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Cara Jill Sulyok*, csulyok@vols.utk.edu, and **Judy Day** and **Suzanne Lenhart**. *A Mathematical Framework to Augment the Q-MARSH Score in the Diagnosis of Celiac Disease*. Preliminary report.

Celiac disease (CeD) is a hereditary autoimmune disease that affects approximately 1 in 133 Americans. It is caused by a reaction to the protein gluten found in wheat, rye, and barley. After ingesting gluten, a patient with CeD may experience a range of unpleasant symptoms while small intestinal villi, essential to nutrient absorption, are destroyed in an immune-mediated process. The only known treatment for this disease is a lifelong gluten-free diet.

This preliminary work provides a mathematical framework to better understand the effects of immune activation on gut health. This mathematical model uses a system of ordinary differential equations to track changes in villus and crypt cell densities as well as intraepithelial lymphocytes to better understand the dynamics of small intestinal destruction and relates these cell densities to the Q-MARSH score, a criterion used in the diagnosis of CeD. The model will be used to investigate and analyze various theories behind the progression of this disease by focusing on understanding the dynamics of the small intestine in situations mirroring healthy function and CeD. By doing so, we can assist in further quantifying and augmenting diagnostic measures and investigate potential therapies to mitigate the negative effects of CeD. (Received September 15, 2020)