BIOTRANS
LA ROCHELLE 2023

N°1502 / PC
TOPIC(s) : (Chemo)enzymatic strategies / Biocatalytic cascade reactions

The Sugar Methyltransferase Bb278 application in methylated flavonoid glucosides production

AUTHORS

Jarosław POPŁOŃSKI / WROCŁAW UNIVERSITY OF ENVIRONMENTAL AND LIFE SCIEN, C.K. NORWIDA 25, WROCŁAW
Sandra SORDON / WROCŁAW UNIVERSITY OF ENVIRONMENTAL AND LIFE SCIEN, C. K. NORWIDA 25, WROCŁAW
Agata MATERA / WROCŁAW UNIVERSITY OF ENVIRONMENTAL AND LIFE SCIEN, C.K. NORWIDA 25, WROCŁAW
Kinga DULAK / WROCŁAW UNIVERSITY OF ENVIRONMENTAL AND LIFE SCIEN, C.K. NORWIDA 25, WROCŁAW
Ewa HUSZCZA / WROCŁAW UNIVERSITY OF ENVIRONMENTAL AND LIFE SCIEN, C.K. NORWIDA 25, WROCŁAW

PURPOSE OF THE ABSTRACT

Sugar-O-Methyltransferases are a group of relatively small 20-48 kDa monomeric proteins that are known for their specific activity of transferring a methyl group onto sugars or sugar moieties of complex molecules, utilizing S-adenosyl-L-methionine as a methyl donor. Many members of this group have been characterized and are mostly involved in the biosynthesis of specific secondary metabolites, such as macrolides and indolocarbazoles [1-2]. Unfortunately, in most cases, sugar methyltransferases are very selective and specific for their activity, which limits their biocatalytic applications.

Recently, a group of enzymes was identified in entomopathogenic filamentous fungi that share a unique ability to transform a variety of natural products to respective 4-O-methylglucosides [3-4]. Our previous work focused on the biochemical characterization of Sugar-O-Methyltransferase from Beauveria bassiana AM278 (Bb278), which revealed a broad acceptor range from small phenolic glucosides to flavonoid glucosides and even bulky steroid glucosides, although limited only to β-glucosides.

The application of Bb278 to preparative-scale methylations is mostly limited to in vivo reactions due to the high price of SAM and SAH inhibition, although it suffers from complicated downstream processing. Herein, we would like to present our recent progress on in vitro reaction engineering of Bb278 methylation focused on lowering the SAM consumption and including the SAM regeneration using halide methyltransferases.

Acknowledgments: This work was supported by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreements no. 814650 (SynBio4Flav).

www.SynBio4Flav.eu

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
methyltransferase | flavonoids | SAM | glycosides

BIBLIOGRAPHY

[1]. C. Zhang, C. Albermann, X. Fu, N. R. Peters, J.D. Chisholm, G. Zhang, E. J. Gilbert, P. G. Wang, D. L. Van Vranken, J. S. Thorson, RebG- and RebM-Catalyzed Indolocarbazole Diversification. ChemBioChem, 2006, 7, 795-804.

[2]. J. Xiao, Q. Zhang, Y. Zhu, S. Li, G. Zhang, H. Zhang, K. Saurav, C. Zhang, Characterization of the sugar-O-methyltransferase LobS1 in lobophorin biosynthesis. Appl Microbiol Biotechnol, 2013 97, 9043-9053.

[3]. L. Xie, L. Zhang, C. Wang, X. Wang, Y.M. Xu, H. Yu, P. Wu, S. Li, L. Han, A.A.L. Gunatilaka, X. Wei, M. Lin, I. Molnár, Y. Xu, Methylglucosylation of aromatic amino and phenolic moieties of drug-like biosynthons by combinatorial biosynthesis, PNAS, 2018, 115, E4980-E4989.

[4]. L. Xie, L. Zhang, J. Bai, Q. Yue, M. Zhang, J. Li, C. Wang, Y. Xu, Methylglucosylation of Phenolic Compounds by Fungal Glycosyltransferase-Methyltransferase Functional Modules, J Agr Food Chem, 2019, 67, 8573-8580.