

Overproduction of bioactive molecules by probiotics and their derived enzymes

Byong H Lee, PhD

Department of Food Science and Biotechnology, Kangwon National University, Chuncheon, South Korea
Department of Microbiology/Immunology, McGill University, Montreal, Canada

E-mail: byong.lee@mail.mcgill.ca

Abstract

By using conventional and metagenomic methods, we screened many lactic and probiotic bacteria originated from humans and fermented foods for tolerance to low pHs, bile salts, enzymes (pepsin, trypsin) and attachment ability on epithelial cells in in vitro GI model.

After screening the robust strains, five commercial probiotics on (1) cholesterol reducing bile salt hydrolase (BSH) active strain, (2) anti-obesity and anti-cancer strain which produces high amounts of conjugated linoleic acid (CLA), (3) anti-hypertensive peptide producing aminopeptidase active strain, (4) immune system stimulating strain, and (5) transgalactosyl lactases which synthesize large amounts of galacto-oligosaccharides (GOS) were developed. Among these, the results of lactases (beta-galactosidases) will be presented.

Intestinal lactase divided into 2 world populations: Lactose digesters (lactase persistent, LP) and lactose maldigesters (lactase nonpersistent, LNP). Solutions have been avoiding lactose containing dietary products (not a permanent and wise solution) or use lactose hydrolyzed milk products, but with a sweetness problem. Lactases are currently used to manufacture whey sweeteners and GOS (prebiotics).

Among many lactase producing strains, we genetically overproduced lactases from *Streptococcus thermophiles*, *Bifidobacterium infantis*, *Bifidobacterium breve* and a hyperthermophilic bacteria, *Pyrococcus furiosus* for GOS. Our animal and human studies with GOS and synbiotics were found to be effective for colonic bacterial adaptation and lactose intolerant patients.

Biography

Dr. Byong Lee received his degrees from the University of British Columbia (Microbiology/Immunology), McGill University (Food Microbiology) and Laval University (Food Biotechnology, PhD, 1980) in Canada. He previously served as a Senior/Principal Scientist and Head of Biotechnology at Food Research and Development Centre of AAFC (St-Hyacinthe, Quebec, 1982-1986) and Professor (AAFC Chair) in Departments of Microbiology/Immunology and Food Science at McGill University (1986-2011), Montreal, Canada. Dr. Lee has been Distinguished Professor in School of Biotechnology at Jiangnan University in China (2011-2014), and he is currently Invited Distinguished Professor in Food Science and Biotechnology at Kangwon National University in South Korea. Dr. Lee was invited visiting professor in UK (Institute of Food Research/University of Reading), France (INRA/U. de Bourgogne), Ireland (Teagasc Food Research Centre) and Korea (Seoul National University) for 4 years. He has published 196 peer reviewed manuscripts, 3 textbooks on "Food Biotechnology", 22 book chapters, and 15 patents/inventions as well as over 200 proceedings and abstracts. He delivered 112 invited speeches at the international conferences, received several awards, and currently serves as an editorial board member for seven international journals.