Weak competition for thyroxine binding sites in serum, Decreased LH and FSH
- Changes offspring, Decreased litter viability and pup survival during lactation, Decreased lactation index and pup weight

HOW TO AVOID EXPOSURE TO EDP'S?

The by far best way to avoid getting exposed to EDP's is eating organic products or products from your own garden.

Washing is always a good idea but generally doesn't help much in reducing pesticides in your food.

Peeling products is good for the part of the pesticides that are on the skin of the products (citrus), but doesn't help for the pesticides that are present inside the product.

If getting hold of organic product is a problem, red-list products should be avoided in all instances and substituted by products from the green list. For the yellow list we recommend substitution by products from the green list, if possible, as well.

Also take a look at the country of origin (see tables). There are quite a lot of differences between the countries of origin and the worst performing countries should be avoided.

WHAT IS THE ADVICE
FOR PREGNANT WOMAN AND BABIES?

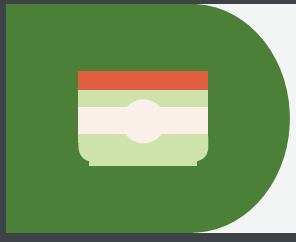
For the foetus exposure to even the tiniest amount of EDP can be a problem. The foetus is protected by a membrane of course, but this is not designed in the evolution to stop synthetic chemicals unfortunately. Many chemical pass on to the foetus. Our advice is a full zero-tolerance for the unborn (and thus the pregnant woman).

WHAT MORE PRODUCTS TO WORRY ABOUT BEYOND PESTICIDES?

Many daily household products contain endocrine disrupting chemicals unfortunately. Companies generally do not pay much attention to these dangerous chemicals and you have to look out for yourself.

Here are some of the main products you have to do the check yourself:

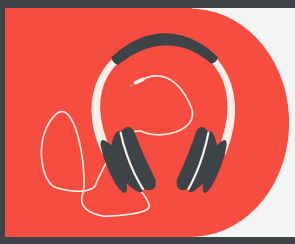
Many whitening toothpaste contain the hormone disruptors, **Triclosan** or **Propylparaben**. Try to avoid these toothpaste's.



Beauty balms may contain the hormone disruptors **Propylparaben** and **Butylparaben**. Watch out.

We understand it will be difficult to find out about all the dangers of products. But try to ask questions in the shops. This will surely help.

Children's jackets might contain the hormone disruptor **PFOA**. Difficult to find out. Ask the shop.

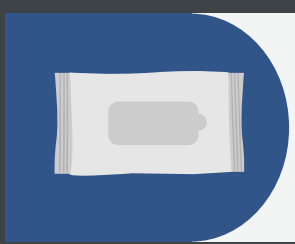


Headphones could contain the hormone disruptor **Phthalate**. Ask the provider.

Water bottles could contain the hormone disruptors **Bisphenol A** and **Phthalate**. Better avoid this plastic products. Also soda cans could contain **Bisphenol A**.

Chewing gum could contain additives that can act as an hormone disruptors, just as Take-away food wrapping

Teddy bears could contain the hormone disruptor **Nonylphenol ethoxylate**.



Baby wipes with parabens, anti-aging cremes with parabens, we could go on for a while.