Quantitative Methods To Analyze the Synergism of Digestive Enzymes for Gluten Breakdown: A Step Closer to Making Glu-Relief Pills

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Millions of people in the USA alone suffer from celiac disease or gluten intolerance. In previous work, I identified three fruit-derived enzymes that when combined have an efficient effect in gluten breakdown (Papain, Bromelain, and Actinidin). This year, I pursued quantitative identification of a combinatorial ratio of these three enzymes that is synergistic and efficient in gluten degradation. For experimentation, gluten was extracted from wheat using a commercial kit. Wheat and fish gelatin were treated with purified enzymes (either commercially available or extracted fresh in the lab), and gluten was measured by ELISA absorbance at 450nm, using G12 antibody-coated 96-well plates. The gluten protein breakdown was visualized by Western blotting. The results of the present study indicate that treating wheat with the combination of three different enzymes displayed more efficient gluten degradation than single-agents. The effective combinatorial ratio of Papain, Bromelain, and Actinidin was found to be 1:2:3 (Units) respectively. A complete loss in the 33-mer gliadin peptide and other gluten proteins was visualized at this enzyme ratio using immunoblotting. Combining any two of these three enzymes was also efficient in the breakdown of gluten but at an increased concentration suggesting that the combination of the three can be synergistic and alcohol and preservatives hinder the function of the enzymes. These results suggest the enzyme combinations needed to develop the “Glu-relief” pill. The current/future goal is to take this idea from bench to bedside in the form of a pill.

Awards Won:
Third Award of $1,000