

# Glycopeptides & Glycoamino Acids

Peptide Glycosylation Products & Custom Synthesis

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**Glycopeptides** offer a unique frontier for research & development of therapeutics, vaccines, adjuvants, drug delivery/targeting systems and diagnostics development. Glycosylation of peptides is known to increase stability, solubility, *in vivo* half-lives and ultimately, the efficacy of peptides. Glycosylation effects can be very dramatic.

**Fmoc glycoamino acids:** Sussex Research Laboratories Inc. provides the most extensive selection of N- and O-linked Glycoamino Acids commercially available. Glycoamino acid building blocks enable facile assembly of glycosylated peptides as well as introduction of carbohydrate-based recognition elements into virtually any synthetic molecule including small molecules and biomolecules such as oligonucleotides and proteins.

**Custom Glycopeptide Synthesis:** Sussex Research Laboratories Inc. is highly active in the custom synthesis of glycopeptides for specific research, drug and vaccine development projects. You pick the glycosylation pattern, the amino acid or linker system, the sequence, and a label if necessary and we'll make it happen.

**About Carbohydrates:** The critical role of carbohydrate ligands on cell surface proteins and lipids as well as those bound to circulatory proteins is well recognized. Carbohydrates mediate a host of biological events including cell adhesion, immune system function, fertilization, cellular targeting as well as protein transport, stabilization, and half-life. Thus, the use of synthetic glycoproteins or their fragments (glycopeptides) as experimental probes for basic research and biomedical applications is growing rapidly.

**Sussex Research Laboratories Inc.** has been the leading source of synthetic, well-defined N- and O-linked glycosylated peptides and Fmoc glycoamino acids since 1996. We offer a range of inventoried glycopeptides and Fmoc glycoamino acids and custom glycopeptides and glycoamino acids synthetic services.

**Experienced in O- and N-linked, Biantennary and Glycated peptides.**

## GLOBAL LEADER IN CARBOHYDRATE SYNTHESIS

Translating complex carbohydrate chemistries into unique, leading-edge products that enable researchers to explore and exploit glycobiology applications that promote human health.

## PRODUCTS & SERVICES

### Products

We take pride in conceptualizing, developing, and manufacturing a novel portfolio of carbohydrate products. From functionalized carbohydrate molecules to glycoconjugates and glucuronide metabolites, the Sussex 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 glycotecnology.

### Contract Research & Development

We participate as a trusted partner in a wide variety of pharmaceutical R&D projects ranging from early-stage drug delivery & 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.

**Specializing in GalNAc for drug targeting, glycans for drug discovery, glycopeptides, and carbohydrate ligands for immunotherapeutic development.**

**Carbohydrate, glycoconjugate or glycan target? We are ready to take on your specific synthetic challenge!**

## COMPANY PROFILE

Sussex Research Laboratories Inc. has been a trusted provider of carbohydrate-based products and synthetic services since 1996. 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. This facility provides excellent infrastructure for organic synthetic chemistry including high field NMR & fermentation facilities.



NRC Facility at Ottawa, Ontario, Canada

In mammals, 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.

## WHY GLYCOTECHNOLOGY?

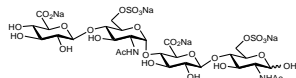
Glycoconjugation of a biotherapeutic (peptide, protein or antibody) may confer increased therapeutic efficacy via:

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

Glycans (unconjugated oligosaccharides) can also mediate various physiological processes. The synthetic pentasaccharide, Fondaparinux, chemically related to Heparin, is also a potent antithrombotic drug.

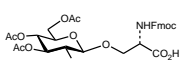
## GENERAL AREAS OF FOCUS

1. **Oligosaccharide/Glycan Synthesis:** Highly pure synthetic glycans for drug discovery and research rigorously characterized by modern spectroscopic methods.

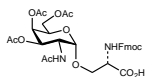


HEPARIN-LIKE TETRASACCHARIDE

2. **Glycoamino Acids:** The largest portfolio of O- and N-linked Fmoc glycoamino acids for glycopeptide synthesis or glycoconjugation of biologicals.

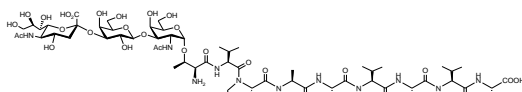


$\beta$ -GlcNAc



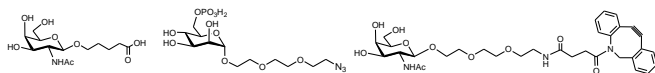
$\alpha$ -GalNAc (Tn-Antigen)

3. **Glycopeptides:** Portfolio of glycopeptides and custom synthesis – virtually any glycoform including biantennary structures). Numerous MUC1 glycopeptides.



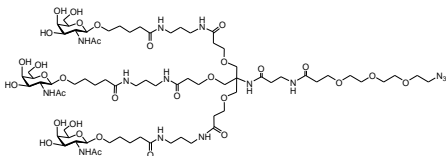
ANTIPROLIFERATIVE FACTOR (Fzzled-8 protein fragment)

4. **Carbohydrate Ligands – Targeting:** Portfolio of carbohydrates conjugated to functionalized linker systems for facile glycoconjugation of other molecules/particles.



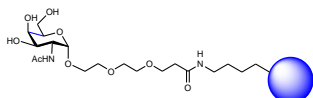
PEGYLATED OR ALKYL GLYCOSIDES (-N<sub>3</sub>, -NH<sub>2</sub>, -COOH, -SH, DBCO, -C≡CH...)

5. **GalNAc – ASGPR Targeting:** Portfolio of ligands for facile glycoconjugation to other molecules for targeting & delivery applications.



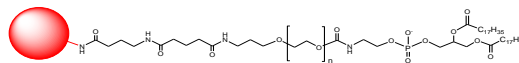
PEGYLATED OR ALKYL GalNAc – various functions available

6. **Neoglycoproteins / Glycoconjugates:** Portfolio of glycans, glycopeptides and other carbohydrate systems conjugated to BSA (or other carrier proteins upon request).



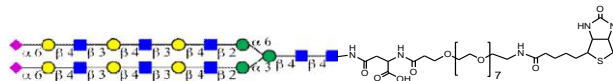
Multivalent  $\alpha$ -GalNAc related to Tn antigen on BSA

7. **LNP Monomers:** Targeting ligands (glycans, peptides or small molecules) conjugated to PEGylated lipids allow for Lipid Nanoparticle (LNP) formulation and targeted drug delivery.



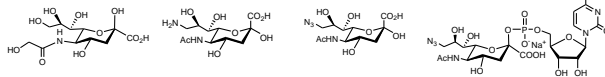
PEG(2000)-DSPE conjugated to a glycan or peptide payload

8. **Biotinylated Glycans:** Portfolio of biotinylated glycans designed for study of protein-carbohydrate interactions across various applications.



6'-Sialyl tri-LacNAc N-Glycan (Biantennary)

9. **Sialic Acid Derivatives:** N-modified sialic acids such as Neu5Gc. 9-hydroxy modifications (9-azido, 9-amino, 9-amido...).



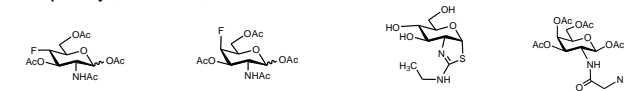
Neu5Gc

9-Amino

9-Azido

9-Azido sialic acid

10. **Modified Saccharides:** Portfolio/custom synthesis of glycosidase inhibitors (anhydro, fluorinated, 5-thio, thiazole and 2-thioisocyanate derivatives) as well as glycals, amines, azides, nitrophenyl, GalNAz, etc.



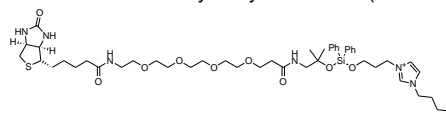
4-F-GlcNAc

4-F-GalNAc

Thiamet-G

GalNAz Ac<sub>4</sub>

11. **Enrichment reagents:** Cleavable Biotin Probes for labeling of biomolecules via azide-alkyne cycloaddition (Click Chemistry).



Azide Analogue, Alkyne also available. Picolyl Azide also available.

### 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 (ADC)
- > GalNAc Ligand Development

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[www.sussex-research.com](http://www.sussex-research.com)



## GLYCOPEPTIDES

Sussex Research has synthesized hundreds of glycosylated peptides over the years. This brochure represents a small sample size. For a more comprehensive listing, please visit [www.sussex-research.com](http://www.sussex-research.com).

### N-Acetylgalactosamine ( $\alpha$ -GalNAc) Peptides:

Glycosylation ( $\alpha$ -GalNAc) at serine or threonine.

### IgA1 Hinge Region Glycopeptides (Immunoglobulin (IgA) nephropathy):

GP100000	PVPSTPPTPS( $\alpha$ -GalNAc)PSTPPTPSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide
GP100005	VPSTPPTPS( $\alpha$ -GalNAc)PSTPPTPSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide
GP100010	VPSTPPTSPS( $\alpha$ -GalNAc)TPPTPSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide
GP100015	VPSTPPT( $\alpha$ -GalNAc)PSPSTPPTSPS-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide - Monoglycosylated ( $\alpha$ -GalNAc)
GP100020	VPSTPPT( $\alpha$ -GalNAc)PS( $\alpha$ -GalNAc)PSTPPTSPS-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide - Diglycosylated ( $\alpha$ -GalNAc)
GP100025	VPSTPPT( $\alpha$ -GalNAc)PS( $\alpha$ -GalNAc)PSTPPTPSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide - Diglycosylated ( $\alpha$ -GalNAc)
GP100030	VPSTPPTPS( $\alpha$ -GalNAc)PSTPPT( $\alpha$ -GalNAc)PSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide - Diglycosylated ( $\alpha$ -GalNAc)
GP100035	VPSTPPTPS( $\alpha$ -GalNAc)PST( $\alpha$ -GalNAc)PPTPSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide - Diglycosylated ( $\alpha$ -GalNAc)
GP100040	VPSTPPT( $\alpha$ -GalNAc)PS( $\alpha$ -GalNAc)PS( $\alpha$ -GalNAc)TPPTSPS-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide – Triglycosylated ( $\alpha$ -GalNAc)
GP100045	VPSTPPT( $\alpha$ -GalNAc)PS( $\alpha$ -GalNAc)PS( $\alpha$ -GalNAc)TPPTPSPSC-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide – Triglycosylated ( $\alpha$ -GalNAc)
GP100050	HYTNPSQDVTVPCPVTSTPPTPS( $\alpha$ -GalNAc)PSTPPTPSPSCCHPR-[NH <sub>2</sub> ] IgA1 Hinge Region Glycopeptide
GP100150	STPPT(GalNAc)PSP-[OH] IgA1 HR 232-239 (GalNAc) IgA1 Hinge Region Glycopeptide fragment 232-239; GalNAc glycosylation at Thr <sup>236</sup>
GP100155	Biotin-PEG6-C(O)NH-STPPT(GalNAc)PSP-[OH] IgA1 HR 232-239 (Biotin, GalNAc) Biotinylated IgA1 Hinge Region Glycopeptide fragment 232-239; GalNAc glycosylation at Thr <sup>236</sup>
GP100152	STPPTPSP-[OH] IgA1 HR 232-239

### Mucin Type Glycopeptides:

Sequences containing Tn Antigen ( $\alpha$ -GalNAc)

GP100055	GVT( $\alpha$ -GalNAc)SA-[NH <sub>2</sub> ]
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GP100060	VGVT( $\alpha$ -GalNAc)ETP-[NH <sub>2</sub> ]
GP100065	PAPGST( $\alpha$ -GalNAc)APPAHGVSAPDT( $\alpha$ -GalNAc)R-[OH]
GP100070	PAPGST( $\alpha$ -GalNAc)APPAHGVSAPDT( $\alpha$ -GalNAc)RPAPG-[OH]
GP100075	PAPGST( $\alpha$ -GalNAc)APPAHGVSAPDT( $\alpha$ -GalNAc)RPAPGC-[NH <sub>2</sub> ]
GP100076	PAPGS( $\alpha$ -GalNAc)T( $\alpha$ -GalNAc)APPAHGVT( $\alpha$ -GalNAc)S( $\alpha$ -GalNAc)APDT( $\alpha$ -GalNAc)R-[NH <sub>2</sub> ]
GP100077	PAPGSTAPPAHGVSAPDTRPAPGSTAPPAHGVSAPDTR-[NH <sub>2</sub> ]
GP100078	PAPGSTAPPAHGVSAPDTRPAPGSTAPPAHGVSAPDTRPAPGSTAPPAHGVSAPDTR-[NH <sub>2</sub> ]
GP100079	TSSAS( $\alpha$ -GalNAc)TGHATPLPVTD-[NH <sub>2</sub> ]
GP100080	PAPGS( $\alpha$ -GalNAc)T( $\alpha$ -GalNAc)APPAHGVSAPDT( $\alpha$ -GalNAc)RPAPG-[OH]
GP100081	PAPGST( $\alpha$ -GalNAc)APPAHGVSAPDTRPAPG-[OH]
GP100082	CPAPGS( $\alpha$ -GalNAc)T( $\alpha$ -GalNAc)APPAHGVT( $\alpha$ -GalNAc)S( $\alpha$ -GalNAc)APDT( $\alpha$ -GalNAc)R-[NH <sub>2</sub> ]
GP100083	GTT( $\alpha$ -GalNAc)PSPVPTTSTTSAP-[NH <sub>2</sub> ]
GP100084	GTPSPVPTTST( $\alpha$ -GalNAc)TSAP-[NH <sub>2</sub> ]
GP100085	MUC1(126-149)-STn(130)
GP100086	GTT( $\alpha$ -GalNAc)PSPVPTTSTT( $\alpha$ -GalNAc)SAP-[NH <sub>2</sub> ]

#### Sequences containing Tf Antigen (Core 1 = Gal $\beta$ (1-3)GalNAc):

GP900115	TSSAS(Gal $\beta$ (1-3)GalNAc)TGHATPLPVTD-[NH <sub>2</sub> ]
GP900130	[AcNH]-AHGVT(Gal $\beta$ (1-3)GalNAc)SAPDTRK-[NH <sub>2</sub> ]
GP900110	T[Gal(b1,3)GalNAc(a)]SNSGLAPNPT[Gal(b1,3)GalNAc(a)]-[OH]

#### Sequences containing Core 3 Glycan (GlcNAc $\beta$ (1-3)GalNAc):

GP900045	VTSAPDTRPAPGST(GlcNAc $\beta$ (1-3)GalNAc)APPAHG-[NH <sub>2</sub> ] Cancer-Associated Core3 Epitope of a Mucin core protein.
GP900050	VTSAPDTRPAPGS(GlcNAc $\beta$ (1-3)GalNAc)T(GlcNAc $\beta$ (1-3)GalNAc)APPAHG-[NH <sub>2</sub> ] Diglycosylated Cancer-Associated Core3 Epitope of a Mucin core protein.
GP900055	APGSTAPPAHGVT(GlcNAc $\beta$ (1-3)GalNAc)S(GlcNAc $\beta$ (1-3)GalNAc)APDTRP-[NH <sub>2</sub> ] Diglycosylated Cancer-Associated Core3 Epitope of a Mucin core protein.

#### Sequences containing Sialic Acid (sTn and sTf Antigen):

GP000040	PAPGST(Neu5Aca(2-6)GalNAc)APPAHGVSAPDT(Neu5Aca(2-6)GalNAc)RPAPG-[OH]
GP000045	PAPGST(Neu5Aca(2-6)GalNAc)APPAHGVSAPDT(Neu5Aca(2-6)GalNAc)RPAPGC-[NH <sub>2</sub> ]
GP000070	T[Neu5Aca(2,3)Gal $\beta$ (1,3)GalNAc( $\alpha$ )]SNSGLAPNPT[Neu5Aca(2,3)Gal $\beta$ (1,3)GalNAc( $\alpha$ )]-[OH] Disialo CD24 Glycopeptide (41-51): CD24, a mucin-type glycosylated cell surface adhesion molecule on

#### Frizzled-8 (FZD8) Fragments / Antiproliferative Factor (APF) Related to Interstitial Cystitis:

GP000017	TVPAVVVA-OH FZD8(541-549); Non-glycosylated Anti-Proliferative Factor (ng-APF)
GP900065	(Gal $\beta$ (1-3)GalNAc)TVPAVVVA-[OH] Asialo Anti-Proliferative Factor (asialo-APF)
GP900070	(Gal $\beta$ (1-3)GalNAc)T(V-d8)PAVVVA-[OH] Asialo Anti-Proliferative Factor (asialo-APF-d8)
GP000015	(Neu5Aca(2-3)Gal $\beta$ (1-3)GalNAc)TVPAVVVA-[OH]

	FZD8(541-549)-STf(541); Anti-Proliferative Factor (APF)
GP000020	(Neu5Ac $\alpha$ (2-3)Gal $\beta$ (1-3)GalNAc)T(V-d8)PAAVVVA-[OH]
	FZD8(541-549)-d8-STf(541); Anti-Proliferative Factor (APF) containing valine-d8
GP000025	(Neu5Ac $\alpha$ (2-3)Gal $\beta$ (1-3)GalNAc)TVPAVVVAC-[OH]
	FZD8(541-550)-STf(541)-Cys; Anti-Proliferative Factor (APF) with Cysteine

### Blood Group Glycopeptide (Glycophorn A):

GP100105	LS( $\alpha$ -GalNAc)T( $\alpha$ -GalNAc)T( $\alpha$ -GalNAc)EVAM-[NH <sub>2</sub> ]
	Asialo Blood group OM-related epitope of glycophorin A (GPA-M)

### Other Glycopeptides:

GP100090	AS( $\alpha$ -GalNAc)A-[NH <sub>2</sub> ]
GP100095	YSPTS( $\alpha$ -GalNAc)PSK-[NH <sub>2</sub> ]
	A repeat unit of the RNA polymerase II (RNAP II) carboxy terminal domain (CTD).
GP100115	TPIVGQPS( $\alpha$ -GalNAc)IPGGPVR-[OH]
GP100100	GAEAEAPS( $\alpha$ -GalNAc)AVPDAAG-OH
GP100120	GAT( $\alpha$ -GalNAc)ES( $\alpha$ -GalNAc)RGAGAGA-[NH <sub>2</sub> ]
GP100125	NH <sub>2</sub> (CH) <sub>2</sub> COGS( $\alpha$ -GalNAc)S( $\alpha$ -GalNAc)S( $\alpha$ -GalNAc)G-[NH <sub>2</sub> ]
GP900060	GS(GlcNAc $\beta$ (1-3)GalNAc)GKC-[NH <sub>2</sub> ]
GP900040	T(Gal $\beta$ (1-3)GalNAc)PLPPTSAHG NVAEGETKPD PDVTER-[NH <sub>2</sub> ]
GP100130	ERGT( $\alpha$ -GalNAc)KPPLEELS-GK(Biotin)
GP100110	RRRRRRRCGSGGVTSAPDT( $\alpha$ -GalNAc)RPAPGSTAPPAH-[NH <sub>2</sub> ]
GP100145	EAISPPDAAS( $\alpha$ -GalNAc)AAPLR-[OH]
	Erythropoietin (Epo) (117-131): Glycopeptide fragment of erythropoietin (GalNAc at Ser126)
GP100147	EAISPPDAASAAPLR-[OH]
	Erythropoietin (Epo) (117-131): Non-glycosylated peptide fragment of erythropoietin
GP900125	EAISPPDAAS(Gal $\beta$ (1-3)GalNAc)AAPLR-[OH]
	Erythropoietin (Epo) (117-131): Glycopeptide fragment of erythropoietin (Gal $\beta$ (1-3)GalNAc at Ser126)
GP900095	T(Gal $\beta$ (1-3)GalNAc)PLP PTS AHG NVA EGET KPD P** DVTERSSD-[NH <sub>2</sub> ] P**=C13-Proline
GP900100	WALRPVLPT (Gal $\beta$ (1-3)GalNAc)QSAHDP P** AVHLSNG-[NH <sub>2</sub> ] P**=C13-Proline
GP900035	GEAEAPS(Gal $\beta$ (1-3)GalNAc)AVPD-[NH <sub>2</sub> ]
GP000005	GPAT(Neu5Ac $\alpha$ (2-6)GalNAc)PAP-[NH <sub>2</sub> ]
	HSV-1 gB glycopeptide (fragment of envelope glycoprotein B)
GP000035	Biotin-GPAT(Neu5Ac $\alpha$ (2-6)GalNAc)PAP-NH <sub>2</sub>
	Biotinylated HSV-1 gB glycopeptide (fragment of envelope glycoprotein B)
GP000030	Biotin-MKPT(Neu5Ac $\alpha$ (2-6)GalNAc)PKAPT(Neu5Ac $\alpha$ (2-6)GalNAc)PKK-[NH <sub>2</sub> ]
GP000065	Ac-AHGV(T(Neu5Ac $\alpha$ (2-3)Gal $\beta$ (1-3)GalNAc)SAPDTRK(5-FAM)-[NH <sub>2</sub> ], where 5-FAM = (5-carboxyfluorescein)

### N-Acetylglucosamine ( $\beta$ -GlcNAc) Peptides (O-linked):

Glycosylation ( $\beta$ -GlcNAc) at serine or threonine.

GP200000	YSPTS( $\beta$ -GlcNAc)PSK-[NH <sub>2</sub> ]
GP200005	SVES( $\beta$ -GlcNAc)GSADAK-[NH <sub>2</sub> ]

GP200010	SVET( $\beta$ -GlcNAc)GSADAK-[NH <sub>2</sub> ]
GP200015	VKSKIGS( $\beta$ -GlcNAc)TENLKC-[NH <sub>2</sub> ]
GP200016	VKSKIGSTENLKC-[NH <sub>2</sub> ]
GP200020	NYIVGQPSS( $\beta$ -GlcNAc)TGNL-[OH]
GP200025	NYSVPSS( $\beta$ -GlcNAc)TGNL-[NH <sub>2</sub> ]
GP200030	TCPVQLWVDS( $\beta$ -GlcNAc)TPPPGTR-[NH <sub>2</sub> ]
GP200035	CGRTAPTST( $\beta$ -GlcNAc)IAPG-[NH <sub>2</sub> ]
GP200040	CGRTAPTS( $\beta$ -GlcNAc)TIAPG-[NH <sub>2</sub> ]
GP200045	CGRTAPT( $\beta$ -GlcNAc)STIAPG-[NH <sub>2</sub> ]
GP200050	Ac-CDTSPAAPVS( $\beta$ -GlcNAc)YADMRTGZ-[NH <sub>2</sub> ]
GP200055	AET( $\beta$ -GlcNAc)PALSESDSTEAFR-[NH <sub>2</sub> ]
GP200060	CIVAT[S(O- $\beta$ -GlcNAc)]TQGSV-COOH
GP200085	Ac-KILRTQESECVCS( $\beta$ -GlcNAc)CONH <sub>2</sub>

#### N-Acetylglucosamine ( $\beta$ -GlcNAc) Peptides (N-linked):

GP200065	SRN( $\beta$ -GlcNAc)TRD-[NH <sub>2</sub> ] RNA polymerase II C-Terminal Domain
GP900075	TYLWVWVNN(GlcNAc $\beta$ (1-4)GlcNAc)QSLPVSP-[NH <sub>2</sub> ]
GP200070	TPRVERN( $\beta$ -GlcNAc)GHSVFLAPYGWMVK-[OH]
GP200075	LNN( $\beta$ -GlcNAc)GT-[NH <sub>2</sub> ]
GP900080	CGGGVN(Fuca(1,6)GlcNAc)FTEI-[NH <sub>2</sub> ] $\alpha$ -Fetoprotein (AFP) synthetic glycopeptide fragment with Fuca1-6GlcNAc glycosylation at Asn251
GP200080	TKLSQKFTKVN( $\beta$ -GlcNAc)FTEIQKLVLDLDC-[NH <sub>2</sub> ]
GP900085	TKLSQKFTKVN(Fuca(1,6)GlcNAc)FTEIQKLVLDLDC-[NH <sub>2</sub> ]
GP900130	AC-AHGVT(Gal $\beta$ (1-3)-GalNAc)SAPDTRK-[NH <sub>2</sub> ]

#### Glucose ( $\beta$ -Glc) Modified Peptides (N-linked):

GP500000	TPRVERN( $\beta$ -Glc)GHSVFLAPYGWMVK-[OH]
GP500010	Ac-KILRTQESECVCS( $\beta$ -Glc)CONH <sub>2</sub>

#### Mannose ( $\alpha$ -Man) Modified Peptides (O-linked):

GP600000	AGAAT( $\alpha$ -Man)EVELK
GP600005	AT( $\alpha$ -Man)PAPVAAIGPPAAAIQEPHHHHHH-[NH <sub>2</sub> ]
GP600010	GYIS( $\alpha$ -Man)GYFVTDPER-[NH <sub>2</sub> ]
GP600015	T( $\alpha$ -Man)PVAPPPAAA-[NH <sub>2</sub> ]
GP600020	LPKRVRRIHAT( $\alpha$ -Man)PTPVTAIGK-Biotin
GP600025	RTRGAIQT( $\alpha$ -Man)PTLG-[NH <sub>2</sub> ]
GP600030	RGAIQT( $\alpha$ -Man)PTLG-[NH <sub>2</sub> ]
GP900090	TT(Man $\alpha$ (1-2)Man)AAMADPAADLIGR-[NH <sub>2</sub> ]

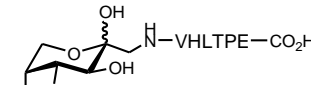
#### Rhamnose ( $\alpha$ -L-Rha) Modified Peptides (O-linked):

GP800005	AS( $\alpha$ -Rha)DDQNPWRAYLDLLFPTDLLLLDLLWA-[NH <sub>2</sub> ]
GP800010	AS( $\alpha$ -Rha)DDQNPWRAYLDLLFPTDLLLLDLLWA-[OH]



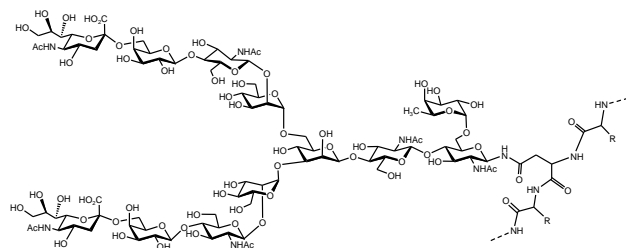
pH (low) insertion peptide (pHLIP) analogue of Cys-Var3 incorporating Ser-Rhamnose. See Wyatt *et al.* PNAS 2018, 115, E2811–E2818.

### Glycated (Fructosyl) Peptides:

GP300000	Fruc-VHLTPE-[OH]	 <p>Glycated hemoglobin terminus</p>
GP300005	Fruc-VHLTPEC-[NH <sub>2</sub> ]	
GP300010	Fruc-VHLTPEEKSC-[NH <sub>2</sub> ]	
GP300011	VHLTPEEKSC-[NH <sub>2</sub> ]	
GP300015	Fruc-VH(PEG)C-[NH <sub>2</sub> ]	
GP300020	Fruc-VHLTC-[NH <sub>2</sub> ]	
GP300021	VHLTC-[NH <sub>2</sub> ]	

### Complex N-Glycan Peptides:

Sussex Research Laboratories Inc. is experienced in the synthesis of Complex N-Glycan Peptides. We welcome projects that utilize our core expertise in carbohydrate synthesis to access Complex N-glycan type peptides featuring high Mannose and biantennary glycans. Sussex Research Laboratories Inc. will prepare peptides with the glycan of your choice – fucosylated, non-fucosylated, sialylated (mammalian or avian forms), non-sialylated or truncated glycans.



Fucosylated Biantennary (A2F Glycan) N-link Peptide (Mammalian Form)

### Custom or Contract Glycopeptide Synthesis Projects:

Sussex Research Laboratories Inc. is the leading specialist in synthesis of homogeneous glycosylated peptides.

#### Capabilities:

- > Virtually any N- or O-link glycan
- > Multivalent glycosylation
- > Conjugation to carrier proteins (BSA, OVA, KLH, CRM)
- > Cyclic Peptides - Cys to Cys, Head to Tail, Internal Lactam
- > Stapled peptides
- > Other modifications: Phosphorylation, Fluorescent dyes, PEGylation, Rhodamine, Biotin, d-amino acids, stable isotopes, EDANS, Dabsyl, Dansyl, Abz, thiolactic acids, and many others

## PEPTIDES

In keeping with our skill level, we will consider non-glycosylated systems of a non-routine nature.

Lanreotide	$\beta$ -Nal-[Cys-Tyr-D-Trp-Lys-Val-Cys]-Thr-[NH <sub>2</sub> ]
Lanreotide-d8	$\beta$ -Nal-[Cys-Tyr-D-Trp-Lys-Val(d8)-Cys]-Thr-[NH <sub>2</sub> ] <b>Deuterium-labeled at Valine</b>
Octreotide-d8	D-Phe-[Cys- Phe-D-Trp-Lys-Thr -Cys]-The
Bacitracin A-d7	Ile-Cys-Leu-D-Glu-Ile-Lys-[Lys-D-Orn-Ile-D-Phe-His-D-Asp-Asn]

Teicoplanin d5	A glycopeptide antibiotic used in the prophylaxis and treatment of serious infections caused by Gram-positive bacteria, including methicillin-resistant <i>Staphylococcus aureus</i> and <i>Enterococcus faecalis</i> .
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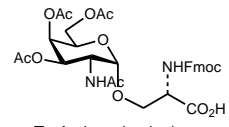
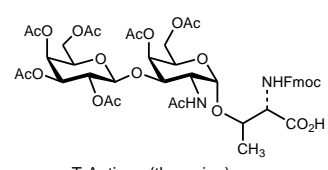
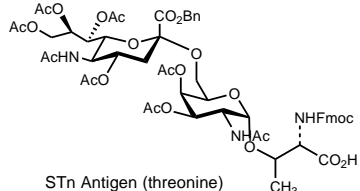
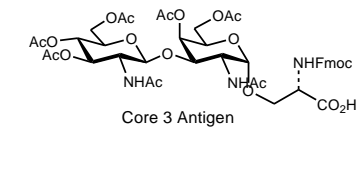


## Fmoc GLYCOAMINO ACIDS

Sussex Research Laboratories Inc. manufactures the most extensive selection of Glycoamino Acids that are commercially available. Fmoc Glycoamino Acids enable facile assembly of glycopeptides as well as introduction of carbohydrate-based recognition elements onto a variety of molecules. These would include small molecules and biomolecules such as oligonucleotides and proteins.

### N-Acetylgalactosamine ( $\alpha$ -GalNAc) O-Link Series:

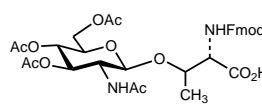
Glycosylation ( $\alpha$ -GalNAc) at serine or threonine.

Mucin-Type, Cancer Related Antigens

GA121000	Fmoc-Ser( $\alpha$ -D-GalNAc(Ac) <sub>3</sub> )-OH	 <p>Tn Antigen (serine)</p>
	Tn Antigen (on Ser)	
GA131000	Fmoc-Thr( $\alpha$ -D-GalNAc(Ac) <sub>3</sub> )-OH	
	Tn Antigen (on Thr)	 <p>T-Antigen (threonine)</p>
GA121005	Fmoc-Ser( $\beta$ -D-GalNAc(Ac) <sub>3</sub> )-OH	
GA131005	Fmoc-Thr( $\beta$ -D-GalNAc(Ac) <sub>3</sub> )-OH	
GA121010	Fmoc-Ser(Gal $\beta$ (1-3)GalNAc)-OH, peracetate	 <p>T or TF Antigen (serine)</p>
	T or TF Antigen (Serine, Fmoc, peracetylated)	
GA131010	Fmoc-Thr(Gal $\beta$ (1-3)GalNAc)-OH, peracetate	
	T or TF Antigen (Threonine, Fmoc, peracetylated)	 <p>STn Antigen (threonine)</p>
GA121015	Fmoc-Ser(Neu5Ac $\alpha$ (2-6)GalNAc)-OH, peracetate	
GA131015	Fmoc-Thr(Neu5Ac $\alpha$ (2-6)GalNAc)-OH, peracetate	
	STn Antigen (Serine, Fmoc, peracetylated)	 <p>STn Antigen (serine)</p>
	STn Antigen (Threonine, Fmoc, peracetylated)	
GA121025	Fmoc-Ser(GlcNAc $\beta$ (1-3)GalNAc)-OH, peracetate	
	Core 3 Antigen (Serine, Fmoc, peracetylated)	 <p>Core 3 Antigen (serine)</p>
GA131025	Fmoc-Thr(GlcNAc $\beta$ (1-3)GalNAc)-OH, peracetate	
	Core 3 Antigen (Threonine, Fmoc, peracetylated)	
GA131020	Fmoc-Thr(Neu5Ac $\alpha$ (2-3)Gal $\beta$ (1-3)GalNAc)-OH	<p>ST or STF Antigen (threonine)</p>
	ST or STF Antigen (Threonine, Fmoc, peracetylated, Benzyl ester)	
GA121020	Fmoc-Ser(Neu5Ac $\alpha$ (2-3)Gal $\beta$ (1-3)GalNAc)-OH	
	ST or STF Antigen (Serine, Fmoc, peracetylated, Benzyl ester)	<p>Core 2 Antigen (threonine)</p>
GA131030	Fmoc-Thr(Gal $\beta$ (1-3)[GlcNAc $\beta$ (1-6)]GalNAc)-OH, peracetate	
	Core 2 Antigen (Threonine, Fmoc, peracetylated)	
GA131035	Fmoc-Thr(GlcNAc $\beta$ (1-3)[GlcNAc $\beta$ (1-6)]GalNAc)-OH, peracetate	<p>Core 4 Antigen (threonine)</p>
	Core 4 Antigen (Threonine, Fmoc, peracetylated)	

### N-Acetylglucosamine ( $\beta$ -GlcNAc) O-Link Series:

Glycosylation ( $\beta$ -GlcNAc) at serine or threonine.

GA221000	Fmoc-Ser( $\beta$ -D-GlcNAc(Ac)3)-OH	 <p>Fmoc-Thr(<math>\beta</math>-GlcNAc(Ac)3)-OH</p>
GA231000	Fmoc-Thr( $\beta$ -D-GlcNAc(Ac)3)-OH	

### Galactose O-linked Amino Acids:

Glycosylation ( $\beta$ -Gal) at serine, threonine or tyrosine.

GA421000	Fmoc-Ser( $\beta$ -D-Gal(Ac)4)-OH	 <p>Fmoc-Ser(Ac4-<math>\beta</math>-Gal)-OH</p>
GA421005	Fmoc-Ser( $\alpha$ -D-Gal(Ac)4)-OH	
GA431000	Fmoc-Thr( $\beta$ -D-Gal(Ac)4)-OH	
GA431005	Fmoc-Thr( $\alpha$ -D-Gal(Ac)4)-OH	
GA441000	Fmoc-Tyr( $\alpha$ -D-Gal(Ac)4)-OH	

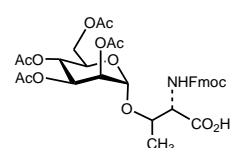
### Glucose O-linked Amino Acids:

Glycosylation ( $\beta$ -Glc) at serine, threonine or tyrosine.

GA521000	Fmoc-Ser( $\beta$ -D-Glc(Ac)4)-OH	 <p>Galactosyl tyrosine</p>
GA521005	Fmoc-Ser( $\alpha$ -D-Glc(Ac)4)-OH	
GA531000	Fmoc-Thr( $\beta$ -D-Glc(Ac)4)-OH	
GA531005	Fmoc-Thr( $\alpha$ -D-Glc(Ac)4)-OH	
GA541000	Fmoc-Tyr( $\alpha$ -D-Glc(Ac)4)-OH	

### Mannose O-linked Amino Acids:

Glycosylation ( $\alpha$ -Man) at serine or threonine.

GA621000	Fmoc-Ser( $\alpha$ -D-Man(Ac)4)-OH	 <p>Mannose (threonine)</p>
GA631000	Fmoc-Thr( $\alpha$ -D-Man(Ac)4)-OH	
GA631005	Fmoc-Thr(Man $\alpha$ (1,2)Man)-OH, peracetate ( $\alpha$ 2-Mannobiose)	
GA621005	Fmoc-Ser(GlcNAc $\beta$ (1-2)Man)-OH, peracetate	
	GlcNAc $\beta$ (1-2)Man is a posttranslational modification of Alpha-dystroglycan ( $\alpha$ -DG), a cell-surface glycoprotein that acts as a receptor for both extracellular matrix proteins containing laminin-G domains and certain arenaviruses.	

### Fucose O-linked Amino Acids:

Glycosylation ( $\alpha$ -Fuc) at serine or threonine.

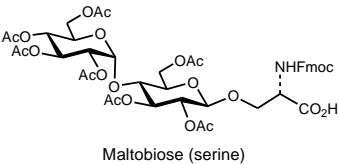
GA721000	Fmoc-Ser( $\alpha$ -Fuc(Ac3))-OH	 <p>Fucose (serine)</p>
GA721005	Fmoc-Ser( $\beta$ -Fuc(Ac3))-OH	
GA731000	Fmoc-Thr( $\alpha$ -Fuc(Ac3))-OH	

### Xylose O-linked Amino Acids:

Glycosylation ( $\beta$ -Xyl) at serine or threonine.

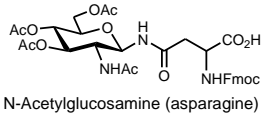
GA821000	Fmoc-Ser( $\beta$ -Xyl(Ac3))-OH	 Xylose (serine)
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### Other O-linked Glycoamino Acids:

GA921000	Fmoc-Ser( $\beta$ -D-Lac(Ac)7)-OH	Lactose	 Maltobiose (serine)
GA931000	Fmoc-Thr( $\beta$ -D-Lac(Ac)7)-OH	Lactose	
GA921005	Fmoc-Ser( $\beta$ -D-Cel(Ac)7)-OH	Cellobiose	
GA921010	Fmoc-Ser( $\beta$ -D-Mel(Ac)7)-OH	Melibiose	
GA921020	Fmoc-Ser( $\beta$ -D-Mal(Ac)7)-OH	Maltobiose	
GA931010	Fmoc-Thr( $\beta$ -D-Mal(Ac)7)-OH	Maltobiose	

### N-Acetylglucosamine ( $\beta$ -GlcNAc) Glycoamino Acids (N-linked):

GlcNAc Glycosylation at asparagine.

GA211000	Fmoc-Asn( $\beta$ -D-GlcNAc(Ac)3)-OH	 N-Acetylglucosamine (asparagine)
GA211005	Fmoc-Asn(GlcNAc $\beta$ (1-4)GlcNAc)-OH, peracetate	
GA211010	Fmoc-Asn(Fuca(1-6)GlcNAc)-OH, peracetate	

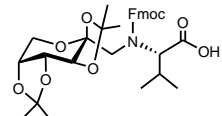
### Glucose ( $\beta$ -Glc) Modified Peptides (N-linked):

Glucose Glycosylation at asparagine.

GA511000	Fmoc-Asn( $\beta$ -D-Glc(Ac)4)-OH	 Glucose (asparagine)
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### Glycated (Fructosyl) Amino Acids:

Glucose glycation at valine.

GA752000	Fmoc-Val(i,i-Fru)-OH, diisopropylidene protected	 Glycated Valine
GA752005	Fmoc-Lys(N $\epsilon$ -i,i-Fru)-OH, N $\epsilon$ -Boc protected	 Glycated Lysine

## Custom Synthesis

Sussex Research Laboratories Inc. welcomes projects which utilize core expertise in carbohydrate synthesis. We specialize in multi-step custom synthesis of carbohydrate and glycoconjugate systems.

**Inquiries:** [info@sussex-research.com](mailto:info@sussex-research.com)

**Orders:** [orders@sussex-research.com](mailto:orders@sussex-research.com)

[www.sussex-research.com](http://www.sussex-research.com)

