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(This category highlights potential health issues from fragrance chemicals and fragranced products.)

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Go Fragrance Free: Healthier Air Has Never Been Easier

Many hospitals, businesses, and employees are not aware that fragranced products can create access barriers to their facilities and can adversely affect the health of those working there. Fragranced products include fragranced cleaning products, hand sanitizers, lotions, laundry products, deodorant, air fresheners or any other scented items.

PERSONAL CARE PRODUCTS

Lotions/Moisturizers, Deodorant/Antiperspirant, Shampoo/Conditioner, Body Wash, Toothpaste, Face Wash/Soap, Shaving Cream, Aftershave, Body Spray, Hair Products

1. Environmental Distribution of Personal Care Products and Their Effects on Human Health

Khalid M, Abdollahi M. Environmental Distribution of Personal Care Products and Their Effects on Human Health. Iran J Pharm Res. 2021 Winter;20(1):216-253. doi: 10.22037/ijpr.2021.114891.15088. PMID: 34400954; PMCID: PMC8170769.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/34400954/> - [PDF](#)

“Chemicals in PCPs (personal care products) have a high health risk to human and aquatic life (14). Little information is available about exposures from PCPs and some ingredients of PCPs known as EDCs and involved in abnormal developmental and reproductive ability.”

“There are 50-300 different chemicals used as fragrances for PCPs. Such chemicals may be **acetals, alcohols, aldehydes, amides, amines, carboxylic acids, coumarins, dioxanes, epoxides, esters, ethers, heterocyclics, hydrocarbons, ketones, lactones, musks, nitriles, phenols, pyrans, pyrazines, quinolines, or Schiff’s bases.** Several PCPs such as **detergents, soaps, cleaners, and fabric softeners** contain various fragrances...”

“Fragrances are a mixture of VOCs that tend to break and mix with the dust or pollutants to form harmful secondary products or toxic air pollutants that are potentially more irritating or allergenic than the original substance. For example, terpenes from PCPs may react with indoor ozone to form secondary pollutants such as formaldehyde.”

“Fragrances exacerbate symptoms of asthmatic patients and may induce atopic asthma. Fragrances with significant absorption in the UV range of 290-400 nm can cause **phototoxicity** and **photoallergy** resulting in dermal irritation and contact dermatitis. Dermatological patients often complain about **hand eczema and allergy**, mostly due to the ubiquitous usage of fragrances. Fragrance chemicals are also responsible for **airborne contact** and **facial dermatitis**. The incidence of **allergic contact dermatitis, hypersensitivity, and skin sensitization** found to be higher among women than men due to their frequency of use of PCPs and ubiquitous presence of fragrance chemicals.”

[Note: [Endocrine Disrupting Chemicals](#) (EDC’s) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC’s and how can they affect us?](#)]

2. Airborne contact dermatitis - current perspectives in etiopathogenesis and management

Handa S, De D, Mahajan R. Airborne contact dermatitis - current perspectives in etiopathogenesis and management. Indian J Dermatol. 2011 Nov;56(6):700-6. doi: 10.4103/0019-5154.91832. PMID: 22345774; PMCID: PMC3276900.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/22345774/> - [Full Text](#)

“Airborne contact dermatitis (ABCD) is a morphological diagnosis that encompasses all acute or chronic dermatoses predominantly of exposed parts of body, which are caused by substances which when released into the air, settle on the exposed skin.”

“In airborne allergic dermatitis, initially there is a refractory phase where there is a periodic or continuous contact with allergen but no response. This is followed by an induction phase where the hapten penetrates skin, conjugates with epidermal protein, comes in contact with antigen presenting cells, migrates to draining lymph nodes followed by stimulation of naive T cells. This leads to proliferation of activated T cells to produce effector and memory cells which then enter the circulation. Re-exposure to the specific hapten leads to the release of mediators producing skin inflammation. A persistent inflammation is produced due to continued presence of effector cells.”

“The common allergens ... include various acids and alkalis, metals and powders of metallic salts, cement, industrial solvents, glass fibers, sewage sludge, ammonia, vegetable and wood allergens, plastics, rubbers and glues, insecticides, pesticides, animal feed additives and many others. The airborne contactants can also be classified on the basis of their physical state as **volatile airborne contactants** like acids, alkalis, ammonia and pesticides; droplets like insecticides, **perfumes** and **hair sprays**; powders which include aluminum, anhydrous calcium silicate, and metallic oxides; and particles like tree sawing particles, wool and plastics.”

“Dooms-Goossens classified airborne dermatitis into five different types, namely, **airborne irritant contact dermatitis**, **airborne allergic contact dermatitis**, **airborne phototoxic reactions**, **airborne photoallergic reactions** and **airborne contact urticaria**.^[33]”

“Rare presentations include **acne like**, **lichenoid eruptions**, fixed drug eruptions, **exfoliative dermatitis**, **telangiectases**, **paresthesias**, **purpura**, **erythema multiforme like eruption**, pellagra like dermatitis and **lymphomatoid CD**. Some agents cause more than one type of reaction. P. hysterothorus can produce allergic CD, photocontact dermatitis and a lichenoid eruption. Similarly, **formaldehyde** and phosphorus sesquisulfide can lead to an **airborne irritant** or **allergic CD** and **contact urticaria**.”

“In the classical airborne allergic contact dermatitis, there is involvement of exposed areas of face, “V” of neck, hands and forearms, “**Wilkinson's triangle**,” both eyelids, nasolabial folds and under the chin. The involvement of both light-exposed and protected areas helps to differentiate ABCD from a photo-related dermatitis. Another close differential is **atopic eczema** as both ABCD and atopic eczema have predominant flexural and skin crease involvement. Initially, there is an acute flare of the dermatitis during the plant growing season but, with repeated exposure, the flare becomes prolonged and produces a chronic lichenified eczema associated with secondary infection, fissuring and **hypo or hyperpigmentation**.... Some patients present with **facial swelling** before manifesting classical **eczematous lesions**.”

[Note: Fragrance is considered the new ‘second hand smoke’, “[The parallels between second-hand smoke and synthetic fragrance use are many. At its core, both are battles over indoor air quality](#)” - quote and link from De Vader, Christy L. & Barker, Paxson.

Chemicals that cigarettes/cigarette smoke and fragranced products can have in common are: Acetone, Formaldehyde, Benzene, acetaldehyde, terpenoids and phenols.]

3. Measurement of endocrine disrupting and asthma-associated chemicals in hair products used by Black women

Helm JS, Nishioka M, Brody JG, Rudel RA, Dodson RE. Measurement of endocrine disrupting and asthma-associated chemicals in hair products used by Black women. *Environmental Research*. 2018 August; 165:448-458. Doi: <https://doi.org/10.1016/j.envres.2018.03.030>.

Article Link: <https://www.sciencedirect.com/science/article/pii/S0013935118301518>

“The hair products tested contained **45 endocrine disrupting or asthma-associated chemicals**, including every targeted chemical class. We found cyclosiloxanes, parabens, and the fragrance marker **diethyl phthalate (DEP)** at the highest levels, and **DEP** most frequently. Root stimulators, hair lotions, and relaxers frequently contained nonylphenols, parabens, and **fragrances**; anti-frizz products contained cyclosiloxanes. **Hair relaxers for children contained five chemicals regulated by California's Proposition 65 or prohibited by EU cosmetics regulation. Targeted chemicals were generally not listed on the product label.**”

“The **fragrance chemicals linalool, limonene, and 1,3,4,6,7,8-hexahydro-4, 6,6,7,8, 8-hexamethylcyclopenta[g]-2-benzopyran (HHCB, or Galaxolide)** were also found at higher detection frequencies and concentrations compared to other target chemicals. Root stimulators, hair lotions, and relaxers frequently contained nonylphenols, parabens, and **fragrance chemicals** whereas anti-frizz products contained cyclosiloxanes. **We did not find strong agreement between detected and labeled chemicals**, although chemicals detected at higher concentrations were labeled more often.”

“**All products contained at least one of the 19 targeted fragrance chemicals, and most had multiple fragrances**, with several root stimulators containing over half of the fragrances targeted. **Linalool, limonene, and HHCB (or Galaxolide)** were the most common (found in about **40% of products**). We found **limonene at the highest concentration among fragrance chemicals (1900 µg/g, or 0.19% by weight)**, and **limonene, linalool, phenethyl alcohol, and terpineol** were frequently detected at **> 100 µg/g in multiple products.**”

4. Contact Dermatitis to Medications and Skin Products

Nguyen HL, Yiannias JA. Contact Dermatitis to Medications and Skin Products. *Clin Rev Allergy Immunol*. 2019 Feb;56(1):41-59. doi: 10.1007/s12016-018-8705-0. PMID: 30145645.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/30145645/>

“Today, consumer products, such as soaps, moisturizing creams, cosmetics, household cleaners, fragrances, **topical medication**, and others, contain a myriad of ingredients that can **cause skin allergy**. When these products contact the skin, they can produce **eczematous pruritic reactions** known as contact dermatitis...”
“...the prevalence of contact dermatitis has been increasing worldwide for the past few decades.”

“**Fragrance mix I, fragrance mix II, and Myroxylon pereirae resin (Balsam of Peru)** are in the **top 11 allergens** of the NACDG 2013–2014...”

“**Fragrance mix I** contains eight allergens:

cinnamic alcohol, cinnamic aldehyde, α -amylcinnamal aldehyde, eugenol, isoeugenol, hydroxycitronellal, geraniol, and oakmoss absolute...”

“...**fragrance mix II** was introduced with six more compounds:

hydroxyisohexyl-3-Cyclohexene- carboxaldehyde (HICC), citral, farnesol, coumarin, citronellol, and α -hexylcinnamal ...”

[**Note:** also see, **Airborne Contact Dermatitis**, these reactions are happening to people when [fragrance chemicals float](#) around and are simply present in the air. For example, someone can react if their caregiver or person next to them uses fragranced laundry products.]

5. Obesogenic endocrine disrupting chemicals: identifying knowledge gaps

Veiga-Lopez A, Pu Y, Gingrich J, Padmanabhan V. Obesogenic Endocrine Disrupting Chemicals: Identifying Knowledge Gaps. Trends Endocrinol Metab. 2018 Sep;29(9):607-625. doi: 10.1016/j.tem.2018.06.003. Epub 2018 Jul 13. PMID: 30017741; PMCID: PMC6098722.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/30017741/> - [PDF](#)

“**EDCs are chemicals that interfere with the endocrine system**, including **adipose tissue**. Historically considered as an organ whose main function is energy storage, the adipose tissue secretes numerous hormones and other factors such as leptin, adiponectin, resistin, adipisin, angiotensin, and free fatty acids. These are involved in a broad range of physiological actions including **glucose and lipid metabolism, appetite control, vascular tone control, angiogenesis, and immunity** [11]. EDCs that not only increase adipose mass / adipogenesis but also result in other **metabolic dysfunctions** are also referred to as **metabolic disrupting chemicals (MDCs)** [12].”

“Diesters of 1,2-benzenedicarboxylic acid, or **phthalates**, are used as industrial plasticizers of polyvinyl chloride to be used in floorings, vinyl upholstery, **car interiors**, and **toys** [72], plastic food packaging [73], as well as in **cosmetic products** such as **lotions and perfumes** [74]....”

The CHAMACOS cohort study reported a positive association between early life exposure (at 14 and 26 weeks of gestation) to **diethyl phthalate (DEP), dibutyl phthalate (DBP) and di-(2-ethylhexyl)-phthalate (DEHP)** and **increase in childhood body weight, BMI, waist circumference, and percent body fat in 5–12 year old children**, supportive of **phthalates being developmental obesogens** [78].”

“Another study also found a positive association between mono-3-carboxypropyl phthalate at 27 to 34 weeks of gestation and **overweight/obese status in 4–7 year-old children** [79].”

6. Occurrence of personal care products as emerging chemicals of concern in water resources

Montes-Grajales D, Fennix-Agudelo M, Miranda-Castro W. Occurrence of personal care products as emerging chemicals of concern in water resources: A review. Sci Total Environ. 2017 Oct 1;595:601-614. doi: 10.1016/j.scitotenv.2017.03.286. Epub 2017 Apr 8. PMID: 28399499.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/28399499/>

“**Personal care products (PCPs)** are a diverse group of common household substances used for health, beauty and cleaning purposes. These include disinfectants, **fragrances**, insect repellents, preservatives and

UV filters, among others. Some of them are considered chemicals of emerging concern due to their presence and negative impact on aquatic ecosystems, specially related to **endocrine disruption** and **reproductive disorders**.”

“PCPs (personal care products) include a large number of **synthetic chemicals** used in everyday products such as **soaps, lotions, toothpaste, fragrances, cosmetics** and sunscreens. The extensive use of them, improperly disposal, and inefficient treatment of urban wastewater contribute to the contamination of water bodies by PCPs and their metabolite.”

“The contamination of the water reservoirs by PCPs is of interest due to their potential **toxicity to aquatic ecosystems and human beings**, as many of them have been reported as **environmental persistent, bioactive, bioaccumulative and endocrine disrupting compounds**.”

“PCPs have been found in all the continents in aquatic ecosystems, even at concentrations above the toxicity threshold for some species.”

[**Note:** Galaxolide is a musk. Most **Musk** in fragrances are created [synthetically](#).]

7. Emission characteristics of VOCs emitted from consumer and commercial products and their ozone formation potential

Dinh TV, Kim SY, Son YS, Choi IY, Park SR, Sunwoo Y, Kim JC. Emission characteristics of VOCs emitted from consumer and commercial products and their ozone formation potential. Environ Sci Pollut Res Int. 2015 Jun;22(12):9345-55. doi: 10.1007/s11356-015-4092-8. Epub 2015 Jan 21. PMID: 25601614.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/25601614/>

“The characteristics of volatile organic compounds (VOCs) emitted from several consumer and commercial products (**body wash, dishwashing detergent, air freshener, windshield washer fluid, lubricant, hair spray, and insecticide**) were studied and compared.”

“In the spray products, 21.6–96.4 % of the VOCs were propane, iso-butane, and n-butane, which are the components of liquefied petroleum gas. **Monoterpene** (C₁₀H₁₆) was the dominant component of the VOCs in the non-spray products (e.g., body wash, 53–88 %).”

“Besides comprising **hazardous VOCs**, VOCs from consumer products were also **ozone precursors**.”

“The TVOCs from spray products (insecticide, **hair spray**, and lubricant) were higher than those from the liquid products such as the windshield washer fluid, dishwashing detergent, **body wash**, and air freshener.”

“**Limonene** and 1-propanol were the components of one dishwashing detergent. In contrast, another dishwashing detergent comprised **1,3-dioxane, ethanol, ethyl acetate, limonene, β-myrcene, 3-pentanol, and α-pinene** (Kwon et al. 2007, 2008).”

“**Benzene, n-hexane, and ethylbenzene** were observed in the **body washes** and the **air fresheners**. Benzene was classified as Group A of the US EPA lists of **known human carcinogen** (WHO 2010). The unit cancer risk of 1 µg/m³ of benzene is 2.2–7.8 in a million (WHO 2010). The unit risk of **leukemia** per 1 µg/m³ air concentration is 6 in a million. Therefore, **long-term exposure to a considerable amount of benzene in those products might cause health risk**, which should be investigated in future researchers.”

“A **longterm exposure of n-hexane may damage the nervous system**. Exposure to 650 ppm n-hexane for 2–4 months causes numbness of the arms and legs (Pohanish 2012). **Ethylbenzene** irritates the eyes, skin, and respiratory tract. A **long-term exposure of ethylbenzene may cause kidney and liver disease....**”

“**Toluene and styrene were detected in body washes**, dishwashing detergents, and windshield washer fluids. It was reported that inhalation of 200–500 ppm **toluene may cause headache, nausea, and loss of appetite** (Pohanish 2012).”

“**Styrene** is considered as a possible carcinogenic to humans. Inhalation of above 100 ppm **styrene may cause headache, inflammation of the lung, kidney and liver damage, and death** (Pohanish 2012). Since **body washes** are used popularly and frequently, **longterm exposure to the above compounds may cause health damage.**”

[Note: **Limonene** is a common skin sensitizer and **known allergen** in fragrance and **fragranced products**. Limonene (natural or **synthetic**) is a terpene. Terpenes can create **formaldehyde and particulate matter** in air as **secondary pollutants**. Limonene is on the **IFRA** list as a fragrance ingredient.]

[Note: **Benzene** is a reported fragrance ingredient in the **CSCP Product Database**.]

[Note: **N-Hexane** is used to extract fragrances and was **on the IFRA list until 2015**.]

[Note: **Toluene** (often a nail polish thinner) is used as a solvent or fragrance in perfume and bath products on the **CSPC Product Database**. **Toluene** is on the **IFRA** list and on the EPA's **Priority Pollutant List**.]

[Note: **Styrene** is “**primarily a synthetic chemical**” used in fragrance. It is on the **CSPC** list as ‘parfum/fragrance’ and also on the **IFRA** list.]

[Note: **Ethyl benzene** is listed for purchase as a perfuming agent.]

8. Endocrine-Disrupting Chemicals & Reproductive Health

Zlatnik MG. Endocrine-Disrupting Chemicals and Reproductive Health. J Midwifery Womens Health. 2016 Jul;61(4):442-55. doi: 10.1111/jmwh.12500. Epub 2016 Jul 8. PMID: 27391253; PMCID: PMC6701840.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/27391253/> - [PDF](#)

“**Phthalates** are another class of chemicals that have been implicated as **endocrine disrupters**. **Phthalates** are used in multiple consumer applications, including **personal care products** such as **lotion** or **shampoo**, often as “**fragrance**”, and as plasticizers to change the physical characteristics of base plastics, including products made with polyvinyl chloride, such as flooring, shower curtains, packaging, and some medical equipment.”

“Human cohort and experimental animal studies have demonstrated possible **adverse effects on reproduction**, including associations with **poor semen quality** and **miscarriage**.”

“**Prenatal phthalate exposure**, as measured by phthalate metabolite levels in maternal urine, has been associated with **abnormal male genital development in the fetus**. In animal models, anogenital distance is a sensitive index of demasculinization of the male reproductive tract. Multiple epidemiologic studies, including prospective cohort studies, have shown a **shortened anogenital distance** (suggesting anti-androgenic influence) **in boys whose mothers had higher urinary phthalate levels during pregnancy**. Some cohort studies have shown an association with **smaller penile size** as well. These findings are reproducible in experimental studies with rodents.”

“Prenatal phthalate exposure has also been associated with reduced “masculine play” in boys, as indicated in a follow-up study of a cohort of couples who had given blood and urine samples during pregnancy. At age 5, the boys’ (n=74) play activities were assessed with a validated inventory of play styles (Pre-School Activities Inventory). An association was seen between prenatal exposure to anti-androgenic phthalates and less male-typical play behavior in boys.”

“A recent systematic review of 11 human studies suggests that higher levels of prenatal exposure to phthalate metabolites, measured as urinary concentrations, are associated with poorer cognitive and behavioral outcomes in children, especially boys.”

9. Endocrine Disruptors and Asthma-Associated Chemicals in Consumer Products

Dodson RE, Nishioka M, Standley LJ, Perovich LJ, Brody JG, Rudel RA. Endocrine disruptors and asthma-associated chemicals in consumer products. *Environ Health Perspect.* 2012 Jul;120(7):935-43. doi: 10.1289/ehp.1104052. Epub 2012 Mar 8. PMID: 22398195; PMCID: PMC3404651.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/22398195/> - [PDF](#)

“Laboratory and human studies raise concerns about **endocrine disruption** and **asthma** resulting from exposure to chemicals in consumer products.”

“Analytes included parabens, **phthalates**, bisphenol A (BPA), triclosan, ethanolamines, alkylphenols, **fragrances**, glycol ethers, cyclosiloxanes, and ultraviolet (UV) filters.”

“In other products, **the highest concentrations** and numbers of detects were in the **fragranced products** (e.g., **perfume, air fresheners, and dryer sheets**) and in sunscreens. Some products that did not contain the well-known endocrine-disrupting phthalates contained other less-studied phthalates (dicyclohexyl phthalate, diisononyl phthalate, and di-n-propyl phthalate; also endocrine-disrupting compounds), suggesting a substitution. **Many detected chemicals were not listed on product labels.**”

“Endocrine disrupting compounds (**EDCs**) are **chemicals that can alter hormonal signaling** and have potential effects on developing reproductive and **nervous systems, metabolism, and cancer** (Colborn et al. 1993). Some phthalates **inhibit testosterone synthesis** (Howdeshell et al. 2008),...”

[Note: Phthalates are [synthetic](#) odorless plasticizers used as solvents, binders or fixatives [in many fragrances](#). Why are phthalates [in the news](#)? [Phthalates](#) are considered Endocrine Disrupting Chemicals.

On the [California Safe Cosmetics Program Product Database](#): [DEP](#), [DIDP](#), and [DBP](#) are reported as fragrance while [DEHP](#) and DBP are perfume solvents. [IFRA](#) lists DEP and DMP, as “reported fragrance ingredients”.]

[Note: Endocrine Disrupting Chemicals (EDC’s) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC’s and how can they affect us?](#)]

10. Endocrine disruptor chemicals as obesogen and diabetogen: Clinical and mechanistic evidence

Kurşunoğlu NE, Sarer Yurekli BP. Endocrine disruptor chemicals as obesogen and diabetogen: Clinical and mechanistic evidence. *World J Clin Cases.* 2022 Nov 6;10(31):11226-11239. doi: 10.12998/wjcc.v10.i31.11226. PMID: 36387809; PMCID: PMC9649566.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/36387809/>

“Besides the **obesogenic effect**, **EDCs** can cause **type 2 diabetes mellitus** through alteration in β cell function and morphology and **insulin resistance**.”

Medical devices, including parenteral feeding tubes, **personal care products** such as nail polish and **perfume**, food packaging, and toys contain various **phthalates**[49]. Unfortunately, phthalates are poorly bio-degradable and highly bioaccumulative in the food chain[50].

“**High phthalate exposure has been linked with increased threat of obesity and infertility, increased body mass index (BMI) and waist circumference, insulin resistance, and a change in thyroid hormones**[49,52]”.

“In this context, **perinatal exposure** can be important as far as the permanent and transgenerational effects are concerned. **EDCs promote adipogenesis leading to fat accumulation**, which causes **alteration in lipid metabolism and satiety as obesogens**. EDCs have shown the potential to induce adipose tissue dysfunction not only in white adipocytes but in brown and beige fat as well.”

[Note: [Endocrine Disrupting Chemicals](#) (EDC's) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC's and how can they affect us?](#)]

[Note: [Phthalates](#) are [synthetic](#) odorless plasticizers used as solvents, binders or fixatives [in many fragrances](#). Why are phthalates [in the news](#)? [Phthalates](#) are considered Endocrine Disrupting Chemicals. On the [California Safe Cosmetics Program Product Database](#): [DEP](#), [DIDP](#), and [DBP](#) are reported as fragrance while [DEHP](#) and DBP are perfume solvents. [IFRA](#) lists DEP and DMP, as “reported fragrance ingredients”.]

11. Chemicals of concern in personal care products used by women of color in three communities of California

Johnson PI, Favela K, Jarin J, Le AM, Clark PY, Fu L, Gillis AD, Morga N, Nguyen C, Harley KG. Chemicals of concern in personal care products used by women of color in three communities of California. J Expo Sci Environ Epidemiol. 2022 Nov;32(6):864-876. doi: 10.1038/s41370-022-00485-y. Epub 2022 Nov 2. PMID: 36323919; PMCID: PMC9628299.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/36323919/> - [PDF](#)

“We found that 65% of labels included CoCs, and 74% of labels had undisclosed ingredients listed as “fragrance.” The most prevalent chemicals were parabens, cyclosiloxanes, and **formaldehyde releasers**. GCxGC-TOFMS found additional CoCs, including **fragrances**, solvents, preservatives, ultraviolet filters, and contaminants.”

“This study is one of the first **detailed assessments of chemicals of concern** found in various types of PCPs used by several racial/ethnic groups. We found that over half of the 546 products selected by community partners as marketed to and/or used by them contained ingredients linked to cancer, reproductive or developmental harm, or endocrine disruption. Laboratory analysis identified additional chemicals in a subset of products, including **unlabeled fragrance chemicals** and **contaminants**. Elucidating exposures to chemicals in PCPs is important for risk assessment and health inequity research.”

“U.S. Black women report higher use of scented intimate care products, which is associated with higher urinary metabolites of **diethyl phthalate** [16] and higher blood levels of 1,4-dichlorobenzene and **ethylbenzene**, which can be **fragrance additives** [17].”

“A separate analysis of 25 personal care products documented the presence of **carcinogens, EDCs, respiratory toxicants, and developmental toxicants**, and found that nearly **80% of those chemicals were fragrance ingredients** exempt from labeling requirements [27].”

“The fragrance ingredient **lilial**, which is a **reproductive toxicant** prohibited by the European Union, was common in hair and skin products.”

“Of the 23 intimate care product labels we examined, including washes, sprays, powders, moisturizers, douches, and wipes, over 60% had **undisclosed fragrance ingredients**. We found undisclosed fragrance ingredients on 85% of all deodorant or perfume product labels, and the specific fragrance ingredients, **lilial** and **galaxolide**, were each listed on 10% of deodorant/perfume products.”

12. Simplified speciation and atmospheric volatile organic compound emission rates from non-aerosol personal care products

Yeoman AM, Shaw M, Carslaw N, Murrells T, Passant N, Lewis AC. Simplified speciation and atmospheric volatile organic compound emission rates from non-aerosol personal care products. *Indoor Air*. 2020 May;30(3):459-472. doi: 10.1111/ina.12652. Epub 2020 Feb 26. PMID: 32034823; PMCID: PMC7217173.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/32034823/> - [PDF](#)

“Volatile organic compounds (VOCs) emitted from personal care products (PCPs) can affect indoor air quality and outdoor air quality when ventilated.”

“Additionally, as **VOCs are a precursor to ozone and a sub-component of PM 2.5, they contribute to poor air quality** and related health effects such as **pulmonary inflammation and respiratory illness**.”

“Less thought has been paid to the VOCs emitted from the use of PCPs (personal care products) and HCPs (household cleaning products) which, along with other domestic emissions of VOCs, are now known to be a substantial contributor to overall VOC emissions.”

“**Shower gels and liquid foundation** were found to have the highest rates of VOC emissions, dominated by **limonene** (representing all monoterpenes) for the former and D5 cVMS for the latter.”

“...the **exposure of an individual to air pollution is comprised of the sum of short-lived, individual exposures to high concentrations of VOCs** from activities such as **showering, cooking, cleaning, and walking along a busy road, in addition to low levels of continuous exposure**.”

[Note: [Limonene](#) is a common skin sensitizer and [known allergen](#) in fragrance and [fragranced products](#). Limonene (natural or [synthetic](#)) is a terpene. Terpenes can create [formaldehyde and particulate matter](#) in air as [secondary pollutants](#). Limonene is on the [IFRA](#) list as a fragrance ingredient.]

13. Fragrance chemicals in domestic and occupational products

Rastogi SC, Heydorn S, Johansen JD, Basketter DA. Fragrance chemicals in domestic and occupational products. *Contact Dermatitis*. 2001 Oct;45(4):221-5. doi: 10.1034/j.1600-0536.2001.450406.x. PMID: 11683833.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/11683833/>

“Epidemiological studies have described an increasing prevalence of **fragrance allergy** and indicated an

association with **hand eczema.**”

“Fragrances are one of the most common causes of allergic contact dermatitis...approximately 2500 substances are used in fragrances, which may contain from 10 to more than 300 different chemical compounds.”

14. Overview of air pollution and endocrine disorders

Darbre PD. Overview of air pollution and endocrine disorders. Int J Gen Med. 2018 May 23;11:191-207. doi: 10.2147/IJGM.S102230. PMID: 29872334; PMCID: PMC5973437.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/29872334/> - [PDF](#)

“Abstract: Over recent years, **many environmental pollutant chemicals have been shown to possess the ability to interfere in the functioning of the endocrine system and have been termed endocrine disrupting chemicals (EDCs).** These compounds exist in air as volatile or semi-volatile compounds in the gas phase or attached to particulate matter. They include components of plastics (**phthalates**, bisphenol A), components of consumer goods (parabens, triclosan, **alkylphenols, fragrance compounds**,... This review summarizes current knowledge concerning the sources of EDCs in air, measurements of levels of EDCs in air, and the potential for adverse effects of EDCs in air on human endocrine health.”

“Whilst much has been written over the past two decades of the actions of EDCs from oral and dermal exposure, research is increasingly documenting their presence in air which opens a debate on the potential for adverse consequences from inhalation of EDCs.”

“Since estrogens and androgens regulate reproductive functions, many of the reported effects of the exposure to EDCs have been on adverse consequences for **reproductive health.** However, physiological consequences have been demonstrated as resulting from disruption to **thyroid function** and alterations to **thyroid hormone levels.** More widely, adverse effects have also been reported as resulting from alterations to adrenocortical function, impairment of the immune system, and the loss of control on energy metabolism including development of **obesity, diabetes, and cardiovascular disease.**”

“Prior to and just after birth are especially **vulnerable times for exposure to EDCs** because disruption of hormonal activity in the developing embryo/fetus or young baby can have **consequences for health in adult life** most notably on **reproductive abilities, brain function, immunity, and metabolic programming.**”

“Man-made EDCs are contained within many agricultural, industrial, and **consumer products**, which due to their widespread use, have become ubiquitous environmental pollutants. This includes components of pesticides and herbicides used both in an agricultural setting and in urban environments.... EDCs are also widely used in **personal care products (PCPs)** for purposes of preservation, deodorant, antiperspirant, conditioning, and **fragrance.**”

“EDCs are contained in domestic pesticide sprays, **air fresheners, laundry detergents, household cleaners,** paints, adhesives, and plastics, all of which may be used routinely indoors.... As a result, **many EDCs are now measurable in indoor air and in indoor dust, often at higher levels than in outdoor air**10...”

15. Newborn chemical exposure from over-the-counter skin care products

Cetta F, Lambert GH, Ros SP. Newborn chemical exposure from over-the-counter skin care products. Clin Pediatr (Phila). 1991 May;30(5):286-9. doi: 10.1177/000992289103000504. PMID: 2044337.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/2044337/>

“...many product ingredient labels list & fragrances. **The chemical composition and potential toxicity of these fragrances is not publicly available.**”

“In light of the relative permeability of newborn skin, the potential hazards of repetitive environmental chemical exposure from OTC skin care products need to be addressed.”

“**This study documents the large number of chemicals, some of which are toxic, to which the average newborn is exposed during the first month of life.**”

16. Skin exposure to scented products used in daily life and fragrance contact allergy in the European general population - The EDEN Fragrance Study

van Amerongen CCA, Ofenloch RF, Cazzaniga S, Elsner P, Gonçalo M, Naldi L, Svensson Å, Bruze M, Schuttelaar MLA. Skin exposure to scented products used in daily life and fragrance contact allergy in the European general population - The EDEN Fragrance Study. Contact Dermatitis. 2021 Jun;84(6):385-394. doi: 10.1111/cod.13807. Epub 2021 Mar 2. PMID: 33576005; PMCID: PMC8247875

Article Link: <https://pubmed.ncbi.nlm.nih.gov/33576005/> - [PDF](#)

“Fragrances are widely used in scented products used in daily life with the potential to induce **skin sensitization.**”

“**Sensitive skin was associated with exposure to scented products and with fragrance allergy.**”

“Fragrances are used widely in scented products used in daily life. These products can be intended to be left on the skin such as **creams** and perfumes, intended to be rinsed off the skin such as **shampoos** or **shaving products**, or intended to be used as household items.”

“The current study shows that females are indeed more exposed to scented products and consequently may be more frequently sensitized to fragrance allergens than males.”

“In the current analysis, **sensitive skin was associated with exposure to perfumes, sunscreens, skin creams and eye make-up.** In addition, reporting a sensitive skin was associated with **fragrance contact allergy** in univariable regression analysis.”

17. Airborne-contact dermatitis of non-plant origin: an overview

Ghosh S. Airborne-contact dermatitis of non-plant origin: an overview. Indian J Dermatol. 2011 Nov;56(6):711-4. doi: 10.4103/0019-5154.91834. PMID: 22345776; PMCID: PMC3276902.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/22345776/> - [Full Text](#)

“Airborne-contact dermatitis (ABCD) denotes an unique type of contact dermatitis originating from dust, sprays, pollens or **volatile chemicals by airborne fumes** or particles without directly handling this allergen. This form of dermatitis commonly involves face, neck, v-area of chest and eyelids. Exposed as well as nonexposed skin

can be affected. Axillae and waist lines can also be the target of this disease. This form of dermatitis can sometimes also be generalized.

Airborne dermatoses often cause diagnostic problems and create a puzzle not only to the patient but also to the doctor. **The incidence of airborne dermatoses has increased considerably in recent years.**"

"Pattern of allergens contributory to ABCD detected in the study were as follows: potassium dichromate 39.7% (n=25), **fragrance mix 28.1%** (n=18), epoxy resin 26.6% (n=17), colophony 17.8% (n=12), **formaldehyde** 13.2% (n=7) and parthenium 9.4% (n=6). Cement, **perfumes or deodorants**, volatile paints and synthetic glues have become commonest allergens contributing to ABCD in urban and semiurban areas."

"Fragrance allergy leading to ABCD has been reported by many authors."

18. The associations between personal care products use and urinary concentrations of phthalates, parabens, and triclosan in various age groups: The Korean National Environmental Health Survey Cycle 3 2015-2017

Lim S. The associations between personal care products use and urinary concentrations of phthalates, parabens, and triclosan in various age groups: The Korean National Environmental Health Survey Cycle 3 2015-2017. Sci Total Environ. 2020 Nov 10;742:140640. doi: 10.1016/j.scitotenv.2020.140640. Epub 2020 Jul 2. PMID: 32721747.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/32721747/> - [PDF](#)

"Phthalates and parabens are ubiquitous chemicals of public concern... Furthermore, the use of **fragrance products**, makeup, and air fresheners significantly increased the exposure risk to EtP in **preschoolers.**"

"Furthermore, the exposure levels of many **phthalates**, parabens, and TCS are higher in children than adults(NIER, 2018; Wang et al., 2019) and **children are a susceptible population to these chemicals.** In the case of parabens, the estimated **dermal absorption** amount of parabens related with PCPs use in **infants and toddlers** was several times higher than that in adult women(Guo and Kennan, 2013)."

"Exposure to phthalates and parabens is an important public concern, especially with respect to the **potential endocrine disrupting effects of phthalates** (DEHP, DBP, and BBP) (European Commission, 2000) and the anti-androgenic effect of parabens (Orton et al., 2014). Additionally, **exposure to phthalates in the prenatal period was associated with asthma** (Berger et al., 2020) and **psychomotor development** (Qian et al., 2019) in children and was related to **allergic symptoms, sensitization** (Hoppin et al., 2013), **preterm birth**(Ferguson et al., 2019) and **type 2 diabetes** in adults (Sun et al., 2014)."

"This study showed the associations between PCPs use and urinary concentrations of phthalates, parabens, and TCS in various age groups in a nationally representative population in Korea. The exposure risks to these chemicals were different according to the patterns of PCPs use by age groups and gender. Female participants used all categories of PCPs more frequently than male participants in adolescents and adults, with statistical significance."

[Note: [Endocrine Disrupting Chemicals](#) (EDC's) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC's and how can they affect us?](#)]

[Note: [Phthalates](#) are [synthetic](#) odorless plasticizers used as solvents, binders or fixatives [in many fragrances.](#) Why are phthalates [in the news](#)? [Phthalates](#) are considered Endocrine Disrupting Chemicals.

On the [California Safe Cosmetics Program Product Database](#): [DEP](#), [DIDP](#), and [DBP](#) are reported as fragrance while [DEHP](#) and DBP are perfume solvents. [IFRA](#) lists DEP and DMP, as “reported fragrance ingredients”.]

19. Scented lotions may cause scarring and premature fading of tattoos (case report)

Pona A, Gonzalez CD, Walkosz BJ, Dellavalle RP. Scented lotions may cause scarring and premature fading of tattoos. *Dermatol Online J*. 2020 Oct 15;26(10):13030/qt5d2676s2. PMID: 33147671.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/33147671/> - [PDF](#)

“The purpose of this case presentation is to provide evidence that **scented lotions** could potentially **harm healing** tattoos and should be mentioned in aftercare instructions.”

“On day 1 after application of the scented lotion, the healing tattooed skin became **erythematous** and **pruritic** minutes after applying the scented lotion. On day 2, the tattooed skin became **swollen** and developed light pink **plaques** with multiple 1-2mm **erosions, scabbing,** and silver **scales.**”

“Avoidance of scented lotions and use of inert vehicles on a tattoo should be included in the tattoo aftercare instructions. New tattoos should be treated like a wound. **Failure to avoid scented vehicles could precipitate an allergic or irritant contact dermatitis,** which may lead to significant tattoo fading, delayed wound healing, and scar formation.”

20. Pediatric allergic contact dermatitis. Part I: Clinical features and common contact allergens in children

Neale H, Garza-Mayers AC, Tam I, Yu J. Pediatric allergic contact dermatitis. Part I: Clinical features and common contact allergens in children. *J Am Acad Dermatol*. 2021 Feb;84(2):235-244. doi: 10.1016/j.jaad.2020.11.002. Epub 2020 Nov 17. PMID: 33217510.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/33217510/> - [PDF](#)

“Children can develop ACD (Allergic Contact Dermatitis) at any age.... Therefore, all children should be asked about the use of personal care products such as **shampoos, soaps, lotions, detergents, and topical medications**....systemic contact dermatitis can occur through oral ingestion of contact allergens in food, such as carmine in red velvet cupcakes, nickel in oatmeal and cocoa, and **balsam of Peru (BoP)** in ketchup....Nickel, **fragrance mix (FM) I, BoP, propylene glycol, CAPB, bacitracin, neomycin, cobalt, formaldehyde (and its releasers),** methylisothiazolinone (MI), and **lanolin** are top relevant allergens in the United States.”

“Fragrances are ubiquitous environmental allergens, and although **there are potentially thousands of allergenic fragrance chemicals,** fragrance markers such as BoP, FM I, and FM II are most frequently used in patch testing.... Fragrances are often used in household products like candles and cleaning supplies. **Children may also be exposed to fragrances used by their care takers, such as perfumes, leading to cases of connubial ACD.**”

“**Formaldehyde** is found in cosmetic and personal care products (including **baby products**), cleaning supplies, adhesives, sporting equipment, and paints. **One study showed that more than 25% of those with PPTs to formaldehyde were also sensitized to its releasers** such as quaternium-15, dimethyloldimethyl hydantoin, bronopol, diazolidinyl urea, and imidazolidinyl urea.

“Often, products such as **baby wipes may contain formaldehyde releasers** even though they may not be listed among the ingredients. **Formaldehyde (and releasers) contact allergy is more frequent in the United States compared to Europe, likely reflecting stricter regulation of product concentration and labeling in Europe.**”

[Note: **Balsam of Peru** is used in [fragrance](#) and is a [known allergen](#). Like with all fragrance allergies, [avoidance is suggested](#).]

[Note: **Formaldehyde** is a [secondary pollutant](#) from fragrance and fragranced products.

Also, a 2012 study, 21 out of 30 perfume samples were shown to [release formaldehyde](#) when tested but formaldehyde was not listed on any of the labels. Formaldehyde is a [sensitizer](#) and [known allergen](#).]

21. Deodorants are the leading cause of allergic contact dermatitis to fragrance ingredients

Heisterberg MV, Menné T, Andersen KE, Avnstorp C, Kristensen B, Kristensen O, Kaaber K, Laurberg G, Henrik Nielsen N, Sommerlund M, Thormann J, Veien NK, Vissing S, Johansen JD. Deodorants are the leading cause of allergic contact dermatitis to fragrance ingredients. *Contact Dermatitis*. 2011 May;64(5):258-64. doi: 10.1111/j.1600-0536.2011.01889.x. PMID: 21480912.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/21480912/>

“Fragrances frequently cause contact allergy, and cosmetic products are the main causes of fragrance contact allergy.”

“Correlation was observed between **deodorants** listed as the cause of allergy and allergy detected with fragrance mix II (FM II) and hydroxyisohexyl 3-cyclohexene carboxaldehyde.”

“Deodorants were the leading causes of fragrance allergy, especially among men. Seemingly, deodorants have an 'unhealthy' composition of the fragrance chemicals present in FM II.”

22. Health risks of chemicals in consumer products: A review

Li D, Suh S. Health risks of chemicals in consumer products: A review. *Environ Int*. 2019 Feb;123:580-587. doi: 10.1016/j.envint.2018.12.033. Epub 2019 Jan 7. PMID: 30622082.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/30622082/> - [PDF](#)

“It should also be noted that some chemicals have multiple functional uses, while we chose the most dominant functional use for each chemical. An example is the grouping of **phthalates**. Despite categorized as plasticizer together in this review, several phthalates such as **diethyl phthalate** and **dimethyl phthalate** are used as solvents in personal care products and cosmetics as **carriers of fragrance** (Schettler, 2006).”

“...we found that the volume of the peer-reviewed literature that addresses human health risks of the chemicals in consumer products did grow over the last two decades, while its growth could by no means match the speed of increasing volume and diversity of the chemicals produced and used in consumer products by the society. This **growing gap between increasing reliance on chemicals in consumer products and our knowledge on their human health risks raises a potential public health concern**, given the pervasive nature of today's mass production and consumption practice.”

“As a result, peer-reviewed journal publications largely failed to serve as an early warning or a preventive mechanism. The **humidifier disinfectant incident** in South Korea is a stark example that shows the potential vulnerability in chemical exposure through consumer products and its consequences, as well as the limited role for peer-reviewed journal publications to prevent them. It also **highlights the needs for understanding the risks of chemicals before putting them into consumer products**, while the rapidly growing diversity of synthetic chemicals often makes the generation of necessary data cost-prohibitive. As a result, we observed that scientific literature tends to appear only after the outbreak of major exposure incidents, or they tend to be concentrated in the chemicals or chemical groups of which human health risks have been previously reported. This is a structural problem that is poised to grow under the current practice.”

“We believe that there is an urgent need for creating the framework conditions that encourage more exploratory and speculative risk assessments and their publications in peer-reviewed journal space in the absence of known human health risks. Reducing the costs and time needed for toxicity and exposure assessments is a key, to which the developments in predictive toxicity and risk assessment techniques for screening-level assessment, as well as **the use of systematic prioritization for high-risk exposure pathways and chemicals in consumer products would be crucial.**”

23. Volatile emissions from common consumer products

Steinemann, A. Volatile emissions from common consumer products. *Air Qual Atmos Health* 8, 273–281 (2015). <https://doi.org/10.1007/s11869-015-0327-6>

Article Link: <https://link.springer.com/article/10.1007/s11869-015-0327-6>

“This study investigates and compares **VOCs emitted from 37 common products** (air fresheners, **laundry products**, cleaners, and personal care products) including those with certifications and claims of green and organic.”

“**For laundry products**, cleaning supplies, and air fresheners, regulated under the US Consumer Product Safety Act (CPSA), **labels do not need to list all ingredients or the presence of a fragrance in the product** Fragrance ingredients are exempt from full disclosure in any product, not only in the USA but also internationally.”

“This study found **156 different VOCs emitted from the 37 products**, with an **average of 15 VOCs per product**. Of these 156 VOCs, **42 VOCs are classified as toxic or hazardous under US federal laws**, and each product emitted at least one of these chemicals.”

“The primary difference between the **fragranced** and fragrance-free versions is the presence of **terpenes (such as d-limonene, β-pinene, α-pinene)** in the fragranced versions but not the fragrance-free versions... Consumer products used indoors, such as **laundry supplies, can affect outdoor air quality**, such as through dryer vent emissions...”

24. Obesogens: An Environmental Link to Obesity

Holtcamp W. Obesogens: an environmental link to obesity. *Environ Health Perspect.* 2012 Feb;120(2):a62-8. doi: 10.1289/ehp.120-a62. PMID: 22296745; PMCID: PMC3279464.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/22296745/>

“Most known or suspected **obesogens** are **endocrine disruptors**. Many are widespread, and exposures are suspected or confirmed to be quite common.”

“**Phthalates**, plasticizers that also have been related to obesity in humans, occur in many PVC items as well as in **scented items such as air fresheners, laundry products, and personal care products.**”

[**Note:** Phthalates are endocrine disruptors. [Endocrine Disrupting Chemicals](#) (EDC's) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC's](#) and how can they [affect us?](#)]

25. Developmental Exposure to Endocrine Disrupting Chemicals and Its Impact on Cardio-Metabolic-Renal Health

Singh RD, Koshta K, Tiwari R, Khan H, Sharma V, Srivastava V. Developmental Exposure to Endocrine Disrupting Chemicals and Its Impact on Cardio-Metabolic-Renal Health. *Front Toxicol.* 2021 Jul 5;3:663372. doi: 10.3389/ftox.2021.663372. PMID: 35295127; PMCID: PMC8915840.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/35295127/> - [Free Full Text](#)

“**Endocrine disrupting chemicals** (EDCs) include **phenols, phthalates**, parabens, flame retardants, heavy metals, pesticides, perfluorinated chemicals, UV filter components, triclosan, and organochlorines.”

“**Cumulative exposure to mixtures of EDCs can lead to adverse effects on the health of the exposed individuals** (Crews et al., 2003). Multiple studies, including the studies of the National Health and Nutrition Examination Survey (NHANES), have shown that **about 75–97% of US and Asian adults have detectable levels of phthalates and phenols [bisphenol A (BPA) and polyfluoroalkyl chemicals] in their urine** (Silva et al., 2004; Calafat et al., 2007, 2008; Vandenberg et al., 2010; Zhang et al., 2011; Husøy et al., 2019).”

“Epidemiological and experimental studies have also linked **adult exposure to EDCs** with **abnormal male and female reproductive health, diabetes, obesity, cardiovascular and metabolic disorders, thyroid function, and hormone sensitive cancers** (Howard and Lee, 2012; Bodin et al., 2015; Heindel et al., 2015, 2017).”

“**Children are also vulnerable to EDCs** (Calafat et al., 2017; Hendryx and Luo, 2018), **making EDC exposure a major health concern for all age groups.**”

“**Chronic kidney disease** is a growing health problem among children and adults. The incidence and the prevalence of chronic kidney disease (CKD) **among children have been steadily increasing since the 1980s**.... A number of traditional risk factors associated with CKD in children include hypertension, obesity, diabetes, and aberrant divalent mineral metabolism.... There is growing evidence that **links exposure to EDCs with early progression to end-stage renal disease (ESRD)** (Kataria et al., 2015)....”

“**Early-life exposure to EDCs was associated with elevated levels of kidney toxicity markers such as albumin-to-creatinine ratio (ACR), estimated glomerular filtration rate (eGFR), and urinary protein-to-creatinine ratio (UPCR) in some human population studies** (Li et al., 2012; Trasande et al., 2013a, 2014; Malits et al., 2018).”

[**Note:** [Phthalates](#) are [synthetic](#) odorless plasticizers used as solvents, binders or fixatives [in many fragrances](#). Why are phthalates [in the news](#)? [Phthalates](#) are considered Endocrine Disrupting Chemicals.

On the [California Safe Cosmetics Program Product Database](#): [DEP](#), [DIDP](#), and [DBP](#) are reported as fragrance while [DEHP](#) and [DBP](#) are perfume solvents. [IFRA](#) lists DEP and DMP, as “reported fragrance ingredients”.]

[**Note:** [Endocrine Disrupting Chemicals](#) (EDC’s) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC’s and how can they affect us?](#)]

26. Disparities in Environmental Exposures to Endocrine-Disrupting Chemicals and Diabetes Risk in Vulnerable Populations

Ruiz D, Becerra M, Jagai JS, Ard K, Sargis RM. Disparities in Environmental Exposures to Endocrine-Disrupting Chemicals and Diabetes Risk in Vulnerable Populations. *Diabetes Care*. 2018 Jan;41(1):193-205. doi: 10.2337/dc16-2765. Epub 2017 Nov 15. PMID: 29142003; PMCID: PMC5741159.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/29142003/> - [PDF](#)

“Scientific evidence linking **EDCs** with the **development of diabetes** and other **metabolic disorders** continues to grow. Of note, exposures to several toxicants have been prospectively linked to diabetes risk, including PCBs, organochlorine (OC) pesticides, **various chemical constituents of air pollution**, bisphenol A (BPA), and **phthalates** (Table 1);...

moreover, exposure to these EDCs is higher among African Americans, Latinos, and low-income individuals (Supplementary Table 1). These unequal exposures raise the possibility that EDCs are underappreciated contributors to diabetes disparities.”

“In this analysis, **metabolites of butyl phthalates and diethylhexyl phthalate (DEHP) were associated with diabetes** (OR 3.16 [95% CI 1.68–5.95] and 1.91 [95% CI 1.04–3.49], respectively).”

(the following quote is from Table 3 in the full document)

“**Phthalates**:... (are found in) Personal care products, such as **perfumes**, hair sprays, deodorants, nail polishes, insect repellants, and **most consumer products containing fragrances**, including shampoos, air fresheners, and laundry detergents”

[**Note:** [Phthalates](#) are [synthetic](#) odorless plasticizers used as solvents, binders or fixatives [in many fragrances](#). Why are phthalates [in the news](#)? [Phthalates](#) are considered Endocrine Disrupting Chemicals.

On the [California Safe Cosmetics Program Product Database](#): [DEP](#), [DIDP](#), and [DBP](#) are reported as fragrance while [DEHP](#) and [DBP](#) are perfume solvents. [IFRA](#) lists DEP and DMP, as “reported fragrance ingredients”.]

[**Note:** [Endocrine Disrupting Chemicals](#) (EDC’s) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC’s and how can they affect us?](#)]

27. Airborne contact dermatitis: common causes in the USA

Schloemer JA, Zirwas MJ, Burkhart CG. Airborne contact dermatitis: common causes in the USA. *Int J Dermatol*. 2015 Mar;54(3):271-4. doi: 10.1111/ijd.12692. Epub 2014 Jul 1. PMID: 24981079.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/24981079/> [PDF](#)

“Airborne contact dermatitis (ABCD) is an inflammatory reaction caused by exposure to particles suspended in air.... Airborne contact dermatitis can be classified as either allergic or irritant contact dermatitis, depending on its etiology and the mechanism of inflammation.... Many **allergens** and **chemicals** have been documented as causative agents of ABCD.”

“Many other agents responsible for causing ABCD have been reported in the literature.... Others include ammonia, anhydrous calcium sulfate, cleaning products, and **formaldehyde**.”

“Of note, the incidence of ABCD caused by chemicals of the isothiazolinone family, including methylisothiazolinone and methylchlorisothiazolinone, is on the rise as these chemicals are used increasingly as preservatives in many household products. Additionally, dermatitis resulting from methylisothiazolinone and related compounds may be allergic in nature, as evidenced by positive patch testing.

“Occupational hazards such as exposure to irritating chemicals and repetitive friction or abrasions to the surface of the skin can also pose a potential gateway for ABCD.”

[Note: [Limonene](#) is a common skin sensitizer and [known allergen](#) in fragrance and [fragranced products](#). Limonene (natural or [synthetic](#)) is a terpene. Terpenes can create [formaldehyde and particulate matter](#) in air as [secondary pollutants](#). Limonene is on the [IFRA](#) list as a fragrance ingredient.]

[Note: [Methylchlorisothiazolinone](#) and [Methylisothiazolinone](#) (MCI-MI) are preservatives and [known allergens](#) used in air fresheners and personal care products.]

28. History of the Obesogen Field: Looking Back to Look Forward

Heindel JJ. History of the Obesogen Field: Looking Back to Look Forward. Front Endocrinol (Lausanne). 2019 Jan 29;10:14. doi: 10.3389/fendo.2019.00014. PMID: 30761083; PMCID: PMC6362096.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/30761083/>

“**Exposure to EDCs during early development (DOHaD) has been shown to increase susceptibility to a variety of diseases including infertility, asthma, breast and prostate cancer, early puberty, susceptibility to infections, heart disease, autoimmune disease, and attention deficit hyperactivity disorder/learning disability.** The chemicals that she noted as having the ability to cause weight gain include organochlorine pesticides, carbamates, polychlorinated biphenols, plastics such as **phthalates** and bisphenol A (BPA), heavy metals and solvents.”

“**EDCs are found in a wide variety of products including pesticides/herbicides/fungicides, flame retardants, surfactants, plastics, sunscreens, cosmetics, and personal care products,** etc. [reviewed in (5)].”

“**Originally, EDCs were shown to interfere with estrogen, androgen and thyroid hormone signaling (7, 8) resulting in diseases and dysfunctions in reproduction, learning, memory, and behavior.**”

[Note: [Endocrine Disrupting Chemicals](#) (EDC's) are [commonly used in perfumes and fragranced products](#) as preservatives or fragrance. [What are EDC's and how can they affect us?](#)]

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