Biotransformation of Flavone by a recombinant *E. coli* pDTG141 which expressed naphthalene dioxygenase from *Pseudomonas* sp. Strain NCIB 9816-4

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Abstract

Flavonoids are polyphenolic compounds found ubiquitously and produced by plant secondary metabolism *via* general phenyl propanoid pathway.[1] They play important roles in the biochemistry, physiology and ecology of plants as pigments, phytoalexins, antifeedants, and nodulation inducers.[2] Moreover recent researches reveal they have functions such as antioxidants, anticancers, oestrogenic to human body.[3] In the other hand, extensive research have been done to synthesize useful and expensive materials through *cis*-dihydrodiol intermediate by microbial dioxygenase since Ley's successful synthesis of (+)-pinitol from benzene through the first step of microbial oxidation. In this study, possibility have been studied to make flavone-derivated enanthiopure dihydrodiol which can be a potential drug intermediate. After incubation of *E. coli* pDTG141 which contains naphthalene dioxygenase in LB liquid medium, high concentrated resting cell were made at phosphoric buffer condition and tested biotransformation ability with 0.1mM Flavone. LC eleution profile showed the *E. coli* pDTG141 produce two different metabolites at 12min and 20min respectively, while neither heat-killed *E. coli* pDTG141 nor *E. coli* pUK18 make any products. LC/MS spectrum shows flavone metabolite 1(FM1) was 257 [m/z] and FM2 was 239 [m/z] at ES+ mode. Further studies will be done for the confirmation of structures by NMR spectroscopy and the kinetics.

References

1. Winkel-Shirley, B. Flavonoid Biosynthesis. A colorful Model for Genetics, Biochemistry, Cell Biology, and Biotechnology. (2001). Plant Physiology 126: 485-493.
2. Gert Forkmann and Stefan Martens. Metabolic engineering and applications of flavonoids. (2001). Current opinion in biotechnology 12: 155-160.
3. P. C. H. Hollman and M. B. Katan. Dietary flavonoids: Intake, health effects and bioavailability. (1999). Food and Chemical toxicology 37: 937-942.
4. Steven V. Ley and Stephen Taylor. Microbial oxidation in synthesis: A six step preparation of (+)-pinitol from benzene. (1987). Tetrahedron Letters 28(2): 225-226.
5. Tomas Hudlicky and David T. Gibson. Enzymatic dihydroxylation of aromatics in enantioselective synthesis: expanding asymmetric methodology. (1999). Aldrichmica Acta 32: 35-62.