Biotransformation of the Flavonoid Compounds using Streptomyces species

Junehyung Kim
Department of Chemical Engineering, Dong-A University, Busan, South Korea
Contact: june0302@dau.ac.kr

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Introduction.

Flavonoids are polyphenolic compounds that are ubiquitous in nature and are categorized according to chemical structure, into flavonols, flavones, flavanones, isoflavones, catechins, anthocyanidins and chalcones. Over 4,000 flavonoids have been identified, many of which occur in fruits, vegetables and beverages (tea, coffee, beer, wine and fruit drinks).

Twelve microorganisms were initially screened for their abilities to catalyze interesting biotransformation reactions of given flavonoid compounds. Of these, Streptomyces avermitilis and Streptomyces ceolicolor transformed phloretin and chrysin to hydroxylated products in good yield. Structures of the transformed product were analyzed through the HPLC and GC-mass. Chrysin was ortho-hydroxylated to produce baicalein (5,6,7-tetrahydroxyflavone), which was confirmed using authentic baicalein with mass analysis. Maximum conversion was 12 %, which was achieved for 4 hours of reaction, and the substrate (chrysin) and reaction product (baicalein) was completely metabolized after 6 hours of reaction. Two different form of hydroxylated product from phloretin was produced and their possible structure was investigated. [1]

Methods.

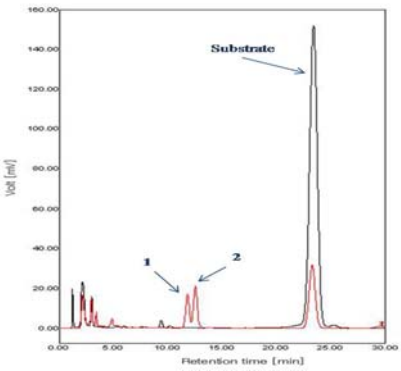


Fig.1 LC analysis of biotransformation product using *Streptomyces avermitilis*, two main peaks were identified.

Fig.2 TMS derivative by heating for 30min at 70℃ with BSTFA(N,O-bis(trimethylsilyl)trifluoroacetamide) for GC-Mass analysis of Biotransformed product

Results.

GC-Mass analysis of Biotransformed product.

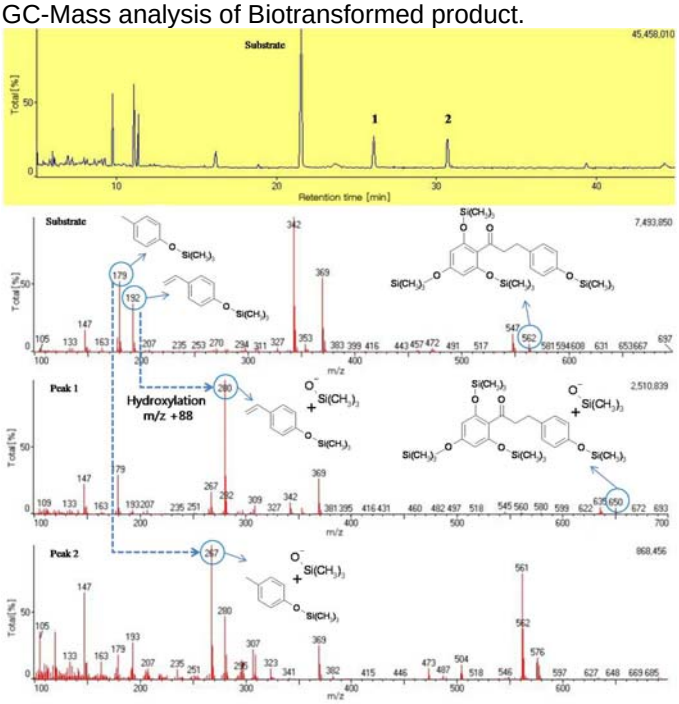
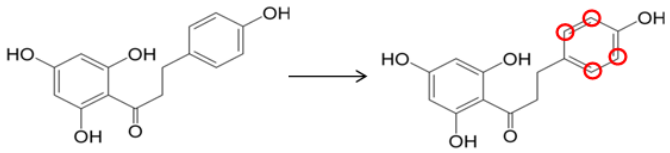


Fig.3 GC-Mass analysis of Biotransformed product.
Fig.4 Proposed hydroxylated structure of Biotransformed product.

Conclusions.

1. Among 12 microorganism, *Streptomyces avermitilis* showed the best efficacy for the biotransformation of phloretin, chrysin. Apigenin is transformed into hydroxylated form by *Streptomyces coelicolor*.



Phloretin Product

2. After GC/MS analysis, they were interpreted as hydroxylated or O-methylated product of substrate at different position.
3. The position of hydroxylation and O-methylation should be elucidated in future research.

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References.

1. M.Sanchez-Gonzalez, J.P.N Rosazza (2004) J. Nat. Prod, 67, 533-558