BEUC The European Consumer Organisation

The Consumer Voice in Europe

ICRT INTERNATIONAL CONSUMER RESEARCH & TESTING

Endocrine disrupting chemicals – analysis of 66 everyday cosmetic and personal care products

Contact: **Sylvia Maurer - safety@beuc.eu**
Davide Nardi - davide.nardi@international-testing.org

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BUREAU EUROPÉEN DES UNIONS DE CONSOMMATEURS AISBL | DER EUROPÄISCHE VERBRAUCHERVERBAND
Rue d'Arlon 80, B-1040 Brussels • Tel. +32 (0)2 743 15 90 • Fax +32 (0)2 740 28 02 • consumers@beuc.eu • www.beuc.eu
EC register for interest representatives: identification number 9505781573-45

Summary

BEUC, the European Consumer Organisation and ICRT, International Consumer Research and Testing, joined forces in 2012 with several of our joint members to check endocrine disrupting chemicals in cosmetic products.

After having screened the ingredient labels on cosmetic products in shops, we selected 66 products which indicated one or several substances which are known or suspected endocrine disrupters such as preservatives, emulsifiers, UV-filters or antibacterial agents.

The 66 product have been sent to an independent laboratory for a quantitative analysis.

Based on the test results, we established different user scenarios and worked together with several scientists which are experts in the field of endocrinology to find out how much of possibly hazardous chemicals could end up in our bodies if we apply many different cosmetic products to our skin in one day.

This paper summarizes the main findings of our project.

While no product exceeded current legally binding limit values for cosmetic products, a hypothetical risk for consumers could exist when the combined exposure to many different cosmetic products is taken into account.

Introduction

Over the last decades, chemicals which may alter our hormone systems, so-called endocrine disrupting chemicals (EDCs), are increasingly at the focus of consumer organisations - having conducted tests on a range of products from toys to suitcases. Their effort contributed to important regulatory changes such as the ban on phthalates on toys in 1999.

In November 2009, the Danish consumer organisation *Forbrugerrådet* initiated a campaign named "Forbyd hormonkemi" focusing on EDCs in cosmetics and personal care products. This campaign was later successfully reproduced in Switzerland by the Fédération Romande des Consommateurs. The Norwegian Consumer Council programmed a smart phone app to inform consumers about EDCs in specific cosmetic products.

In 2011, the Danish Consumer Council, the Capital Region of Denmark and BEUC organised a conference on endocrine disrupting chemicals in cosmetics at the European Parliament which was hosted by MEP Christel Schaldemose. One of the outcomes of this conference was a call on Members of the European Parliament to draft an own initiative report on EDCs.

Building upon this previous expertise, several consumer organisations active at national, European and international level joined forces in 2012 to further investigate our daily exposure to chemicals which may negatively interfere with our own hormones[1].

1. The Project – scope and goals

The above-mentioned project is co-funded by the European Environment and Health Initiative (EEHI) and aims at unveiling the combined exposure of women to EDCs through daily contact with best-selling cosmetics. A growing body of evidence suggests that cumulative exposure to these chemicals – many of which are already on a priority list of chemicals with hormone disrupting properties established by the European Commission[2] – may disrupt the human hormonal system[3]. For the purposes of the project, 66 popular cosmetics were subject to advanced laboratory analysis.

The project has two major goals:

1) Awareness rising of consumer through articles in consumer magazines in different countries across the EU.
2) Formulating and contributing our policy demands to the ongoing EU debate on better regulating EDCs and developing a revised EU strategy on endocrine disrupters.

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[1] The project team was made up of International Consumer Research and Testing (ICRT), The European Consumer Organisation (BEUC), Fédération Romande des Consommateurs (Switzerland), Forbrugerradet (Denmark), UFC – Que Choisir (France), Which? (UK). A wider group of organisations joined with follow-up activities on the project results such as Altroconsumo (Italy), Deco (Portugal), OCU (Spain) and Test-Achats (Belgium). We thank the European Environment Health Initiative (EEHI), the Oak Foundation and the Jenifer Altman Foundation for their support to our work on EDCs.

[2] http://ec.europa.eu/environment/endocrine/strategy/substances_en.htm#priority_list

[3] State of the Art Assessment of endocrine disrupters, http://ec.europa.eu/environment/endocrine/documents/4_SOTA%20EDC%20Final%20Report%20V3%206%20Feb%2012.pdf

Therefore we wanted to test a range of best-selling cosmetics to find out:

- How much of the substances is contained in each product?
- Are manufacturers compliant with the legislation?
- Is the label correct?
- How high could the combined exposure be in a worse-case scenario?

1.1 Consumer group at focus

Although all men, women and children are exposed to EDCs, this project focuses on women as they are commonly considered to be the primary users of multiple cosmetic products. Most importantly, exposure of women during pregnancy may adversely influence the foetus even at a later stage of its life. However, it must not be forgotten that products marketed to women such as body lotion, soap, shower gel, toothpaste or sunscreen are used by the whole family.

1.2 Selection of products

We first studied the ingredient labels (INCI list) of a wide range of products in shops. Based on studying the label, we purchased a total of 66 products which were sent to the laboratory. The product categories selected for the purposes of this project represent a "minimum common denominator" of what can be found in most household bathrooms. They all belong to international brands with a considerable market share in order to enhance the market overlap between the participating countries.

Category	Number of products tested
Body lotion	6
Deo Aerosol	3
Deo non-spray	3
Eye shadow	1
Face-cream	6
Foundation - liquid	7
Hair conditioner	2
Hair styling product	2
Handcream	1
Handsoap	5
Lipstick, Lip salve	5
Make-up remover	1
Mascara	1
Mouth wash	1
Nail polish	4
Shampoo	5

Shower Gel	6
Suncream	5
Toothpaste	2
Total	**66**

1.3 Substances analysed

We focused on preservatives, antibacterial agents, UV-filters and emulsifiers and have selected the following 20 substances for the analysis:

Substance in ingredient list (INCI)	cas no	Function	Endocrine disrupter?
Cyclotetrasiloxane	556-67-2	hair and skin conditioning, emollient, solvent	known ED
Cyclopentasiloxane	541-02-6	hair and skin conditioning, emollient, solvent	suspected ED
Cyclohexasiloxane	540-97-6	hair and skin conditioning, emollient, solvent	no; used as replacement
Cyclomethicone	69430-24-6 / 556-67-2 / 541-02-6 / 540-97-6	hair and skin conditioning, emollient, solvent	suspected ED
Methylparaben	99-76-3	preservative	suspected ED
Ethylparaben	120-47-8	preservative	suspected ED
Propylparaben	94-13-3	preservative and perfuming	known ED
Butylparaben	94-26-8	preservative and masking	known ED
Isopropylparaben	4191-73-5	preservative	known ED
Isobutylparaben	4247-02-3	preservative	known ED
Phenoxyethanol	122-99-6	preservative	no; used as replacement
Hydroxycinnamic acid (PCA)	7400-08-0	skin conditioning	known ED
Butyl hydroxyanisole (BHA)	25013-16-5	antioxidant /masking	known ED
Butyl hydroxytoluene (BHT)	128-37-0	antioxidant /masking	no; used as replacement
Ethylhexyl methoxycinnamate	5466-77-3	UV absorber /UV filter	known ED
Benzophenone-1	131-56-6	UV absorber	known ED
Benzophenone-2	131-55-5	masking and UV absorber	known ED
Benzophenone-3	131-57-7	UV absorber /UV filter	known ED
Benzophenone-4	4065-45-6	UV absorber /UV filter	known ED
Triclosan	3380-34-5	deodorant, preservative	known ED

Among these molecules, some have known endocrine disrupting effects, others are only suspected to have such effects. In addition, we also added some substances which are not necessarily EDCs but which are frequently used as replacements. In case they were not at least suspected to have an effect on the endocrine system, they have not been taken into account later on when we calculated the potential exposure.

1.4 Lab methodology

Chromatography refers to a set of laboratory techniques for the separation of mixtures. For different substances, different analytic techniques have been used:

- Gas chromatography coupled with mass spectrometry (GC-MS) for siloxanes.
- High performance liquid chromatography coupled with a diode array detector (HPLC-DAD) was used preservatives and UV-filters.
- Liquid chromatography–mass spectrometry (LC-MS) was used for triclosan.

1.5 Test results

From our lab analysis no product was found to exceed the maximum concentration allowed for each substance based on the EU Cosmetics Regulation EC 1223/2009.

In one case, the maximum concentration recommended by SCCS for propylparaben (0.19%) has been exceeded but the product is still compliant with current legal limit values.

Some surprising findings:

The highest concentration of ethylhexyl-methocinnamate, a UV filter is found……. in face cream and not in a sunscreen.

- The highest concentration of the UV filter benzophenone-3 is found …

  … in a deodorant.

- The highest concentration of the UV filter benzophenone-4 was found …

  … in a handsoap.

One can wonder why a UV filter should be present in a deodorant spray. We asked manufacturers who explained that this UV absorber is used for the protection of the perfume used in the formula. The similar answer was given related to the handsoap where the UV filter was present to protect the color of the handsoap.

Which ingredients have been found most often?

The most frequent substance found in the ingredient list is methylparaben appearing in a total of 40 products, followed by propylparaben which appears in 38 products. Phenoxyethanol has been observed to be used more and more as a replacement for parabens and was spotted in 30 products. The substance BHT was present in 21 products. UV filters are also quite common: ethylhexyl methoxycinnamate is present in 18 products. The use of triclosan seems to be much less widespread nowadays as it was found only in two products.

Was the label correct?

In three cases, substances that did not appear in the ingredient list have been measured by the lab. On the other hand, the analysis revealed that a number of substances included in the ingredient list were below the detection limit at the lab. The explanation might be linked to the fact that manufacturers tend to add one or two preservatives on the ingredient list thinking that the raw material used for the formula could contain them. In total, we found 39 cases where ingredients were labelled but not detected in the products.

Mixture of preservatives?

For each product that contained at least one paraben, we measured all parabens as often manufacturers use a mix of them in order to create a synergic effect.

1.6 Exposure calculation

As we were interested to find out to how many EDCs and in which quantities a consumer could in a worst-case scenario be exposed, we developed an exposure assessment scenario based on SCCS opinions - if existing - and in collaboration with knowledgeable scientists in the field of endocrinology.

To make an assessment of the exposure, several factors have to be taken into account:

- The type of product.
- The frequency of use by day, for an average exposure or a higher exposure as for example some consumers use face cream once a day, while others might use it twice a day.
- The average amount of product used per application.
- The retention/dilution factor which depends on the type of product (rinse-off or leave on products) and the part of the body (skin or hair).

To calculate the exposure scenarios, we used the following methodology:

- We identified a product in each category which had the highest amount of a certain substance.
- We made two user scenarios. One in which a women uses a combination of these products with a lower/average frequency and one with a higher frequency. For example, some women use face cream once per day whereas others use it twice. We made scenarios both with and without sunscreen as sunscreen is usually used on a large body surface and therefore may be a major contributor to the exposure. However, it is not used every day.
- We calculated the external total daily exposure per kilogram bodyweight for a bodyweight of 60kg according to the exposure values found in the literature.
- As the skin acts as a barrier, only a fraction of the substance will be absorbed by the skin, and lead to internal exposure. To find more about the fraction that is taken up by our bodies and therefore relevant to assess a possible risk, we consulted several scientists who are specialised in the field of endocrinology.

Conclusions

- Based on the exposure scenario, we concluded that for some scenarios the overall amount of cosmetics we use during a normal day might reach or exceed the amount of substances which is considered to be safe. Therefore potential effects on our endocrine system cannot be excluded. This is especially the case when we not only add the risk of each substance from different products but also take into account the combined risk different substances which behave in a similar way.

- The largest contributors to the exposure are products that are left on the skin for a long time such as body lotion, face cream and sunscreen and which contain ethylhexyl methocinnamate and propylparaben. Even though triclosan has only been used in two products the substance can contribute to the overall exposure if present.

- The list of cosmetic ingredients on a specific product did not always correspond to the findings of the lab.

- More research is needed to fill in existing knowledge gaps. For example, for certain molecules there is a lack of information regarding skin penetration, hence several uncertainties remain with regard to their contribution to the overall exposure.

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