Production of Lactic Acid Bacteria Transformant Containing Extracellular Superoxide Dismutase by Gene Engineering Techni

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ABSTRACT

Reactive oxygen species (ROS) such as superoxide anion are associated with the pathogenesis of a variety of diseases. Extracellular superoxide dismutase (EC-SOD, SOD3) is the only known extracellular enzyme designed to scavenge the superoxide anion. SOD3 is capable of preventing and curing diseases resulting from the accumulation of superoxide anion, such as cardiovascular disease, lung disease ,neurological disorders, and inflammation. Our study was focus on the generation of the recombinant Lactic acid bacteria (LAB), Lactobacillus casei, containing the human extracellular superoxide dismutase (hSOD3) gene fragment and the feasibility of large-scale production. In the first instance, the hSOD3 gene was amplified by polymerase chain reaction (PCR), and was cloned into L. casei expression vector pLP3537. The recombinant plasmid hsod3/pLP3537 via electroporation was introduced into L. casei and used erythromycin to select the LAB transformants. The recombinant hSOD3 was purified from L. casei transformants using fast protein liquid chromatography (FPLC) with heparin affinity column. The purified enzyme showed two bands with apparent molecular masses of 38 and 50 kDa on SDS-PAGE and Western blot. The subunit molecular sizes of recombinant hSOD3 were 38 and 50 kDa representing monomer and dimer, respectively. Antioxidative activity of recombinant hSOD3 was determined by SOD assay kit, and the result showed that expressed hSOD3 in recombinant L. casei actually possessed enzymatic activity.

Keywords : Extracellular superoxide dismutase ; Lactobacillus casei ; Antioxidative activity

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