

Parabens and Breast Cancer

By Marianne Marchese, ND

Abstract

Parabens are preservatives used in a wide range of topical cosmetic products. Some research has raised concern that parabens may be associated breast cancer. Parabens have been detected in human breast tissue and have shown estrogenic properties. The cosmetics industry has maintained that parabens are safe for human exposure, while public outcry has caused many companies to remove them from products such as shampoos, conditioners, face lotions, and cosmetics.

Introduction

Parabens are a group of synthetic chemicals that women are exposed to everyday. They are in many cosmetics, shampoos, lotions, soaps, and other grooming products. Parabens are antimicrobial, keeping bacteria from growing in the product. Common parabens used in cosmetic and grooming products are methylparaben, ethylparaben, butylparaben, and propylparaben. Typically more than one paraben is used in a product, and they are often used in combination with other chemical preservatives. Parabens were first approved for use in cosmetic products in 1984 when the Cosmetic Ingredient Review (CIR) determined they were safe. The CIR again looked at the safety of parabens in cosmetics in 2003 and 2005 and again determined that parabens are safe as used in cosmetics.

In July 2010 the CIR updated its safety assessment of parabens and determined the following are safe:¹

- Butylparaben: Up to 0.4% if used alone
- Ethylparaben: Up to 0.4% if used alone
- Methylparaben: Up to 0.4% if used alone
- Propylparaben: Up to 0.4% if used alone
- Paraben mixes: Up to 0.8%

According to the U.S. Food and Drug Association, the average amount of parabens in cosmetics is 0.01% to 0.3%. They are in shaving creams, skin care, hair care, and personal care products. They are not used in major brands of deodorants or antiperspirants.²

Body Burden

Studies conducted by the Centers for Disease Control and Prevention (CDC) did find methylparaben, ethylparaben, propylparaben, and butylparaben in human urine samples, indicating exposure despite the very low levels in products.^{3,4} The source of exposure was assumed to be topical application of personal care products, as studies have shown that parabens can

be absorbed through the skin.⁵ Although parabens do penetrate the dermis, metabolism of parabens takes place within the skin, which likely will result in less than 1% unmetabolized parabens available for absorption in the body.⁶ Studies show that after topical application of cosmetic products, parabens absorbed through the skin are immediately hydrolyzed, conjugated, and excreted in the urine. Even if there is high dermal uptake of parabens, few intact parabens can be recovered in the blood and urine.⁷ Whether or not intact parabens can be measured in human tissue will be discussed later.

Estrogenicity

Research often focuses on parabens' ability to act like estrogen in the body. A 2005 review of the estrogenic activity of parabens found that based on maximum daily exposure estimates on the levels in cosmetics, parabens could not increase the risk associated with exposure to estrogenic chemicals.⁸ One study in 2002 showed that parabens can act like estrogen in the body at the strength necessary to cause breast cancer cells to grow and proliferate.⁹ However, a 1998 study found that the most potent paraben, butylparaben, had 10,000- to 100,000-fold less estrogenic activity than does endogenous estradiol.¹⁰ Parabens do bind the estrogen receptor alpha and progesterone receptors in rat uteri, but much less than natural estradiol does.¹¹ One study on animals found that parabens' estrogenic effects may not occur due to binding to estrogen receptors, but instead may be attributable to inhibiting estrogen sulfotransferases in the skin; hence long-term topical application of parabens may lead to estrogenic effects as a result of inhibition of sulfotransferase activity.¹²

Effects on Breast Cancer Cells

It seems parabens possess some estrogenicity and can bind to estrogen receptors, but to what extent do they affect breast cells? A 2007 study examined the effect of parabens on MCF7

breast cancer cells. Methylparaben, butylparaben, and 17beta-estradiol were applied to MCF7 cells in low concentrations for 7 days. The parabens gave growth responses to MCF7 human breast cancer cells similar to 17beta-estradiol. Gene expression varied between parabens and estradiol.¹³

Human Breast Tissue

A 2004 study by Darbre looked at 20 women with breast cancer and measured the tumor tissue for presence of 6 different parabens. One hundred percent of samples contained at least one paraben, with methylparaben being the highest.¹⁴ The study discussed the information in the context of the weak estrogen-like properties of parabens and the influence of estrogen on breast cancer. The study clearly had some flaws. First, it was a small sample of women who all had breast cancer, and it did not compare this group to women without breast cancer. Also, it is important to note that the study did not show that parabens caused breast cancer but merely showed a correlation. The Darbre study did bring up an interesting point of concern, though. The study showed that 5 of the 6 parabens widely used in cosmetics can be detected intact in human tissue. Often studies look at urine or blood levels of chemicals, which show changed or metabolized effects of the chemical. This study showed unchanged, intact parabens stored in human tissue.

Conclusion

A report published in the *Journal of the American College of Toxicology* in 1984 estimated that parabens were used in more than 13,000 consumer products. Is there a concern for women applying a weak estrogen to the skin every day through cosmetics, lotions, shampoos, sunscreens, and soaps? Caution may be warranted based on the studies showing the weak estrogenic activity of parabens and their ability to penetrate the skin and be found intact in human breast cancer tissue. However, further research comparing a large group of women with breast cancer to a large group of healthy women without breast cancer, as well as more estrogenicity studies in the lab, needs to be conducted.

About the Author



Marianne Marchese, ND, received her doctorate of naturopathic medicine from the National College of Naturopathic Medicine in 2002. She currently maintains private practice in Phoenix, Ariz., and is adjunct faculty at the Southwest College of Naturopathic Medicine. Marchese is on the Board of Directors of the Arizona Naturopathic Medical Association and the Council of Naturopathic Medical Education. She has numerous publications and currently writes a column on environmental medicine in *The Townsend Letter*. She lectures nationally on women's health and environmental medicine and was recently named 2010 *Phoenix* magazine Top Doctor. Learn more about her at www.drmmarchese.com

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