

Effect of Parabens on Breast Cancer: Pressing or Pointless?



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INTRODUCTION

About one in eight U.S. women will develop invasive breast cancer, and it is a leading cause of death in women. Parabens rose to the surface as an ingredient in commonly used products that could potentially increase the risk of breast cancer. Methylparaben, propylparaben, and butylparaben are the three most common parabens found to be commonly used in everyday products that could have an impact on cancer development.

OBJECTIVES

- Utilize published research articles and conduct expository research to determine the impact of parabens on human health.
- Determine how parabens affect tumor growth with a focus on breast cancers.
- Determine further research that can be conducted to further the understanding of how parabens affect breast cancer tumor growth.

RESULTS

- Studies show that estrogens are affiliated with the evolution of breast cancer growth. Many parabens act as estrogenic compounds and are suspected to further breast cancer tumor proliferation.
- **Butylparaben**
- Taking into account the signaling between estrogen receptor α and the human epidermal growth factor receptor (HER) family, human cancer cells were observed with butylparaben in the presence of heregulin.
- Combined butylparaben (BP) with heregulin (HRG), an HER ligand, resulted in an increase in c-Myc mRNA and protein levels in BT-474 cancer cells.
- The combination of BP and HRG stimulated growth of these cancer cells more effectively than BP alone. HRG decreased the level of butylparaben needed to stimulate cell proliferation. These findings suggest that parabens in the body may be active at levels not previously thought to be harmful.

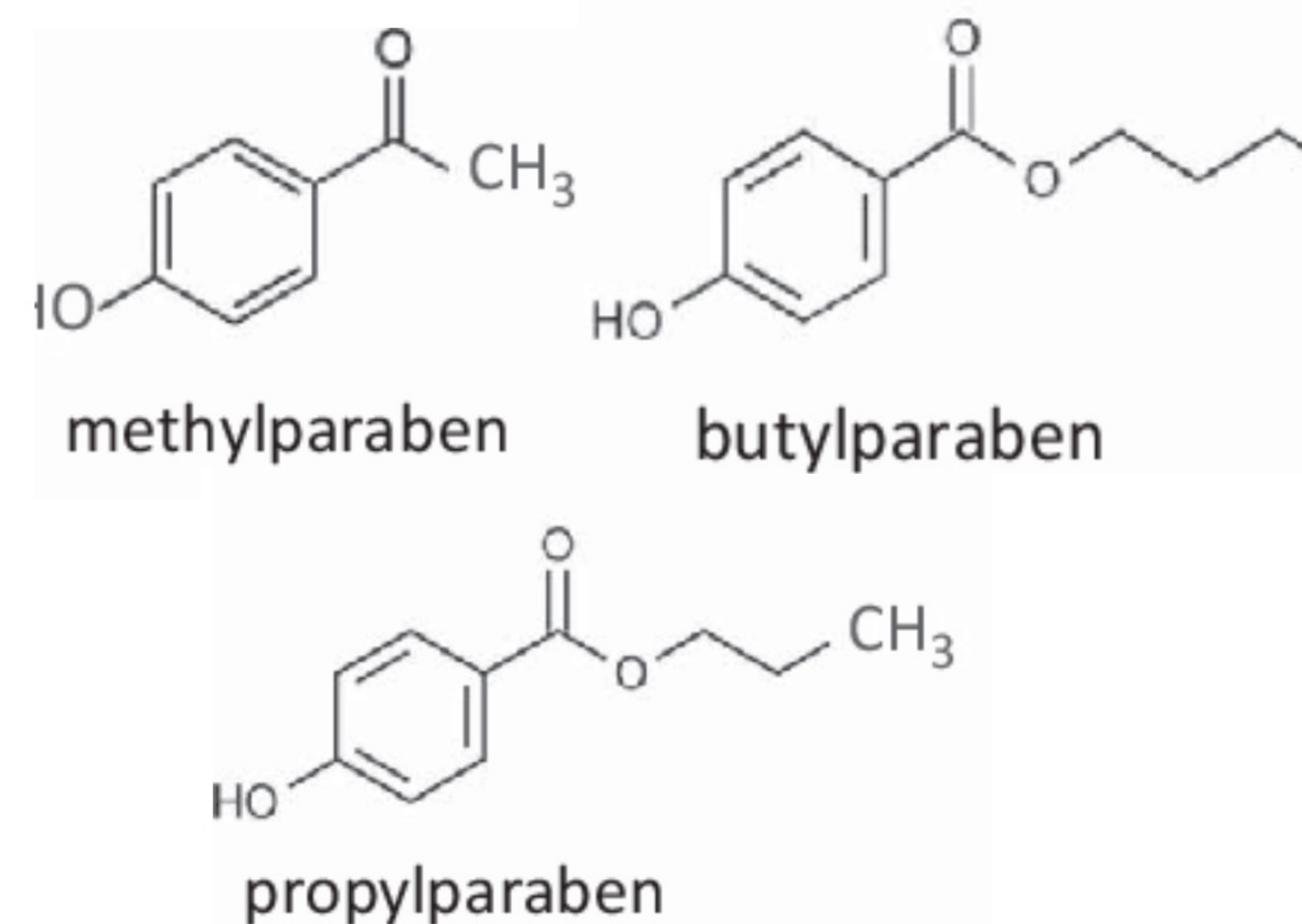


Figure 1. Chemical structures of parabens

RESULTS Continued

- **Methylparaben**
 - Cultured MCF-7 human breast cancer cells were placed into the hind flank of 6-week-old mice that had undergone ovariectomies.
 - Researchers implanted pellets with methylparaben (mePB) hormones and 17β -estradiol (E2) as well as placebo pellets that both had a 90-day slow release these mice.
 - After 17 weeks the mice with mePB pellets showed an increase in tumor growth and size compared to the placebo mice.
- **Propylparaben**
 - Propylparaben (PP) is commonly used in many cosmetics, pharmaceuticals, food, and personal care products.
 - Evidence indicates that PP can potentially impact the epithelial cells of breast tissues and cause DNA damage.
 - The study concludes that PP is an endocrine disrupting chemical (EDC) and minimal studies have been carried out to confirm whether PP has harmful impacts on health.

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RESULTS Continued

- **Opposing Evidence**
 - PP has been “generally recognized as safe” by the FDA and safely used for decades. Its relative inexpensiveness, lack of odor, biodegradability, stability at a variety of pH levels and temperatures, as well of lack of interference with the products it is in has all contributed to its classification under the “safe” category and the circular logic that it does not need to be further studied.

CONCLUSIONS

Based on the research conducted, there is a lack of repetition in the experimentation to determine if propylparaben concretely impacts the proliferation of breast cancer tumor cells. Evidence of parabens’ abilities to disrupt the endocrine system by mimicking estrogen is strong, and especially promising when looking at methyl and butylparabens. Patterns in research indicate that parabens influence breast cancer cell growth, but further studies should be conducted to determine the relation between paraben levels in the body and their effect on abnormal growth of breast cells.

FUTURE WORK

To confirm what’s already been discovered, repetition of experiments should be performed. Future work entails studying all common parabens with human growth factor to obtain results in a more realistic, human environment. In addition, we suggest long-term, low-exposure experiments to determine if small amounts of parabens may have a lasting impact over a lifetime.

References

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