

Endocrine Disruptors from Cosmetic Products: Health Impacts and Regulatory Methods

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Received: March 19, 2018; **Published:** April 02, 2018

Endocrine disruptors are chemicals that can produce adverse effects on endocrine system via disrupting its functions [1]. The potential negative impacts of these chemicals include developmental and neurological disorders, infertility and increased cancer risk [1-3]. Humans are exposed to endocrine disrupting compounds from many sources such as food, water, cosmetics and personal care products. These chemicals enter the human body's via inhalation, ingestion, dermal contact and from the biological transfer from placenta or mother's milk [4]. Parabens and phthalates are the most concerned harmful chemicals that are used in cosmetics and personal care products. These compounds are of increasing importance in chemical regulations worldwide.

Phthalates are synthetic chemicals that are most commonly used in manufacturing of food packaging, plastic products, paints, toys and personal care products e.g. perfumes and hair sprays. These chemicals have several adverse impacts on human health including carcinogenicity and reproductive toxicity in animals. Recent studies showed a correlation between exposure to phthalates and incidence of asthma and obesity in children [5].

Parabens are alkyl esters of p-hydroxybenzoic acids that are widely used in personal care products as preservatives due to their broad spectrum antimicrobial activity [6]. Prolonged exposure to these compounds can impact human health and lead to many adverse effects such as allergy, endocrine disruption, neurotoxicity, birth defects or cancers [1]. Parabens showed a weakly estrogenic activity in some *in-vitro* screening tests such as ligand binding to the estrogen receptor, regulation of CAT gene expression, and proliferation of MCF-7 cells [7]. They also showed some estrogenic activities in vivo studies such as increased uterine weight [7].

The widespread of manufacturing of cosmetics and personal care products in the last century resulted in an increased exposure to a wide variety of these xenobiotics that can cause adverse health effects on consumers.

In Europe, safety assessments are based on the safety of the ingredients contained in each cosmetic product [8]. The daily exposure value for all cosmetic products that one person can apply on the skin per day estimated by the Scientific Committee on Cosmetic Products and Non-food products intended for Consumers (SCCNFP) is 17.4 g/day [8].

For the establishment of distributions of use for populations, data on use prevalence and use frequency of personal care products are needed. For example, it has been reported that for the Dutch population, women used seventeen products per day and on the other hand men used seven on average. Another survey has been conducted among more than 2300 people in the United States showed that, on average, women used twelve products daily and men used six products per day [9].

Information on the levels of phthalates and parabens in cosmetic and personal care products are needed for estimating the potential human exposure through use of these products. European Union states that the maximum concentration of single paraben allowed in a cosmetic product is 0.4% (w/w) and 0.8% (w/w) for paraben mixtures [10]. Therefore, the development of analytical methods for the assessment of parabens and phthalates content in cosmetic products is demanded for consumer health. The number of methodologies developed for the determination of endocrine disruptors in personal care products have been dramatically increased using different techniques such as gas chromatography [11] and high performance liquid chromatography [12-14]. Several studies have reported high concentrations of parabens and phthalates in cosmetic products, therefore quality controls are highly recommended for cosmetics and personal care products especially for leave-on products and eye products that designed to be in long contact with the skin of eyelids. Also, consumers should be enlighten on the harmful chemicals contained in these products. Governments and concerned authorities should implement regulatory systems to limit manufacturing or importing products from unauthorized companies.

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Volume 2 Issue 2 May 2018

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