Development of biosynthetic pathways for the medium-chain-length chiral hydroxycarboxylic acids in recombinant *Escherichia coli*

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Polyhydroxyalkanoates (PHAs) are biodegradable and biocompatible polyesters, which are synthesized in many bacteria when the bacteria face the unfavorable growth conditions. The monomers consisting of PHAs are all in *(R)*-configuration if the asymmetric center exists in the position of hydroxylated group. These *(R)*-hydroxyalkanoic acids (RHAs) contain two functional groups that can easily be modified to produce many chiral compounds, especially fine chemicals such as antibiotics, vitamins, perfumes, and pheromones.[1,2)] The objective of this study is to establish medium-chain-length(MCL) RHAs biosynthesis pathway by *in vivo* depolymerization of MCL PHAs in recombinant *E. coli* employing *Peudomonas aeruginosa phaZ*(PHA depolymerase) gene. *In vivo* depolymerization of MCL PHAs are successfully worked for the production of MCL RHAs in recombinant *E. coli*. The expression of fabG(3-ketoacyl reductase) gene only in *fadA* mutant *E. coli* WA101 was enough for the production of MCL RHAs. This work was kindly supported by a Korean Systems Biology Research Grant (M10309020000-03B5002-00000) of the Ministry of Science and Technology.

References

1. Park, S.J., et al., 2004. Biosynthesis of (R)-3-Hydroxyalkanoic Acids by Metabolically Engineered *Escherichia coli*. Appl Biochem Biotechnol, 114:373-380.
2. Lee, S.Y., and Lee, Y., 2003. Metabolic engineering of *Escheichia coli* for production of enantiomenically pure (R)-(-)-hydroxycarboxylic acids. Appl Environ Microbiol, 69:3421-3426.