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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.

VEHICLES

Air Fresheners (hanging/in-vent or inconspicuous areas), Sprays, Cleaners

1. Ubiquity, Hazardous Effects, and Risk Assessment of Fragrances in Consumer Products

Pastor-Nieto MA, Gatica-Ortega ME. Ubiquity, Hazardous Effects, and Risk Assessment of Fragrances in Consumer Products. *Curr Treat Options Allergy*. 2021;8(1):21-41. doi: 10.1007/s40521-020-00275-7. Epub 2021 Jan 23. PMID: 33520600; PMCID: PMC7825391

Article Link: <https://pubmed.ncbi.nlm.nih.gov/33520600/> - [PDF](#)

“**Scented air care products** (aerosol and pump sprays, diffusers, gels, candles potpourri, incense, diffusers, wax melts, and plug-ins) are largely used by the population [9, 28] and may cause **airborne contact dermatitis**. For instance, a **severe facial and eyelid dermatitis from a car diffuser** involving an Uber driver sensitized to **M. pereirae** and **FM** was reported. He experienced flare-ups during his work days and the removal of the diffuser led to a dramatic improvement of the lesions [28].”

“...**hormonal activities** are octinoxate and butylated hydroxytoluene (**thyroid and androgen-like activities**) and octinoxalate, oxybenzone, benzophenone-1, **diethyl phthalate, galaxolide, tonalide, musk ketone, benzyl salicylate, and butylphenyl methylpropional (estrogen or androgen activity)**. **Diethyl phthalate, a fragrance solvent, can cause abnormal development of reproductive organs** in infant males, **attention deficit disorder** in children, and **sperm damage** in adults.”

“Information regarding the risks of fragrances should be delivered to the non-sensitized population. Warning signals should be added to the containers. Most consumers trust the manufacturers and authorities and think fragrances are safe and positive”

“Producers should respect regulations and recommendations by the SCCS and IFRA [20]; produce fewer toxic compounds for human or the environment; avoid damaging substitutes [20]; lower the doses to below elicitation [2]; and implement measures to avoid pre-hapten air oxidation during handling and storage,”

“**Fragrances are not necessary for human survival**. Thus, their risks clearly outweigh their benefits. Sensitization results from a failure of the legislation to prevent inappropriately high exposures”

2. Erectile Dysfunction in Men on the Rise: Is There a Link with Endocrine Disrupting Chemicals?

Cripps SM, Mattiske DM, Pask AJ. Erectile Dysfunction in Men on the Rise: Is There a Link with Endocrine Disrupting Chemicals? *Sex Dev*. 2021;15(1-3):187-212. doi: 10.1159/000516600. Epub 2021 Jun 16. PMID: 34134123.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/34134123/> - [PDF](#)

“**Erectile dysfunction (ED)** is one of the **most prevalent chronic conditions affecting men**. ED can arise from **disruptions during development**, affecting the patterning of erectile tissues in the penis and/or **disruptions in adulthood** that impact sexual stimuli, neural pathways, molecular changes, and **endocrine signalling** that are required to drive erection.”

“**Androgen signalling** is critical for erectile function through its role in **penis development** and in regulating the physiological processes driving erection in the adult. Interestingly, **estrogen signalling is also implicated in penis development** and potentially in processes which regulate erectile function during adulthood.”

“Given that **endocrine signalling has a prominent role in erectile function**, it is **likely that exposure to endocrine disrupting chemicals (EDCs) is a risk factor for ED**, although this is an under-researched field. Thus, our review provides a detailed description of the underlying biology of erectile function with a focus on the role of endocrine signalling, exploring the **potential link between EDCs and ED based on animal and human studies.**” © 2021 S. Karger AG, Basel

[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?](#)]

3. Investigation of volatile organic compounds and phthalates present in the cabin air of used private cars

Geiss O, Tirendi S, Barrero-Moreno J, Kotzias D. Investigation of volatile organic compounds and phthalates present in the cabin air of used private cars. Environ Int. 2009 Nov;35(8):1188-95. doi: 10.1016/j.envint.2009.07.016. Epub 2009 Sep 3. PMID: 19729200.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/19729200/>

“The presence of selected volatile organic compounds (VOCs) including **aromatic**, aliphatic compounds and low molecular weight carbonyls, and a target set of **phthalates** were investigated in the interior of 23 used private cars during the summer and winter. **VOC concentrations often exceeded levels typically found in residential indoor air**, e.g. **benzene** concentrations reached values of up to 149.1 $\mu\text{g m}^{-3}$. Overall concentrations were 40% higher in summer, with temperatures inside the cars reaching up to 70 °C. The most frequently detected **phthalates** were di-n-butyl-phthalate and bis-(2-ethylhexyl) phthalate in concentrations ranging from 196 to 3656 ngm^{-3} .”

“The data presented in this paper clearly show the need to assess long term exposure to air pollutants and the related health risks for drivers and passengers.”

[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.]

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

4. Volatile Chemical Emissions from Car Air Fresheners

Steinemann, A., Nematollahi, N., Weinberg, J.L. *et al.* Volatile chemical emissions from car air fresheners. *Air Qual Atmos Health* 13, 1329–1334 (2020). <https://doi.org/10.1007/s11869-020-00886-8>

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“Across the 12 car air fresheners, 546 VOCs were emitted (occurrences), representing 275 unique VOCs (identities). The most prevalent VOCs (in at least 75% of all car air fresheners) were **limonene**, **benzyl acetate**, **acetone**, **ethanol**, **linalool**, **2-methylbutyl acetate**, **acetaldehyde**, and **methanol** (Table 2 and Supplementary Table 2). In "regular" car air fresheners, the most prevalent VOC was **limonene**. In "natural" car air fresheners, the most prevalent VOC was **benzyl acetate**.”

“This study found that car air fresheners of all types, including both regular and natural versions, emit numerous volatile chemicals, some of which are classified as hazardous, and few of which are disclosed to the public. Car air freshener emissions are of particular concern, given that car interiors are small and enclosed spaces that can be subject to air pollutants from both outdoor and indoor sources, and thus air fresheners represent an additional source of pollutants and **health risks**.”

[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: [Linalool](#) is a common ingredient in [fragranced products](#). Linalool is a [sensitizer](#) after it is exposed to air and can cause [contact allergies](#).]

[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.]

5. Head-space, small-chamber and in-vehicle tests for volatile organic compounds (VOCs) emitted from air fresheners for the Korean market

Jo WK, Lee JH, Kim MK. Head-space, small-chamber and in-vehicle tests for volatile organic compounds (VOCs) emitted from air fresheners for the Korean market. *Chemosphere*. 2008 Feb;70(10):1827-34. doi: 10.1016/j.chemosphere. 2007.08.021. Epub 2007 Sep 21. PMID: 17889253.

Article Link: <https://pubmed.ncbi.nlm.nih.gov/17889253/>

“Five toxic or hazardous analytes were found in the headspace phase of AFs (**toluene**, **benzene**, **ethyl benzene**, and **m,p-xylene**) at a frequency of more than 50%. **Limonene** and **linalool**, which are known to be unsaturated **ozone-reactive VOCs**, were detected at a frequency of 58 and 35%, respectively.”

“Previous studies have implicated several consumer products as being sources of indoor air pollution (Habib *et al.*, 2006; Singer *et al.*, 2006; Su *et al.*, 2007). ... **AFs work by using a nerve-deadening chemical that interferes with the human sense of smell**, coating the nasal passage with an oily film, masking an offending odor with a different odor, or by deactivating the odor (EHANS, 2004) Certain VOCs emitted from AFs such as **ethanol**, **benzaldehyde**, **α -terpineol**, and **benzyl acetate** showed toxic effects at dose levels between 9 and

14 mg/kg (Cooper et al., 1995), however, **AFs emit significant amounts of VOCs when applied indoors** (Salthammer, 1999; Zhu et al., 2001; Singer et al., 2006).”

“Synthetic, chemical-based AFs contain a number of chemicals including **carcinogens** and **sensitizers**, possible **reproductive toxins**, and **neurotoxins** (EHANS, 2004). Moreover, unsaturated organic constituents emitted from **AFs produce secondary toxic pollutants via reactions with oxidants such as ozone, hydroxyl radicals, and nitrogen oxides** (Weschler and Shields, 1999; Atkinson and Arey, 2003).”

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

[Note: **Xylene** “[occurs naturally in petroleum and coal tar, and is major component of gasoline and fuel oil](#)”. Xylene is used as a musk fragrance. [Xylene](#) is on [IFRA](#).]

[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: **Linalool** is a common ingredient in [fragranced products](#). Linalool is a [sensitizer](#) after it is exposed to air and can cause [contact allergies](#).]

6. Scented lotions may cause scaring and premature fading of tattoos (case report)

Pona A, Gonzalez CD, Walkosz BJ, Dellavalle RP. Scented lotions may cause scaring 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.”

7. 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?](#)]

8. *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.”

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