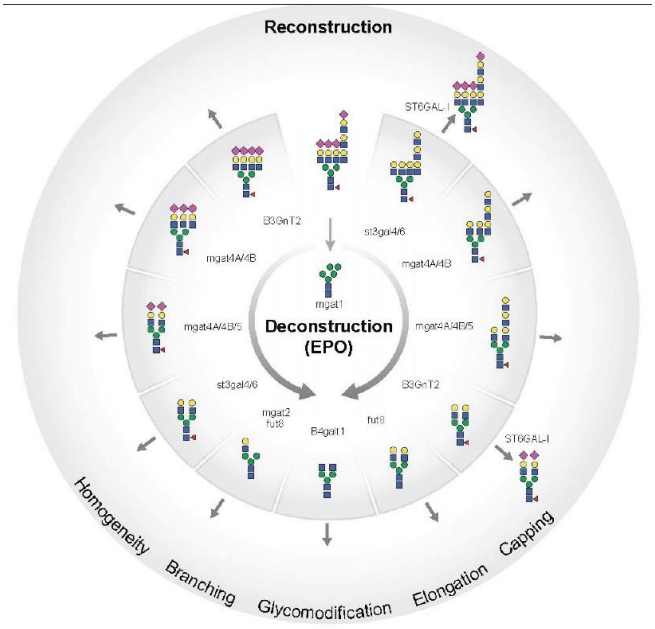
Highlights 2015

Copenhagen Center for Glycomics focus on diseases caused by defects in the biosynthesis and structure of complex carbohydrates. Our unique approach is to use precise gene editing for dissection of glycosylation and discovery of biological functions. In 2015 we reached substantial milestones that clearly warrant our unique approach and pave way for a new bigger vision. Importantly, we managed to substantially increase the number of high impact publications.

We reported the first viral O-glycoproteome, and demonstrated that O-glycosylation of viral envelope proteins is important for virus propagation and infectivity (**PLoS Pathog**). Local collaborators were able to use this to identify a novel first line innate antiviral activity relying on viral O-glycans (**Nat Immunol**). We demonstrated a new fundamental role of O-glycosylation in co-directing regulated ectodomain shedding (**PNAS**), which have substantial biomedical implications. We developed the first quantitative O-glycoproteomics strategy to probe unique non-redundant functions of the many polypeptide GalNAc-transferases (**EMBO R**), which is a true discovery workhorse in broad use in our lab now. We discovered a novel type of O-mannose glycosylation in yeast that mimics the essential cytosolic O-GlcNAcylation found in all non-yeast eukaryotes (**PNAS**), potentially providing new therapeutic options and strategies to improve yeast as a bioreactor. International collaborators demonstrated how axons and dendrites from the same neuron prevent self-interactions during development through avoidance guided by protocadherins (**Cell**), which may have huge implications for the role of the conserved O-mannose glycosylation of cadherins and protocadherins we discovered in 2014. Finally, we reported the first grand deconstruction and reengineering of an entire glycosylation pathway in a cell (CHO) (**Nat Biotech**), which represents a major milestone in glycoengineering of cells and manufacturing platforms for therapeutics.



Genetic deconstruction of N-glycosylation in CHO cells. Genes defining each step in biosynthesis are designated. Reconstruction of new glycosylation capacity indicated (Nat Biotech 2015).

We have achieved a number of other major scientific breakthroughs in 2015, and some of these are already published in 2016. There is an excellent momentum in the program, and the achievements reached so far are forming the basis for proposing a new quantum leap in glycomics with novel experimental and in-silico platforms in the half-term renewal application for DNRF due in 2016. We also continue moving forward with translational activities in several directions. Two patent applications have been filed, and we are negotiating spin-out options with the University. In short the program continues to thrive and expand, and we are having increasing impact in the field and a leading international position.