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Development of a Transformed Bifidobacterium Strain with Enhanced Ability of GABA Production

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Abstract

Glutamate decarboxylase (GAD) catalyzes the α-decarboxylation of L-glutamate forming CO_2 and γ-Aminobutyric acid (GABA). In animals, GABA is a major transmitter in central nervous system but it also exerts functions in peripheral organs. The important roles of GABA in animals have directed a keen attention to GAD. To develop *Bifidobacterium* strains with enhanced ability of GABA production, we cloned a GAD gene derived from rice cDNA libraries into *Bifidobacterium-E. coli* shuttle vector pBES2 (pBES2GAD) and introduced the pBES2GAD vector into *Bifidobacterium longum* by electroporation. The transformed *Bifidobacterium* strain expressing the foreign rice GAD has about 2-fold higher GAD activity compared with untransformed *Bifidobacterium* counter part. By culturing in MRS medium containing 1% monosodium glutamate(MSG), the levels of GABA produced in the transformed vs. untransfored strains were 315 nmol/㎖ and 45 nmol/㎖, respectively. In 3% MSG conditions, the levels of GABA in the transformed vs. untransfored strains were 1,008 nmol/㎖ and 11 nmol/㎖, respectively. These results show that the pBES2GAD system can provide an effective way of producing GABA in the *Bifidobacterium* strains.