

Title – Impact of Antigen-specific Avian IgY on Bacterial Shedding, Bacterial Survival, and Serum Antibody Response to *Citrobacter Rodentium* in a Murine Model

Program of Study – Biology

Presentation Type – Powerpoint

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Category – Experimental Basic

Abstract

This study examines the therapeutic effects of antigen-specific avian IgY on *Citrobacter rodentium* infection in a murine model. *Citrobacter rodentium* is a gram-negative rod-shaped bacterium that colonizes the gastrointestinal tract leading to lesions of enterocytes. IgY is a class of avian antibodies that is present in egg yolk or serum of birds. Isolatable from the egg yolk, it has been tested with success as a therapeutic treatment for various diseases in the GI tract in murine, piglet, bovine, and human models. By conferring passive immunity, IgY is able to aid in preventing infection via neutralization of pathogenic antigens. This study seeks to determine if *C. rodentium* infection in a murine model can be neutralized by oral administration of *C. rodentium*-specific IgY either once per day immediately following infection or twice per day after development of clinical symptoms. After infection, bacterial shedding, intestinal antigen persistence, and serum Ab levels were examined at increments post-infection or at necropsy. Results demonstrated that bacterial load and antigen presence decreased more rapidly in mice treated with IgY versus non-treated. Results additionally showed that mice infected versus non-infected displayed greater levels of murine antibodies.* This increase in murine antibodies is suspected to be a response to foreign avian IgY and not a response to *C. rodentium*. In conclusion, our findings support the efficacy of antigen-specific IgY treatment of *C. rodentium*. Specifically, IgY treatment immediately following infection was demonstrated to have greater effect than treatment administered only following clinical presentation of symptoms. These

results have implication for translation to other GI pathogens with similar mechanisms of pathology, including the enteric infection Rotavirus.

We strive to live in a way that coincides with a consistent biblical worldview. This extends to all areas of life, and is not excluded from scientific research. Our research is a tangible approach through which we seek out ways to better the lives of others. Specific to this project design, we are continually motivated by a belief in the value of human life. We hold that man occupies a special place as God's image bearer among creation and that those living in poverty and in areas of poor health care resource are no less valuable. This is the source of our desire to translate our experimental design and results to Rotavirus research. Rotavirus is a leading cause of childhood death in developing countries due to severe diarrhea and dehydration, and its overall pathologic effects are similar to that of *C. rodentium* in causing malabsorptive diarrhea. In conjunction with prior studies showing efficacy of IgY treatment against Rotavirus in various models, our findings support the advancement of further widespread human clinical trials until a sustainable treatment is established. Our desire is that our research benefits those working to treat Rotavirus as well as those afflicted with the infection. We hope that in the future we can transition from a bacterial model to a viral model to continue generating highly relevant supporting data. In communication of our results, we consciously maintain a focus on the end goal of our research: human lives, and specifically human lives in areas where the Gospel is not proclaimed.

**Please note that at time of submission, our data analysis is not yet complete and the projected results are what we expect to happen; they are not, however, our final conclusions and may differ from what is presented during Research week.*