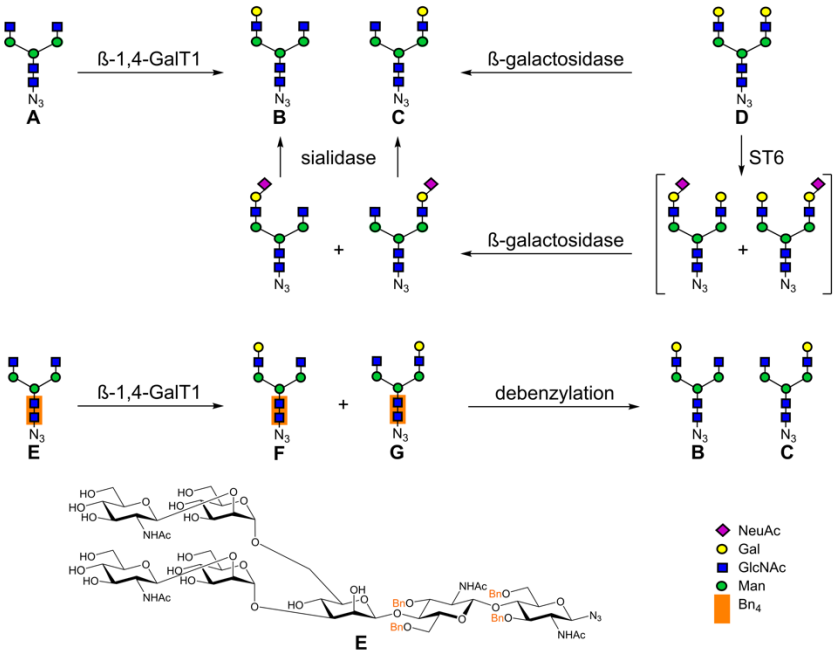
Chemoenzymatic Approaches to Unsymmetric *N*-Glycans

Freya FRÖHLE [1], M. WEIß [1], P. M. MÜLLER [1], C. SPIEß [1], K. LAM [1], T. ZIEGELMEIER [1], C. UNVERZAGT [1]

[1] University of Bayreuth, 95447 Bayreuth, Germany

freya.froehle@uni-bayreuth.de

The presence of *N*-glycans can greatly influence the biological properties of *N*-glycoproteins.[1] To evaluate the biological recognition of natural *N*-glycans via glycan-microarrays, *N*-glycans with symmetric and unsymmetric[2,3,4,5] substitution patterns are needed. Unsymmetric *N*-glycans can be obtained by enzymatic conversions of the antennae of biantennary heptasaccharide azide **A**. The incomplete galactosylation of **A** led to the isomeric octasaccharides **B** and **C**. However, the ratio of both isomers is unfavourable (**B**:**C** = 10:1) and the regioisomers separate poorly even over a porous graphitic HPLC-column (PGC). Digestion of galactosylated nonasaccharide **D** with ß-galactosidase improves the ratio of **B**:**C** to 4:1. An alternative route via monosialylation of **D** with a bacterial 2,6-sialyltransferase (PdST6) followed by digestion with ß-galactosidase and desialylation provided pure unsymmetric *N*-glycan azides **B** and **C**. The monosialylation improved the separation of unsymmetric *N*-glycans. In contrast, the partial galactosylation of benzyl-protected *N*-glycan **E** yielded the monogalactosylated compounds **F** and **G** in a ratio of nearly 1:1. Additionally, the HPLC-separation of the isomers was markedly improved. Since the oxidative debenzylation of the protected azides **F** and **G** with bromine radicals[6,7] was not feasible, a photochemical debenzylation using riboflavintetraacetate was developed.[8]



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