THE 67<sup>TH</sup> INTERNATIONAL

## OPEN READINGS



CONFERENCE FOR STUDENTS OF PHYSICS AND NATURAL SCIENCES

## BOOK OF 2024 ABSTRACTS



VILNIUS UNIVERSITY PRESS

Editors:

Martynas Keršys Rimantas Naina Vincentas Adomaitis Emilijus Maskvytis

Cover and Interior Design:

Goda Grybauskaitė

Vilnius University Press 9 Saulėtekio Av., III Building, LT-10222 Vilnius info@leidykla.vu.lt, www.leidykla.vu.lt/en/ www.knygynas.vu.lt, www.journals.vu.lt

Bibliographic information is available on the Lithuanian Integral Library Information System (LIBIS) portal www.ibiblioteka.lt ISBN 978-609-07-1051-7 (PDF)

© Vilnius University, 2024

## HYDROLYSIS OF ALKYL FUCOSIDES BY ALPHA-L-FUCOSIDASES

Daniel Parvicki<sup>1</sup>, Rūta Stanislauskienė<sup>1</sup>, Rasa Rutkienė<sup>1</sup>, Agnė Krupinskaitė<sup>1</sup>, Jonita Stankevičiūtė<sup>1</sup>, Rolandas Meškys<sup>1</sup>

<sup>1</sup>Department of Molecular Microbiology and Biotechnology, Institute of Biochemistry, Life Sciences Center, Vilnius University, Lithuania daniel.parvicki@gmc.stud.vu.lt

Fucosylated compounds are associated with a wide range of biological processes in different forms of life. In mammalian cells, they play an essential role in various biological and pathological processes (embryogenesis, cell adhesion, signaling, regulation of the immune response, etc.). Fucosylated human milk oligosaccharides (HMOs) offer benefits to infants by acting as prebiotics, preventing the attachment of pathogens and potentially providing protection against infections. Although there is a clear demand for fucosylated compounds, their availability is limited due to the difficult and expensive chemical synthesis. Therefore, enzymatic synthesis using  $\alpha$ -L-fucosidases is considered a better alternative. These enzymes catalyse the removal of L-fucose from glycosides by the cleavage of O-glycosyl bonds. Moreover, under certain conditions, they can perform a transfucosylation reaction (the transfer of a fucosyl group from the donor to the acceptor molecule) [1, 2]. As methyl- $\alpha$ -L-fucopyranoside and 1-methoxyethyl- $\alpha$ -L-fucopyranoside could be potential fucosyl group donors, we aim to investigate whether  $\alpha$ -L-fucosidases could hydrolyse these alkylated compounds and carry out transfucosylation.

We screened  $\alpha$ -L-fucosidases from metagenomic libraries for their ability to hydrolyse methyl- $\alpha$ -L-fucopyranoside and 1-methoxyethyl- $\alpha$ -L-fucopyranoside. Several metagenomic fucosidases showed hydrolytic activity towards both compounds investigated. Few were chosen for further research. Recombinant proteins were successfully synthesised in *Escherichia coli* and purified. We showed that enzymes studied were also able to use methyl- $\alpha$ -L-fucopyranoside as fucosyl group donor in transfucosylation reactions. In our opinion, the alkyl fucosides studied could be potential novel substrates to be used by  $\alpha$ -L-fucosidases as fucosyl group donors in the synthesis of fucosylated compounds.

B. Zeuner and A. S. Meyer, Enzymatic transfucosylation for synthesis of human milk oligosaccharides. Carbohydrate research vol. 493 (2020): 108029.
F. Guzmán-Rodríguez et al., Employment of fucosidases for the synthesis of fucosylated oligosaccharides with biological potential. Biotechnology and applied biochemistry vol. 66,2 (2019): 172-191.