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

Download the poster to share: <https://www.fragrancefreecoalitionusa.com/>

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.

LAUNDRY PRODUCTS

Detergent, Scent Boosters/Beads, Fabric Softener, Dryer Sheets, Disinfectants, Spot Treatment, Scented Bleach/Oxygen Bleach, Scented Ammonia, Scented Vinegar

1. 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 fragranced products (e.g., perfume, air fresheners, and **dryer sheets**) and sunscreen.”

“**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)...”

“**Fragrances have been shown to exacerbate asthma**. ...The phthalate bis(2-ethylhexyl) phthalate (**DEHP**) in dust was associated with **asthma and wheezing in children**...”

“Our results also indicate that use of multiple products can lead to **exposure to an even larger mixture of compounds**, even if a consumer selected products considered alternative according to our criteria. For example, a consumer who used the alternative surface cleaner, tub and tile cleaner, **laundry detergent**, bar soap, shampoo and conditioner, facial cleanser and lotion, and toothpaste (a plausible array of product types for an individual) would potentially be exposed to at least 19 compounds: two parabens, three **phthalates**, MEA, DEA, five alkylphenols, and seven **fragrances**.”

[Note: Fragrance chemicals listed in Figure 1 are: Benzylacetate, Eugenol, Hexyl cinnamal, Limonene, Linalool, Methyl eugenol, Methyl salicylate, Pinene, Terpineol, AHTN, Bucina, Diphenyl ether, DPMI, HHCB, Isobornyl acetate, Methyl ionone, Musk ketone, Musk xylene, Phenethyl alcohol]

[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”.]

2. *Fragranced laundry products and emissions from dryer vents: implications for air quality and health*

Goodman N, Nematollahi N and Steinemann A (2021) *Fragranced laundry products and emissions from dryer vents: implications for air quality and health*. *Air Quality, Atmosphere and Health*, 14. pp. 245-249.

Article Link: <https://researchonline.jcu.edu.au/64706/> - [PDF](#)

“The study pursues three main objectives: (a) to determine the frequency and types of health problems associated with exposure to fragranced laundry products from dryer vents, (b) to assess and compare the VOCs from fragranced and fragrance-free laundry products, and (c) to calculate potential reductions in **limonene** emissions from dryer vents by switching from fragranced to fragrance-free laundry products. Results can provide a scientific foundation and practical approach to reduce pollutants and potential health risks associated with the use of laundry products and their emissions through dryer vents.”

“Among the general population in the US and AU, 12.5% and 6.1% of adults report health problems when exposed to **scented laundry products** from dryer vents. Adverse health effects include **respiratory problems (the most frequently reported, collectively), mucosal symptoms, skin problems, asthma attacks, migraine headaches, neurological problems**, among others.”

“Dryer vent emissions from seven households were analyzed for their limonene concentrations...”

“In households that switched from fragranced products to fragrance-free products, emissions of limonene were reduced within two weeks by up to 99.7% (average 79.1%).”

“At a regional level, during use of fragranced laundry products, limonene emissions from dryer vents across metropolitan Melbourne is estimated at 1.99 tons/year.”

“In this same analytical approach, applied to the state of California, limonene emissions from dryer vents across the state was estimated at 10.95 tons/year”

“This study indicates that fragranced laundry products emitted from dryer vents can be sources of indoor and outdoor air pollutants and health risks. The study also indicates that switching from fragranced to fragrance-free laundry products can generate potential improvements for air quality and health.”

3. *Emissions from dryer vents during use of fragranced and fragrance-free laundry products*

Goodman, N.B., Wheeler, A.J., Paevere, P.J. et al. *Emissions from dryer vents during use of fragranced and fragrance-free laundry products*. *Air Qual Atmos Health* 12, 289–295 (2019). <https://doi.org/10.1007/s11869-018-0643-8>

Article Link: <https://link.springer.com/article/10.1007/s11869-018-0643-8> - [PDF](#)

“The study focused on D-limonene because it is (a) a prevalent and dominant VOC in fragranced laundry products as well as other fragranced consumer products, (b) a suitable marker as it is generally found in fragranced laundry products but not in fragrance-free laundry products, (c) associated with a range of adverse human health and environmental effects, and classified as a potentially hazardous compound (SWA 2018), and (d) a terpene that readily reacts with ozone to generate a range of hazardous secondary air pollutants.”

(note: Graphic is from preceding article)

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Table 3 GC/MS headspace analysis of VOCs emitted from the fragranced laundry detergent and the fragrance-free laundry detergent used in this study, listed according to retention time

Compound	CAS #	Fragranced detergent	Fragrance-free detergent
Acetaldehyde*	75-07-0	✓	✓
Ethanol*	64-17-5	✓	
Acetone*	67-64-1	✓	✓
2-methyl-Pentane*	107-83-5	✓	
2-methyl-2-Propanol	75-65-0		✓
2-Propen-1-ol*	107-18-6	✓	
2-methyl-Hexane*	591-76-4	✓	
2,3-dimethyl-Pentane*	565-59-3	✓	
3-methyl-Hexane*	589-34-4	✓	
1,3-dimethyl-Cyclopentane	2453-00-1	✓	
Ethylbenzene*	100-41-4		✓
Heptane*	142-82-5	✓	
methyl-Cyclohexane*	108-87-2	✓	
2,3,4-trimethyl-Hexane	921-47-1	✓	
(E)-3-Hexen-1-ol	928-97-2	✓	
1-Hexanol*	111-27-3	✓	
α-Pinene	80-56-8	✓	
2-methyl-ethyl ester Pentanoic acid	39255-32-8	✓	
Sabinene	3387-41-5	✓	
3-Carene	13466-78-9	✓	
β-Myrcene	123-35-3	✓	
β-Ocimene	3779-61-1	✓	
4-Hexen-1-ol, acetate	72237-36-6	✓	
Acetic acid, hexyl ester	142-92-7	✓	
Octanal	124-13-0	✓	
D-Limonene*	5989-27-5	✓	
β-Phellandrene	555-10-2	✓	
2,6-dimethyl-5-Heptenal	106-72-9	✓	
2,6-dimethyl-7-Octen-2-ol	18479-58-8	✓	
1,3,4-Trimethyl-3-cyclohexenyl-1-carboxaldehyde	40702-26-9	✓	
Linalool*	78-70-6	✓	
3-methyl-5-propyl-Nonane	31081-18-2		✓
(E)- 7-Tetradecene	41446-63-3		✓
Cyclododecane	294-62-2		✓
Benzyl acetone	2550-26-7	✓	
4-tert-Butylcyclohexyl acetate	104-05-2	✓	
α-Terpinyl acetate	98-55-5	✓	
2-Carene	554-61-0	✓	
Lilial*	80-54-6	✓	

* Classified as hazardous under Safe Work Australia, Hazardous Chemical Information System (SWA 2018)

“This study demonstrated the **improvements to air quality after switching from fragranced to fragrance-free products**. It found that, by a change to fragrance-free laundry products, concentrations of D-limonene can be almost completely eliminated from the dryer vent emissions. This strategy may also reduce the formation and concentrations of secondary pollutants such as **formaldehyde, acetaldehyde**, and ultrafine particles. Findings from this study can provide an important foundation for future research, and for demonstrating cost-effective strategies to reduce VOC emissions and personal exposures.”

[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.]

4. Hazard assessment of chemical air contaminants measured in residences

Logue JM, McKone TE, Sherman MH, Singer BC. Hazard assessment of chemical air contaminants measured in residences. *Indoor Air*. 2011 Apr;21(2):92-109. doi: 10.1111/j.1600-0668.2010.00683.x. PMID: 21392118.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/21392118/>

“Fifteen pollutants appear to **exceed chronic health standards** in a large fraction of homes. Nine other pollutants are identified as **potential chronic health hazards** in a substantial minority of homes, and an additional nine are identified as potential hazards in a very small percentage of homes. Nine pollutants are identified as priority hazards based on the robustness of measured concentration data and the fraction of residences that appear to be impacted: **acetaldehyde**; acrolein; **benzene**; 1,3-butadiene; 1,4-dichlorobenzene; **formaldehyde**; naphthalene; nitrogen dioxide; and PM2.5. Activity-based emissions are shown to pose potential acute health hazards for PM(2.5), **formaldehyde**, CO, chloroform, and NO(2).”

[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: [Acetaldehyde](#) is on the [IFRA](#) list. It is on the [Carcinogens and Reproductive Toxicants List](#). “[Acetaldehyde at a low concentration synergistically exacerbates allergic airway inflammation as an endocrine-disrupting chemical and as a volatile organic compound](#)”]

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

5. 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?**]

6. Acetaldehyde at a low concentration synergistically exacerbates allergic airway inflammation as an endocrine-disrupting chemical and as a volatile organic compound

Kawano T, Matsuse H, Fukahori S, Tsuchida T, Nishino T, Fukushima C, Kohno S. Acetaldehyde at a low concentration synergistically exacerbates allergic airway inflammation as an endocrine-disrupting chemical and as a volatile organic compound. *Respiration*. 2012;84(2):135-41. doi: 10.1159/000337112. Epub 2012 Apr 25. PMID: 22538484.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/22538484/>

“Acetaldehyde is an endocrine-disrupting chemical (EDC) and a volatile organic compound (VOC). It is also a **carcinogen** and teratogen that causes **bronchoconstriction** in a subset of **asthmatics**. However, the mechanism through which acetaldehyde acts as an EDC/VOC causing **allergic airway inflammation** remains unknown.”

“Conclusions: **Exposure to acetaldehyde can enhance allergic airway inflammation in asthma.**”

[**Note:** **Acetaldehyde** is on the **IFRA** list. It is on the **Carcinogens and Reproductive Toxicants List**. “**Acetaldehyde at a low concentration synergistically exacerbates allergic airway inflammation as an endocrine-disrupting chemical and as a volatile organic compound**”]

[**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?**]

7. 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...**”

8. Identification of combinations of endocrine disrupting chemicals in household chemical products that require mixture toxicity testing

Lee I, Ji K. Identification of combinations of endocrine disrupting chemicals in household chemical products that require mixture toxicity testing. *Ecotoxicol Environ Saf.* 2022 Jul 15;240:113677. doi: 10.1016/j.ecoenv.2022.113677. Epub 2022 May 26. PMID: 35642859.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/35642859/> - [PDF](#)

“The present study listed the ingredients contained in 11064 household chemical products from a publicly available database, and identified **EDCs** related to **estrogenicity, androgenicity, thyroid hormone disruption, and changes in steroidogenesis.**”

“A total of 293 chemicals were related to **endocrine disruption**, and **nearly two-thirds of the products contained more than one of these chemicals**. Cleaning products, synthetic detergents, fabric softeners, air fresheners, and deodorants have several hotspots for **fragrances**, isothiazolinones, glycol ethers, and

parabens. The **three most prevalent EDCs** in household chemical products were **added to act as fragrances** and preservatives.”

“The most frequently observed EDCs in the five product groups are **hexyl cinnamaldehyde, geraniol, citronellol, 2-(4-tert-butylbenzyl)propionaldehyde** (CAS no. 80-54-6), and **benzyl benzoate** (CAS no. 120-51-4). These EDCs are commonly used to add fragrance.”

“The most frequently identified combinations were **benzisothiazolinone** and **butylated hydroxytoluene** (CAS no. 128-37-0) in cleaners, **benzisothiazolinone** and **hexyl cinnamaldehyde** in synthetic detergents, **2-(4-tert-butylbenzyl)propionaldehyde** and **citronellol** in fabric softeners, **benzyl benzoate** and **hexyl cinnamaldehyde** in air fresheners, and **geraniol** and **citral** (CAS no. 5392-40-5) in deodorants. The EDCs in these products were mostly included to act as **fragrances** and preservatives.”

“Consistent with the results of this study, Wieck et al. (2018) reported that 26 fragrances were named approximately 2000 times on the ingredient list of 1447 household detergents, and **fragrances** such as **limonene, linalool, hexyl cinnamaldehyde, 2-(4-tert-butylbenzyl)propionaldehyde,** and **citronellol** were frequently mentioned (Wieck et al., 2018, Yazar et al., 2011)... **Geraniol** appeared to have the potential to **interact with estrogen receptors** in estrogen-inducible yeast expressing the human estrogen receptor (Howes et al., 2002)... **Benzyl benzoate** and **2-(4-tert-butylbenzyl)propionaldehyde** added to **synthetic detergents, fabric softeners, and air fresheners** were reported to induce estrogenic responses in **MCF-7 human breast cancer cell line** (Charles and Darbre, 2009).

“This study confirmed that DEHP, DINP, and DBP were used in cleaners, synthetic detergents, coating agents, adhesives, **air fresheners**, and paints. **Exposure to DEHP or DBP at levels seen in human populations** has been **linked to male reproductive defects**, such as **poor semen quality** and **abnormal genital development** (Radke et al., 2018).”

9. Fragrance allergens in household detergents

Wieck S, Olsson O, Kümmerer K, Klaschka U. Fragrance allergens in household detergents. Regul Toxicol Pharmacol. 2018 Aug;97:163-169. doi: 10.1016/j.yrtph.2018.06.015. Epub 2018 Jun 22. PMID: 29940212.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/29940212/>

“For the first time, fragrance allergens were evaluated in a complete set of detergents in households. In 131 households, we investigated the prevalence of detergents and searched their lists of ingredients for 26 fragrance allergens liable to be indicated on products according to the European Detergents Regulations.”

“On the ingredient lists of 1447 products, these 26 fragrance substances were named almost 2000 times, most often **limonene, linalool** and **hexyl cinnamal**. **Benzyl salicylate** was used frequently in all-purpose cleaners. Linalool and limonene, hexyl cinnamal and **butylphenyl methylpropional** and **citronellol** and linalool co-occurred most often together in products. **Fragrance allergens** co-occurring together most frequently within households were **eugenol, coumarin** and **cinnamyl alcohol**. The study shows that **detergents could play a relevant role for the exposure of consumers towards fragrance allergens** and that they should not be underestimated as an exposure source during the exposure assessment.”

“Further factors such as **chemical transformation (e.g. by oxidation) into stronger allergens or new molecules** of often unknown properties and individual use practices can increase the risk of allergy further (Bråred Christensson et al., 2016; Niu et al., 2017; Rossignol et al., 2013).”

“Our results demonstrate that detergents could contribute to the aggregated exposure to fragrance allergens...The results indicate that detergents, next to cosmetics, should be included in exposure scenarios calculating the aggregate exposure.”

[**Note: In the EU**, [26 known fragrance allergens](#) have been a labeling requirement [since 2009](#), but as of 2022 the EU is planning to add [56 more fragrance allergens](#).]

[**Note: IN THE U.S. NEWS** - On Dec. 29, 2022, the MOCRA - (Modernization of Cosmetic Regulation Act) was signed into law. In a few years, the U.S. should start listing [fragrance allergens in cosmetics](#), but this Act may tie the hands of states' ability to make a law pertaining to disclosing the over 3,000 other potentially concerning fragrance ingredients ([like California did](#)).

To learn more, see what [Women's Voices for the Earth \(WVE\)](#) have figured out.

To read the Act, go to [congress.gov link/PDF](#) (page 1396).

What to know:

Which products qualify as [‘cosmetics’](#) and [Who regulates what??](#)

Items such as fragranced laundry products, air fresheners, carpet fragrance, fragrance in cleaning products or car / car wash fragrances are not considered cosmetics, therefore, it is safe to say that companies who sell these products will not be obligated to list the known fragrance allergens in their products.]

10. *Fragranced consumer products: effects on asthmatics*

Steinemann A. *Fragranced consumer products: effects on asthmatics*. *Air Qual Atmos Health*. 2018;11(1):3-9. doi: 10.1007/s11869-017-0536-2. Epub 2017 Dec 11. PMID: 29391919; PMCID: PMC5773620.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/29391919/> - [PDF](#)

“...41.0% of asthmatics report **health problems** from air fresheners or deodorizers, 28.9% from **scented laundry products** coming from a dryer vent, 42.3% from being in a room cleaned with scented products, and 46.2% from being near someone wearing a fragranced product.”

“Fragranced consumer products pervade society and emit numerous volatile organic compounds, such as **limonene, alpha-pinene, beta-pinene, acetaldehyde, and formaldehyde...**”

“Fragranced products have been associated with a range of adverse health effects including work-related asthma (Weinberg et al. 2017), **asthmatic exacerbations** (Kumar et al. 1995; Millqvist and Löwhagen 1996), **respiratory difficulties** (Caress 2009), **mucosal symptoms** (Elberling et al. 2005), **migraine headaches** (Kelman 2004), and **contact dermatitis** (Rastogi et al. 2007; Johansen 2003), as well as **neurological, cardiovascular, cognitive, musculoskeletal, and immune system problems** (Steinemann 2016).”

“The study provides important data on the extent and severity of the problem, pointing to opportunities to reduce the adverse health, economic, and societal effects by reducing exposure to fragranced products.”

“Fragranced products were categorized as follows:

(a) air fresheners and deodorizers (e.g., sprays, solids, oils, disks);

- (b) personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos);
- (c) cleaning supplies (e.g., all-purpose cleaners, disinfectants, dishwashing soap);
- (d) laundry products (e.g., detergents, fabric softeners, dryer sheets);
- (e) household products (e.g., scented candles, restroom paper, trash bags, baby products);
- (f) fragrance (e.g., perfume, cologne, after-shave); and (g) other.”

“Results indicate that 64.3% of asthmatics report one or more types of adverse health effects from fragranced products, including **respiratory problems** (43.3%), **migraine headaches** (28.2%), and **asthma attacks** (27.9%)...”

11. Chemical emissions from residential dryer vents during use of fragranced laundry products

Steinemann, A.C., Gallagher, L.G., Davis, A.L. *et al.* Chemical emissions from residential dryer vents during use of fragranced laundry products. *Air Qual Atmos Health* 6, 151–156 (2013). <https://doi.org/10.1007/s11869-011-0156-1>

Article Link: <https://link.springer.com/article/10.1007/s11869-011-0156-1>

“In a controlled study of washing and drying laundry, we sampled emissions from two residential dryer vents during the use of no products, fragranced detergent, and fragranced detergent plus fragranced **dryer sheet**. Our analyses found more than **25 VOCs emitted** from dryer vents, with the highest concentrations of **acetaldehyde, acetone, and ethanol.**”

“**Seven** of these VOCs are classified as **hazardous air pollutants** (HAPs) and **two as carcinogenic HAPs (acetaldehyde and benzene) with no safe exposure level**, according to the US Environmental Protection Agency. As context for significance, the **acetaldehyde emissions** during use of one brand of laundry detergent **would represent 3% of total acetaldehyde emissions from automobiles** in the study area...”

“The fragrance alone in a product can contain up to several hundred chemicals among more than 2,600 chemicals documented as fragrance ingredients (Ford et al. 2000; Bickers et al. 2003).”

12. Laundry detergents and detergent residue after rinsing directly disrupt tight junction barrier integrity in human bronchial epithelial cells

Wang M, Tan G, Eljaszewicz A, Meng Y, Wawrzyniak P, Acharya S, Altunbulakli C, Westermann P, Dreher A, Yan L, Wang C, Akdis M, Zhang L, Nadeau KC, Akdis CA. Laundry detergents and detergent residue after rinsing directly disrupt tight junction barrier integrity in human bronchial epithelial cells. *J Allergy Clin Immunol*. 2019 May;143(5):1892-1903. doi: 10.1016/j.jaci.2018.11.016. Epub 2018 Nov 27. PMID: 30500342.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/30500342/> - [PDF](#)

“It is well documented that increased exposure to multiple environmental factors, such as air pollutants, tobacco smoke, **allergens in the air, fragrances**, and preservatives, contribute to the development and exacerbation of asthma and other allergies.... The popularizing of synthetic laundry detergents coincided with the uprising of allergic diseases over the past few decades.”

“Laundry detergents contain numerous ingredients that might be irritants (surfactants and bleaches) or sensitizers (**fragrances** and enzymes) and can cause asthma and other allergic diseases.”

“Airway epithelial cells form a surface barrier against inhaled environmental insults. Increasing evidence indicates that defective epithelial barrier function is associated with asthma....

“Our data demonstrated that **both laundry detergents and detergent residue after rinsing showed high cytotoxicity and directly impaired barrier integrity of bronchial epithelial cells.**”

“**Fragrance** can also cause exacerbations of symptoms and airway obstruction in asthmatic patients.”

“Considering the high concentration and large amount of detergent residue in clothing and the close contact with human organs, the irritative and sensitized ingredients of **laundry detergents** can be easily **inhaled** into the airways and reach the lung from newly washed clothing.”

“It must be noted that contents of **household detergents, carpet cleaners, dishwashers, and laundry detergents** are quite similar, indicating extensive exposure to detergents. Therefore the problem of long-term high exposure to detergent in daily life should receive attention for public health. “

“**Epigenetic** mechanisms are thought to play a role in different complex diseases of the lungs, such as **asthma** and **COPD**, which are strongly influenced by environmental factors, such as cigarette smoke. Although we showed a negligible effect of laundry detergents on chromatin accessibility and DNA methylation in HBECs, these data helped us reach the conclusion that **laundry detergents directly attack barrier integrity**, without affecting the epigenome in short-term exposure. However, we cannot rule out the possibility that a longer time period and more chronic daily exposure to detergent could influence **DNA methylation**. In line with this concept, one recent study demonstrated that exposure of HBECs to diesel exhaust had minimal effects on DNA methylation at 48 hours; however, when the same lung was exposed to diesel exhaust but separated by 4 weeks, significant changes in DNA methylation were observed.”

13. *Fragranced consumer products: effects on autistic adults in the United States, Australia, and United Kingdom*

Steinemann A. *Fragranced consumer products: effects on autistic adults in the United States, Australia, and United Kingdom*. *Air Qual Atmos Health*. 2018;11(10):1137-1142. doi: 10.1007/s11869-018-0625-x. Epub 2018 Sep 25. PMID: 30546500; PMCID: PMC6244938

Article Link: <https://pubmed.ncbi.nlm.nih.gov/30546500/> - [PDF](#)

“Fragranced consumer products are ubiquitous in society and emit numerous volatile organic compounds including hazardous air pollutants.”

“**Health effects were categorized as follows:**

- (a) migraine headaches;
- (b) asthma attacks;
- (c) neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination);
- (d) respiratory problems (e.g., difficulty breathing, coughing, shortness of breath);
- (e) skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis);
- (f) cognitive problems (e.g., difficulties thinking, concentrating, or remembering);
- (g) mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing);
- (h) immune system problems (e.g., swollen lymph glands, fever, fatigue);
- (i) gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea);
- (j) cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort);
- (k) musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness); and

(l) other.”

“**Specific problematic exposures, associated with adverse health effects for autistic adults, include but are not limited to the following:** ...air fresheners and deodorizers (62.9%), the scent of laundry products coming from a dryer vent (57.5%), being in a room recently cleaned with scented products (65.9%), **being near someone wearing a fragranced product** (60.5%), and other types of fragranced consumer products (64.3%)... Among autistic adults reporting health effects, 74.1% across the three countries (85.4% US, 82.4% AU, 54.5% UK) report that the severity of these health effects from fragranced products was potentially disabling. Among non-autistic adults, the prevalence of potentially disabling effects was 25.4%.”

“...62.1% of autistic adults are unable or reluctant to use the restrooms in a public place if it has an air freshener, deodorizer, or scented product; 59.8% are unable or reluctant to wash their hands with soap in a public place if the soap is fragranced; 58.7% enter a business and then want to leave as quickly as possible if they smell air fresheners or a fragranced product; and **66.7% have been prevented from going someplace because they would be exposed to a fragranced product that would make them sick...**”

“Involuntary exposure is a concern. Autistic individuals are prevented from accessing public restrooms, societal venues, businesses, and workplaces due to adverse health effects from fragranced products. Further, 59.4% of autistic adults have lost workdays, in the past year, due to fragranced product exposure in the workplace.”

“**A strong majority of autistic as well as non-autistic adults would prefer that workplaces, health care facilities, and health care professionals were fragrance-free than fragranced.**”

14. 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...”

15. Contact Allergens in Top-Selling Textile-care Products

Article Link: <https://pubmed.ncbi.nlm.nih.gov/31905182/>

“Ten common allergens were identified: benzisothiazolinone, **benzyl benzoate**, cocamidopropyl betaine, **decyl glucoside**, “**fragrances**,” lauryl glucoside, methylisothiazolinone, methylchloroisothiazolinone, **phenoxyethanol**, and **propylene glycol**. **Fragrances and essential oils are the top allergens in laundry detergents** (66.7%), **fabric softeners** (90%), **dryer sheets** (75%), and **stain removers** (58.8%). ...found that 139 to 2820 parts per million of **detergent residue remain** after one wash and **required 20 to 22 washes to become undetectable**. **Formaldehyde** is a preservative that may be emitted by laundry products during the washing and drying process but not listed by manufacturers.”

16. *Fragranced consumer products: effects on asthmatic Australians*

Steinemann A, Wheeler AJ, Larcombe A. *Fragranced consumer products: effects on asthmatic Australians*. *Air Qual Atmos Health*. 2018;11(4):365-371. doi: 10.1007/s11869-018-0560-x. Epub 2018 Mar 17. PMID: 29780436; PMCID: PMC5954056.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/29780436/> - [PDF](#)

“Exposure to fragranced consumer products is associated with adverse health effects such as **asthma attacks, breathing difficulties, and migraine headaches....** Nationally, 55.6% of asthmatics, and 23.9% of non-asthmatics, report adverse health effects after exposure to fragranced products.”

“Overall, the majority of asthmatics and non-asthmatics were unaware of **potentially hazardous chemicals emitted from fragranced products**, even ones called green or organic, and would not continue to use a fragranced product if they knew it emitted these pollutants.... Most asthmatics (67.1%) and non-asthmatics (69.2%) were not aware that **fragrance chemicals do not need to be fully disclosed** on the product label or material safety data sheet.”

“A majority of asthmatics (62.6%) and non-asthmatics (55.8%) **would prefer an airplane without scented air pumped through the passenger cabin...** Nearly half of both asthmatics (50.2%) and non-asthmatics (40.4%) **would prefer that healthcare facilities and healthcare professionals were fragrance-free.**”

“More than half of asthmatics (50.5%) and nearly half of non-asthmatics (39.7%) **would support a fragrance-free policy in the workplace...prefer a hotel without scented air**”

“...55.6% of “asthmatics” in our study who report adverse health effects due to fragranced product exposure would represent over 2.2 million adult Australians (ABS 2016). Combining this with the **23.9% of “non-asthmatics” (71.5%) who also report adverse health effects** would represent over 4.5 million adult Australians affected adversely **by fragranced consumer products.**”

“Results from this study show that **voluntary and involuntary exposure to fragranced products** is widespread in Australian society, that **exposure is associated with a range of potentially serious and adverse health effects**,...In addition to the adverse health consequences, exposure to fragranced products imposes significant **adverse impacts** on workplace productivity and quality of life, **including the ability to access public places such as restrooms.**”

“**A straightforward approach to reduce undesirable effects would be to reduce or avoid use of fragranced products, especially in public places that would impose involuntary risks, and to implement fragrance-free policies in workplaces, healthcare facilities, and other environments.**”

17. 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](#)

“In the European general population, female subjects and subjects younger than 40 years of age are most exposed to scented products. **In females, high exposure to scented products may lead to fragrance contact allergy.** Sensitive skin is associated with exposure to different leave-on product subgroups and with contact allergy to fragrances. Overall, **exposure to scented products**, especially to leave-on products, is associated with **fragrance contact allergy.**”

18. Role of perfumes in pathogenesis of autism

Bagasra O, Golkar Z, Garcia M, Rice LN, Pace DG. Role of perfumes in pathogenesis of autism. *Med Hypotheses*. 2013 Jun;80(6):795-803. doi: 10.1016/j.mehy.2013.03.014. Epub 2013 Apr 8. PMID: 23578362.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/23578362/>

“**There are 3100 ingredients that contribute to “fragrance,”** and consumers routinely have no idea about how much the pleasant smells included in perfumes may be damaging their health, and the health of their fetus.... “

“During pregnancy, the use of fragrances and other cosmetics may actually expose the **growing fetus to diethyl phthalate (DEP)**, a common fragrance solvent that can cause **abnormal development of reproductive organs in infant males, Attention Deficit Disorder (ADD) in children, and sperm damage in adults....**”

“Two chemicals, octinoxate and **butylated hydroxytoluene (BHT)**, have **thyroid** and **androgen-like** hormonal activities... In addition, octinoxalate, oxybenzone, benzophenone-1 diethyl phthalate, galaxolide, tonalid, **musk ketone, benzyl salicylate**, butylphenyl methylpropionate, and **even the many yet-to-be-exposed chemicals that still hide incognito within perfumes, are known to act like estrogen or androgens....**”

“We analyzed 91 perfumes by the Ames test... As shown in Fig. 3, numerous perfumes exhibit serious mutagenic potential, as compared with the positive control (4-NOPD), which is highly mutagenic. Distilled water was used as the negative control. Our analyses showed that **each of the 91 perfumes tested imparted some degree of mutagenic potential**; several exceeded the mutagenic potential of 4-NOPD by 2.5-fold. Fig. 3 only shows the few perfumes with mutagenic ability, but during our studies **we did not find a single perfume that did not have some degree of mutagenic capacity at 1:15,000 dilutions...**”

“The role of perfumes in the molecular and cellular pathogenesises of ASD has not been evaluated adequately. This is **due mainly to the 1973 FDA decision to exempt perfumes from appropriate testing**, which is generally required for any consumer item that enters the human body and is metabolized by human metabolic pathways. We **provide evidence** that many perfumes are highly mutagenic and carcinogenic, even at

extremely low concentrations. We also provide evidence that even at femtomole levels, certain perfumes are **cytotoxic to human fetal brain development** (neuroblastoma cell lines) in vitro. In addition, we show that even at 1:108 dilutions, certain perfumes are **neurostimulatory** and **may cause abnormal brain development.**”

19. Environmental factors in the development of autism spectrum disorders

Sealey LA, Hughes BW, Sriskanda AN, Guest JR, Gibson AD, Johnson-Williams L, Pace DG, Bagasra O. Environmental factors in the development of autism spectrum disorders. *Environ Int.* 2016 Mar;88:288-298. doi: 10.1016/j.envint.2015.12.021. Epub 2016 Jan 28. PMID: 26826339.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/26826339/> - [PDF](#)

“Many modern companies do not disclose the industrial secrets in many of their fragrances that are, in reality, a complex concoction of synthetic chemicals and natural essences, which often have been found to be petrochemicals.”

“Among those are chemicals, such as **musk ketone** and **diethyl phthalate**, which are responsible for **allergic reactions and hormone disruption**.... Although these **chemicals have been found to accumulate in human tissues**, they have not yet been adequately analyzed for safety in products used by unsuspecting humans. **As a result of a giant loophole in the Federal Fair Packaging and Labeling Act of 1973**, which explicitly exempts fragrance producers from having to disclose cosmetic ingredients on product labels, fragrance concealment is not illegal and is often used by the industry to hide from the public the full list of ingredients, even substances that can cause grave health problems (Environmental Working Group (EWG), 2005). It is a common practice for businesses to list the chemicals as simply “fragrance,” which may mean that **the majority of the ingredients are never revealed to buyers.**”

“Even worse, people who use cologne, fragrances, body spray, and other scented cosmetics are blindly exposed to dangerous chemicals since the Food and Drug Administration lacks authority to control mandates to manufacturers that require testing of all fragrances for safety, before being released to the public.”

“Also, during pregnancy, the use of fragrances and other cosmetics may actually expose the developing fetus to **diethyl phthalate (DEP)**, a common fragrance solvent that can cause **abnormal development of reproductive organs in infant males, Attention Deficit Disorder** in children, and **sperm damage in adults.**”

“The role of environmental factors like **fragrances, glyphosate and other synthetic chemicals derived from petrochemicals containing carcinogenic, mutagenic, hormones disturbing and neuromodifying capabilities** in the molecular and cellular pathogenesis of ASD has not been evaluated. This is partly due to the 1973 FDA decision to exempt fragrances and cosmetics from appropriate testing, which is generally required for any consumer item that enters the human body and is metabolized by human metabolic pathways.”

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 conjugal 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. 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/> - [Full Text](#)

“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.**”

22. *Fragranced consumer products: exposures and effects from emissions*

Steinemann A. *Fragranced consumer products: exposures and effects from emissions*. *Air Qual Atmos Health*. 2016;9(8):861-866. doi: 10.1007/s11869-016-0442-z. Epub 2016 Oct 20. PMID: 27867426; PMCID: PMC5093181.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/27867426/> - [PDF](#)

“Fragranced consumer products, such as cleaning supplies, **air fresheners**, and personal care products, **are a primary source of indoor air pollutants** and personal exposure.... The study investigated the prevalence and types of fragranced product exposures, associated health effects, awareness of product emissions, and preferences for fragrance-free policies and environments.”

“**Secondhand scents** (as termed in this article) **refers to indirect or involuntary exposure to fragranced products (in an analogy to secondhand smoke)**. ... Individuals report **health problems when exposed to fragranced products in society**, other than through intentional use of products.”

“**Fragranced products (even ones called green or organic) emit a range of volatile organic compounds**, including hazardous air pollutants, but relatively few are disclosed to the public (Steinemann 2015).... Further, 67.3 % were not aware that **fragranced products typically emit hazardous air pollutants such as formaldehyde**, and 72.6 % were not aware that even so-called natural, green, and organic fragranced products typically emit hazardous air pollutants.”

23. *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](#)?]

Back to top of [Laundry Products](#)

To print, share, or download poster and documents go to our website:

<https://www.fragrancefreecoalitionusa.com/>