# Ludger News

March/April 2022


## Ludger's Custom Glycan Analytical Services

We provide cutting-edge technologies for assisting you with your glycoprotein analysis and characterisation of glycosylation critical quality attributes (GCQAs) in line with **FDA**, **EMA**, and **ICH Q6B guidelines** from a host of sample types.

We also offer bespoke glycan analysis services to assist with clinical diagnostics studies. Our data and customised reports are used:

- in QbD studies and early stages of drug development
- in process optimisation and production scale-up
- in comparability studies (biosimilars, biobetters)
- to support regulatory submissions
- for lot release of drug batches during biomanufacturing
- in research & method development

Please visit our Glycan Analysis Service webpages or contact info@ludger.com for more information.

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## Launch of LudgerClean S-plus cartridges (LC-S-A48) - Saver Pack

At Ludger, we are committed to supporting our scientific community by offering products and services that have exceptionally high-quality, robustness and cost-effective too. For this reason, we are launching a **48-cartridge version** of the popular LudgerClean S cartridges at a **highly cost-effective pricing** along with the same superior efficiency of glycan enrichment/clean-up capabilities and reproducibility.

LudgerClean S cartridges are one of the most reliable, robust and scalable clean-up cartridges used for achieving post-labeling cleanup of glycans. These cartridges are routinely used in the biopharma industry during glycoprofiling QC for lot release of FDA and EMA approved biopharmaceuticals. They are also used for cutting-edge clinical diagnostics and medical research around the world.


The glycan-binding membrane in these cartridges allows the consistent recovery of N- & O-glycans from complex mixtures. While glycans in solutions with a high level of certain organic solvents are retained, most hydrophobic contaminants either simply pass through the cartridges or bind very lightly and can be washed off the membrane. Therefore, glycans can simply be eluted from the membrane with water.

To enquire about the LudgerClean S-plus (8 packs of 6 cartridges) pricing please email info@ludger.com or visit our S-cartridge feature page for more information.

## Review published in 'Antibodies' journal

A review titled "***Glycoengineering of Therapeutic Antibodies with Small Molecule Inhibitors***" co-authored by Alex McCraw et al (Ludger's collaborators from Kings college London) illustrates the expanding chemical toolbox that is becoming available for monoclonal antibody (mAb) glycoengineering in the biotechnology community.

This article begins with a brief introduction to the effects of glycosylation on the biological and pharmacological functions of the five classes of immunoglobulins (IgG, IgE, IgA, IgM and IgD) that form the backbone of all current clinical and experimental mAbs. An overview of common mAb expression systems is shared along with a discussion on the impacts of small molecule inhibitors on the glycosylation profiles of therapeutic antibodies, and, consequently, impacts upon the efficacy of these biotherapeutics.

Furthermore, potential advantages, challenges and future applications of selected examples of small-molecule inhibitors used in MAb glycoengineering are discussed.

For more information about this article visit our Publication webpage, and visit our Procainamide webpage for more information on how to characterise your mAb using Ludger technology.

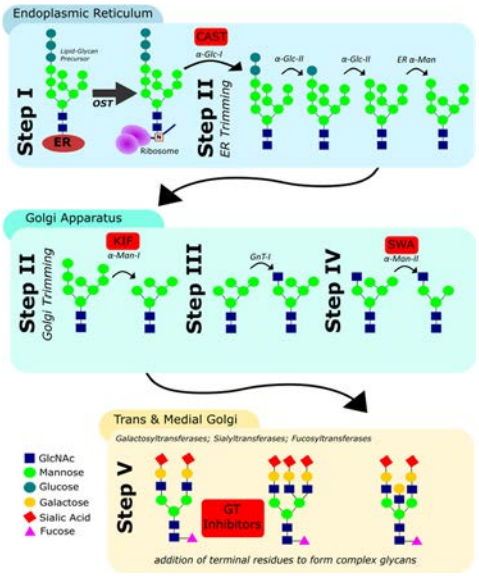
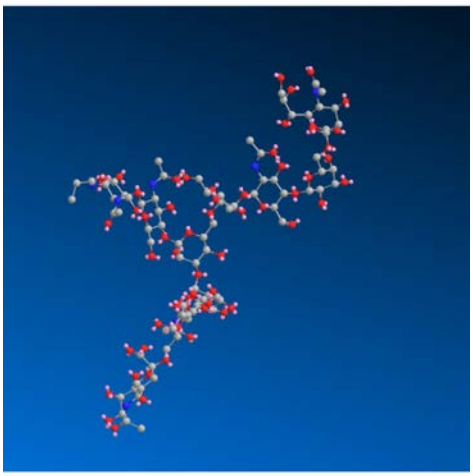



**Figure 1.** Key steps during eukaryotic N-glycan biosynthesis. Red boxes indicate inhibitors of individual enzymes

## Ludger's Quantitative Glycopeptide Standard:

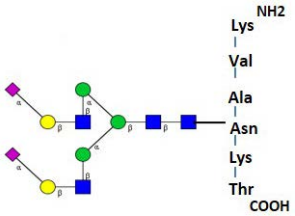
*A process control standard for determining analytical process efficiency and glycan quantitation*

The quantitative analysis of sialic acids and monosaccharides is a regulatory requirement for any biopharmaceutical drug during the development stage, as well as throughout its whole life cycle (*Reference: ICH guidelines Q6B and Q5E for comparability studies, EMA monograph on MAb, USP chapters 1084 and 1094 on glycosylation analysis*).



At Ludger, we have produced a purified quantitative glycopeptide standard which can be used as an internal standard and as a positive control when performing:

- Quantitative sialic acid analysis
- Quantitative monosaccharide analysis
- Routine glycan release and labelling experiments




The BioQuant Standard BQ-GPEP-A2G2S2 is a quantitative standard that is a purified N-link glycopeptide comprised of a di-sialylated biantennary glycan of the form A2G2S2. This is attached to the asparagine amino acid of a peptide with the sequence Lysine-Valine-Alanine-Asparagine-Lysine-Threonine (KVANKT).

Features and benefits of the BioQuant GPEP-A2G2S2 standard:

- **System Suitability**: Use to demonstrate efficiency of labelling, column efficiency and repeatability of glyco-analysis
- **Positive Control**: The GPEP-A2G2S2 standard can run in parallel with your sialic acid release or monosaccharide analysis
- **Regulatory Submissions**: Supports with regulatory submissions by demonstrating consistent and reproducible results
- **Quality Assurance**: Monosaccharide and Sialic acid analysis is traceable to internationally accepted references from USP and dispensed using NIST traceable

To find out how to incorporate this quantitative standard in your glycans analysis workflow please view our data presentation using this link: www.ludger.com/products/glycan-standards/quantitative-glycopeptide-standard-gpep-a2g2s2.php or visit our Products page for a full listing of the Quantitative Standards we have available.

If you have any questions or to request a quotation, please contact: info@ludger.com

## Publication in Biotechnology Journal

A research project to study and to characterise impacts of different cell culture conditions on the glycosylation profiles of IgG4 monoclonal antibodies was led by Dr Richard Gardner, Lead Scientist at Ludger and our UCL collaborators Vincent Wiegmann and colleagues. This researched enabled the publishing of an article titled "***Equal mixing time enables the optimization of IgG4 MAb production with minimal impact on glycosylation profiles***" in the Biotechnology Journal.

This work for the first time provides a framework of how the micro-Matrix microbioreactor can be implemented in a bioprocess development workflow and demonstrates the scalability of growth and production kinetics as well as the optimization of IgG4 MAb production using the micro-Matrix and a benchtop-scale stirred tank reactor (STR) system.

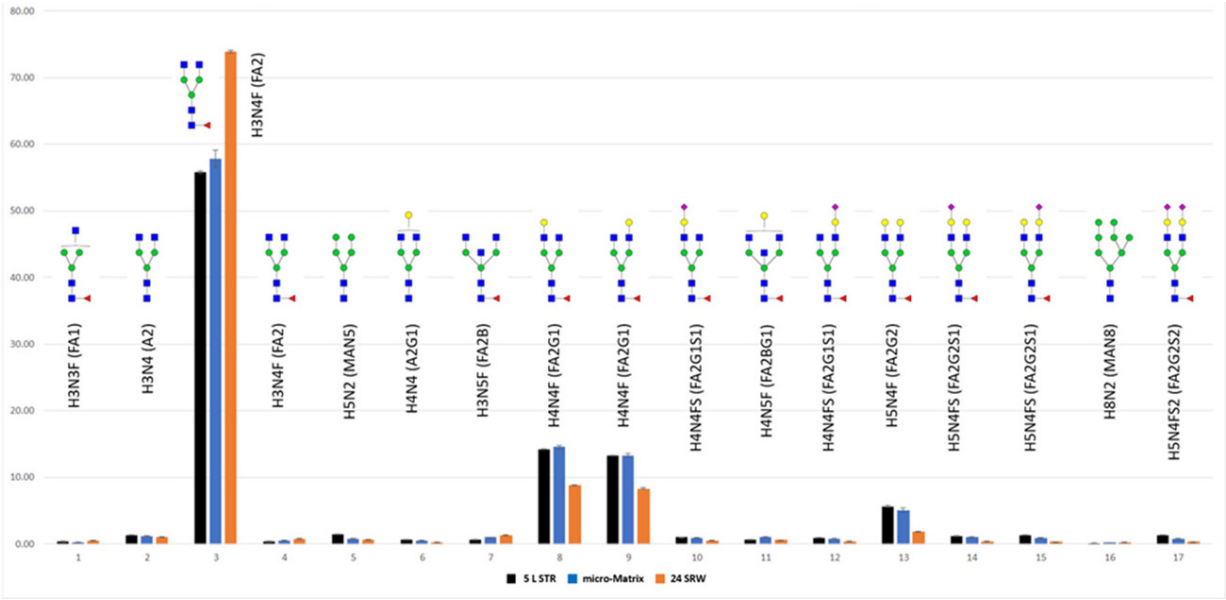



**Figure 1.** Comparison of the relative% areas for each N-glycan peak from each sample analysed; black: STR; blue: micro-Matrix; orange: Standard Reaction Well.

Glycan characterisation was performed using our procainamide labelling and LC-FD-MS system that yields relative quantities of each glycan type present and ionises with high sensitivity in the mass spectrometry to provide clear MS and MS/MS signals. A comparison of micro-reactor and larger-scale 5 L reactors demonstrated that with carefully controlled cell cultures the impact on glycosylation profiles was minimal although there were indications that less pH control on the micro-reactor did skew the glycans present on the biomolecules.

Visit our Procainamide webpage for more information on how to characterise glycans using LC-MS. And for more information about this article visit our Publication webpage.