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Inhibition of Glycosidases

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Glycosidases or glycoside hydrolases (EC 3.2.1.) are hydrolytic enzymes, which catalyze the cleavage of the glycosidic bond of disaccharides, oligosaccharides, polysaccharides and glycoconjugates [1,2]. They include many important enzymes such as α-amylase (EC 3.2.1.1), α-glucosidase (EC 3.2.1.20), β-glucosidase (EC 3.2.1.21), isomaltase (EC 3.2.1.10), sucrase (EC 3.2.1.48), β-glucuronidase (EC 3.2.1.31) and trehalase (EC 3.2.1.28). These enzymes are important in the digestion, metabolism and processing of carbohydrates [3-6].

The inhibition of these enzymes is of great importance that has many applications. The inhibition of α-glucosidase is important for maintaining the postprandial blood glucose level [7]. Since trehalase regulates trehalose as the insect blood sugar and fungal storage sugar [6], the inhibitor of this enzyme is considered as either an insecticide or a fungicide [8,9]. In addition, trehazolin was found to act as a tight binding inhibitor of silkworm trehalase [10]. Furthermore, penta-*O*-galloyl-β-D-glucose has a potent inhibitory activity for maltase-glucoamylase complex from rat intestine [7]. In diabetic animals, the inhibition of intestinal α-glucosidase by acarbose lead to a reduction in glycosylated hemoglobin and the delay of the development of diabetic complications [11].

However, the inhibition of these enzymes is dependent upon the structure and configuration of the inhibitor. It was found that 1-deoxynojirimycin inhibits human α-glucosidase through hydrophobic interaction with the enzyme active site [12]. Hepatic lysosomal α-glucosidase from mice was strongly inhibited by phenyl 6-deoxy-6-(morpholin-4-yl)-β-D-glucopyranoside, whereas diethanolamine is a potent inhibitor for hepatic lysosomalβ-glucuronidase from the same animals [13]. Also, Hepatic lysosomal α-glucosidase from mice was strongly inhibited by 4-amino-3-(D-glucopentitol-l-yl)-5-mercapto-1,2,4-triazole and its 3-methyl analogue [14]. Moreover, the heterocyclic thione derivatives 4,5-diphenylimidazole-2-thione, 4,5-Diphenyl-1,2,4-triazole-3-thiol and 5-(2-Hydroxyphenyl)-4-phenyl-1,2,4-triazole-3-thiol are potent inhibitors of hepatic α-glucosidase and α-amylase from rabbits [15].Recently, it was found that Glycosyl-oxadiazolinethione and glycosyl-sulfanyl-oxadiazole derivatives asS- and N-glycosides inhibit α-amylase and α-glucosidase produced by *Bacillus subtilis* AH [16].

Finally, it was reported that the glycosidase inhibitors are important for drug design to be of applicable value. The heterocyclic thione derivatives have anticoccidial activity in rabbits by inhibiting coccidiosis-stimulated activity of hepatic α-glucosidase [17]. Glycosyl-oxadiazolinethione and glycosyl-sulfanyl-oxadiazolederivatives as S- and N-glycosides inhibit hepatic α-amylase and β-glucuronidase in experimentally diabetic rats [16]. In conclusion, variable inhibitors for glycosidases from different sources were intensively investigated for their structural and biological importance.

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