Analysis of Tissue Transglutaminase as a Possible Indicator of Gluten Sensitivity in Human Saliva

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Celiac disease (CD) and gluten sensitivity (GS) affect over three million Americans. The consumption of food products containing gluten causes adverse effects including bloating, discomfort, and malnutrition with a risk of permanent damage to the digestive organs. Definitive diagnosis of CD distinguishes the enzyme tissue tranglutaminase (tTG) in serum followed by gastrointestinal biopsy. tTG alters the structure of gluten peptides, which stimulate an immune response, causing the symptoms of CD. The purpose of this experiment was to investigate the viability of a salivary test for tTG expression as an indicator for GS. Salivary tests provide a cost-effective alternative to serum testing and surgical intervention. In this study, an enzyme-linked immunosorbent assay (ELISA) tested for the expression of tTG in human saliva. Saliva samples of subjects who were either diagnosed with CD, self-diagnosed GS, or identify with neither condition (control group) were evaluated. Following ELISA protocol, a color change indicating tTG expression was imaged and analyzed using the FIJI distribution of the ImageJ software. Visualization and quantification of color saturation supports a three-tiered division of data: positive, severe; positive, mild; and negative. The results indicate statistically significant differences (mann whitney $p < 0.05$) between the three groups. The experimental results support the identification and quantification of tTG in saliva as a possible indicator for GS. Additionally, this study supports a three-tiered classification system indicating disease state. Further investigation of the proteomic pathways involved in tTG upregulation and downregulation could improve the possibility of developing a reliable saliva test.