Short Chain Fatty Acid -butyrate Anti- IL-1 β Induced Intestinal Inflammation by Regulating the Intestinal Barrier Function Related Genes in Neonatal Mice

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**Recommended Citation**

Davis, Brittany, Yanan Gao, Di Meng, and W. Allan Walker. Short Chain Fatty Acid -butyrate Anti- IL-1 β Induced Intestinal Inflammation by Regulating the Intestinal Barrier Function Related Genes in Neonatal Mice." Poster presented at the DePauw University Science Research Fellows Poster Session, Greencastle, IN, October 2019.

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Necrotizing Enterocolitis (NEC) is a disease that causes excessive inflammatory necrosis within the intestines. It affects 10% of premature infants weighing under 1500 grams, and leads to increased morbidity and mortality, causing extensive expenditure of healthcare dollars. This disease triggers devastatingly painful symptoms within infants. Recent studies have shown that feeding infants breast milk rather than formula milk can help alleviate the painful inflammation of this disease. Moreover, supplementing a mother’s breast milk with probiotics has been shown to enhance this anti-inflammatory effect. Currently, the focus towards ameliorating NEC disease lies within determining the underlying mechanism of these findings.

Seeing that short chain fatty acids (SCFAs) are a metabolite of breast milk, and have proven to help decrease inflammation within extant literature, this study focuses on the anti-inflammatory effects of short chain fatty acid-butyrate within the intestines of neonatal mice. Specifically, we used quantitative reverse transcription PCR (RT-qPCR) to explore the relationship between short chain fatty acid butyrate and intestinal barrier function genes. Intestinal genes were isolated and amplified from neonatal mice in order to perform gene analysis through transcripion profiling. Preliminary results suggest potential relationships between anti-inflammatory effects of short chain fatty acid butyrate and increased expression of Ocln, Cldn4, Muc1, Muc2, Casp3, and Casp8 genes. If these findings can be replicated in human intestinal cells, further understanding gene regulation can ultimately provide more effective and efficient treatment to neonatal infants.

**Materials & Methods**

- Specific Pathogen Free C57BL/6 Mice
- PBS (Control) and Butyrate (Buty) groups
- P4 (postnatal day 4) received PBS (10 µl) or Buty (100 mM, 10 µl) once per day for 3 days, following twice per day for 4 days then all mice were euthanized
- Intestinal tissue of jejunum, ileum and colon were collected
- Tissues were stimulated with or without 1mg/ml of recombinant mouse IL-1β (inflammatory stimulus)
- Supernatants were collected and stored at -80°C for ELISA analysis and the tissues were kept at -80°C for total RNA isolation
- RNA isolation
- cDNA preparation
- RT-qPCR
- Data (Gene) Analysis

**Acknowledgements**

I would like to thank the MGHfC Digestive Disease Summer Research Program Director, Bryan Hurley, PhD, Associate Director & Principal Investigator W. Allan Walker, MD, Lab manager Di Meng, MD, PhD, and Yanan Gao, PhD Candidate for providing the space, time, and opportunity to conduct this project.