Immunology and Gastroenterology: The Association Between Genes, Autoimmune Diseases, and Gastrointestinal Issues

TBIOMD 496

By: Lara Abdullah, Scott Rayermann

Introduction/Objective

This study was done to see whether there was a correlation between autoimmune diseases and gastrointestinal issues. The manifestation of autoimmune diseases is caused by many factors, not just one. Even if there was a more specific cause, there is always something underlying that also caused the autoimmune disease (Ray et al. 2012). The main thing that influences autoimmune diseases is genetics. It is also shown that the gut microbiome can play a big role in the progression of autoimmune diseases such as lupus (Hevia et al. 2014).

Abstract

Autoimmune diseases such as lupus can cause gastrointestinal distress as well as an imbalanced gut microbiome. In this literature review I investigate the correlation between autoimmune diseases, gastrointestinal issues, and cancer. It is rare for patients with lupus to present with gastrointestinal symptoms; if there are gastrointestinal symptoms, they are mostly due to the medications used to treat lupus. With regard to the gut microbiome, patients with lupus, Irritable Bowel Syndrome, Celiac disease, and an *E. coli* infection tend to have a higher amount of *Bacteroidetes* as compared to *Firmicutes* than healthy patients; whereas patients with other autoimmune diseases like Crohn's disease show a higher amount of *Firmicutes* as compared to *Bacteroidetes* than healthy patients. Individuals with colorectal cancer tend to have a high amount of *Bacteroidetes*. With respect to genetic factors, there are certain genes (such as *IKZF1, BCAT 1, and FCGR2A*) that are shared between autoimmune diseases, gastric cancer, and other gastrointestinal diseases. An imbalanced gut microbiome can be the key to identifying autoimmune diseases and their comorbid gastrointestinal issues.

RESULTS

- Patients with lupus have a higher amount of *Bacteroidetes* as compared to *Firmicutes* than healthy patients (Hevia et al. 2014).
- A portion of patients with gastrointestinal diseases are expected to have a significantly lower amount of *Bacteroidetes* than normal, especially those with Crohn's disease (Zhou and Zhi 2016).
- IKZF1 is associated with Primary Sjogren's syndrome (pSS) (Qu et al. 2017).
- Patients with irritable bowel syndrome (IBS) have a higher amount of *Bacteroidetes* (Chong et al. 2019).
- People with celiac disease and an *E.coli* infection tend to have a significantly higher *Bacteroidetes* count (Nardone et al. 2017).
- Individuals with lupus and gastric cancer expected to have a mutation in the *BCAT1* gene (Dimitrov et al. 2020)
- Patients with lupus and IBS expected to have a mutation in the *FCGR2A* gene (Dopico 2018).

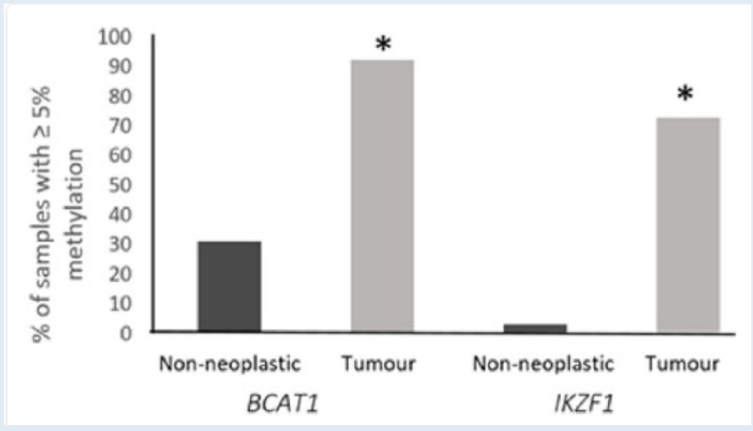

Figure 1: When looking at the gastrointestinal tumor cells, there was a higher amount of methylation of the *IKZF1* and *BCAT1* genes (Jedi et al. 2018).

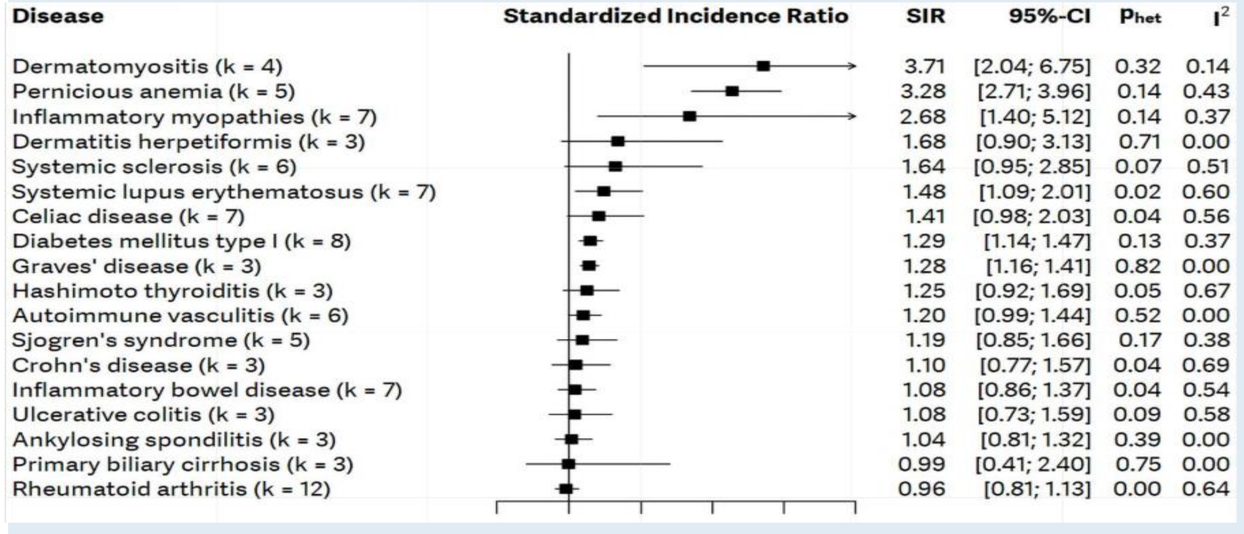

Figure 2: Incidence ratio between each autoimmune disease and gastric cancer, with dermatomyositis having the highest incidence (Zádori et al. 2021).

CONCLUSION

In conclusion, there is a positive correlation between autoimmune diseases and gastrointestinal diseases. The genes that mostly overlap are IKZF1, FCGR2A, and the BCAT1 gene. The gut biome can also play a role in gastrointestinal diseases and autoimmune diseases. Some gastrointestinal diseases have an increased *Firmicutes* to *Bacteroidetes* ratio; other gastrointestinal diseases, like IBS and gastric cancer, have an increased *Bacteroidetes* to *Firmicutes*. This higher *Bacteroidetes* to *Firmicutes* ratio can be seen in individuals with autoimmune diseases.

ACKNOWLEDGEMENTS

Dr. Jutta Heller

Prime Health Clinic for the internship

SOURCES