

Highlights 2021

Copenhagen Center for Glycomics (CCG) ceases DNRF funding in mid 2022 after 10 highly creative and productive years. CCG has achieved an acclaimed international reputation and impact as leader and pioneer of Next Generation Glycomics with a range of novel analytical strategies and resources. CCG has seeded strong sustainable research activities at University of Copenhagen that we hope to continue under the same name brand.

In 2021, we contributed a series of invited reviews covering areas relevant to our unique strategies and advances (Narimatsu *et al.* **J Biol Chem** 2021; Căval *et al.* **Anal Chem** 2021; Ye *et al.* **Mol Cell Proteomics** 2021) and a chapter in the educational textbook of the field (Clausen *et al.* **Essentials of Glycobiology** 2021). We expanded our cell-based glycan array strategy to cell-based display of human mucins with custom-designed glycans – a resource that for the first time enables production of well-defined human mucins with homogeneous glycans (Nason *et al.* **Nat Commun** 2021). The ability to produce homogenous mucins has sparked wide interest and delivered new opportunities to study the role of mucins in microbial adherence and metabolism as well as their role in modulating mucosal immunity. We discovered that innate immune receptors (Siglecs) serving important roles in regulation of immunity recognize and bind to mucins (Büll *et al.* **PNAS** 2021). Mucins (the primary constituent of mucus, often also referred to as slime) may therefore play central roles not only in lubrication and protection of our mucosal surfaces but also in regulating the microbiome and setting the inflammatory tone. We further expanded our cell-based display approach to include cell-based production of heparin - an anticoagulant drug still sourced from animal tissues, which has resulted in discovery of a strategy to produce heparin without a known serious side-effect (Karlsson *et al.* **Sci Adv** 2021).

We reached our long-term goal to achieve control over the cellular glycosylation machinery and developed an array of technologies to discover biological functions of glycosylation and the underlying molecular mechanisms. A rather comprehensive map of the complex metabolic network for cellular glycosylation is now assembled and the first predictor for glycosylation in the individual cell was developed (Dworkin *et al.* **iScience** 2022). This is an important step towards our vision of *in silico* single cell glycomics, and we are advancing towards analysis of single glycoconjugate molecules and making the glycomics field approachable like proteomics and genomics.

Year 2021 continued to be affected by Corona restrictions and several PhD students were delayed. CCGs group leaders continued to secure independent funding, and we congratulate associate professor Adnan Halim with obtaining tenure and the Carlsberg Foundation young research fellowship as well as the prestigious international Mizutani award.

