Investigating the Efficacy and Mechanisms of Mesenchymal Stem Cell Therapy in Celiac Disease: Year 2

Yacobe, Grace (School: Academy of Notre Dame de Namur)

This experiment aimed to continue the search for a cure for celiac disease using mesenchymal stem cells by inhibiting the PD-L1/PD-1 pathway to determine whether it was a contributing factor to the suppression of celiac disease symptoms and regenerative capabilities from the MSCs. The hypothesis proposed that if CD4 + CD45Rb - CD25- memory T-cells were inhibited via the PD-1/PD-L1 pathway, then the MSC and T-cells would cause T-cell apoptosis and repair the damage brought on by celiac disease. In-vitro procedures addressed three questions: whether MSCs express PD-L1, the effects of co-culture on T-cell apoptosis, and the impact on MSC viability and regeneration. To answer these questions, immunofluorescent staining, quantitative PCR, MTT assay, and flow cytometry analysis were conducted. The hypothesis was partially supported as when the MSC and the T-cells utilized the PD-1/PD-L1 pathway it caused the viability of the MSC to be 71.2% and the T-cell apoptosis rate to be 6.74% compared to removing the pathway and discovering 35.2% MSC viability and the 14.99% T-cell apoptosis rate. Although on a molecular level, it produced statistically significant results, it did not completely eradicate symptoms of malnourishment and other gastrointestinal symptoms as indicated by the disease scores. With these further advancements, this work may serve as a basis for the creation of vital cures for celiac disease patients, reducing the inflammatory response as well as future diseases brought on by consuming gluten and ultimately enhancing a patient's quality of life.

Awards Won: