Carcinogens in Cosmetics

The laws governing cosmetics and personal care products are so limited that known cancer-causing chemicals, or carcinogens, are legally allowed in personal care products. Some carcinogens, such as formaldehyde and formaldehyde-releasing preservatives, are common in personal care products, while others are less common, but still occasionally present.

Where do we find those known human carcinogenic chemicals?

The International Agency for Research on Cancer (IARC) is an intergovernmental agency, and part of the World Health Organization. IARC's mission is to enhance collaboration in cancer research internationally.[10]

IARC consolidates scientific evidence and classifies the chemicals it reviews into five levels:[11]

- Group 1: Carcinogenic to humans
- Group 2A: Probably carcinogenic to humans
- Group 2B: Possibly carcinogenic to humans
- Group 3: Not classifiable as to their carcinogenicity to humans
- Group 4: Probably not carcinogenic to humans.

Of the 113 agents listed by IARC as known human carcinogens (Groups 1), at least 11 have been or are currently used in personal care products: formaldehyde, phenacetin, coal tar, benzene, untreated or mildly treated mineral oils, methylene glycol, ethylene oxide, chromium, cadmium and its compounds, arsenic, and crystalline silica or quartz.[12]

Carcinogens in personal care products: Chemicals and their health concerns?

Formaldehyde

Formaldehyde is intentionally added to some products, such as keratin hair straighteners.[13] Formaldehyde-releasing preservatives (FRPs) are also widely[14][15] used in personal care products including nail polish, eye shadow, mascara, nail treatment, shampoo and blush[16] for the prevention of bacterial growth.[17] FRPs are designed to release formaldehyde slowly and constantly over time[18] to act as a preservative.[19][20]

IARC, the National Toxicology Program (NTP) and California EPA's Proposition 65 (Prop 65) classify formaldehyde as a human carcinogen.[21][22][23] EPA identifies formaldehyde as a probable human carcinogen.[24] The National Institute of Occupational Safety and Health (NIOSH) also raises concern that exposure to formaldehyde leads to irritation of the eyes, nose, throat and respiratory system.[25] Standards for cosmetics in Japan prohibit formaldehyde use in cosmetics,[26] and the European Commission restricts formaldehyde in cosmetics to no more than five percent concentration in the finished product.[27]

Phenacetin

Phenacetin was used as pain and fever reducer until banned in the US by the Food and Drug Administration (FDA) in 1983 due to its carcinogenicity.[28] Although it is no longer used as a drug, it is still occasionally used in personal care products as a stabilizer in products such as facial hair bleach, hair color and women's depilatories.[29][30]

IARC and Prop 65 identify phenacetin as a human carcinogen.[31][32] NTP lists that phenacetin and analgesic mixtures containing phenacetin are reasonably anticipated to be human carcinogens.[33] Phenacetin can also cause renal damage and anemia.[34] Exposure to phenacetin has been linked malignant mammary tumors.[35]

Coal Tar

Coal tar is a known carcinogen and a by-product from coal processing. It is used in cosmetics containing hair dyes, shampoos, dandruff/scalp treatment and redness/rosacea treatment.[36]

IARC, NTP and EPA classify coal tar as a known human carcinogen.[37][38][39] Coal tar was one of the first occupational exposures linked to cancer; when scrotal cancer among young chimney sweeps was associated with exposure.[40] It is also associated with cancers of the lung, bladder, kidney, and digestive tract.[41] Environmental Canada classifies that coal tar pitch is persistent and inherently toxic to aquatic organisms.[42] European Commission prohibits coal tar use in cosmetics.[43]

Coal tars are complex mixtures that can contain other known carcinogens, such as polycyclic aromatic hydrocarbons (PAHs),[44] such as benzo[a]pyrene.[45][46] PAHs damage DNA,[47] and exposure to PAHs can lead to tumors on lungs, bladder and skin; and PAHs can also cause non-cancer toxicities like reproductive and developmental toxicity.[48]

Benzene

Benzene is derived from coal tar, and exposure routes of benzene are inhalation and ingestion.[49] Benzene is used in the production of plastics and detergents[50] and occasionally in hair conditioner and styling lotion.[51]

IARC and NTP classify benzene as a known human carcinogen.[52][53] Prop 65 identifies benzene as a concern for both cancer and developmental toxicity,[54] and benzene can lead to mammary tumors in female mice.[55] EPA identifies benzene as a known human respiratory toxicant.[56] Benzene is considered a priority pollutant of wastewater by EPA, which means environmental releases of benzene are regulated.[57] The Endocrine Disruption Exchange considers benzene as an endocrine disruptor.[58] Occupational exposure to benzene is linked to leukemia; and benzene can target organs including eyes, skin, respiratory system, blood, central nervous system and bone marrow.[59] The European Commission prohibits benzene use in cosmetics,[60] and it is restricted in the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).[61]

Mineral oils (untreated and mildly treated)

Mineral oils are derived from crude oil; and mildly refined mineral oils always contain significant amounts of PAHs.[62] Mineral oils are common in a wide array of personal care products, including eye shadow, moisturizer, lip gloss, lipstick, conditioner, hair color and bleaching, facial treatment, styling gel/lotion, blush and concealer.[63]

IARC, NTP and Prop 65 classify untreated and mildly treated mineral oils as a known human carcinogen.[64][65][66] NIOSH raises concerns that mineral oils can target organs including eyes, skin, and respiratory system though inhalation, or skin and eye contact.[67]

Ethylene oxide

Ethylene oxide is a possible impurity in personal care products as a byproduct of the process of ethoxylation, which is used to buffer the harsh effects of some sudsing agents;[68] Ethylene oxide is most widely used to sterilize medical instruments.[69] It can be found in tobacco smoke, automobile exhausts, and foods.[70] There is strong evidence that ethylene oxide can lead lymphatic and

hematopoietic cancers; and some studies found increased incidence of breast cancer in exposed workers.[71]

Prop 65 identifies ethylene oxide as a concern for both cancer and developmental toxicity in both females and males.[72] The Endocrine Disruption Exchange lists ethylene oxide as an endocrine disruptor.[73] NIOSH concludes that ethylene oxide leads peritoneal cancer and leukemia; exposure to ethylene oxide through inhalation, ingestion, and skin and eye contact can disrupt respiratory system, central nervous system, and reproductive system.[74] The European Commission prohibits ethylene oxide use in cosmetics.[75]

Heavy Metals

Heavy metals like hexavalent chromium, and cadmium serve as colorants in eye shadow and lip gloss. [76][77][78] Other metals such as arsenic are impurities in cosmetic ingredients including facial lotion, shampoo, and foundation[79][80] as a result of arsenic contamination in ingredients such as D&C Red 6, aluminum starch octenylsuccinate, hydeogenated cottonseed oil, and polyvinyl acetate.[81][82].

IARC, the National Toxicology Program and California's Prop 65 identify cadmium and its compounds, arsenic, and chromium as human carcinogens;[83][84][85] in addition, chromium can also lead to developmental problems in both females and males.[86]

Cadmium and its compounds

In addition to its carcinogenic properties, cadmium targets the cardiovascular, renal, neurological, reproductive and respiratory systems through inhalation and ingestion.[87] Standards for cosmetics in Japan and European Commission prohibit use of cadmium compounds in cosmetics.[88][89]

Arsenic

The U.S. Environmental Protection Agency (EPA) concludes that there is sufficient evidence that arsenic is a carcinogen; and arsenic can also lead hyperpigmentation, keratosis and possible vascular complications.[90] EPA lists arsenic as a priority pollutant and regulates arsenic emissions; [91] The Endocrine Disruption Exchange suggests that arsenic can cause endocrine disruption.[92] NIOSH demonstrates that exposure to arsenic leads to lung and lymphatic cancer; because it can target organs including liver, kidneys, skin, lungs and lymphatic system through inhalation, skin absorption, skin and eye contact, and ingestion.[93] The European Commission prohibits arsenic in cosmetics.[94]

Chromium

The European Chemicals Agency (ECHA) lists chromium as a carcinogen and mutagen.[95] NIOSH indicates that exposure to chromium leads to lung cancer; and the metal targets organs including blood, respiratory system, liver and kidneys. It can cause increased blood leukocytes, eye injury, and skin ulcers through inhalation, ingestion, and skin and eye contact.[96] EPA considers chromium to be both bioaccumulative and ecotoxic.[97] The European Commission prohibits chromium use in cosmetics.[98]

Silica

Silica occurs in two different forms: crystalline or amorphous; quartz is the common mineral in crystalline silica.[99] Respirable crystalline silica is an airborne contaminant that can penetrate the lung when it is inhaled.[100] Crystalline silica is widely used in lipsticks, lip gloss, eye shadow, eye liner, foundation, sunscreen, lotion and shampoo.[101]

NTP and IARC both list crystalline silica of respirable size as a known human carcinogen,[102][103] and Prop 65 classifies silica, crystalline (airborne particles of respirable size) as a carcinogen.[104] NIOSH raises concerns about lung cancer in animals exposed to crystalline silica; and this chemical can target eyes and the respiratory system through inhalation, and skin and eye contact.[105]

Found In

- A wide variety of products, depending upon the ingredient

What to look for on the label

- Formaldehyde
- Phenacetin
- Coal tar
- Benzene
- Untreated or mildly treated mineral oils
- Methylene glycol
- Ethylene oxide
- Chromium
- Cadmium and its compounds, arsenic, and crystalline silica or quartz.

Health Concerns

- Cancer
- Endocrine disruption
- Developmental and reproductive toxicity
- Bioaccumulation
- Ecotoxicity

Vulnerable Populations

Babies & Children (https://www.safecosmetics.org/population/babies-children/), Pregnant Women (https://www.safecosmetics.org/population/pregnant-women/), Teenagers (https://www.safecosmetics.org/population/teenagers/), Women of Color (https://www.safecosmetics.org/population/women-of-color/)

Regulations

Formaldehyde is prohibited in Japan,[1] and restricted in the EU;[2] coal tar is prohibited in the EU;[3] benzene is prohibited in the EU;[4] ethylene oxide is prohibited in the EU;[5] chromium is prohibited in the EU; [6] cadmium compounds are prohibited in Japan[7] and the EU;[8] arsenic is prohibited in the EU.[9]

How to Avoid?

Read labels and avoid cosmetics and personal care products containing formaldehyde and formaldehyde-releasing preservatives (quaternium-15, diazolidinyl urea, imidazolidinyl urea, DMDM hydantoin, and 2-bromo-2-nitropropane-1,3 diol), phenacetin, coal tar, benzene, untreated or mildly treated mineral oils, ethylene oxide, chromium, cadmium and its compounds, arsenic and crystalline silica (or quartz).

Explore other Chemicals

P-Phenylenediamine (https://www.safecosmetics.org/chemicals/p-phenylenediamine/)

Benzophenone & Related Compounds (https://www.safecosmetics.org/chemicals/benzophenone/)

1,4-DIOXANE (https://www.safecosmetics.org/chemicals/14-dioxane/)

Methylisothiazolinone and Methylchloroisothiazolinone (https://www.safecosmetics.org/chemicals/methylisothiazolinone/)

Hydroquinone (https://www.safecosmetics.org/chemicals/hydroquinone/)

Fragrance (https://www.safecosmetics.org/chemicals/fragrance/)

View All Chemicals of Concern > (/chemicals/)

FILTER BY:

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By Products

By Health Concerns

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