

Alteration of Intestinal Microbiota in response to Induced Immune System

I. Introduction

The intestinal microbiota is composed of a myriad of microorganisms that reside in our digestive tract and play important roles in nutrient absorption, and vitamin synthesis, and in competition against pathogenic bacteria. Pregnancy, use of antibiotics, and changes in diet, physical activity, or environment can induce lasting compositional changes. The importance of the microbiota is highlighted by the number of diseases associated with alterations in its composition. Re-stabilization and “normalization” of the gut microbiota would prove to be an effective tool in addition to the standard means of treatment for these illnesses. Our group hypothesizes that such an alteration can be achieved through an induced adaptive immune response against the established microbiota, since the innate and adaptive immune systems of the host maintains homeostasis of the microbiota.

II. Method

To test our hypothesis; we will induce the immune response in three groups of mice of varying immune functions by using weekly intraperitoneal injections of flagellin. The body weight of these mice will be recorded and we will collect fecal and blood samples. These samples will allow us to measure immunoglobulin and cytokine response to flagellin using ELISA and qPCR techniques. In addition, Illumina technology will be employed to analyze microbiota composition from fecal samples.

III. Results

Preliminary results show elevated concentrations of anti-flagellin and total IgG in wild type and DKO mice. Increase in anti-flagellin IgG was greater in wild type mice than in DKO

mice. Colitis, a considered side effect of the injections was only present in RAG KO mice, characterized by elevated levels of lipocalin-2 and abnormal colon weight and length.

IV. Discussion/Conclusion

Elevated anti-flagellin and total IgG concentrations show that weekly injections of flagellin created an induced immune response in mice with functioning adaptive immune systems. Mice without functioning adaptive immune systems developed colitis. This data shows that the adaptive immune system plays an integral part in the homeostasis of the intestinal microbiota. Further microbiota composition analysis would show the effects of the induced adaptive immune system on the intestinal microbiota of the mice.