Spring 2019

The Effect of Ethyl and Butyl Parabens to Mimic Estrogen to Alter Differentiation of Myeloid Derived Suppressor Cells

Lyndi Earnshaw  
Longwood University

Jessica Savas  
Longwood University

Caitlin Harris  
Longwood University

Rayven Brown  
Longwood University

Annie Choi  
Longwood University

Follow this and additional works at: https://digitalcommons.longwood.edu/rci_spring
Part of the Biology Commons

Recommended Citation  
Earnshaw, Lyndi; Savas, Jessica; Harris, Caitlin; Brown, Rayven; and Choi, Annie, "The Effect of Ethyl and Butyl Parabens to Mimic Estrogen to Alter Differentiation of Myeloid Derived Suppressor Cells" (2019). Spring Showcase for Research and Creative Inquiry. 36.  
https://digitalcommons.longwood.edu/rci_spring/36

This Poster is brought to you for free and open access by the Research & Publications at Digital Commons @ Longwood University. It has been accepted for inclusion in Spring Showcase for Research and Creative Inquiry by an authorized administrator of Digital Commons @ Longwood University. For more information, please contact hamiltonma@longwood.edu, alwinehd@longwood.edu.
The effect of ethyl and butyl parabens to mimic estrogen to alter differentiation of myeloid derived suppressor cells

Caitlin Harris, Jessica Savas, Annie Choi, Rayven Brown, and Lyndi Earnshaw
Department of Biological and Environmental Sciences

Methods

- Comparison of mature dendritic cells with estrogen and parabens
- Flow Cytometry to measure MDSC markers
- ELISA to measure Th1 inhibition
- ELISA to measure CD4 T cell skewing
- MTT CD4 T cell proliferation assay

Parabens mimic Estrogen to induce the differentiation of MDSCs.

Future Directions

- Development of safer parabens that don’t induce MDSCs.
- This data can be used to further understand the mechanisms of MDSCs
- Investigate other xenoestrogens on their effect to induce MDSCs.

Acknowledgments

We would like to thank the Department of Biological and Environmental Sciences for providing scientific resources. We would also like to thank Dr. Conejo-Garcia and Dr. Amorette Barber for mentoring us throughout this project. We would also like to thank Dr. Conijn-Garita for his previous work on MDSCs.

References


Results

Figure 1: The chemical structures of ethyl- and butyl-paraben and estradiol (β and α).

Figure 2: Immunosuppressive function of MDSCs.

Figure 3: Parabens mimic Estrogen in skewing expression of Myeloid Derived Suppressor Cell markers. Murine immature dendritic cells were cultured and the expression of MDSC marker was measured using Flow Cytometry. This data represents averaged triplicate data sets which were compared against the natural log of known concentrations of IFN-γ and IL-4 cytokines.

Figure 4: Parabens mimic Estrogen in increased secretion of cytokine IL-10 from MDSCs.

Figure 5: Parabens inhibit Th1 activation, there is an increase in secretion of cytokine IL-10 from MDSC.

Figure 6: Parabens skew Th2 activation in relation to IFN-γ and IL-4 cytokines.

Figure 7: Parabens suppress T cell proliferation.

Figure 8: Parabens skew T cell proliferation.

Figure 9: Parabens induce MDSC.

Figure 10: Parabens mimic Estrogen to induce the differentiation of MDSC.

Background

Paraben as a Xenoestrogen
- Parabens are a group of alkyl esters of para-hydroxybenzoic acids that have commonly been used as preservatives in food, cosmetics, and drugs.2
- Various research has confirmed paraben permeability by detectable levels in human urine, breast tissue, breast milk and plasma.3
- They can interfere with the natural endocrine system by binding to an estrogen receptor (ER).4

Myeloid-Derived Suppressor Cells & Cancer
- Estrogen stimulates myeloid-derived suppressor cell (MDSC) activity linked to malignant progression of ovarian cancer.5
- MDSCs are associated with immunosuppressive activity and can be found in high levels in patients with cancer.6

Research Question: Do endocrine disrupting compounds (EDC) mimic/block estrogen to alter differentiation of MDSC?

Hypothesis: Ethyl and Butyl-parabens will mimic estrogen to induce the differentiation of MDSC.