Penka M Petrova et al., J Biotechnol Biomater 2017, 7:4 (Suppl)
DOI: 10.4172/2155-952X-C1-080

Amylolytic enzymes engaged in starch utilization by lactic acid bacteria: A transcriptome analysis

Penka M Petrova, Petya V Velikova and Kaloyan K Petrov
Institute of Chemical Engineering, BAS, Bulgaria

Amylolytic lactic acid bacteria (ALAB) are diverse group of microorganisms that are capable to degrade starch and to convert it directly into sugars with lower molecular weight, lactic acid, and volatiles. They have numerous applications in food industry due to specific ability to improve the organoleptic properties and to increase the nutritional value of starch foodstuff, as well as in perspective biotechnologies for lactic acid production using renewable and abundant starch biomass as a feedstock. Here we report a comprehensive study of the amylolytic properties of 28 novel ALAB strains inhabiting the special niche of fermented cereals. The study describes the isolation of the first amylolytic representatives of *Lactobacillus sakei, Enterococcus faecium* and *E. durans*. By transcriptome analysis, it was revealed that seven different genes are engaged in starch degradation by ALAB, as their expression levels are species and strain specific. The most highly expressed in all strains were the genes encoding amylases and glycosyltranferases, in difference to the genes for α-glucosidases. One exception among the genus *Lactobacillus was L. sakei*, which although possessing extracellular amylase activity, owned very limited number of genes for starch hydrolysis (*glgB, agl*, and *treC*). Interestingly, only one of these genes was expressed – *treC*. It encodes an enzyme with a dual oligo-1,6-glucosidase and trehalose-6-phosphate hydrolase activity in *L. paracasei*, and *L. rhamnosus*, and therefore, it may be potentially responsible for the amylolytic activity of *L. sakei* too. Another enzyme, possibly interacting with starch in *L. sakei* is glucan 1,6-a-glucosidase (dextran glucosidase), encoded by dexB. However, since the last two genes encode intracellular enzymes, but amylase activity of the strain was extracellular, the most likely acting enzyme may be unrecognized and unexploited, similarly to other unknown, but putative glycoside hydrolases in lactobacilli.

Biography

Penka M Petrova is the Head of Gene Expression Laboratory at The Institute of Microbiology, Bulgarian Academy of Sciences. Her main interests are in the area of Microbiology and Molecular Biology of lactic acid bacteria (LAB) with special attention to probiotic starter cultures development including isolation and genetic characterization of LAB, searching for new enzymatic activities, prebiotics utilization and synthesis, genes cloning and expression. She is the author of more than 50 scientific publications and book chapters, cited more than 430 times. She is a leader of a number of research projects, funded by the National Scientific Fund, Republic of Bulgaria, Chr. Hansen A/S, and State Key Laboratory of Dairy Biotechnology of Bright Dairy & Foods Co. Ltd

pepipetrova@yahoo.com

Notes: