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Overproduction of functional food ingredients and biotherapeutics by probiotics and their derived enzymes

The market of bioactive functional ingredients and biotherapeutics has been increased to US \$ 167 billion per year at a 7.3% increase in 2014 and is expected to US \$ 279 billion by the end of 2021. The specific components of my research pertain to the molecular and biochemical characterization, as well as, scale up production of probiotic and fungal recombinant enzymes in order to: (i) produce and demonstrate the suitability of those enzymes derived bioactive compounds as functional food ingredients and biotherapeutics, and (ii) develop health promoting probiotics (anti-cholesterol, anti-cancer, anti-obesity, etc). Among 10 different enzymes were genetically overproduced up to 1,000 folds in different hosts, two recombinant enzymes (lipase and aminopeptidase) have been scaled up to 1,500 liter reactor with excellent performance and reliable results at all scales. After screening the robust probiotic strains by conventional and metagenomic methods, Five commercial probiotics and their enzymes were developed: (1) cholesterol reducing bile salt hydrolase (BSH) active strain, (2) anti-hypertensive peptide producing and accelerated cheese ripening aminopeptidase active strain, (3) transgalactosyl and hydrolytic lactase producing strains which produce large amounts of galacto-oligosaccharides (GOS) and lactose free milk, (4) esterase/lipase active strains which produce a large amount of natural butyric acid (pro drug) and strong esterification (inter- and trans-) activities, and (5) conjugated linoleic acid (CLA) producing strains with anti-obesity and anti-cancer properties.

Biography

Byong (Byron) 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 worked as a Senior/Principal Scientist and Head of Biotechnology at Food R/D Centre of Agriculture and Agri-Food Canada (AAFC) in St-Hyacinthe and Professor (AAFC Chair) in Departments of Microbiology/Immunology and Food Science at McGill University in Montreal, Canada for about 30 years until 2011. 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 and Advisor at MSC Co, Ltd. 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 207 peer reviewed manuscripts, 3 textbooks on "Food Biotechnology (1st and 2nd Edition in English and Spanish, Wiley, 500 pages)", 22 book chapters, and 15 patents/inventions. He delivered 115 invited speeches (often as keynote or plenary) at the international conferences, received several awards, and currently serves as the editorial board of seven journals.

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