Plenary 9

Organic Synthesis and Glycobiology

Yukishige Ito

Advanced Science Institute, RIKEN, Japan

Glycoprotein structures are characterized by their complexity and diversity. To clarify their functions, synthetic approaches are considered to be promising. Development of synthetic methodologies useful for efficient and facile preparation of oligosaccharides is a focal issue in carbohydrate chemistry. In light of their structural diversity, practical strategy to facilitate the synthesis of oligosaccharide is expected to be highly valuable.

The folding of glycoproteins is primarily mediated by a quality control system in the ER, in which glucosidase II (G-II) and UDP-Glc:glycoprotein glucosyltransferase (UGGT) serves as a key enzymes. In order to conduct precise analyses of these enzymes, we established systematic synthetic route to high-mannose-type glycans [1]. Our analysis using synthetic substrates revealed glycan specificities of G-II [2] and UGGT [3]. The inhibitory activities of various glycans suggest that UGGT has a strong affinity for the core pentasaccharide ($Man_3GlcNAc_2$) of high-mannose-type glycans. Our comparison of the reactivity of acceptors that have been modified by various aglycons supports the hypothesis that UGGT recognizes the hydrophobic region of client glycoproteins. Moreover, we discovered fluorescently labeled substrates that will be valuable for highly sensitive detection of UGGT activity [4].

1. Matsuo, I. et al. Tetrahedron 62, 8262-8277, 2006.
2. Totani, K. et al. J. Biol. Chem. 281, 31502-31508, 2006.
3. Totani, K. et al. J. Am. Chem. Soc. 130, 2101-2107, 2008.
4. Totani, K. et al. Angew. Chem. Int. Ed. 44, 7950-7954, 2005.
5. Totani, K. et al. Biochemistry, 48, 293-2940, 2009.

,