



Targeting the Interleukin-21 Cytokine as a Potential Treatment Option for Inflammatory Bowel Disease

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BACKGROUND

The term inflammatory bowel disease (IBD) is used to describe chronic disorders that are responsible for inflammation of the digestive track¹. The two types of IBD include Crohn's disease and ulcerative colitis¹.

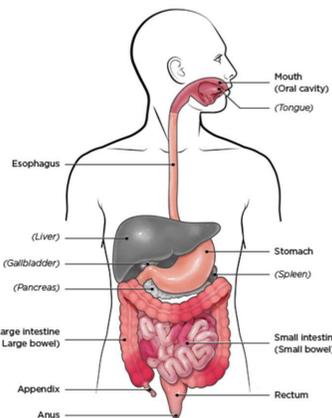


Figure 1: The image presented on the left is the generalized anatomy of the gastrointestinal tract. Crohn's disease primary affects the small intestine, however, Crohn's disease may exist anywhere along the GI tract¹. Ulcerative colitis only presents itself in the colon¹.

Pathophysiology of IBD

The immune system is a complex, and necessary component of homeostasis maintenance³. Regulatory T cells (Tregs) are responsible for suppressing immune response, thereby regulating the body's inflammatory process³. Successful regulation of the inflammatory process is required to reduce tissue damage³. The interleukin-21 cytokine (IL-21) is derived from specific T cells and it is upregulated in patients with IBD⁴. Evidence shows that IL-21 promotes the development of inflammatory disorders².

RESEARCH QUESTION

Will the IL21R KO Treg cell aid in successful and improved rescue of mice with IBD?

METHODS

Immunocompromised mice will live in static conditions, thereby inducing IBD. The weights of these mice will be closely monitored and recorded. At the time of significant weight loss, indicating development of IBD, the mice will enter the "rescue period". In which 5 groups of mice will receive their respective treatment.

PBS	WT Treg		IL21RKO Treg	
n/a	125k	250k	125k	250k

Figure 2: The table above represents the 5 groups of mice that were used in this study. The table includes the approximate number of cells injected into the mice during the rescue period.

Predicted Outcomes

During the 18 weeklong study, the average weights of each treatment group would be recorded. We expected to find that the PBS (control) group of mice would continue to lose weight, essentially showing progression of IBD. However, mice injected with WT Treg cells should successfully recover from IBD. This will correspond with weight gain. We hypothesize that mice injected with IL21RKO Treg cells should present with significantly improved rescue of IBD, corresponding with a faster and improved rate of weight gain.

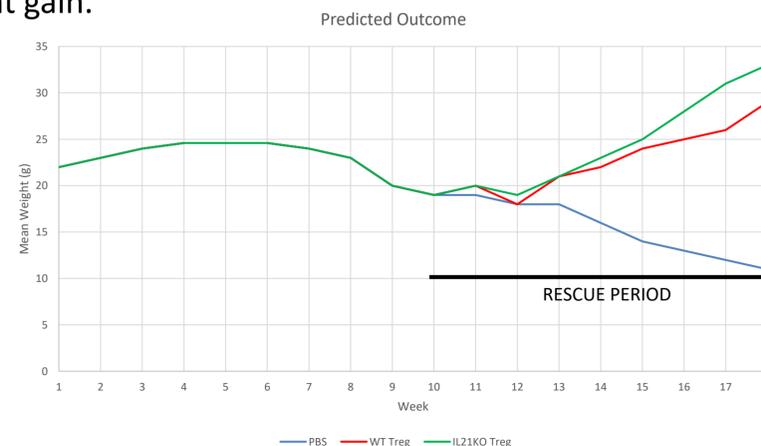


Figure 3: The graph above depicts the predicted mean weights of each mice group, with their respective treatment.

PREDICTED STATISTICAL ANALYSIS

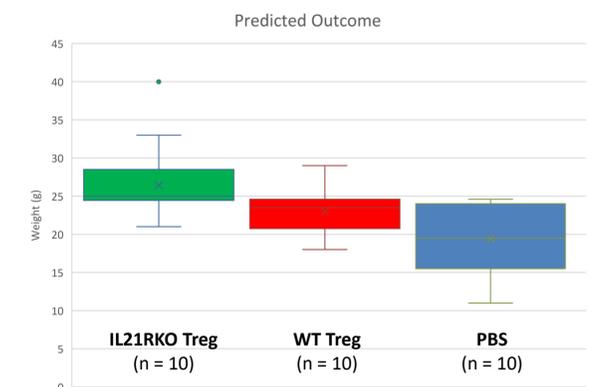


Figure 4: The graph on the left is the predicted outcome of conducting this experiment. In which each treatment group should show significant differences in weight.

FUTURE DIRECTIONS

As a result, from conducting the 18 weeklong study of recording the overall progression/rescue of IBD, we hope to observe significant improvement in mice that were injected with the IL21RKO Treg. If successful, this study would support the viability of using IL21RKO as a potential treatment option for patients with IBD.

Continued research should address the limitations of this study, such as using a larger sample size and potentially looking at the concentration of different metabolites within each mouse group.

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