

Probiotics in Celiac Disease: Simulated Gut Hydrolysis of Gluten

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The aim of this study was to demonstrate the capacity of probiotic lactobacilli to hydrolyze immunogenic gluten peptides. Eighteen commercial strains of probiotic lactobacilli with highly variable peptidase activity (i.e., aminopeptidase N, iminopeptidase, prolylendopeptidyl peptidase, tripeptidase, prolidase, prolinase and dipeptidase), including towards Pro-rich peptides, were tested in this study. Ten probiotic strains were selected based on their specific enzyme activity. When pooled, these ten strains provide the peptidase portfolio that is required to completely degrade the immunogenic gluten peptides involved in celiac disease (CD). The selected probiotic mixture was able to completely hydrolyze well-known immunogenic epitopes, including the gliadin 33-mer, α 9-gliadin peptide 57-68, A-gliadin peptide 62-75, and γ -gliadin peptide 62-75. During digestion under simulated gastrointestinal conditions, the pool of 10 selected probiotic lactobacilli strongly hydrolyzed the wheat bread gluten to less than 10 ppm after 360 min of treatment. As determined by multidimensional chromatography (MDLC) coupled to nanoelectrospray (ESI)-mass spectrometry (MS/MS), no known immunogenic peptides were detected in wheat bread that was digested in the presence of the probiotics. Accordingly, the level of cytokines (IL-2, IL-10 and IFN- γ) produced by duodenal biopsies of CD patients who consumed wheat bread digested by probiotics was similar to the baseline value (negative control). Probiotics that specifically hydrolyze gluten polypeptides could also be used to hydrolyze immunogenic peptides that contaminate gluten-free products. This could provide a new and safe adjunctive therapy alternative to the gluten-free diet.