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Proteome Analysis of a Temperature-Inducible Recombinant *Escherichia coli* for Poly- β -hydroxybutyrate Production

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ABSTRACT

A recombinant *Escherichia coli* strain harboring the λ p_R-p_L promoter and heterologous poly- β -hydroxybutyrate (PHB) biosynthesis genes was shown to accumulate PHB when the incubation temperature was changed from 34℃ to temperatures higher than 37℃. In the present research, total gene expression patterns of the recombinant *E. coli* before and after induction were investigated by two-dimensional gel electrophoresis. Proteins encoded by *serS, sucC, trpA,* and *alaS* were found to be expressed before induction of *phb* genes at a culture temperature of 34℃. On the other hand, proteins encoded by *metG, rplI,* and *carA* were found to be expressed after induction achieved by increasing the temperature to 40℃. In the case of plasmid-free cells, all the selected genes have been shown to be expressed except *metG,* and *ibpA* and *ibpB* among the heat-shock proteins. The heat-shock proteins were found to be upregulated upon induction of *phb* genes, which may be due to the stress caused by the accumulation of PHB granules as well as by the temperature upshift. The changes in the expression of some of the metabolic pathway-related proteins before and after induction were interpreted in relation to the consumption of NADPH and acetyl-CoA for PHB synthesis.

[Key words: proteome analysis, *phb* gene, recombinant *Escherichia coli*, PHB, heat-shock protein**]**

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