Parabens

Parabens are preservatives used in a wide variety of personal care products and foods to prevent the growth of microbes. These endocrine-disrupting chemicals can be absorbed through skin, blood and the digestive system.[1]

WHAT ARE PARABENS?

Parabens are actually several distinct chemicals with a similar molecular structure. Several are common in a wide array cosmetic and personal care products: ethylparaben, butylparaben, isobutylparaben, isopropylparaben, methylparaben and propylparaben.

Methylparaben and propylparaben are the most common of these. Parabens are most common in personal care products that contain significant amounts of water such as shampoos, conditioners, lotions and facial and shower cleansers and scrubs because they discourage the growth of microbes.[1] While the Cosmetic Ingredient Review recommends concentration limits for single (up to 0.4%) and total paraben concentrations (up to 0.8%) in a single product, these recommendations do not account for exposure to parabens from several products by a single individual.[3]

Parabens are found in nearly all urine samples from U.S. adults regardless of ethnic, socioeconomic or geographic backgrounds.[4] In one biomonitoring study, adolescents and adult females had higher levels of methylparaben and propylparaben in their urine than did males of similar ages.[5]

A 2004 UK study detected traces of five parabens in the breast tumors of 19 out of 20 women studied.[6] This small study does not prove a causal relationship between parabens and breast cancer, but it is important because it detected the presence of intact parabens—unaltered by the body's metabolism—which is an indication of the chemical's ability to penetrate skin and remain in breast tissue. A more recent study found higher levels of one paraben, n-propylparaben, in the axilla quadrant of the breast (the area nearest the underarm).[7] This is the region in which the highest proportion of breast tumors is found, although paraben concentration in the tissue samples was not related to location of breast tumors in individual women.

Parabens are not water soluble and can penetrate the skin. As a result, repeated application of a product or multiple products containing parabens could mean almost continuous exposure.[8] The ubiquity of parabens in personal care products makes this a reasonable scenario.

Found In

- Shampoos
- Conditioners
- Lotions

- Facial and shower cleansers and scrubs

What to look for on the label

- Ethylparaben
- Butylparaben
- Methylparaben
- Propylparaben
- Isobutylparaben
- Isopropylparaben
- Other ingredients ending in –paraben

Health Concerns

Endocrine disruption: Parabens are potential endocrine disruptors due to their ability to mimic estrogen.[9] In cell studies, parabens have been found to weakly bind to estrogen receptors.[10] Studies demonstrate that at sufficient concentrations, parabens can increase cell proliferation in human breast cancer MCF-7 cells, which are often used as a sensitive measure of estrogenic activity.[11] In MCF-7 cells, isopropyl- and isobutyl parabens have the most potent of proliferative potency, but they are around 170,000 times lower than estradiol.[12],[13]

The so-called "long chain" parabens[14] (butylparaben and its alternative form, isobutylparaben and isopropylparaben and propylparaben) have the strongest estrogenic activity among those widely used in personal care products. A study of prenatal isobutylparaben exposure in rats demonstrated increased uterus weight and uterine sensitivity to estrogen in the offspring.[15] Ethylparaben showed lower levels of estrogenic activity and methylparaben shows almost no estrogen activity.[16] In addition to direct estrogenic effects, parabens can block androgens (for example, testosterone)[17] and inhibit enzymes that metabolize estrogen.[18]

The Endocrine Disruption Exchange includes methylparaben,[19] ethylparaben,[20] propylparaben,[21] butylparaben,[22] isopropylparaben,[23] isobutylparaben[24] as endocrine disruptors due the multiple endocrine effects described above.

Skin Cancer: Applying personal care product containing parabens—especially methylparaben—can lead to UV-induced damage of skin cells and disruption of cell proliferation (cell growth rate).[25],[26] Daily application, in particular, can lead to increased concentrations of methylparaben because it is not completely metabolized.

[27] Parabens combined with other estrogenic chemicals may potentially influence the development of malignant melanoma, one form of skin cancer, through their estrogenic and genotoxic activites.[28]

Developmental and Reproductive toxicity: Propyl and butyl parabens appear to reduce sperm production[29],[30] and lead to reduced testosterone levels,[31] while methyl- and ethyl-parabens do not affect sperm production. These effects appear to be dose-dependent.[32] In addition, one study found that maternal exposure to butylparaben during gestation and lactation alters the development of the reproductive organs and sperm production.[33] In general, propyl- and butylparabens, specifically, appear disrupt male reproductive system and affect the reproductive organs.[34],[35] This is consistent with their estrogenic activity noted above.

Laboratory evidence suggests that maternal exposure to isobutylparaben during gestation can lead to anxiety and behavioral changes in offspring.[36],[37]

Vulnerable Populations

Pregnant Women (https://www.safecosmetics.org/population/pregnant-women/)

Regulations

Some forms of parabens are banned in Denmark (propyl and butyl paraben, their isoforms and their salts) in cosmetics products for children up to 3 years.[2]

How to Avoid?

Look for products labeled “paraben-free” and read ingredient lists on labels to avoid products with parabens. Many natural and organic cosmetics manufacturers have found effective alternatives to parabens to prevent microbial growth in personal care products. Some companies have created preservative-free products that have shorter shelf lives than conventional products (six months to a year).

Explore other Chemicals

Nanomaterials (https://www.safecosmetics.org/chemicals/nanomaterials/)

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

Acrylates (https://www.safecosmetics.org/chemicals/acrylates/)

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

Styrene Acrylates Copolymer (https://www.safecosmetics.org/chemicals/styrene-acrylates-copolymer/)

Toluene (https://www.safecosmetics.org/chemicals/toluene/)

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