Synopsis of Original Research Paper

Development of production systems of a powerful antioxidant hydroxytyrosol

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Hydroxytyrosol (HT) obtained from olives is an antioxidant with multiple health benefits for human. Because of its low content in olives, fermentative processes with engineered microorganisms have been developed as alternative sources. We for the first time succeeded in HT production from glucose with *Escherichia coli* engineered an artificial pathway employed tyrosine (Tyr) hydroxylase (TyrH), dihydroxyphenylalanine (DOPA) decarboxylase (DDC), and monoamine oxidase (MAO). In the pathway, central metabolic Tyr is converted into HT as follows: (i) hydroxylation of Tyr by TyrH, (ii) decarboxylation of DOPA by DDC, (iii) oxidation of dopamine by MAO, and (iv) reduction of dihydroxyphenylacetaldehyde by endogenous alchohol dehydrogenase(s). However, the productivity was quite low. For high HT production, enhanced Tyr-supply in the cells is needed. Here, we established a Tyr-supplying pathway using a bacterial phenylalanine (Phe) hydroxylase together with a cofactor-recycling system in *E. coli* and the titers of Tyr reached 2.9 g/L from Phe. Even though the strain was applied to the HT production, the productivity was still low unexpectedly. We therefore need further improvements to accomplish practical HT production.