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Rutinosidase and other diglycosidases: Rising stars in biotechnology

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PURPOSE OF THE ABSTRACT

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Diglycosidases are glycosidases catalyzing the cleavage of entire disaccharide moieties from the aglycone. Rutinosidases, main diglycosidase representatives, cleave rutinose (α -L-Rha-(1-6)- β -D-Glc) from rutin or other rutinosides (Fig. 1A). Some diglycosidases can be classified as monoglucosidases with extended substrate specificity. They also have distinct synthetic (transglycosylating) abilities. Rutinosidase from *A. niger* [1] and *A. oryzae* (GH5-23) can glycosylate various acceptors, including phenols, in a good yield using priceworthy rutin as a glycosyl donor. Surprisingly, they are even able to glycosylate species such as inorganic azide to form β -rutinosyl azide [2] or carboxylic acids forming (anomeric) glycosyl esters [3], which is a unique property in the glycosidase family. The variant of *A. niger* rutinosidase mutated at the catalytic nucleophile residue E319A is capable of generating β -rutinosyl azide [2]. It was found that rutinosidase is able to accept quercetin 3- β -glucopyranoside as a substrate and therefore it is also able to transfer a β -glucosyl moiety [4]. Thus, this enzyme has a dual glycosylation activity, generating either rutinosides or glucopyranosides. Its broad substrate specificity has also been demonstrated in the enzymatic cleavage of various 6"-acylated quercetin-3-O- β -glucopyranosides (Fig. 1B). Rhamnose-containing compounds (such as rutinose) are attracting attention due to their anti-cancer activity and as skin anti-aging agents in dermatology [3]. Their easy availability through the action of rutinosidase opens a whole new avenue in cancer therapy, biomedicine, dermatology, and other fields.

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FIGURES

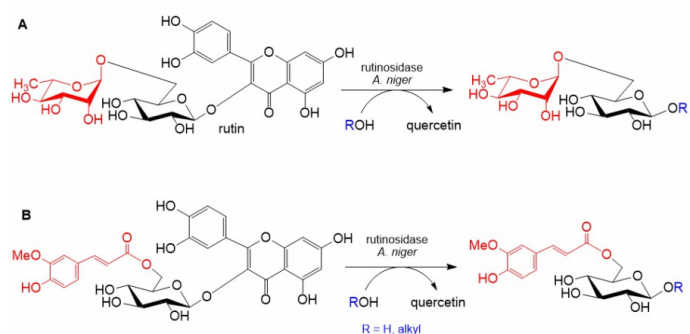


FIGURE 1

Figure 1.

FIGURE 2

KEYWORDS

Enzyme synthesis | Glycosidases | Rutinosidase | Anti-aging agents

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