Empowering Therapeutic Innovation Through Glycoscience

Sussex Research Laboratories Inc. translates glycobiology discoveries and glycan chemistries into enabling technologies used by drug developers to exploit glycoscience in the development of products that promote human health.

Specializing in glycans, glycan ligands, glycopeptides, glycolipids and glycoconjugates including GalNAc and sialic acid for drug targeting, drug discovery or immunotherapeutic development.

Glycan, ligand, glycopeptide or glycoconjugate synthetic target? We are ready to take on your specific synthetic challenge!

PRODUCTS & SERVICES

Products

We take pride in conceptualizing, developing, and manufacturing a novel portfolio of glycan products. From functionalized carbohydrate ligands for targeting to glycoconjugates for vaccine development, our product portfolio is both unique and wide-ranging.

Custom Synthesis

We are well known for our custom synthesis capabilities which utilize our core carbohydrate synthetic expertise. We provide synthesis solutions for pharmaceutical, biopharmaceutical, diagnostic and vaccine applications that require elements of glycotechnology.

CRO / CDMO Services

We participate as a trusted partner in a wide variety of pharmaceutical R&D projects ranging from early-stage drug delivery/targeting & development to polysaccharide and glycoconjugate vaccine development.

Structural Analysis

We draw on extensive knowledge in Nuclear Magnetic Resonance (NMR) Spectroscopy, Mass Spectrometry (MS), purification and subsequent chemical characterization of carbohydrate and isotope-labeled molecules.

COMPANY PROFILE

Sussex Research has been a trusted provider of carbohydrate-based products and synthetic services for almost 30 years. A spin-off of the National Research Council (NRC) of Canada, the company is housed at NRC's Industry Partnership Facility within NRC's flagship facility in Ottawa, Canada.

NRC Facility in Ottawa, Ontario, Canada

WHY GLYCOTECHNOLOGY?

In mammals, glycans (sugars) are most commonly found as glycoconjugates, the most abundant being the glycoproteins, proteoglycans and glycolipids. These are predominantly located on cell membranes but also in secreted fluids where they modulate or mediate a host of events in cell-cell and cell-matrix interactions.

Glycoconjugation of a biotherapeutic (peptide, protein or antibody) may confer increased therapeutic efficacy via:

> Superior stability
> Increased bioavailability
> Longer in-vivo half-lives
> Higher aqueous solubility
> Enhanced target resolution

Protein-based therapeutics with sales well over $100B in 2023, rely on glycans to moderate stability, activity, antigenicity and pharmacodynamics in intact organisms. Non-protein-based drugs such as Heparin, a potent antithrombotic drug, have global sales well in excess of $10B in 2023.

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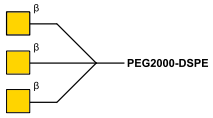
SUSSEX RESEARCH

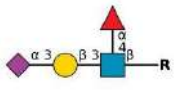
General Areas of Expertise

1. **GalNAc Ligands for ASGPR Targeting**: GalNAc ligands for facile glycoconjugation to other molecules for targeting & delivery applications. *Custom synthesis available.*



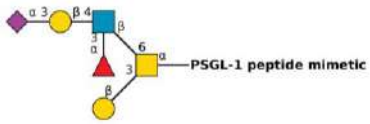
Pegylated or Alkyl GalNAc
Various linker and scaffold modifications are available.

2. **Ligands for Siglec Targeting**: Synthetic high affinity and selective ligands for Siglecs for cell selective applications including delivery of therapeutic or diagnostic probes and desensitizing immune cells to allergens.



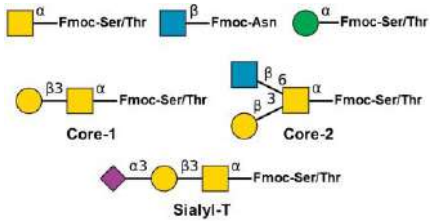
Sialyl Lewis A ligand (R = N_3, CO_2H, NHS…) and
Ligands for Siglec-E, Siglec-7 and Siglec-9

3. **Glycopeptides**: Large portfolio of glycopeptides including many MUC1, IgA1 Hinge Region and PSGL-1 mimetic peptides. *Custom synthesis available.*

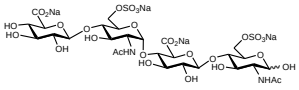


Antiproliferative Factor (Frizzled-8 protein fragment)

4. **Glycoamino Acids**: Large portfolio of *O*- and *N*-linked Fmoc glycoamino acids for glycopeptide synthesis and/or glycoconjugation of biologicals. *Custom synthesis available.*

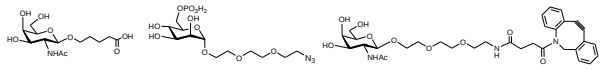


5. **Oligosaccharide/Glycan Synthesis**: Synthetic glycans for drug discovery and research. *Custom synthesis available.*



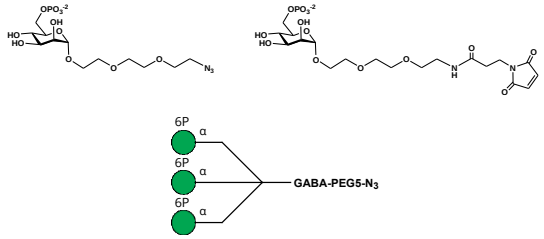
Heparin-Like Tetrasaccharide

6. **Glycan Ligands for Targeting**: Portfolio of functionalized linker systems for facile glycoconjugation to other molecules, surfaces or particles. *Custom synthesis available.*



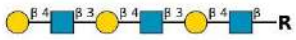
Pegylated or **Alkyl Glycosides (-N_3, -NH_2, -CO_2H, -SH, DBCO, -C≡CH...)**

7. **Mannose-6-Phosphate Ligands for M6P Receptor Targeting**: M6P ligands designed for facile glycoconjugation to other molecules and proteins for targeting & delivery applications. *Custom synthesis available.*



Clickable M6P Ligands

8. **Galectin Ligands**: Synthetic ligands for proteins that bind specifically to β-galactoside sugars, such as *N*-acetyl lactosamine.

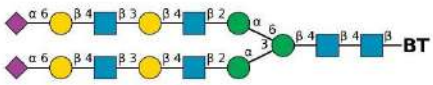


Poly LacNAc Structures & Other Ligands

9. **Biotinylated Glycans**: Portfolio of biotinylated glycans designed for study of protein-carbohydrate interactions.

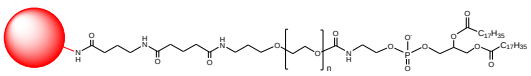
Biotinylated 6'-Sialyl GalNAc-Threonine (STn)

10. **Influenza Glycans**: Series of biotinylated glycans designed for typing Avian and Human Influenza A viruses. Essential for developing effective antiviral strategies and vaccines.



Biotinylated Complex N-Glycan Example

11. **Glycosylated Lipid Nanoparticles (LNP)**: Liposomal formulation and targeted drug delivery. Targeting ligands (glycans, peptides or small molecules) conjugated to PEGylated lipids.



PEG(2000)-DSPE Conjugated to a Glycan or Peptide Payload

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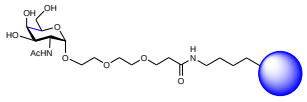
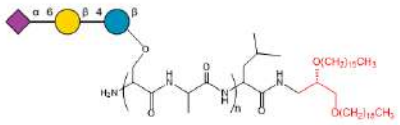
12. **Neoglycoproteins / Glycoconjugates**: Glycans, glycopeptides and other carbohydrate systems conjugated to BSA, CRM or KLH (or other carrier proteins upon request).



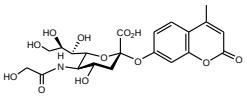
Multivalent α-GalNAc Related to Tn Antigen on BSA

13. **Glycopolypeptides**: Synthetic, high molecular weight multivalent glycopolypeptide ligands for use in lectin recognition. *Custom made to specifications.*

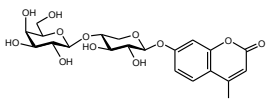


6'-Sialyllactose Glycopolypeptide with Lipid C-Terminal

14. **Glycosylated Probes**: Glycosylated probes are used to detect enzymes or delineate protein-carbohydrate interactions. Custom synthesis available.

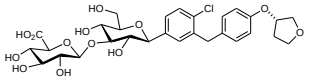


4-MU α-Neu5Gc

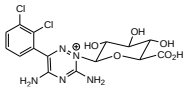


4-MU β(Galβ1-4Xyl)

15. **Glucuronides of API**: Portfolio of >60 glucuronides. Custom synthesis available.

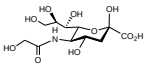


Empagliflozin-3-β-D-glucuronide

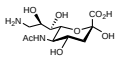


Lamotrigine-N-2-β-D-glucuronide

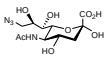
16. **Modified Sugars**: *N*-modified **sialic acids** such as Neu5Gc. C-9 modifications including 9-N_3, 9-NH_2, 9-amido and more…



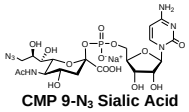
Neu5Gc



9-Amino

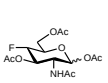


9-Azido

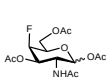


CMP 9-N_3 Sialic Acid

Glycosidase inhibitors (anhydro, fluorinated, 5-thio, thiazole and 2-thioisocyanate derivatives) as well as glycals, amines, azides, nitrophenyl, GalNAz, etc…

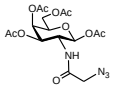


4-F-GlcNAc



4-F-GalNAc

Thiamet-G



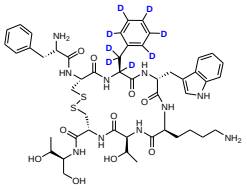
GalNAz Ac_4

Novel Oxazolines

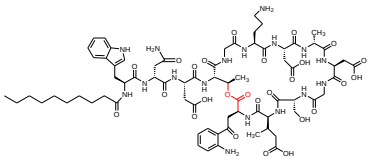
17. **Polysaccharide Analogues**: High purity and well characterized (NMR and Mass Spectrometry) chemically derivatized LPS, polysaccharides, O-chains and lipids for vaccine research and development. *Custom synthesis available.*

GENERIC SYNTHETIC CHEMISTRY

1. **Challenging Synthetic Peptides**: **Lipidated & Macrocyclic** Peptide glycosylation, lipidation, macrocyclization or any combination are effective strategies to modify the pharmacokinetic and pharmacodynamic properties of lead peptide therapeutics. We provide synthesis of glycosylated, lipidated, glycolipid and macrocyclic peptides.
Custom synthesis available.

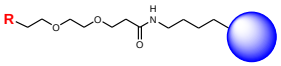


Octreotide Analogs



Daptomycin Analogs

2. **Macromolecule Conjugates**: Small molecule, peptides or glycosylated systems conjugated to proteins, antibodies, oligonucleotides or other macromolecules upon request.
Custom synthesis available.



Conjugate where R = small molecule, glycan, prodrug or API attached to a macromolecule

WE ARE A CRO / CDMO THAT WILL ASSIST YOU IN REALIZING THE FULL THERAPEUTIC POTENTIAL OF YOUR MOLECULE THROUGH APPLICATION OF GLYCOSCIENCE.

CONTRACT RESEARCH, SYNTHESIS, PROCESS DEVELOPMENT

We welcome projects involving research, development and optimization of synthesis methods, scale-up and manufacturing strategies for all kind of carbohydrate and small molecules.

Applications include:

> Vaccine Development
> Drug Development
> Drug Targeting/Delivery
> Polysaccharide Chemistry
> Drug Half-Life Extension
> Antibody Development
> Protein/Antibody Modification
> GalNAc Ligand Development

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