

HYDROLYSIS OF ALKYL FUCOSIDES BY ALPHA-L-FUCOSIDASES

Daniel Parvicki¹, Rūta Stanislauskienė¹, Rasa Rutkienė¹, Agnė Krupinskaitė¹, Jonita Stankevičiūtė¹, Rolandas Meškys¹

¹Department 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 α -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- α -L-fucopyranoside and 1-methoxyethyl- α -L-fucopyranoside could be potential fucosyl group donors, we aim to investigate whether α -L-fucosidases could hydrolyse these alkylated compounds and carry out transfucosylation.

We screened α -L-fucosidases from metagenomic libraries for their ability to hydrolyse methyl- α -L-fucopyranoside and 1-methoxyethyl- α -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- α -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 α -L-fucosidases as fucosyl group donors in the synthesis of fucosylated compounds.

[1] B. Zeuner and A. S. Meyer, Enzymatic transfucosylation for synthesis of human milk oligosaccharides. Carbohydrate research vol. 493 (2020): 108029.

[2] 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.