Supporting Information

Boosting Immunity to Small Tumor-Associated Carbohydrates with Bacteriophage Qβ Capsids

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1. General Experimental Procedures and Methods for Synthesis

The chemicals used were reagent grade as supplied, except where noted. Analytical thin-layer chromatography was performed using silica gel 60 F254 glass plates. Compound spots were visualized by UV light (254 nm) and by staining with a yellow solution containing $Ce(NH_4)_2(NO_3)_6$ (0.5g) and $(NH_4)_6Mo_7O_24H_2O$ (24.0 g) in 6 % H_2SO_4 (500 mL). Flash column chromatography was performed on silica gel 60 (230–400 mesh). NMR spectra were referenced using Me_4Si (0 ppm), residual $CHCl_3$ (^{1}H NMR δ =7.26 ppm, ^{13}C NMR δ =77.0 ppm), CD_3OD (^{1}H NMR δ=3.30 ppm, ^{13}C NMR δ = 49.00 ppm). THPTA ligand **6** was prepared by a new procedure.[1]

Centrifugal filter units of 10,000 and 100,000 molecular weight cut-off (MWCO) were purchased from EMD Millipore. For protein liquid chromatography GE ÄKTA Explorer (Amersham Pharmacia) on a Superose-6 column was used. Microfluidic capillary gel electrophoresis was performed with Bioanalyzer 2100 Protein 80 microfluidics chip (Agilent Technologies). For MALDI-TOF MS analysis, each viral sample (10 μL, 1 mg mL^{-1}) was denaturated and cleaned using Cleanup C18 Pipette Tips (Agilent Technologies). The mixture (0.6 μL) and matrix solution (0.6 μL, saturated sinapic acid in 50% acetonitrile, 0.1% trifluoroacetic acid) was spotted on a MALDI plate, air-dried, and analyzed by MALDI-TOF mass spectrometry (AB SCIEX Voyager DE Pro MALDI-TOF). Protein concentration was measured using the Coomassie Plus Protein Reagent (Pierce) with bovine serum albumin as standard. Agarose gel electrophoresis was performed using a 1.2% w/v agarose gel and CPMV was visualized by ethidium bromide staining under a UV lamp and Coomassie staining.[2]

2. Synthesis and Characterization of Qβ Conjugates

Qβ particles were expressed and purified as previously described.[3] NHS-alkyne **1** (10.25 mg mL^{-1} in DMSO, 0.4 mL, 0.02 mmol, 30 equiv with respect to the concentration of protein subunit) was added slowly to a solution of wild-type Qβ VLPs (2.78 mg/mL in 0.1 M phosphate buffer, pH=7, 3.6 mL). The reaction mixture was left overnight at room temperature. This reaction was

performed several times and the products pooled to assemble a large batch of Qβ-alkyne **2**. Purification of the acylated VLP was performed using a centrifugal filter (MWCO: 100 kDa, 4 mL) against phosphate buffer. Total protein concentration was measured using the Coomassie Plus Protein Reagent (Pierce) with bovine serum albumin as standard. Mass recoveries of acylated Qβ were typically 70-90% and were composed of >95% intact particles, as determined by analytical size-exclusion fast protein liquid chromatography (FPLC) on a Superose-6 column (Figure S4). The degree of acylation was 540 alkynes per Qβ (an average of 3 alkynes per subunit) as determined by MALDI-TOF (Figure S7A)

Synthesis of Qβ conjugates (7–11)

The following reagents were combined in the following sequence: Qβ-alkyne **2** (2.32 mg mL^{-1} in 0.1M phosphate buffer, 0.90 mL), 10xPBS (0.060 mL), Tn-azide **3** (10 mM in DMSO, 0.176 mL, 1.76 μmol, 12 equiv per capsid protein (CP), which is approximately 2 equiv per alkyne) premixed Cu-ligand solution [$CuSO_4$, 50 mM in water, 0.012 mL, 0.6 μmol + THPTA ligand **6**, 50 mM in water, 0.060 mL, 3 μmol), aminoguanidine (100 mM in water, 0.147 mL, 0.015 mmol, 100 equiv per CP), and sodium ascorbate (100 mM in water, 0.147 mL, 0. 015 mmol, 100 equiv per CP). Final concentrations: Qβ particles, 1.39 mg mL^{-1}; alkyne groups on the particles, 0.39 mM; Tn-azide **3**, 1.17 mM; Cu, 0.39 mM; THPTA ligand **6**, 1.95 mM; aminoguanidine, 9.70 mM; sodium ascorbate, 9.70 mM. The reaction tube was capped, sealed in a larger closed glass vial, and agitated gently by slow tumbling at room temperature for 6 hours. Purification of **7** was performed by the standard procedure below.

Particles **10** and **11** were prepared with the same procedure, using decreasing amounts of Tn-azide **3** to 4 and 2 equiv. (0.39 mM and 0.20 mM) per CP respectively. After 6 hours, 100 μL aliquots were removed for electrophoretic and mass spectrometry analysis. The remaining material was carried on without purification to cap the unreacted alkynes in a second click reaction with 3-azido 1-propanol **4**. Thus, the following reagents were added to the previous reaction mixture in the following sequence: 3-azido 1-

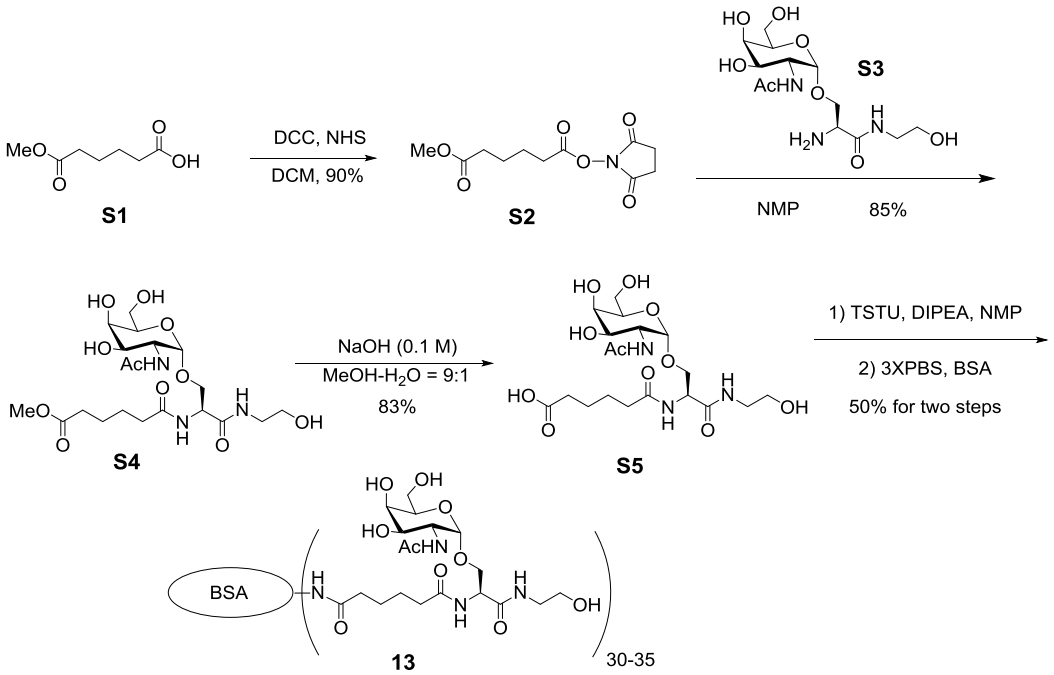
propanol (**4**, 10 mM, 0.148 mL, 1.5 μmol, 10 equiv per CP), premixed Cu-ligand solution [$CuSO_4$, 50 mM in water, 0.012 mL, 0.6 μmol + THPTA ligand **6**, 50 mM in water, 0.060 mL, 3 μmol), aminoguanidine (100 mM, 0.147 mL, 0.015 mmol, 100 equiv per CP), and sodium ascorbate (100 mM, 0.147 mL, 0.015 mmol, 100 equiv per CP). Final concentrations: Qβ particles, 1.0 mg mL^{-1}; 3-azido 1-propanol **4**, 0.70 mM; Cu, 0.28 mM; THPTA ligand **6**, 1.41 mM; aminoguanidine, 7.03 mM; sodium ascorbate, 7.03 mM. The reaction mixture was capped and agitated gently as above at room temperature overnight.

The negative control particles **8** and **9** were prepared by the same procedure as the second click step above, using azides **4** or **5**, respectively.

Workup and analysis. The VLP conjugates were freed from small molecule reagents and concentrated by repeated passage through 100 kDa MWCO centrifugal filters (4 mL) against phosphate buffer. Total protein concentration was measured using the Coomassie Plus Protein Reagent (Pierce) with bovine serum albumin as standard. Mass recoveries of protein were typically 70–90% and were composed of >95% intact particles, as determined by analytical size-exclusion fast protein liquid chromatography (FPLC) on a Superose-6 column. The Tn content of the Qβ-Tn conjugates **7**, **10** and **11** was determined by microfluidic electrophoresis using a Bioanalyzer 2100 Protein 80 microfluidics chip (Agilent), in which the labeled subunits separated from unlabeled subunits. The average Tn loading was determined from the ratio of the integration of the Bioanalyzer electrophoretic peaks (Figures S8 and S9) and was confirmed by MALDI-TOF (Figure S7). Particle stability after conjugation was shown by size-exclusion FPLC (Figure S10).

3. Synthesis of BSA-Tn Conjugate

As shown in **Scheme S1**, the adipic acid monoester **S1** was first converted into a NHS activated ester **S2**, which was coupled to Tn antigen derivative **S3**[4] to give **S4** in 85% yield. After saponification, the Tn carboxylic acid **S5** was activated by (*O*-(*N*-succinimidyl)-1,1,3,3-tetramethyl uronium tetrafluoroborate) (TSTU)[5] and conjugated with BSA. MALDI-TOF analysis showed that 30–35 Tn antigens was introduced on the surface of BSA (Figures S11 and S12).



Scheme S1. Synthesis of BSA-Tn **13**.

Succinimidyl 5-(methoxycarbonyl)pentanoate (**S2)**

Dicyclohexylcarbodiimide (DCC, 1.55 g, 7.53 mmol, 1.20 equiv.) was added to a mixture of compound **S1** (1.00 g, 6.24 mol) and *N*-hydroxysuccinimide (0.76 g, 6.6 mmol, 1.05 equiv.) in anhydrous dicholoromethane (DCM, 20 mL) at room temperature. The reaction was stirred overnight, filtered, and then concentrated on a rotary evaporator. The crude mixture was purified by silica gel column chromatography (DCM/MeOH = 20/1) to afford 1.45 g of **S2** as oil in 90% yield. ^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.71-1.77

(m, 4H), 2.34 (t, 2H, *J* = 7.0 Hz), 2.61 (t, 2H, *J* = 7.0 Hz), 2.81 (s, 4H), 3.65 (s, 3H). ^{13}C-NMR (125 MHz, $CDCl_3$): δ 23.99, 25.59, 30.63, 33.42, 51.62, 168.28, 169.12, 173.48. HRMS: $[M+NH_4]^+$ $C_{11}H_{19}N_2O_6$ calcd 275.1243, obsd 275.1248.

5-(Methoxycarbonyl)pentanoate-*O*-(2-acetamido-2-deoxy-α-D-galactopyranosyl)-L-serine ethanolamide (**S4**)

Compound **S2** (222 mg, 0.86 mmol) and **S3** (252 mg, 0.72 mmol) were dissolved in *N*-methy-2-pyrrolidone (NMP, 3 mL) and stirred for 30 min at room temperature. Cold methyl tert-butyl ether (MTBE, 40 mL) was then added to the reaction mixture. The precipitate was filtered and washed with MTBE (2 × 10 mL), which was used directly for the next step. Yield: 85%. ^{1}H-NMR (500 MHz, CD_3OD): δ 1.62-1.65 (m, 4H), 2.00 (s, 3H), 2.29-2.32 (m, 2H), 2.33-2.37 (m, 2H), 3.29-3.33 (m, 4H), 3.57-3.61 (m, 2H), 3.65 (s, 3H), 3.67-3.77 (m, 4H), 3.79-3.82 (m, 1H), 3.84-3.87 (m, 2H), 4.27 (dd, 1H, *J* = 4.0, 11.0 Hz), 4.58 (t, 1H, *J* = 5.0 Hz), 4.82 (d, 1H, *J* = 3.5 Hz). ^{13}C-NMR (125 MHz, CD_3OD): δ 22.85, 25.48, 26.14, 34.39, 36.36, 43.09, 51.41, 52.04, 54.68, 61.41, 62.88, 69.47, 69.79, 70.30, 72.93, 99.97, 172.28, 173.94, 175.69, 175.80. HRMS: $[M+H]^+$ $C_{20}H_{36}N_3O_{11}$ calcd 494.2350, obsd 494.2338.

5-Carboxyl-pentanoate-*O*-(2-acetamido-2-deoxy-α-D-galactopyranosyl)-L-serine ethanolamide (**S5**)

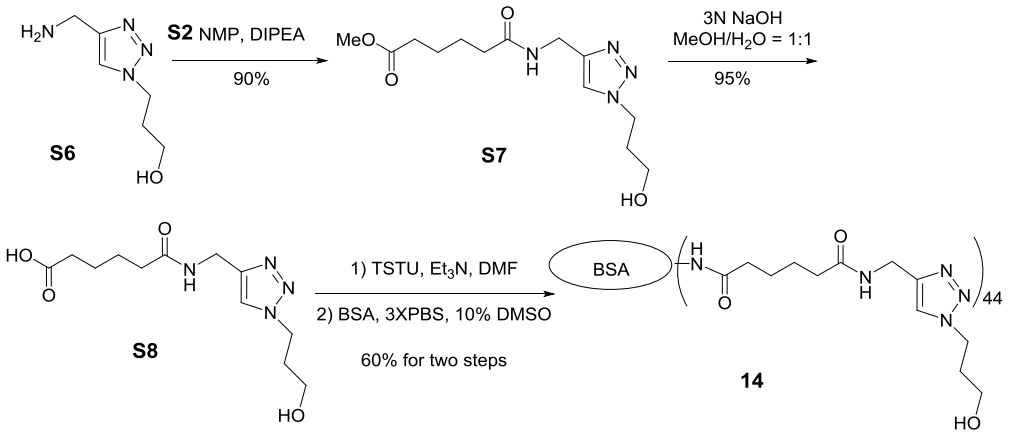
Compound **S4** (256 mg, 0.52 mmol) was dissolved in methanol (9 mL) and 0.1 N NaOH solution (1 mL) was slowly added. The reaction mixture was stirred for 2 h at room temperature, then neutralized with Amberlyst ion-exchange resin (Sigma-Aldrich), filtered and concentrated to afford 207 mg of compound **S5** in 83% yield. ^{1}H-NMR (600 MHz, CD_3OD): δ 1.62-1.68 (m, 4H), 2.00 (s, 3H), 2.30-2.34 (m, 4H), 3.32 (t, 2H, *J* = 6.0 Hz), 3.60 (m, 2H), 3.70 (dd, 1H, *J* = 5.4, 10.8 Hz), 3.72-3.77 (m, 3H), 3.81 (t, 1H, *J* = 6.0 Hz), 3.84-3.87 (m, 2H), 4.27 (dd, 1H, *J* = 3.6, 10.8 Hz), 4.58 (t, 1H, *J* = 5.4 Hz), 4.82 (d, 1H, *J* = 3.6 Hz). ^{13}C-NMR (150 MHz, CD_3OD): δ 22.84, 25.53, 26.21, 34.52, 36.44, 43.09, 51.44, 54.70, 61.41, 62.89, 69.45, 69.80, 70.31, 72.92, 99.95, 172.29, 173.98, 175.86, 177.28. HRMS: $[M+H]^+$ $C_{19}H_{34}N_3O_{11}$ calcd 480.2193, obsd 480.2183.

BSA-Tn conjugate (**13**)

To a mixture of compound **S5** (48 mg, 0.1 mmol) and *N*,*N*,*N*′,*N*′-tetramethyl-*O*-(*N*-succinimidyl)uranium tetrafluoroborate (TSTU, 36 mg, 0.12 mmol) in NMP (1 mL) was added N,N-diisopropylethylamine (DIPEA, 34 μl, 0.12 mmol) and the reaction mixture was stirred for 30 min at room temperature. Cold methyl tert-butyl ether (MTBE, 30 mL) was then added to the reaction mixture. The precipitate was filtered and washed with MTBE (2 × 10 mL), which was used directly for next step. The above product (4.4 mg, 7.6 mmol, 200 eq) and BSA (2.5 mg, 38 nmol) were dissolved in 3× PBS buffer and incubated overnight at room temperature. Then the reaction mixture was ultrafiltered using Millipore Centrifugal Filter units (cut-off: 10000) and washed with de-ion water. The collected glycoprotein solution was lyophilized to afford conjugate **13** as white foam. Yield: 80% for two steps. MALDI analysis of the conjugate was performed by using Shimadzu Biotech Axima TOF and compared to that of BSA prior to conjugation (see Figure S11 and S12). The loading of Tn antigen was determined by the following formulation: Average number of Tn loading per BSA = $(MW_{BSA\text{-}Tn} - MW_{BSA})/(MW_{Tn}\text{-}18)$.

4. Synthesis of BSA-triazole Conjugate 14

BSA-triazole conjugate **14** was synthesized as shown in **Scheme S2**. The triazole amine **S6**[6] was amidated with N-hydroxysuccinimide activated ester **S2** to form **S7**, the methyl ester of which was hydrolyzed and coupled to BSA following similar procedures described above for the synthesis of BSA-Tn. On average, 44 triazoles were linked onto BSA by MALDI-TOF analysis (Figures S11 and S13).



Scheme S2. Synthesis of BSA-triazole **14**.

1-(3-Hydroxypropyl)-4-(5-methoxycarbonyl pentamido)methyl-1*H*-1,2,3-triazole (**S7**)

The procedure was similar to the synthesis of compound **S4** except that the product was purified by silica gel column chromatography (DCM/MeOH = 50/1, 20/1, 10/1). Yield: 90%. ^{1}H-NMR (500 MHz, CD_3OD): δ 1.58-1.64 (m, 4H), 2.07 (m, 2H), 2.23 (m, 2H), 2.32 (m, 2H), 3.43 (t, 2H, *J* = 6.0 Hz), 3.64 (s, 3H), 4.41 (s, 2H), 4.48 (t, 2H, *J* = 7.0 Hz), 7.84 (s, 1H). ^{13}C-NMR (125 MHz, CD_3OD): δ 25.48, 26.26, 34.00, 34.37, 35.60, 36.45, 48.25, 52.00, 59.27, 124.40, 146.26, 175.62, 175.72. HRMS: $[M+H]^+$ $C_{13}H_{23}N_4O_4$ calcd 299.1719, obsd 299.1721.

1-(3-Hydroxypropyl)-4-(5-carboxyl pentamido)methyl-1*H*-1,2,3-triazole (**S8**)

The procedure was similar to the synthesis of compound **S5**. Yield: 95%. ^{1}H-NMR (500 MHz, CD_3OD): δ 1.56-1.68 (m, 4H), 2.04-2.12 (p, 2H, *J* = 6.5 Hz), 2.23 (dd, 4H, *J* = 6.5, 14.0 Hz), 3.54 (t, 2H, *J* = 6.0 Hz), 4.41 (s, 2H), 4.47 (t, 2H, *J* = 7.0 Hz), 7.85 (s, 1H).

^{13}C-NMR (125 MHz, CD_3OD): δ 26.53, 26.72, 34.01, 35.65, 36.69, 37.01, 48.25, 59.26, 124.41, 146.41, 176.02. HRMS: $[M+Na]^+$ $C_{12}H_{20}N_4O_4Na$ calcd 307.1382, obsd 307.1394.

BSA-triazole Conjugate (**14**)

To a mixture of compound **S8** (71 mg, 0.25 mmol) and TSTU (86 mg, 0. 27 mmol) in DMF (1 mL) was added triethylamine (38 µl, 0.27 mmol). The reaction mixture was stirred for 30 min at room temperature and then concentrated on a rotary evaporator. The resultant oil product and BSA (8.8 mg) were dissolved in 3× PBS buffer with 1% DMSO (v/v) and incubated overnight at room temperature. The reaction mixture was ultrafiltered using Millipore Centrifugal Filter units (cutoff: 10000) and washed with de-ion water. The collected conjugation solution was lyophilized to afford conjugate **14** as white foam. Yield: 60% for two steps. MALDI analysis of the conjugate was performed by using Shimadzu Biotech Axima TOF and compared to that of BSA prior to conjugation (see Figures S11 and S13). The loading of triazole antigen was determined by the following formulation: Average number of triazole loading per BSA = $(MW_{BSA\text{-}Triazole} - MW_{BSA})/(MW_{triazole}\text{-}18)$.

5. Synthesis and Characterization of CMPV-Tn Conjugate

CPMV nanoparticles were obtained from the cowpea mosaic virus infected *V. unguiculata* according to the procedure described previously.[7] CPMV (8.7 mg/mL, 0.8 mL) was added to 1.6 mL of potassium phosphate buffer (0.1 M, pH 7) in a 15 mL falcon tube followed by addition of Tn-NHS ester formed from **S5** (10.3 mg/mL in DMSO, 0.4 mL, 0.007 mmol). The reaction mixture was stirred overnight at room temperature on a tube rotator. The conjugate was purified by repeated filtration using Millipore 100,000 MWCO filter units (cutoff: 100,000) against PBS buffer to yield 3 mL of CPMV-Tn at 2.10 mg/mL protein concentration. A loading of 120 Tn per CPMV was determined using electrophoretic analysis (Figures S5 and S6); note CPMV is composed of a small

and large subunit, and two bands are often observed for the former.[8] Particle stability after conjugation was shown by size-exclusion FPLC (Figure S16).

6. Procedure for Carbohydrate Microarray Analysis

Serum samples were stored at −80 °C until used. Glycan arrays were prepared as reported previously.[4] Sera were diluted 1:100 in PBST containing 1% BSA and then incubated at 37 °C and 100 rpm for 4 hours. After washing, the anti-glycan antibodies bound to the glycans on the array were probed with fluorescent secondary antibodies specific for IgG (dilution of 1:500; Dylight 549 Anti-Mouse IgG: Jackson 115-505-071) or IgM (dilution of 1:250; Dylight 649 Anti-Mouse IgM: Jackson 115-495-075) in 1% BSA containing PBS at 37 °C and 100 rpm for 2 hours. The glycan microarrays were scanned using GenePix Pro (Molecular Devices) at PMT settings of 430 and 520. Each serum sample was run in duplicate, and the fluorescence values over the replicate experiments were averaged to give a single final value for each array component. The pre-immune readings were the average reading of sera from six pre-immunized mice. The serum samples were blinded during both profiling and processing.

7. Procedures for FACS analysis with Jurkat Cells.

Human lymphoma Jurkat cells (kindly provided by Profs. Barbara Kaplan and Norbert Kaminski, Michigan State University) were cultured in RPMI 1640 supplemented with 10% FBS, 2 mM L-glutamine, 1 mM sodium pyruvate, minimal essential medium nonessential amino acid, 100 units/mL each of penicillin G and streptomycin (all from Invitrogen). Mouse sera collected on day 35 were diluted 10-fold and incubated with 10^5 Jurkat cells for 30 minutes at 4 °C. The cells were washed twice with FACS buffer (1% BSA + 0.1% NaN_3/PBS) and incubated with a 1:100 diluted goat anti-mouse IgG labeled with FITC (Jackson ImmunoResearch Laboratory, catalog #115-095-164) for 30 min at 4 °C. The cells were washed again twice with FACS buffer and re-suspended in FACS buffer. Data analysis was done with LSR II (BD Biosciences).

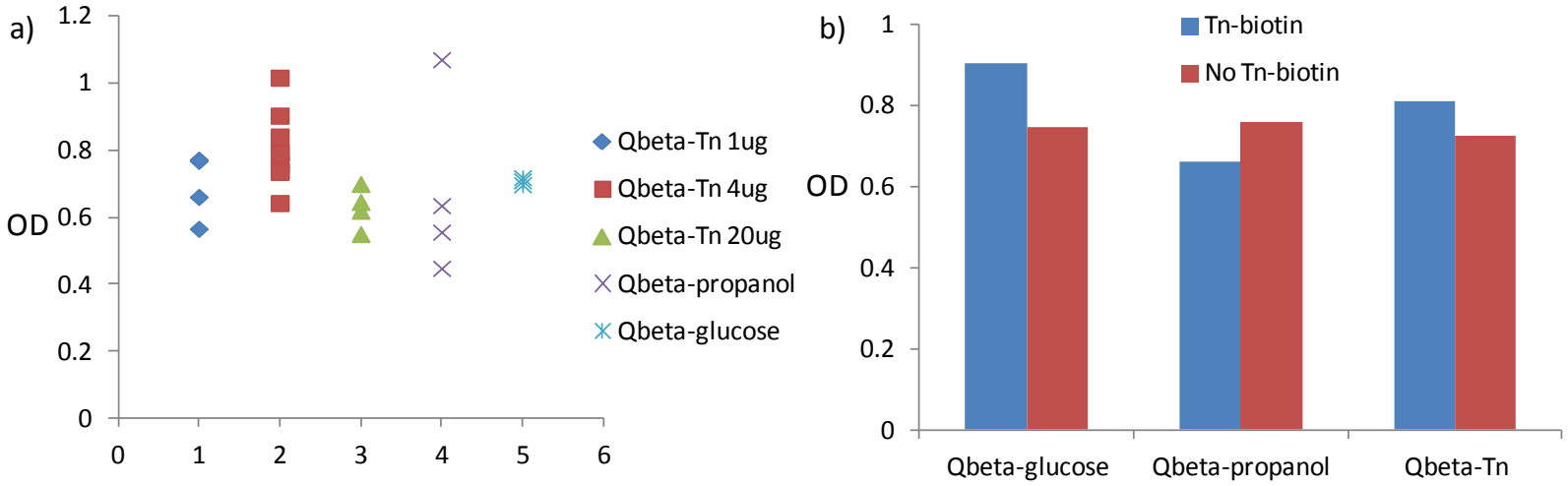


Figure S1. a) Optical densities of Tn-biotin coated wells upon incubation with various mouse sera. b) Comparison of optical densities of various mouse sera in wells with or without Tn-biotin. These results indicated that serum antibodies did not recognize Tn-biotin immobilized on ELISA plates.

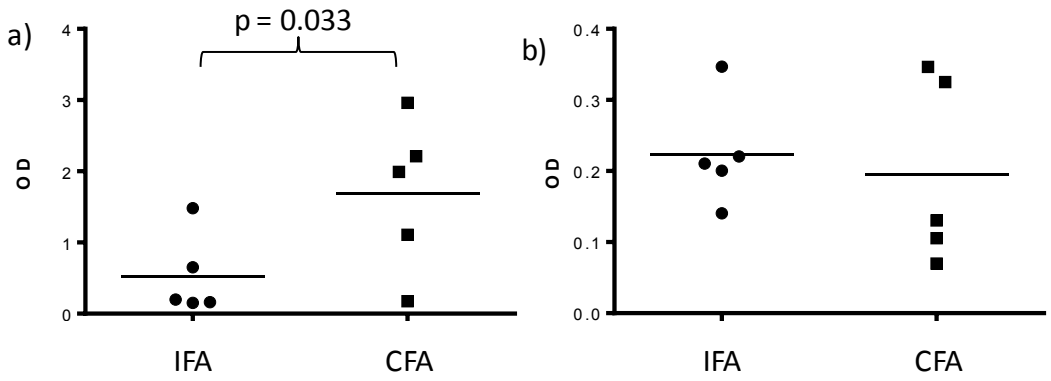
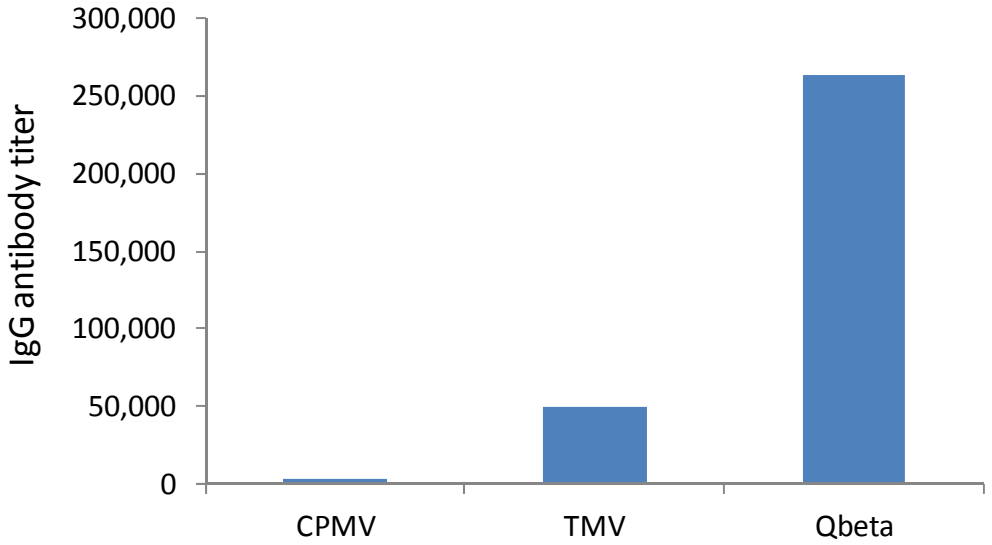
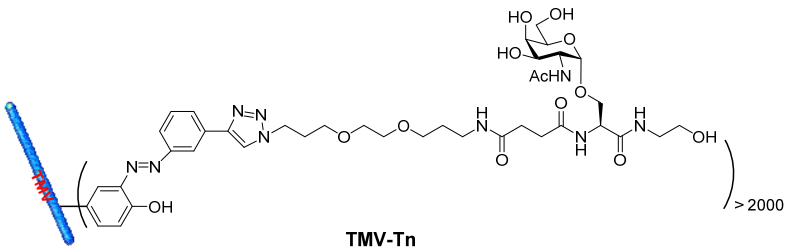
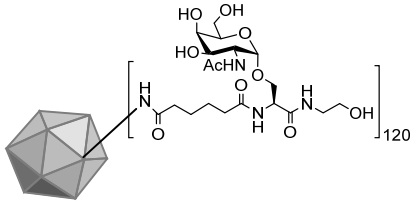


Figure S2. Comparison of immune responses with IFA or CFA as the adjuvant measured at 1:6400 dilution. Mice were immunized with Qβ-Tn **5** (4 μg Tn) and the indicated adjuvant. a) IgG and b) IgM responses. Statistical analyses were performed using student t test. Significantly higher IgG antibodies were obtained when CFA was used suggesting it was important to have the bacterial components of CFA for high IgG responses.





TMV-Tn



CPMV-Tn

Figure S3. Comparison of anti-Tn IgG antibody titers from mice immunized with CPMV-Tn, TMV-Tn and Qβ-Tn (7, see Figure 1 for structure) (4 μg).

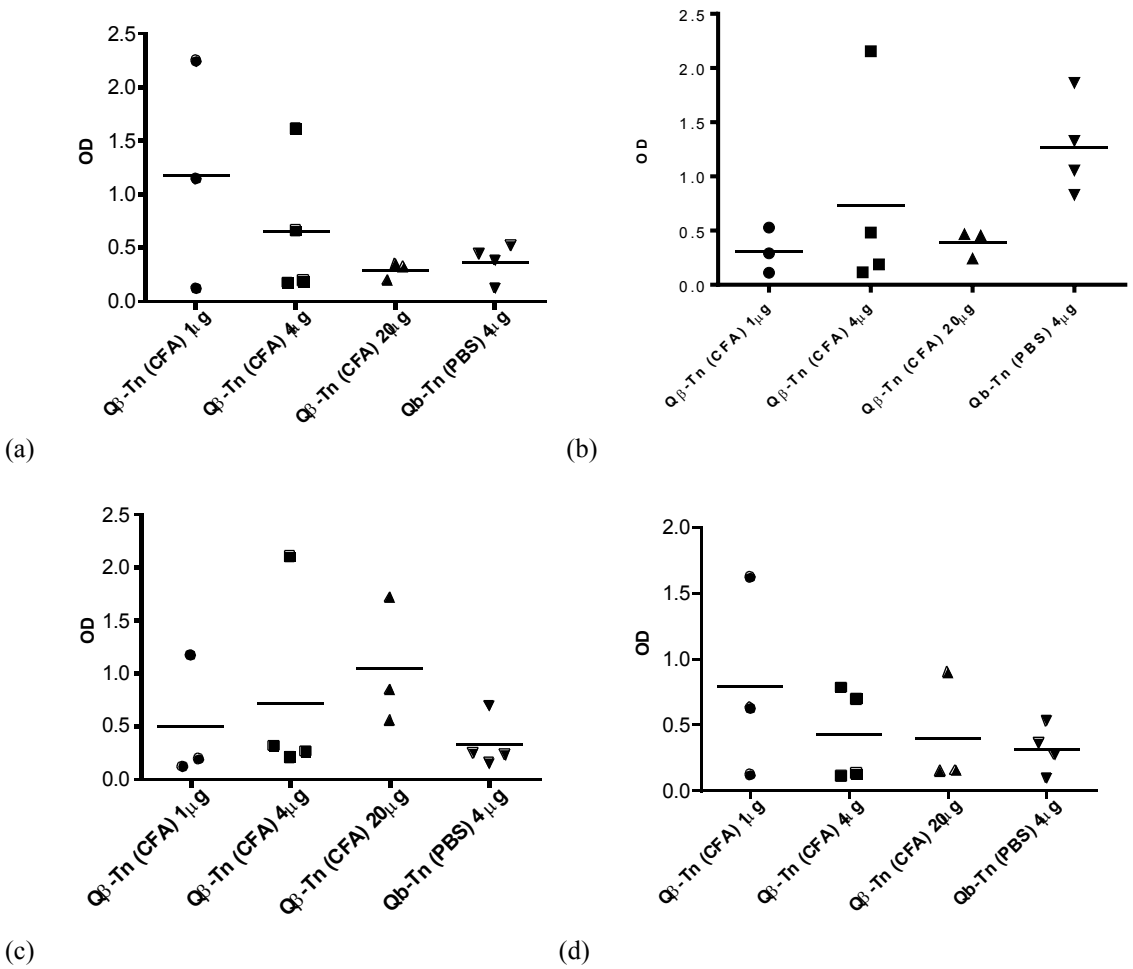


Figure S4. Analysis of IgG subclasses against Tn antigen. IgG1 (a), IgG2b (b), IgG2c (c), and IgG3 (d) were tested at a serum dilution of 1:6400. Only mice that showed significant IgG were analyzed in each group. The OD reading for negative controls was 0.1.

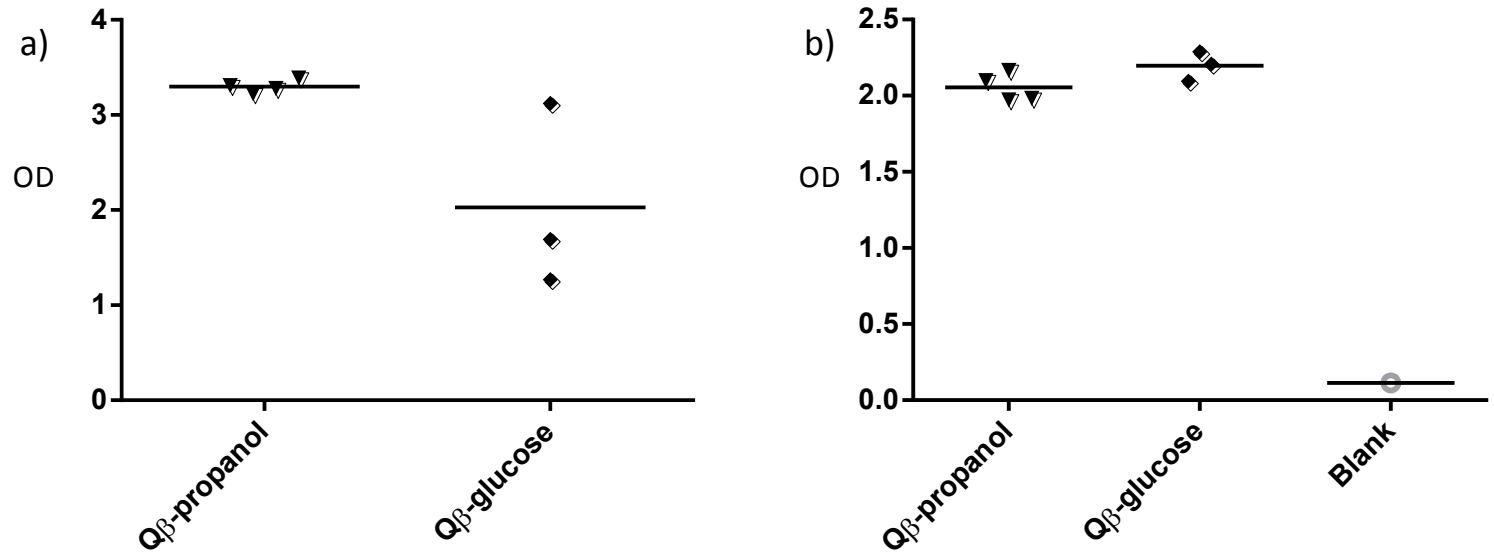


Figure S5. ELISA results of a) anti-triazole IgG antibodies measured against BSA-triazole **13** (1:1600 dilution) and b) anti-Qβ IgG antibodies measured against Qβ capsid (1:25600 dilution).

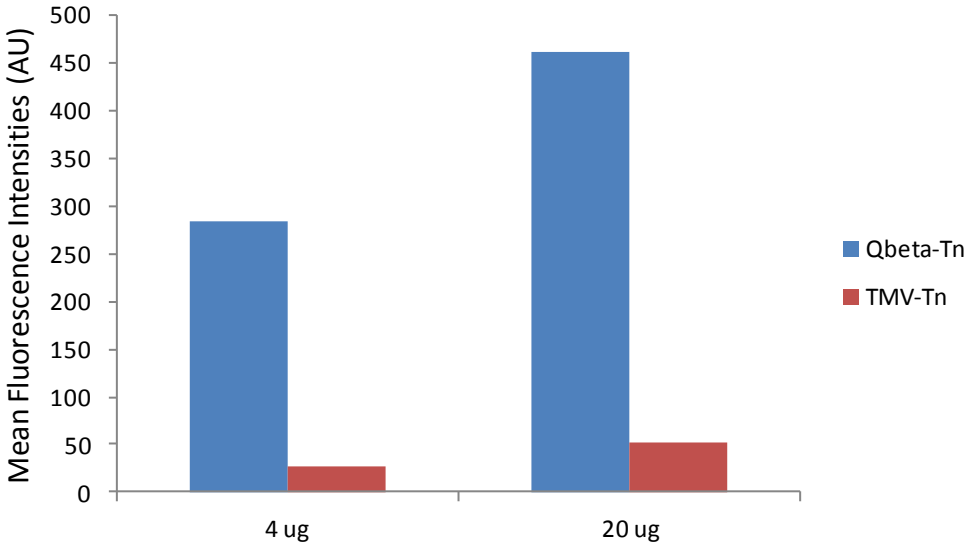


Figure S6. The mean fluorescence intensities of Jurkat cells upon incubation with sera from mice immunized with either Qβ-Tn or TMV-Tn at 4 μg and 20 μg Tn doses. Antibodies generated with Qβ-Tn recognized Jurkat cells much stronger than those from TMV-Tn immunized mice.

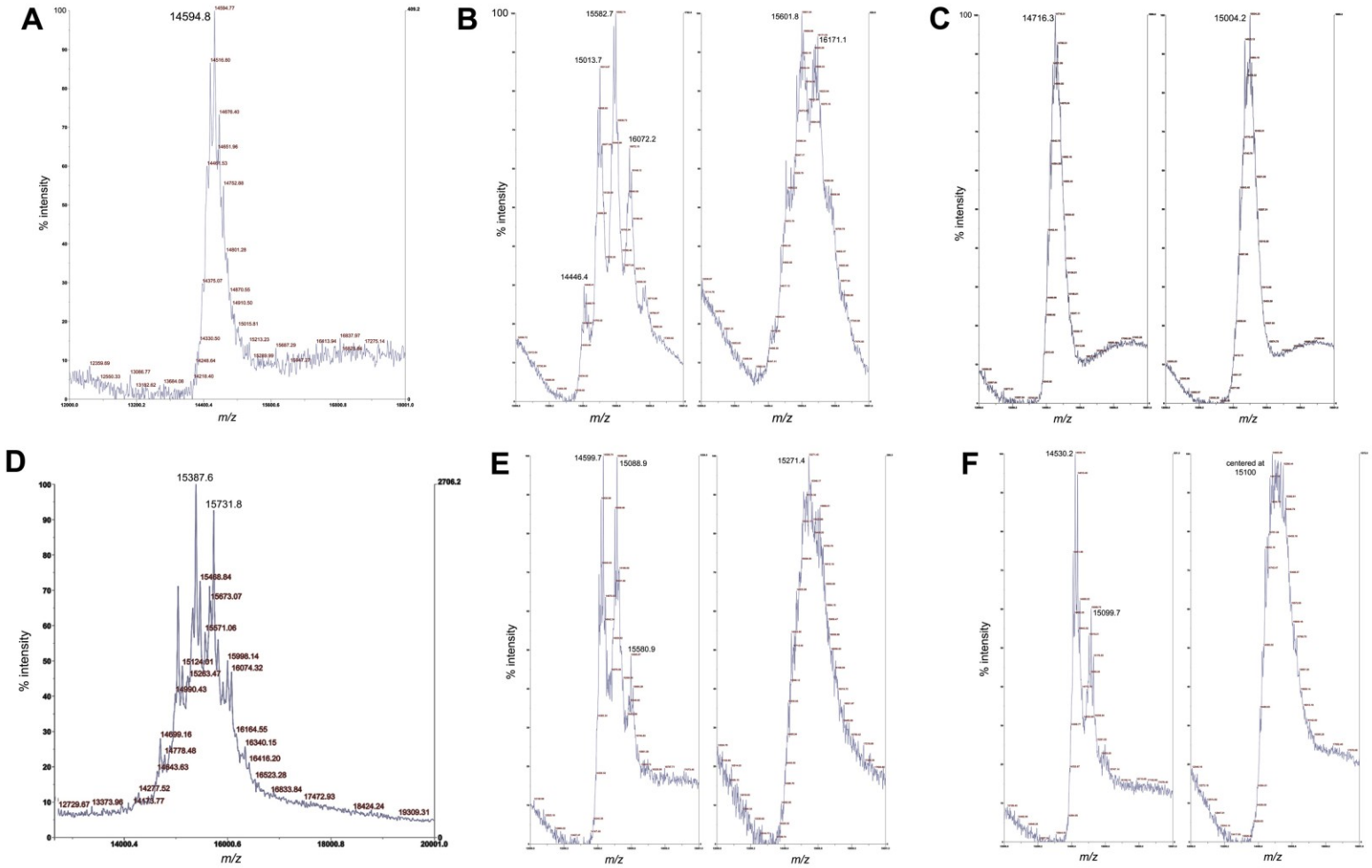
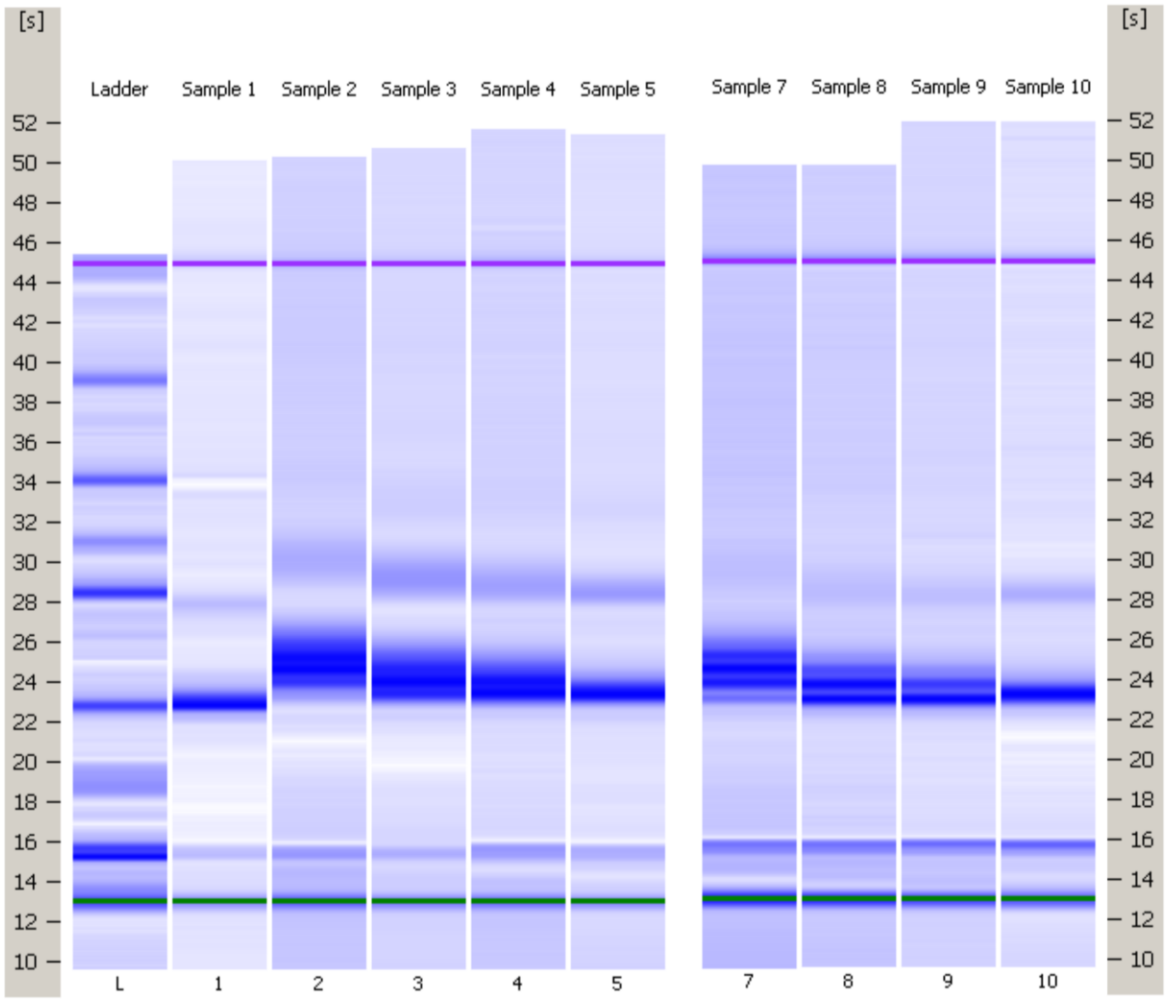


Figure S7. MALDI mass spectrometry of the following particles. (A) Qβ-alkyne (**2**), (B) Qβ-Tn (**7**) before and after 3-azido 1-propanol conjugation, (C) Qβ-propanol (**8**), (D) Qβ-glucose (**9**), (E) Qβ-Tn (**10**) before and after 3-azido 1-propanol conjugation, (F) Qβ-Tn (**11**) before and after 3-azido 1-propanol conjugation.



1_Qbeta-Alkyne

Final Samples:

2_Qbeta-Tn-Propanol (High Loading)

3_Qbeta-Tn-Propanol (Med Loading)

4_Qbeta-Tn-Propanol (Low Loading)

5_Qbeta-Propanol-Propanol (N)

Intermediate Samples:
(used to calculate the Tn loading)

7_Qbeta-Tn (High Loading)
Calculated: **340 Tn/Qb**

8_ Qbeta-Tn (Med Loading)
Calculated: **150 Tn/Qb**

9_Qbeta-Tn (Low Loading)
Calculated: **76 Tn/Qb**

10_Qbeta-Propanol (N)

Figure S8. Electrophoretic analysis and Qβ-Tn loading determination (gel).

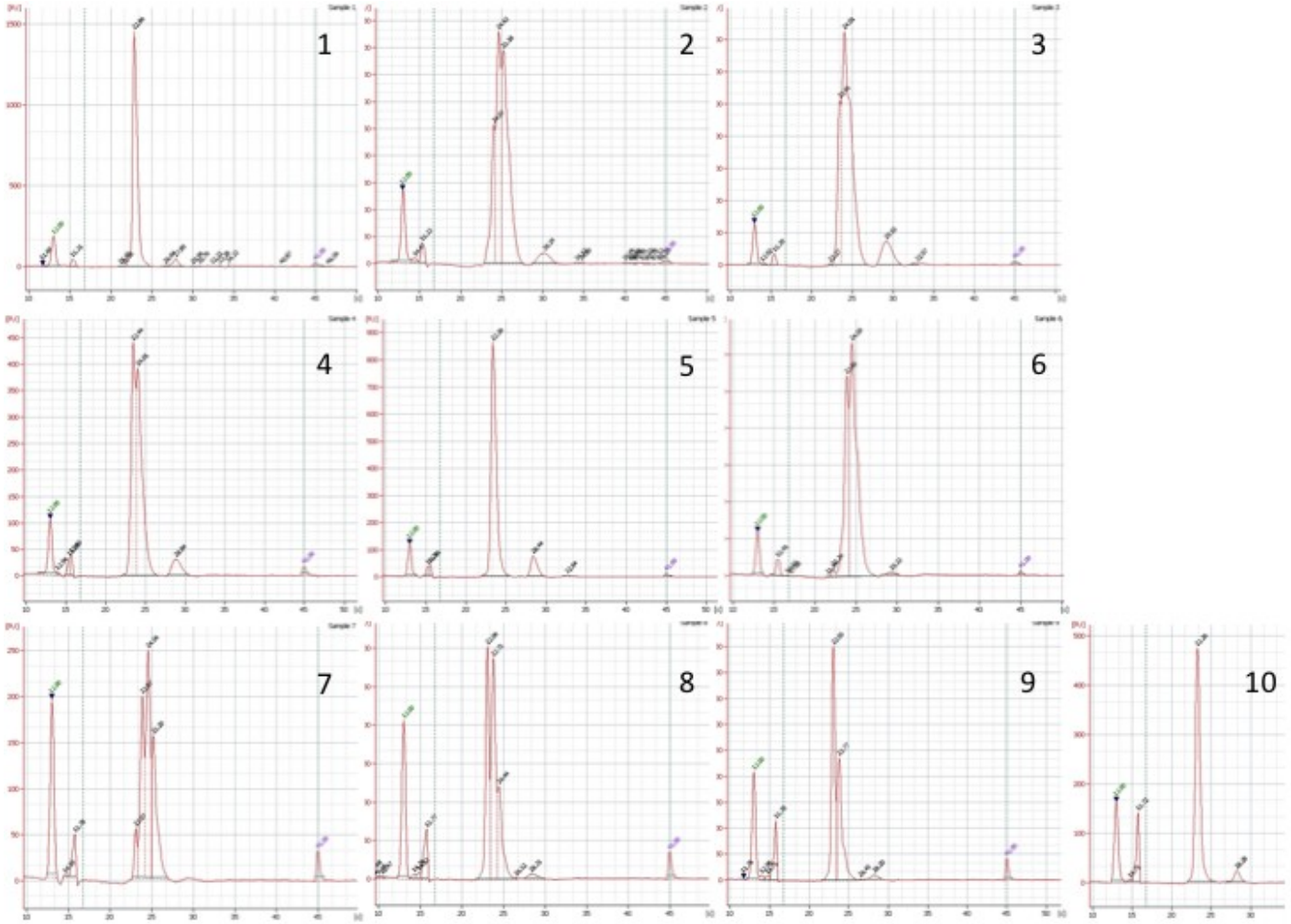


Figure S9. Electrophoretic band analysis derived from Figure S2 for Qβ-Tn loading determination.

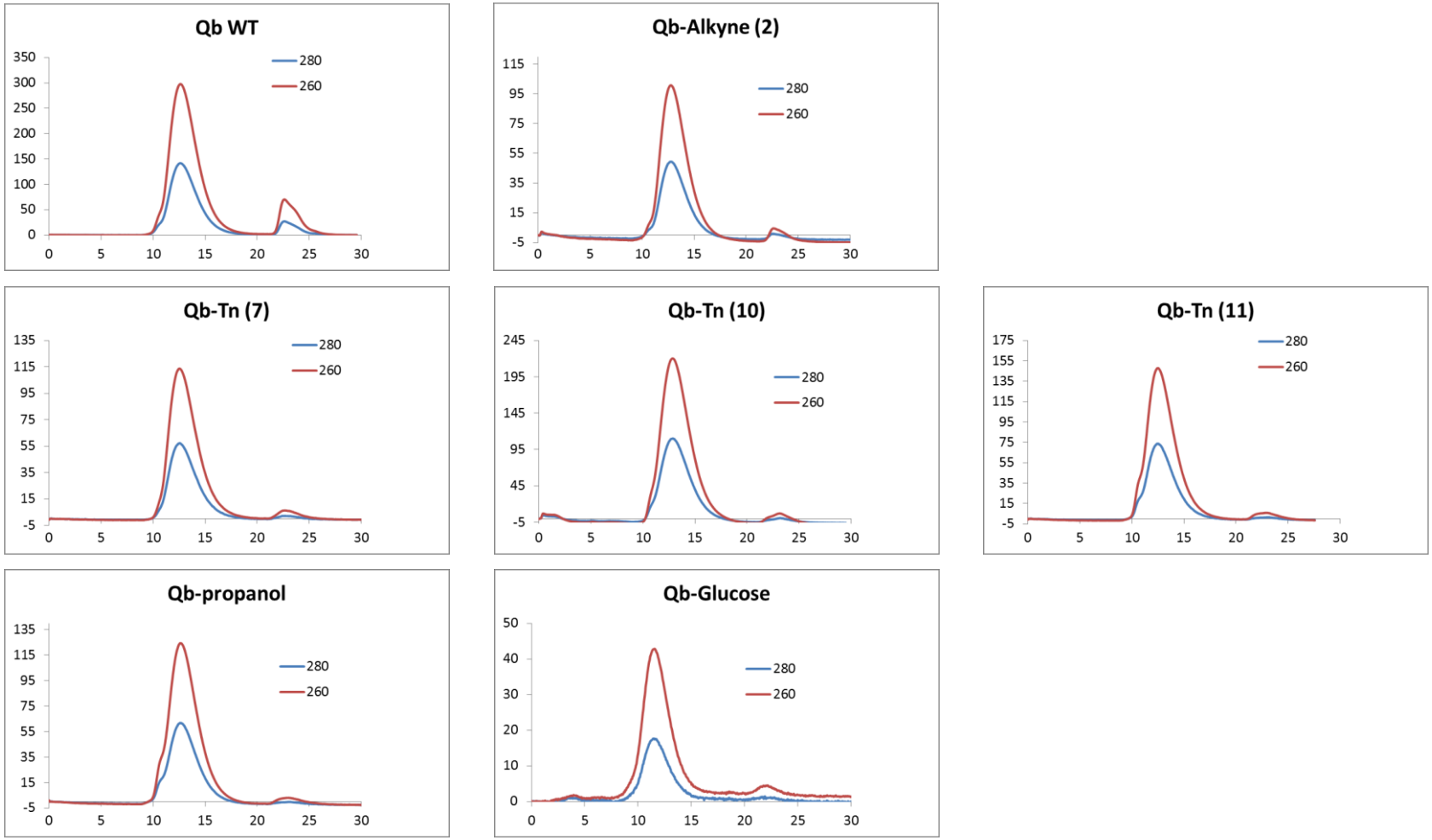


Figure S10. FPLC analysis of Qβ WT, Qβ-alkyne (**2**), Qβ-Tn (**7**, **10**, and **11**), and the control conjugates Qβ-propanol (**8**) and Qβ-Glucose (**9**).

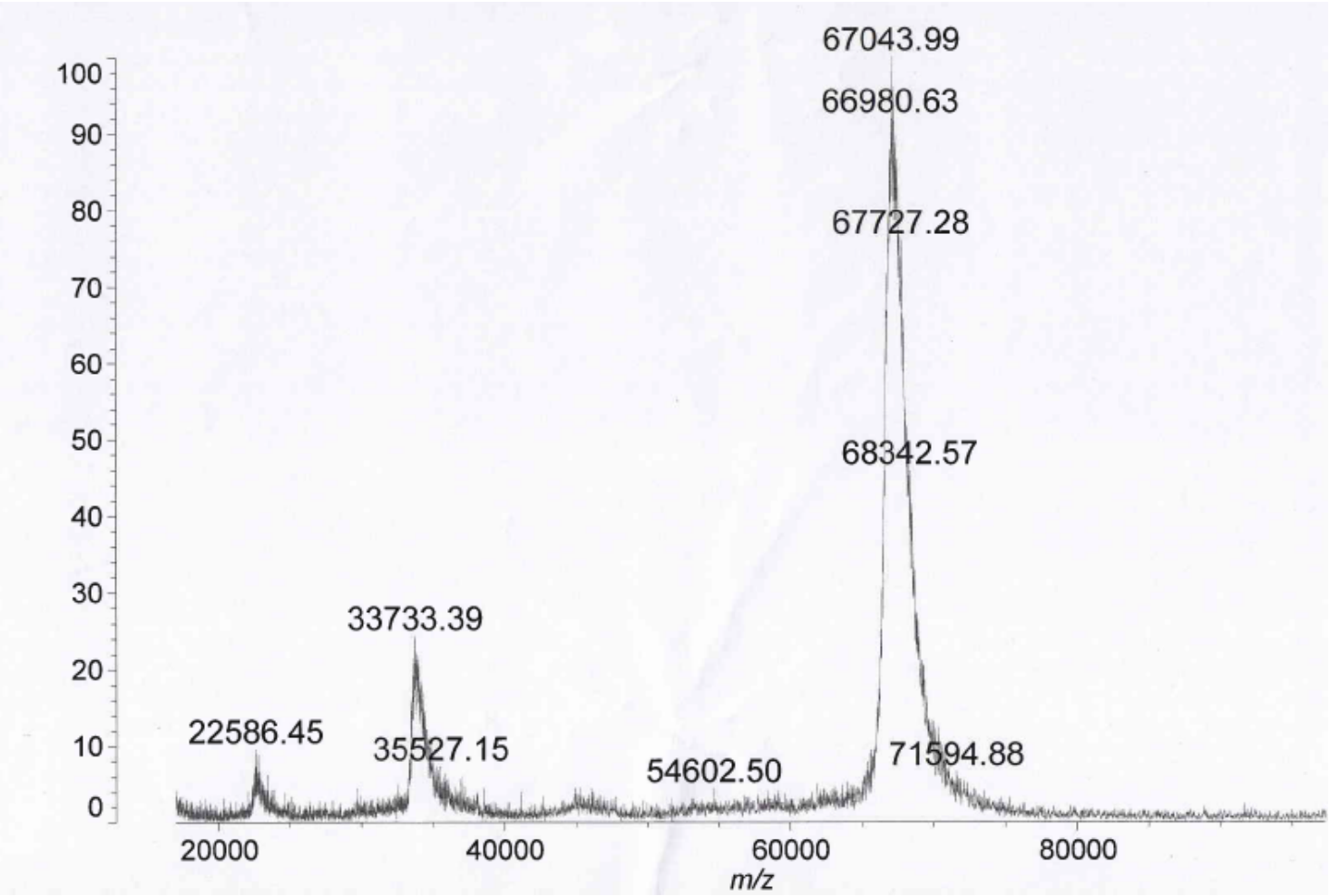


Figure S11. MALDI-TOF spectrum of BSA before conjugation.

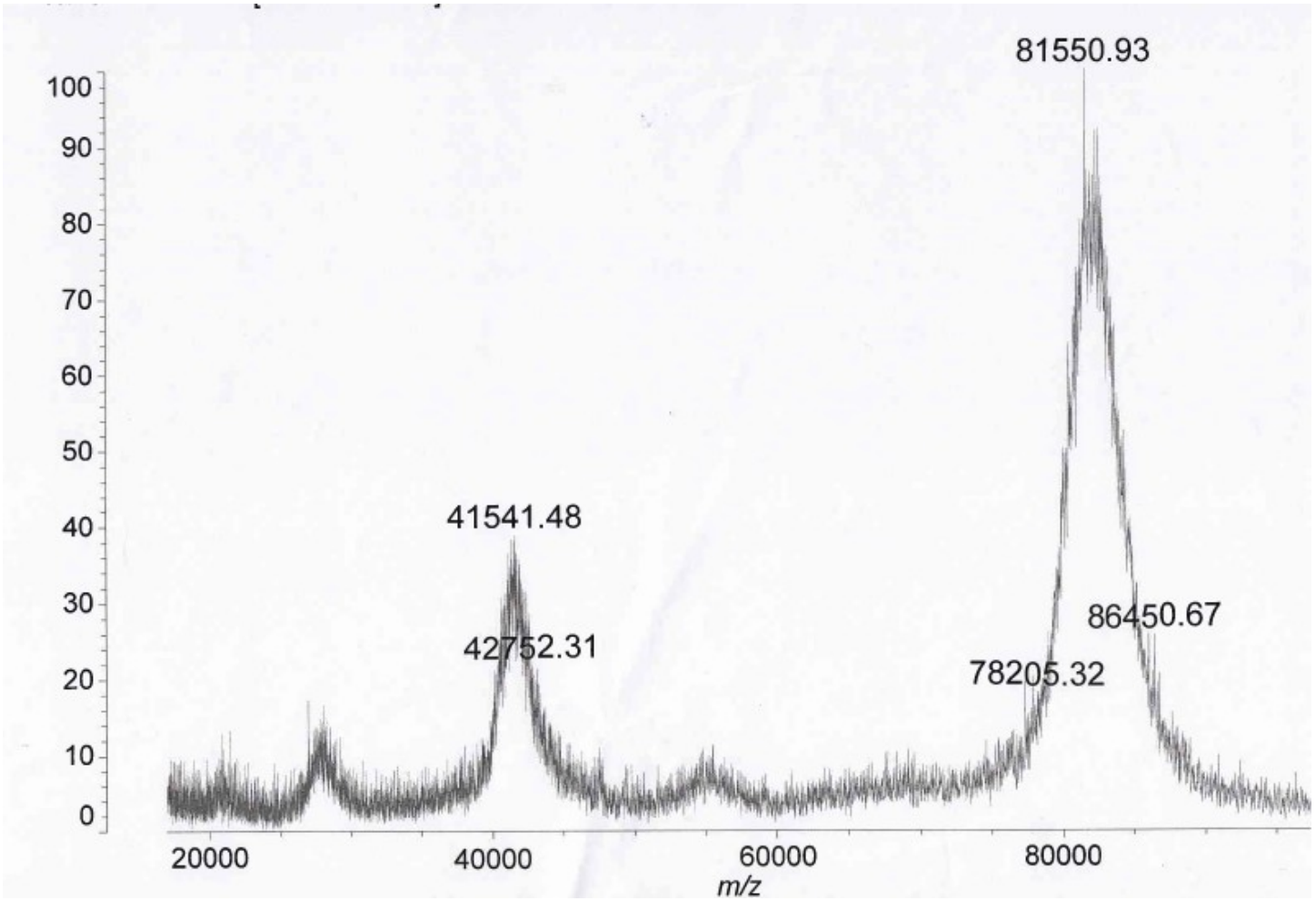


Figure S12. MALDI-TOF spectrum of BSA-Tn **15.**

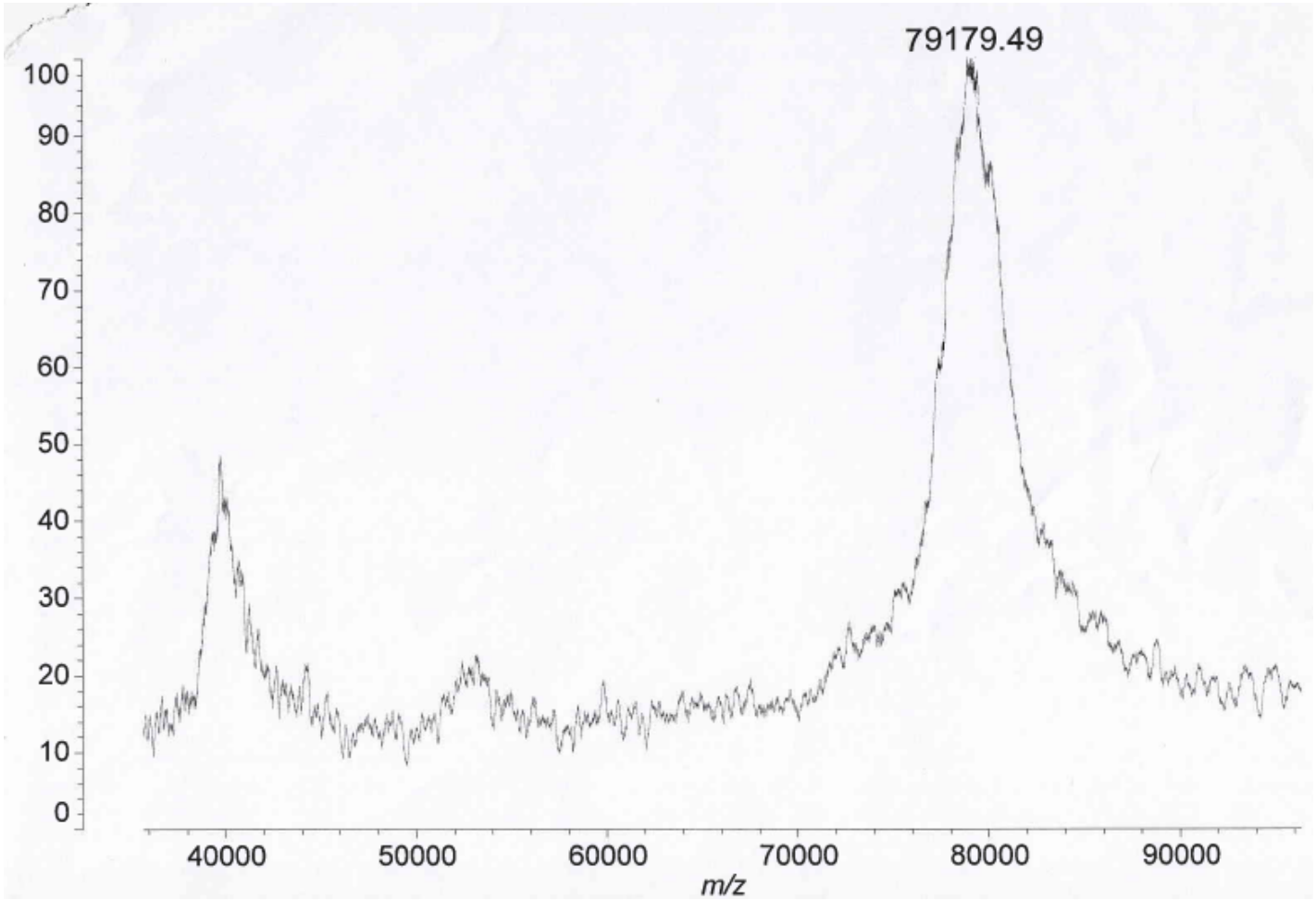


Figure S13. MALDI-TOF spectrum of BSA-triazole **19.**

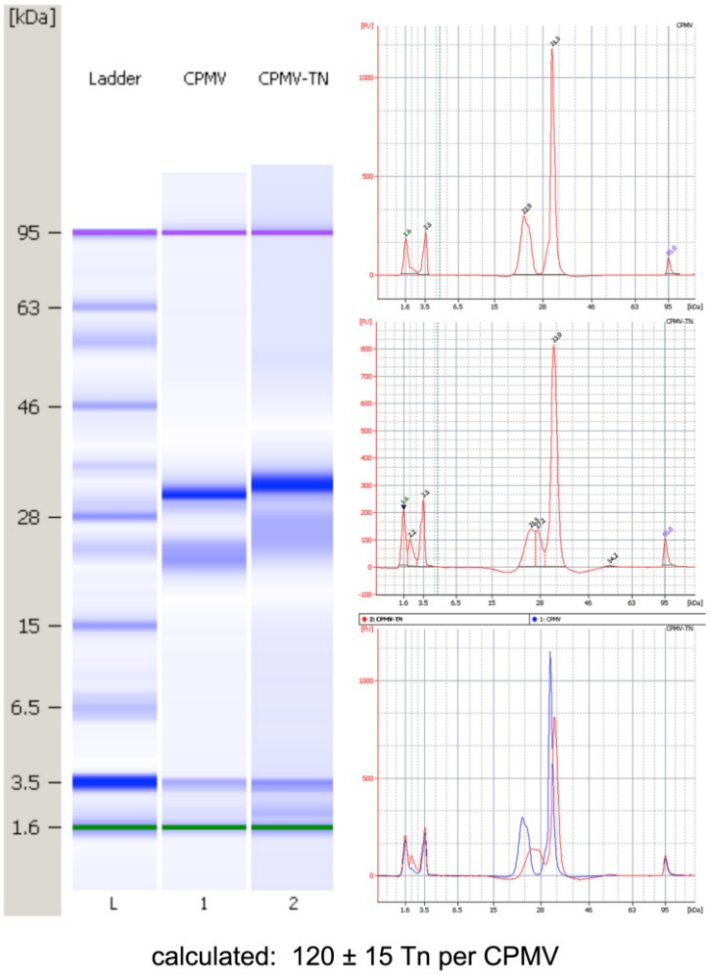


Figure S14. Electrophoretic analysis and CPMV-Tn loading determination. Gel (left) and electropherograms of CPMV WT (right top), CPMV-TN (right middle), and an overlay of the two (right bottom).

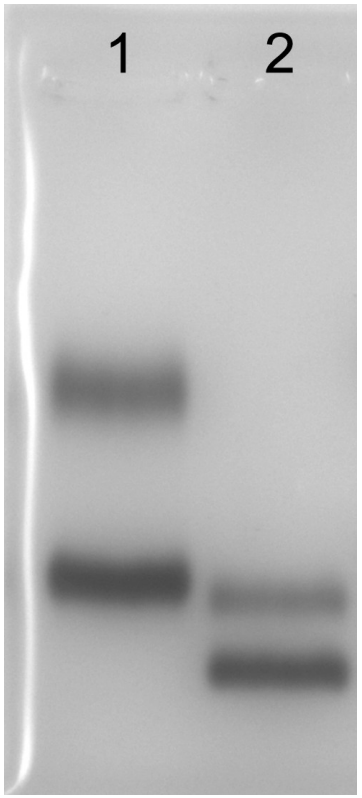


Figure S15. Agarose gel electrophoresis analysis of CPMV WT and CPMV-Tn (Coomassie staining). Lanes: 1 = CPMV WT, 2 = CPMV-Tn).

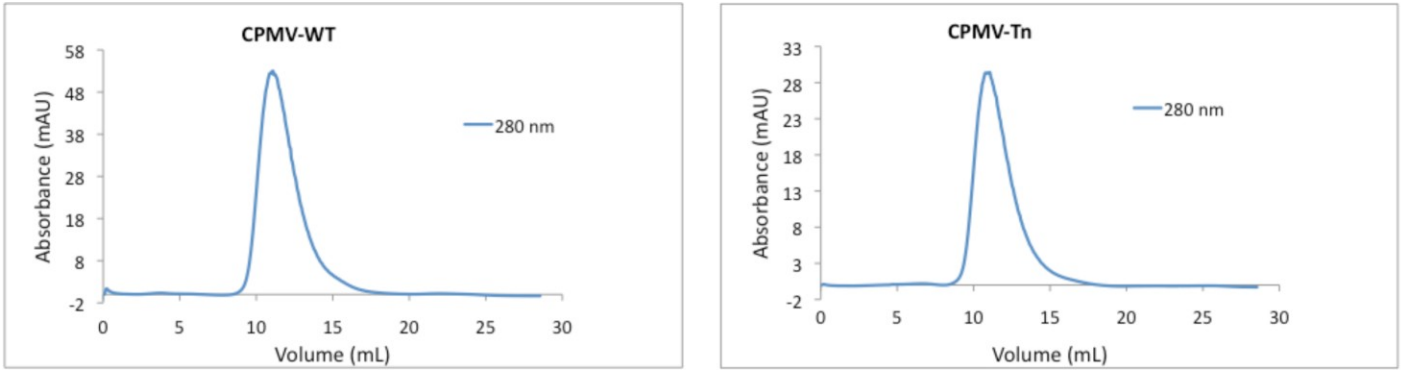


Figure S16. FPLC analysis of CPMV WT and CPMV-Tn conjugate.

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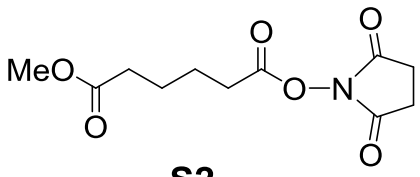
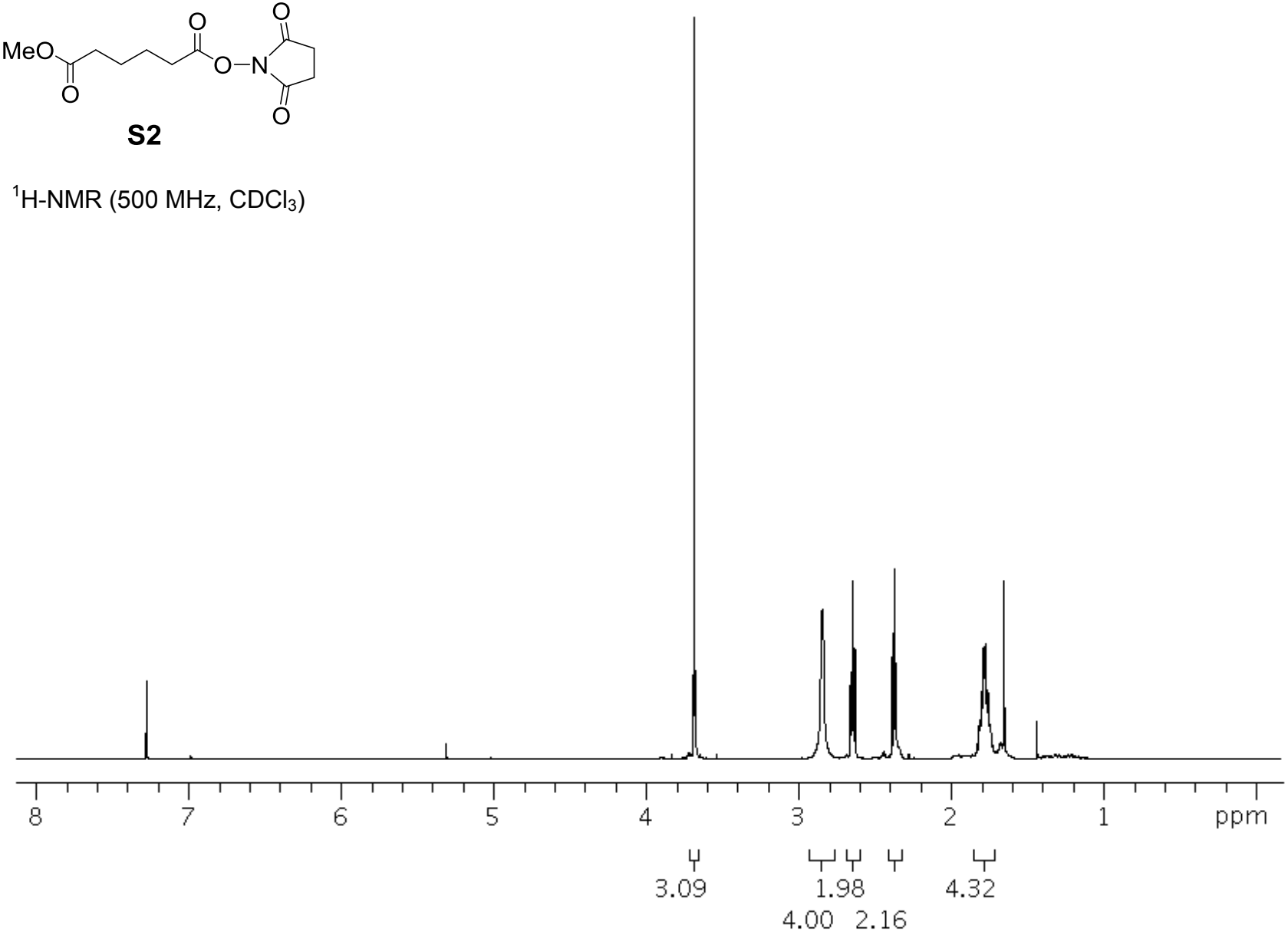
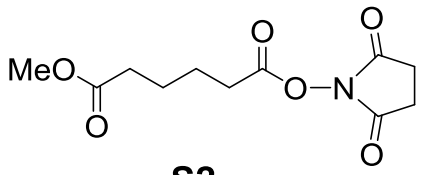


S2

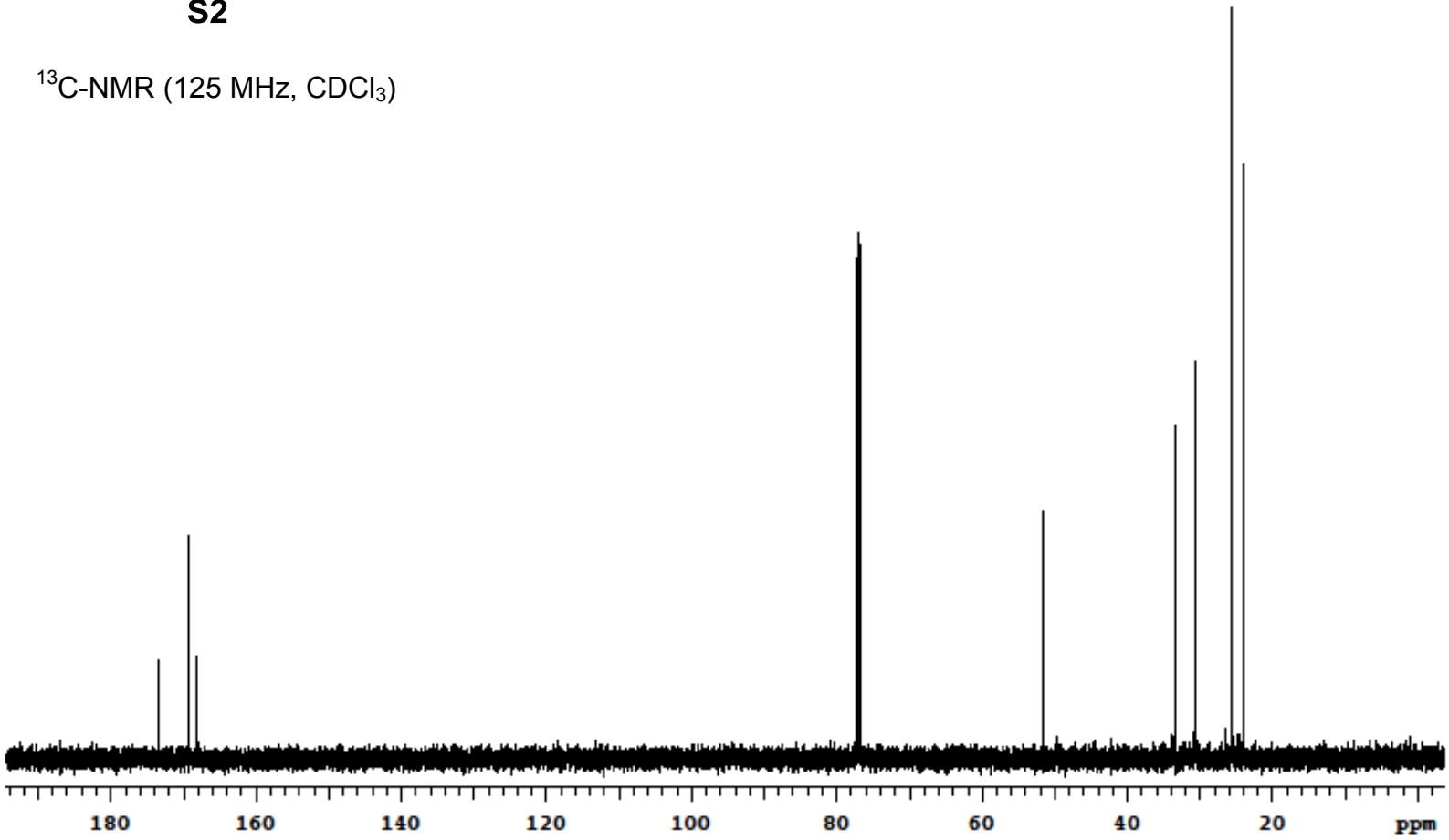
^{1}H-NMR (500 MHz, $CDCl_3$)

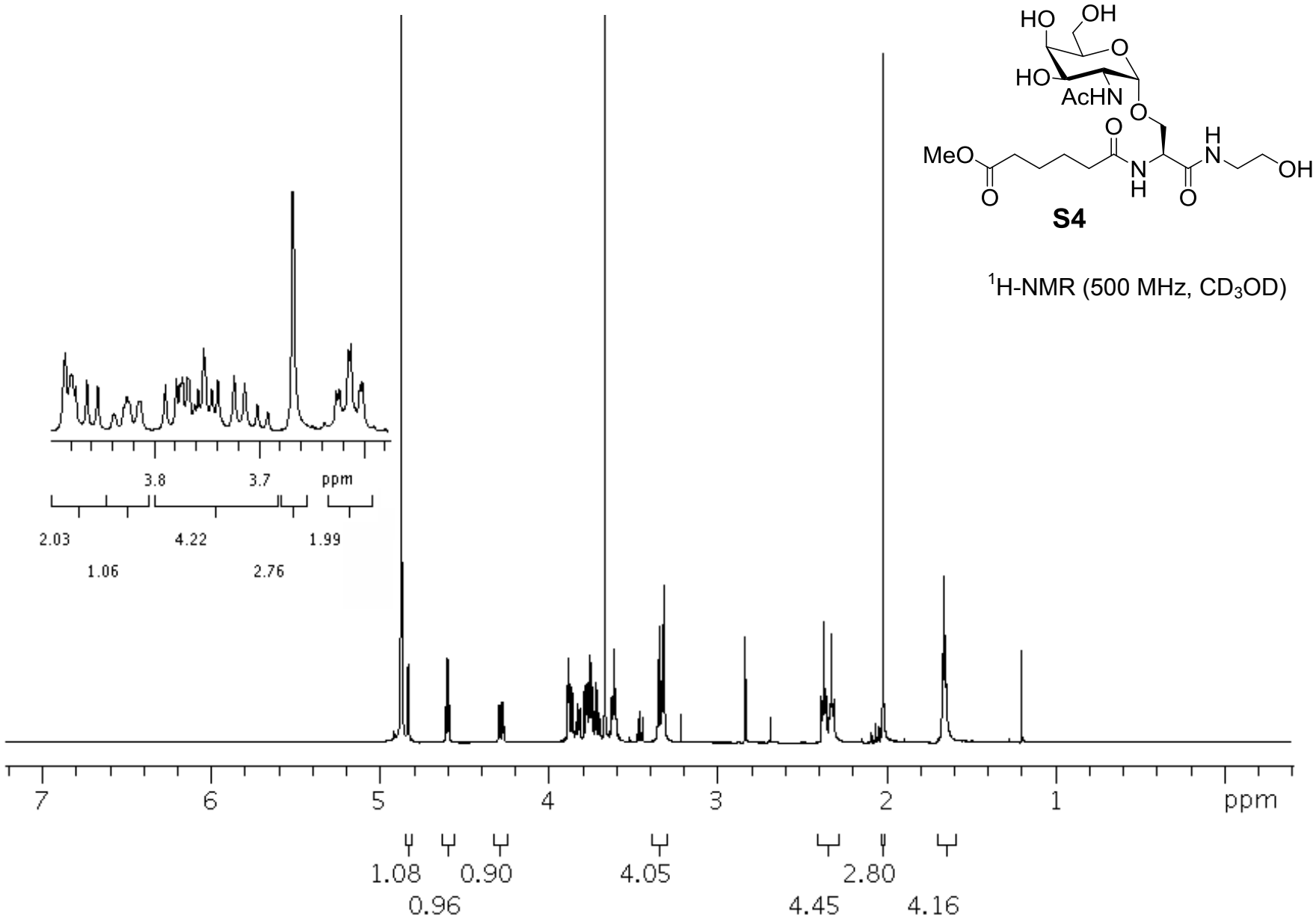




S2

^{13}C-NMR (125 MHz, $CDCl_3$)



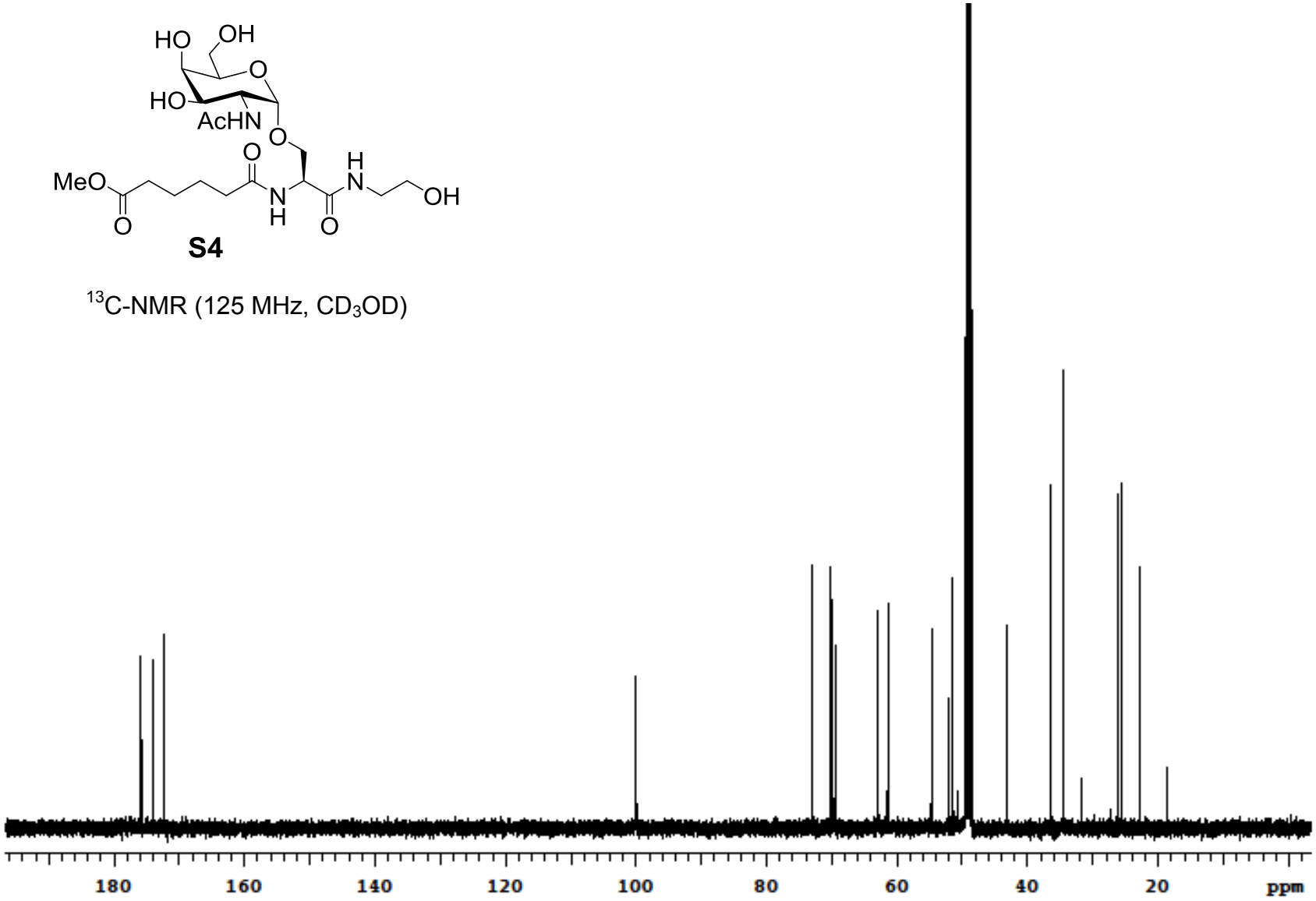


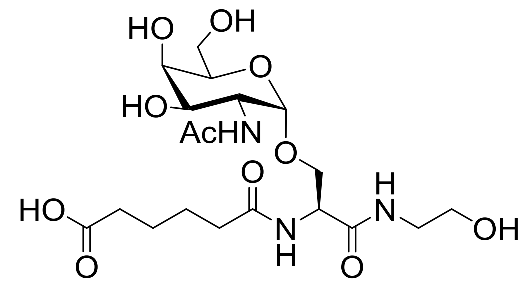
S4

^{1}H-NMR (500 MHz, CD_3OD)

S4

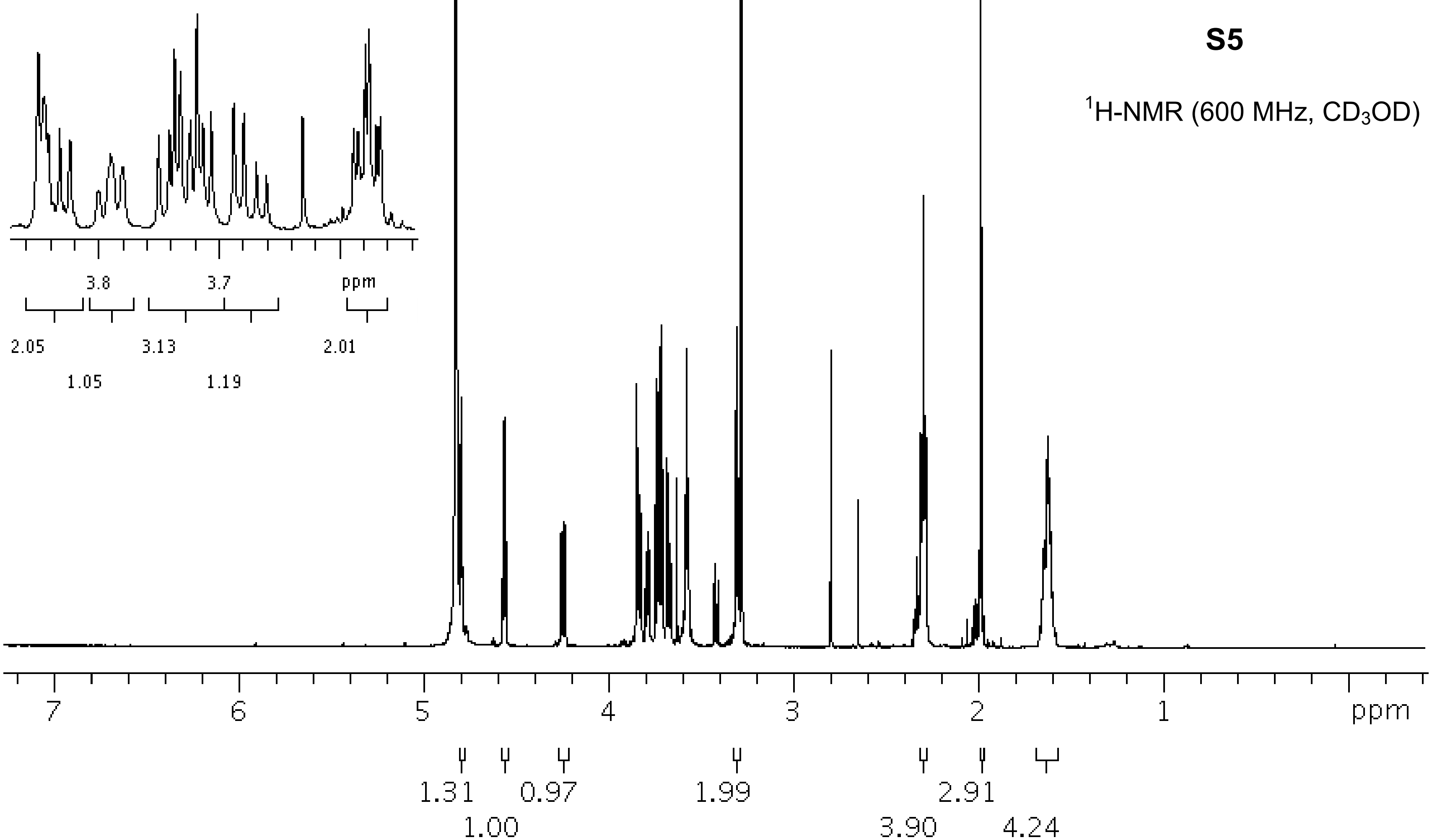
^{13}C-NMR (125 MHz, CD_3OD)





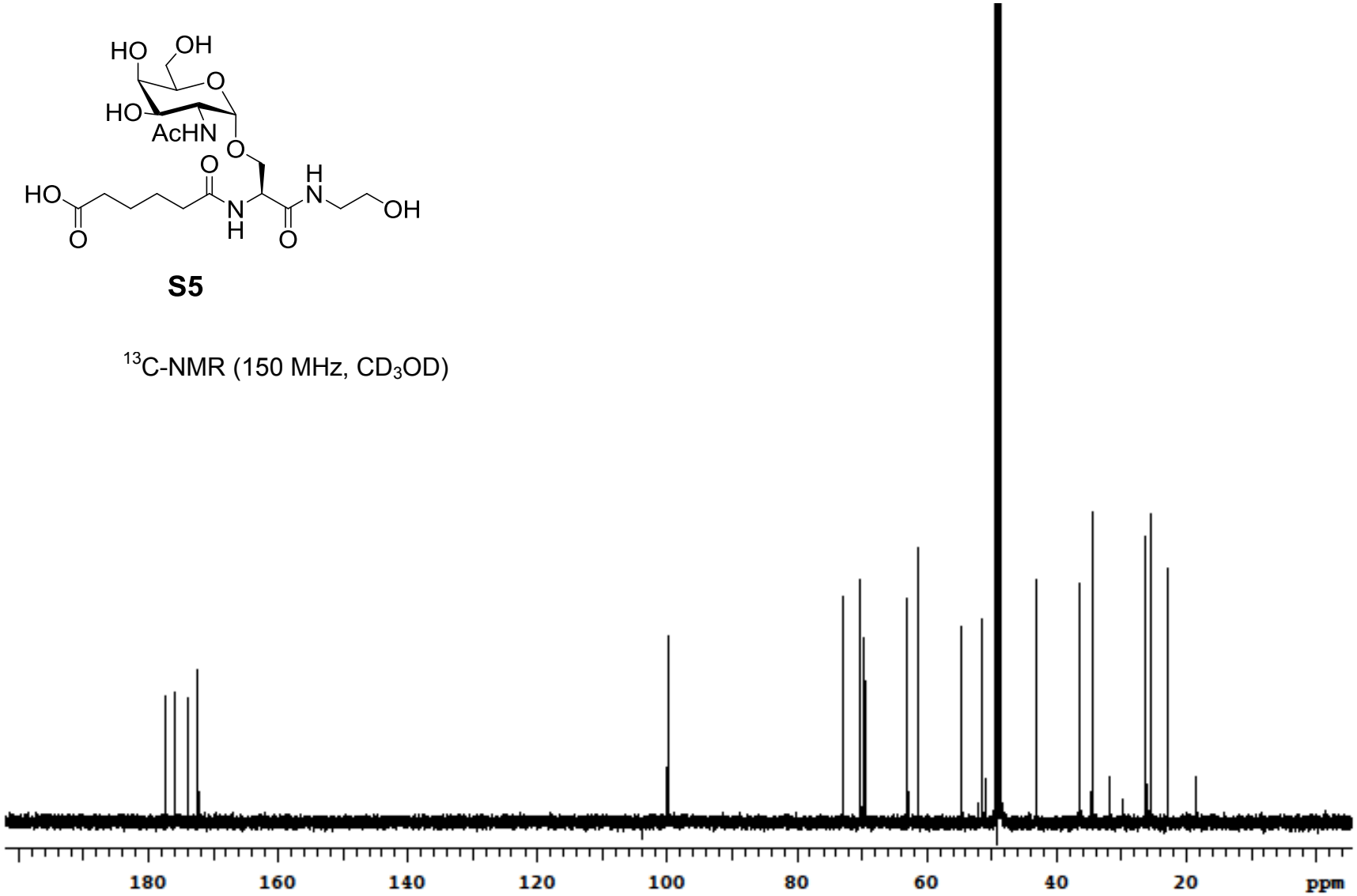
S5

^{1}H-NMR (600 MHz, CD_3OD)



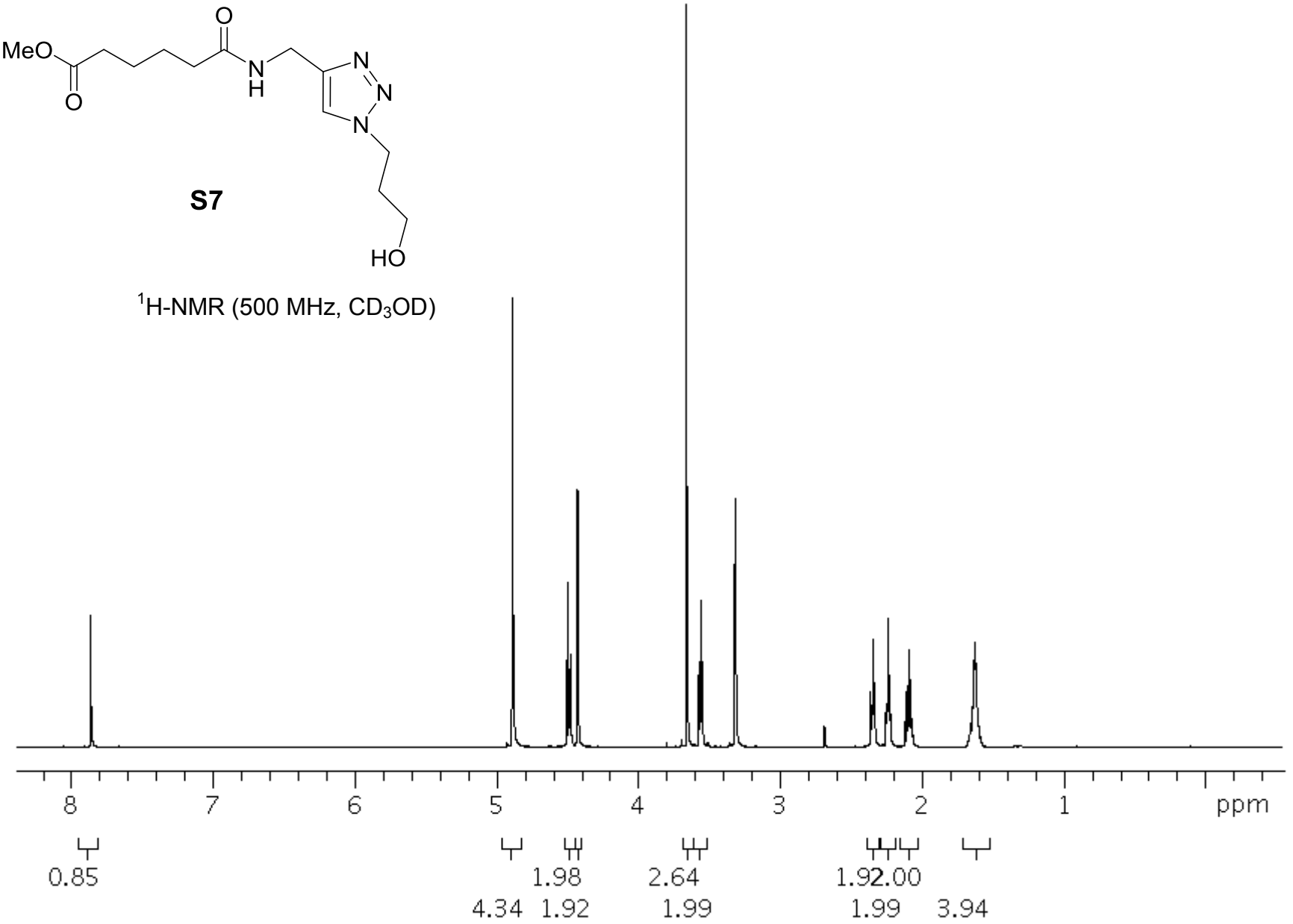
S5

^{13}C-NMR (150 MHz, CD_3OD)



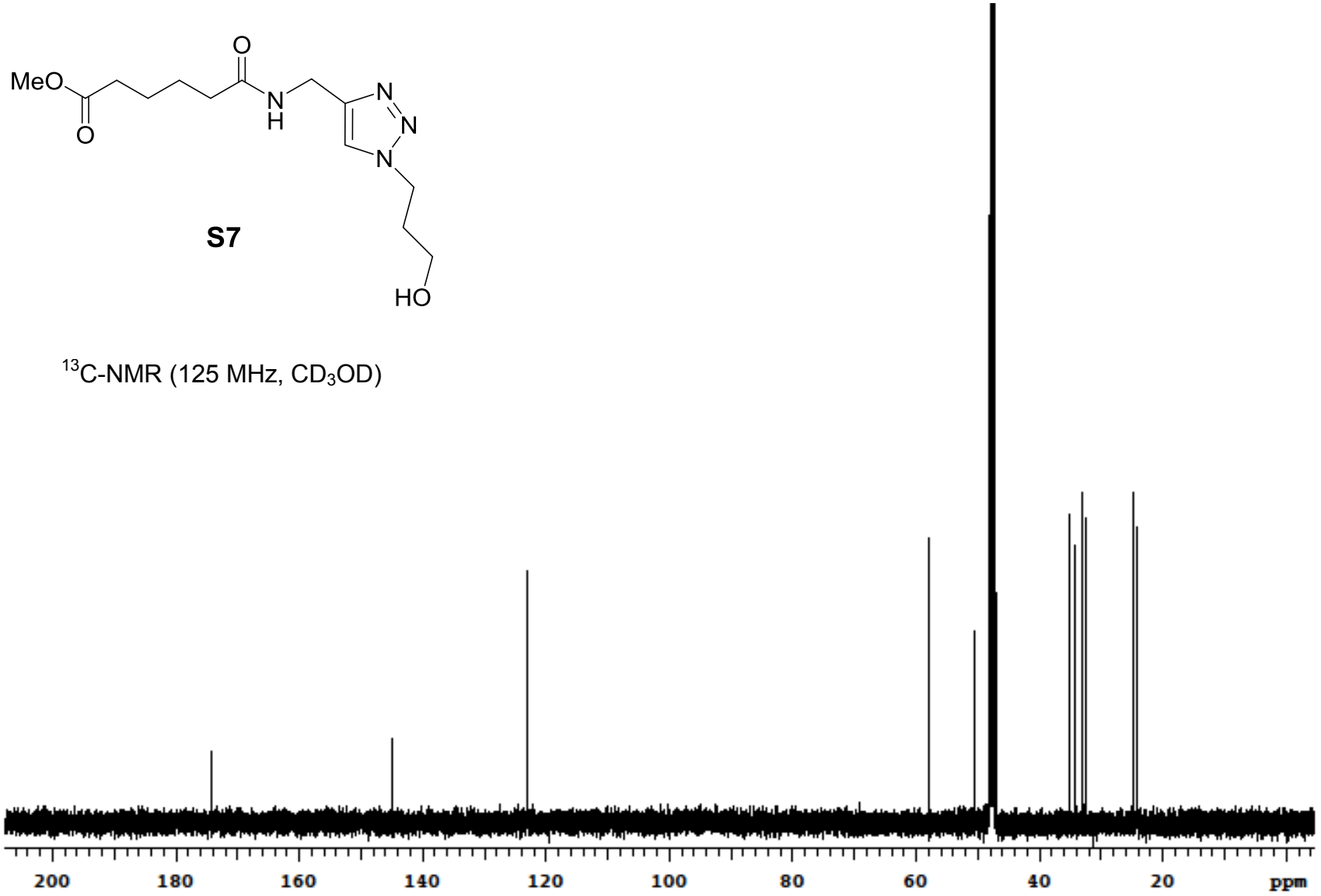
S7

^{1}H-NMR (500 MHz, CD_3OD)



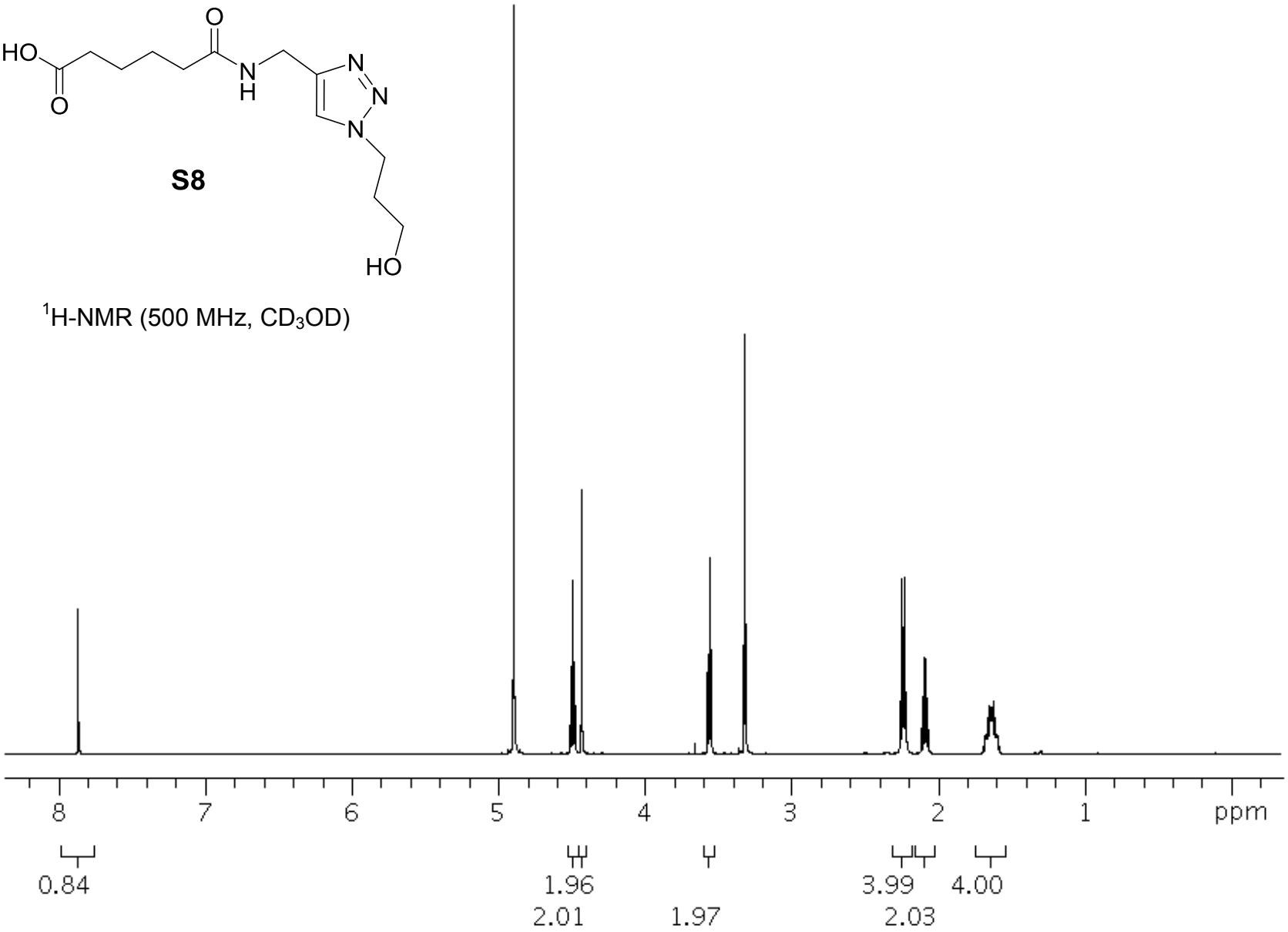
S7

^{13}C-NMR (125 MHz, CD_3OD)



S8

^{1}H-NMR (500 MHz, CD_3OD)



S8

^{13}C-NMR (125 MHz, CD_3OD)

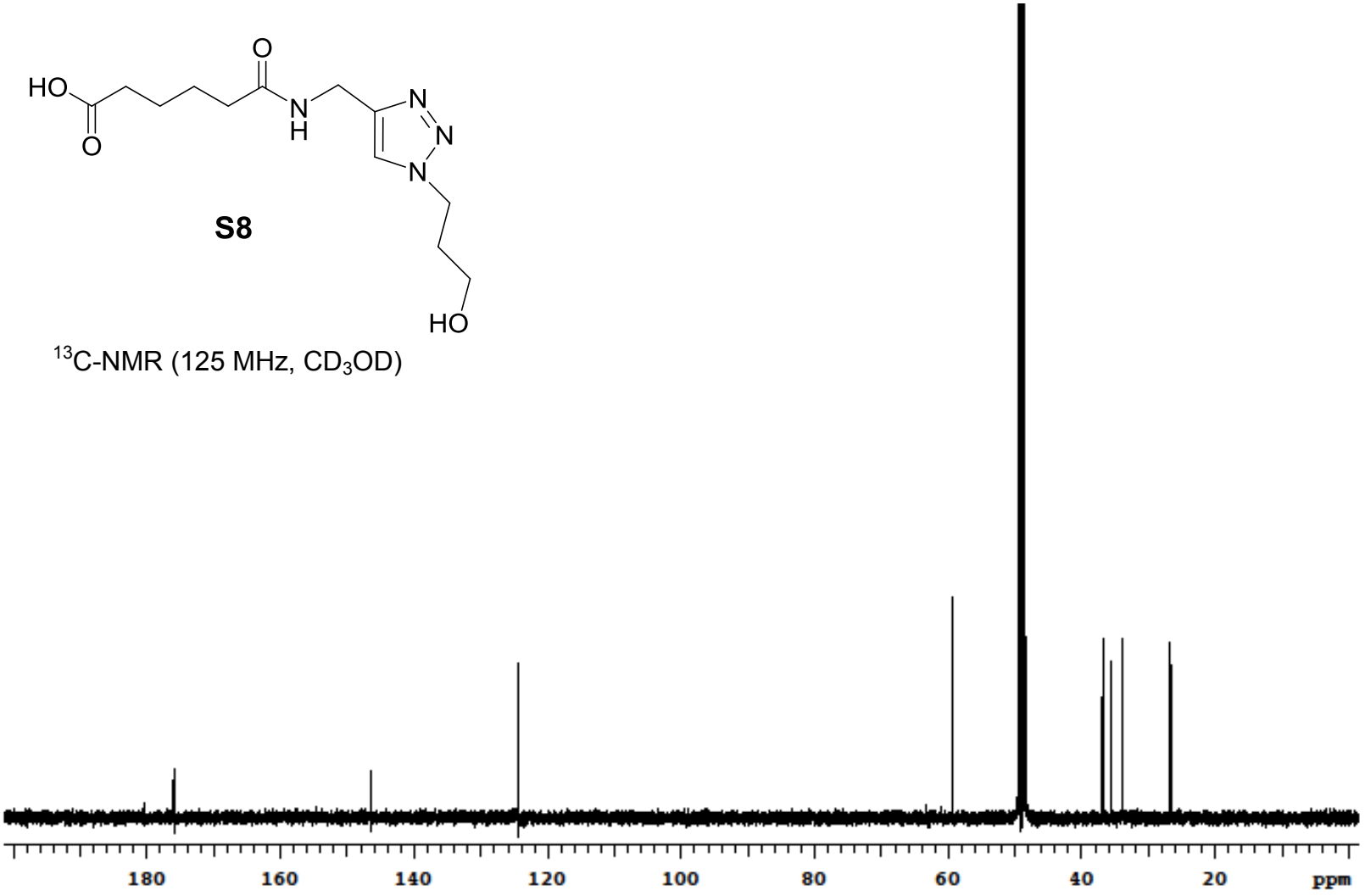


Table S1. Results of glycan microarray screening of mouse sera. a) IgM and b) IgG binding results; c) Description of microarray components

a) IgM binding results

anti-IgM	vaccination group =	PRE	Qb-propanol	Qb-Glc	Qb-Tn 1ug	Qb-Tn 4ug	Qb-Tn 20ug
Family	**Array component**	AVE	AVE	AVE	AVE	AVE	AVE
Blood Group A	2'F-A type 2-Sp - 05	203	779	492	3170	355	497
Blood Group A	2'F-A type 2-Sp - 13	302	2330	1281	4735	692	2224
Blood Group A	A tetra type 1-Sp - 05	238	628	548	2733	542	189
Blood Group A	A tetra type 1-Sp - 15	197	1309	955	1948	486	189
Blood Group A	A tetra type 2-Sp - 05	236	214	526	1485	256	228
Blood Group A	A tetra type 2-Sp - 07	275	418	781	3064	537	339
Blood Group A	A tetra type 2-Sp - 17	1061	2138	2758	6282	965	1402
Blood Group A	Adi - 04	274	340	279	9604	578	2144
Blood Group A	Adi - 17	1743	3551	4646	50576	5918	44652
Blood Group A	A-LeB hexa	206	224	353	167	285	305
Blood Group A	BG-A	3196	4171	6629	18682	1886	37060
Blood Group A	BG-A1	166	135	2002	312	306	576
Blood Group A	Globo A	41836	42752	48913	27801	52741	55453
Blood Group B	2'F-B type 2-Sp - 03	234	304	170	1486	213	390

Blood Group B	2'F-B type 2-Sp - 07	562	757	647	3796	769	604
Blood Group B	2'F-B type 2-Sp - 15	330	584	213	2185	346	743
Blood Group B	B tetra type 1-Sp - 04	553	889	758	2454	1078	382
Blood Group B	B tetra type 1-Sp - 16	392	1192	731	1880	990	617
Blood Group B	B tetra type 2-Sp - 05	472	531	645	2625	4465	357
Blood Group B	B tetra type 2-Sp - 07	667	1115	1246	4655	5405	401
Blood Group B	B tetra type 2-Sp - 20	551	1468	1849	7238	6013	1063
Blood Group B	BG-B (Dextra)	409	1788	6249	33096	4736	1451
Blood Group H	2'FucLac (BG-H6)	429	903	997	749	420	417
Blood Group H	BG-H1	882	1002	419	828	1504	2210
Blood Group H	BG-H2	1384	1627	3600	1368	2094	1224
Blood Group H	Globo H	11511	20709	33498	24488	34606	18189
Blood Group H	Sia-LNF V	194	229	199	157	241	294
Blood Group H	TFiLNO(1-2,1-2,1-3)	255	104	133	114	134	147
Blood Group H	TFiLNO(1-2,1-2,1-4)	521	1239	726	809	1122	857
carb-Fuc	Fuc-a - 04	218	800	582	4610	744	587
carb-Fuc	Fuc-a - 22	410	2634	2673	32796	2218	1256
carb-Gal	Gal-a	4656	4405	8689	37342	4691	6764
carb-Gal	Gala1-4Galb	65076	44166	20418	75479	52967	53384
carb-Gal	Gal-b	30696	26954	10885	54359	31163	24040
Carb-Gal	Lactose	1186	10908	113	1285	1990	637

Carb-Gal	Lactose-C5 - 05	464	8393	7804	34927	7978	7494
Carb-Gal	Lactose-C5 - 14	545	10478	9343	38604	11523	7299
carb-GalNAc	GalNAc-a - 04	358	247	224	3043	594	4515
carb-GalNAc	GalNAc-a - 22	1109	4379	3631	33050	7496	55072
carb-GalNAc	GalNAca1-6Galb - 04	509	1539	551	12770	1470	13691
carb-GalNAc	GalNAca1-6Galb - 22	7498	13360	5528	43076	25001	90294
carb-GalNAc	GalNAc-b	1621	6097	4774	36009	4808	5779
carb-GalNAc	LDN-Sp - 05	183	496	1324	2238	281	144
carb-GalNAc	LDN-Sp - 14	300	2458	6191	7416	2568	707
carb-Glc	Glc-a	295	1455	8371	30254	2241	3489
carb-Glc	Glc-a - 05	298	235	5654	16750	287	347
carb-Glc	Glca1-6Glca1-4Glca1-4Glcb	579	556	318	2698	2155	1046
carb-Glc	Glc-b	12399	14623	15881	44079	19814	45437
carb-Glc	Isomaltose	1533	4401	2190	34080	3443	3449
carb-Glc	Maltopentaose	337	1930	177	141	253	1284
carb-Glc	Maltose	337	1342	1759	35044	1125	942
carb-GlcNAc	3'GN type1-Sp - 04	435	2295	4641	6174	2121	512
carb-GlcNAc	3'GN-Di-LacNAc-Sp - 06	4483	4889	7401	13477	8177	8535
carb-GlcNAc	3'GN-Di-LacNAc-Sp - 14	7955	4162	7556	14263	7585	7392
carb-GlcNAc	GlcNAca1-4Galb - 03	502	449	444	1521	656	555
carb-GlcNAc	GlcNAca1-4Galb - 20	2665	819	905	22432	2473	3729

carb-GlcNAc	GlcNAc-b	28638	16484	9162	44927	20870	21998
carb-GlcNAc	GNLacNAc-Sp - 06	2507	3939	4789	11440	5203	5433
carb-GlcNAc	GNLacNAc-Sp - 16	14440	11154	16385	29027	16886	16370
carb-GlcNAc	LNT-2-Sp - 06	1640	4060	6676	12949	4805	4844
carb-GlcNAc	LNT-2-Sp - 15	8486	6528	13317	27829	12994	12320
carb-Man	Man-a	879	2090	3985	33319	1866	1680
carb-Man	Man-a - 05	338	266	312	22751	368	239
carb-Man	Mana1-6Man-a	817	6630	1250	29593	2611	1460
carb-Man	Mana1-6Man-a - 04	533	2855	668	32121	1419	254
carb-Man	ManT	1511	1886	1398	2849	7603	2724
carb-Sia	3'KDNLacNAc-Sp - 05	236	611	1642	2493	564	245
carb-Sia	3'KDNLacNAc-Sp - 12	192	1182	2278	3114	464	388
carb-Sia	3'-KDNLeC-Sp - 04	256	2179	3152	3536	897	449
carb-Sia	3'-KDNLeC-Sp - 12	188	2862	4041	6564	844	585
carb-Sia	3'S(Gc)LacNAc-Sp - 06	224	303	1935	2292	355	274
carb-Sia	3'S(Gc)LacNAc-Sp - 10	408	1164	4336	2991	717	610
carb-Sia	3'S(Gc)LeC-Sp - 05	283	2281	6173	8249	1169	279
carb-Sia	3'S(Gc)LeC-Sp - 12	188	2866	5483	8304	1228	650
carb-Sia	3'S-Di-LacNAc-Sp - 06	129	196	300	1118	195	104
carb-Sia	3'S-Di-LacNAc-Sp - 13	177	415	405	1122	318	245
carb-Sia	3'Sia-3-FL	238	112	159	100	115	113

carb-Sia	3'SLacNAc	374	192	1049	560	1515	531
carb-Sia	3'SLacNAc-Sp - 05	479	768	3807	2788	832	580
carb-Sia	3'SLacNAc-Sp - 10	515	858	3852	2621	1710	631
carb-Sia	3'SLDN-Sp - 05	139	439	1185	2701	329	242
carb-Sia	3'SLDN-Sp - 11	124	1089	2476	2219	433	330
carb-Sia	3'SLeC-Sp - 05	282	2002	3576	8898	1355	841
carb-Sia	3'SLeC-Sp - 12	308	3616	5153	13416	1694	647
carb-Sia	6'S(Gc)LacNAc-Sp - 05	182	285	805	1163	367	115
carb-Sia	6'S-Di-LacNAc-Sp - 05	114	421	758	2084	364	121
carb-Sia	6'S-Di-LacNAc-Sp - 13	134	393	952	1489	333	138
carb-Sia	6'SLac	196	138	513	153	230	140
carb-Sia	6'SLacNAc-Sp - 05	405	2345	5251	9200	3716	984
carb-Sia	6'SLacNAc-Sp - 11	117	707	2077	2544	373	220
carb-Sia	6'SLDN-Sp - 05	1525	1570	2887	3145	2323	1419
carb-Sia	6'SLDN-Sp - 13	522	920	3027	3462	1775	322
carb-Sia	9OAc3'SLacNAc-Sp - 04	581	532	3457	2009	996	392
carb-Sia	9OAc3'SLacNAc-Sp - 10	649	1410	5681	3336	1135	695
carb-Sia	9OAc3'SLeC-Sp - 05	225	2173	4684	4489	1025	791
carb-Sia	9OAc3'SLeC-Sp - 12	406	4926	7424	10528	2235	2070
carb-Sia	CT/Sda-Sp - 05	230	833	965	2529	372	465
carb-Sia	CT/Sda-Sp - 13	170	1417	1907	3613	502	601

carb-Sia	DSLNT	222	101	111	103	136	126
carb-Sia	LSTa	189	101	100	101	125	121
carb-Sia	LSTb	227	100	359	455	206	364
carb-Sia	LSTc	170	104	150	123	170	114
carb-Sia	Sia-LNnT	166	100	133	105	134	137
carb-type 1	iLNO	255	533	619	776	216	188
carb-type 1	LNT - 05	164	107	767	431	160	144
carb-type 1	LNT - 21	271	136	3894	2337	316	259
carb-type 1	LNT-Sp - 06	270	384	1808	4833	515	253
carb-type 1	LNT-Sp - 15	376	1361	6431	5714	932	521
carb-type 1	MFiLNO(1-3)	115	206	1267	801	288	299
carb-type 1	pLNH - 07	310	248	594	696	352	376
carb-type 1	pLNH - 21	665	641	5320	4391	1059	942
carb-type 1+2	LNH - 13	422	1471	488	256	287	195
carb-type 2	Di-LacNAc-Sp - 06	248	591	1108	2702	314	153
carb-type 2	Di-LacNAc-Sp - 16	276	483	377	1686	445	140
carb-type 2	LacNAc	1042	2742	228	755	7408	927
carb-type 2	LacNAc (trimeric)	461	509	367	578	398	323
carb-type 2	LacNAc-Sp - 06	291	1274	2044	4924	903	223
carb-type 2	LacNAc-Sp - 15	357	2017	3856	9418	1404	518
carb-type 2	LNnH - 11	794	789	167	277	441	277

carb-type 2	LNnT - 04	342	236	218	211	346	320
carb-type 2	LNnT - 14	316	402	372	221	269	199
GAG	Hep-5000	205	295	293	206	401	257
GAG	Hep-N-acetylated	233	238	218	174	312	288
GAG	Hya8	394	884	451	633	674	354
GAG	Hya9	562	561	2825	4707	822	501
glycolipid	Fuc-GM1a - 08	162	185	222	489	380	217
glycolipid	GA1 - 06	493	202	109	230	439	108
glycolipid	GA1 - 20	300	280	150	1789	498	144
glycolipid	GA1di	280	107	121	114	397	214
glycolipid	GA2di - 16	1417	3824	4100	39047	3834	1459
glycolipid	GA2di - 37	1291	6047	4219	35903	3502	1784
glycolipid	GA2di (accurate)	1826	3211	1315	4019	1756	1234
glycolipid	Gb4	176	164	112	149	187	249
glycolipid	Gb4 tetra (P1 tetra)-Sp - 06	321	1245	2794	6455	1335	1082
glycolipid	Gb4 tetra (P1 tetra)-Sp - 15	434	1562	2440	8060	2092	1554
glycolipid	Gb5/SSEA3 - 04	132	123	152	127	126	119
glycolipid	Gb5/SSEA3 - 12	154	151	369	459	172	415
glycolipid	GD1a-Sp - 05	125	337	320	857	227	206
glycolipid	GD1a-Sp - 10	128	560	297	1082	292	255
glycolipid	GD1b	145	100	113	100	123	103

glycolipid	GD2-Sp - 04	172	820	865	1941	589	286
glycolipid	GD2-Sp - 10	159	102	134	118	184	164
glycolipid	GD3-Sp - 04	183	604	810	2159	351	320
glycolipid	GD3-Sp - 08	140	2508	3336	4776	838	713
glycolipid	GM1a	201	101	135	102	149	119
glycolipid	GM2-Sp - 04	235	650	1128	1577	393	251
glycolipid	GM2-Sp - 07	114	969	1805	2149	369	192
glycolipid	GM2-Sp - 14	200	409	858	1068	468	111
glycolipid	GM3	170	165	681	155	207	208
glycolipid	GM3(Gc)-Sp - 05	426	1347	2429	3692	800	837
glycolipid	GM3(Gc)-Sp - 14	190	3905	6839	9665	1347	967
glycolipid	GM3-Sp - 04	245	1126	1655	4218	533	549
glycolipid	GM3-Sp - 11	239	2462	5513	7446	898	958
glycolipid	GQ2-Sp - 03	129	280	176	952	349	129
glycolipid	GQ2-Sp - 06	840	488	267	1293	371	251
glycolipid	GT2-Sp - 03	646	923	1111	1417	847	781
glycolipid	GT2-Sp - 08	149	863	242	1445	397	348
glycolipid	GT3-Sp - 03	160	494	480	1439	331	248
glycolipid	GT3-Sp - 07	120	298	279	655	168	192
glycolipid	P1	532	2671	4322	1150	2459	3388
glycolipid	Pk or Gb3	665	228	4036	5267	1397	1448

glycolipid	SSEA-4-Sp - 05	1518	3769	2726	5538	3749	3010
glycolipid	SSEA-4-Sp - 12	1119	2797	1949	4340	2809	2946
Lewis	3'-sulpho-LeA	223	109	158	102	301	113
Lewis	3'-sulpho-LeX	218	134	185	132	199	218
Lewis	6'-sulpho-LeA	652	1201	180	173	222	279
Lewis	6'-sulpho-LeX	2783	2759	564	985	1333	940
Lewis	DFLNH(c)	106	148	151	198	198	258
Lewis	DFLNnH	1563	1616	1541	6418	4227	13927
Lewis	DFpLNH I	178	130	138	117	181	165
Lewis	Di-LeC-Sp - 06	332	656	1395	3350	639	275
Lewis	Di-LeC-Sp - 16	232	3245	6766	7876	1145	1125
Lewis	LeA	3743	7648	3543	4770	3174	2971
Lewis	LeA-LeX	169	160	127	142	202	200
Lewis	LeB	331	108	148	100	243	103
lewis	LeC-Sp - 06	547	2783	4266	8124	802	506
Lewis	LeC-Sp - 07	222	2626	4590	10479	713	289
Lewis	LeC-Sp - 15	278	5667	7250	16108	1204	960
Lewis	LeX (dimeric)	8226	21217	13207	20757	15521	20130
Lewis	LeX (monomeric)	7065	13797	8732	16163	12380	19129
Lewis	LeY	578	2544	859	919	903	703
Lewis	MFLNH I	472	1051	327	841	992	637

Lewis	MFLNH III	233	227	1153	208	373	223
Lewis	MSMFLNH I	158	119	127	161	153	100
Lewis	MSMFLnNH	285	323	126	118	613	379
Lewis	Sialyl LeA	291	131	100	101	131	100
Lewis	Sialyl LeX	399	717	691	1329	1620	814
Lewis+Sia	Fuc, Sia-LNnH-APD-HSA	145	105	218	108	113	102
N-linked	GlcNAc-Man3	241	413	589	300	493	355
N-linked	GlcNAc-Man5	288	199	555	177	296	438
N-linked	Hybrid-M5N4B	244	305	249	194	286	247
N-linked	LacNAc-Man5	213	385	386	244	466	531
N-linked	Man1 - 04	301	270	380	462	614	309
N-linked	Man1 - 12	1477	3094	3220	3164	4866	5592
N-linked	Man3	217	154	175	111	187	199
N-linked	Man5	265	231	223	118	166	211
N-linked	Man6 - I	240	260	206	159	262	259
N-linked	Man6 - II	334	343	354	294	427	343
N-linked	Man7D1	451	755	497	255	468	831
N-linked	Man7D3	544	945	679	877	743	914
N-linked	Man8D1D3	1208	1605	1170	1785	1480	1983
N-linked	Man9	373	379	261	229	278	381
N-linked	NA2	255	162	102	132	210	171

N-linked	NA3	437	335	128	130	221	180
N-linked	NA4	308	378	152	228	191	424
N-linked	NGA2	239	244	223	151	314	226
N-linked	NGA2B	161	112	150	316	158	180
N-linked	NGA3	274	190	267	184	249	204
N-linked	NGA3B	251	997	231	532	881	345
N-linked	NGA4	227	781	280	285	312	386
N-linked	NGA4(B)2	353	6114	627	2718	3523	784
N-linked	NGA5B	265	4563	585	2040	2252	579
non-human	alpha-Gal tetra - 04	172	133	167	388	128	122
non-human	alpha-Gal tetra - 17	123	100	100	103	110	104
non-human	Ara5	6199	2985	13765	8504	2869	9297
non-human	B6 di - 06	201	156	295	162	285	645
non-human	B6 di - 16	227	149	180	329	347	109
non-human	Bdi	582	677	622	1167	6491	522
non-human	Cellobiose	5738	13242	22439	41987	12489	17848
non-human	Cellotriose	1814	9889	11786	1529	4425	10074
non-human	Chito 3	1006	2507	2131	1905	2862	1563
non-human	Chito 3 - 20	7947	11362	14920	14334	13832	16007
non-human	Forssman Di - 04	268	178	272	993	240	892
non-human	Forssman Di - 21	1662	1276	2704	38797	1910	28518

non-human	Forssman Di - 31	2207	1566	3872	41216	2652	32585
non-human	Forssman Tetra-BSA - 05	222	101	151	200	171	195
non-human	Forssman Tetra-BSA - 13	251	126	203	1030	218	1132
non-human	Fuc-b - 04	628	1164	1129	8802	1451	1051
non-human	Fuc-b - 22	603	2743	3741	36881	4447	1495
non-human	G2M4	139	176	130	209	585	253
non-human	Gala1-2Gal	391	321	500	159	341	430
non-human	Galb1-4Gal	403	364	206	247	3155	1357
non-human	Galb1-6Man-a	5314	13811	2002	32918	9631	8256
non-human	Manb4	4282	3519	3359	8245	5625	13880
non-human	Rha-a	3603	5220	6200	38316	9287	17743
non-human	Rha-b	48367	35499	19171	90342	44251	45162
non-human	X3Glc4	708	3595	4302	1522	4401	953
non-human	Xylb4	9654	13338	17395	17486	14411	22911
non-human-aGal	alphaGal	279	198	381	251	914	402
non-human-aGal	alphaGal-6-deoxy	115	101	151	110	138	103
non-human-aGal	Gal3	197	166	182	131	351	158
non-human-aGal	Gala3-type1	198	108	113	126	163	102
non-human-aGal	Galilli	174	108	199	126	165	104
peptide	Ac-S-S-S-G	190	319	286	276	509	460
peptide	Ac-S-Thr-S-G - 18	217	297	335	374	452	656

peptide	GTSSASTGHATPLPVTD	323	306	480	628	1130	319
peptide-GlcNAca	Ac-S-Ser(GlcNAca)-S-G - 07	10184	7706	2232	1613	4823	6350
peptide-GlcNAca	Ac-S-Ser(GlcNAca)-S-G - 24	24531	11891	4498	10416	12358	12502
peptide-GlcNAcb	Ac-S-Ser(GlcNAcb)-S-G - 07	497	2571	245	4286	997	359
peptide-GlcNAcb	Ac-S-Ser(GlcNAcb)-S-G - 24	19402	19809	6275	28992	20332	16161
peptide-TF	Ac-S-TF(Ser)-S-G - 04	326	169	277	135	386	199
peptide-TF	Ac-S-TF(Ser)-S-G - 16	220	100	136	151	287	100
peptide-TF	Ac-S-TF(Ser)-S-G - 28	256	104	215	324	347	113
peptide-TF	Ac-TF(Ser)-G - 04	383	353	447	231	539	527
peptide-TF	Ac-TF(Ser)-G - 24	167	184	111	497	464	300
peptide-TF	GTSSAS-TF(Thr)-GHATPLPVTD	366	142	215	275	412	151
peptide-TF	GTSSASTGHA-TF(Thr)-PLPVTD	246	1770	2100	1598	2098	1157
peptide-TF	GTSSA-TF(Ser)-TF(Thr)-GHATPLPVTD	153	160	265	715	923	324
peptide-TF	GTSSA-TF(Ser)-TGHATPLPVTD	211	306	419	940	1628	489
peptide-Tn	Ac-A-Tn(Thr)-S-G - 05	745	3345	1094	9470	3254	45617
peptide-Tn	Ac-A-Tn(Thr)-S-G - 23	1494	7441	2469	17522	6391	51680
peptide-Tn	Ac-G-V-Tn(Thr)-S-A-G - 04	471	466	308	615	1025	10096
peptide-Tn	Ac-G-V-Tn(Thr)-S-A-G - 21	565	1449	634	2476	2240	19301
peptide-Tn	Ac-P-Tn(Thr)-T-G - 05	821	2212	791	1768	2027	9979
peptide-Tn	Ac-P-Tn(Thr)-T-G - 08	1404	4541	1261	5292	3037	20415

peptide-Tn	Ac-P-Tn(Thr)-T-G - 22	2301	9651	3053	19715	6558	35204
peptide-Tn	Ac-S-Tn(Ser)-S-G - 04	394	1748	254	7226	3995	21424
peptide-Tn	Ac-S-Tn(Ser)-S-G - 22	4620	8616	10796	44705	17934	127126
peptide-Tn	Ac-S-Tn(Ser)-S-G - 33	5480	13592	13872	48969	19684	121501
peptide-Tn	Ac-S-Tn(Thr)-A-G - 04	323	678	464	872	513	14320
peptide-Tn	Ac-S-Tn(Thr)-A-G - 08	1373	8564	2968	19345	6174	64633
peptide-Tn	Ac-S-Tn(Thr)-A-G - 22	3026	25470	6718	39645	14783	92308
peptide-Tn	Ac-S-Tn(Thr)-G-G - 03	563	2085	671	13205	2347	58734
peptide-Tn	Ac-S-Tn(Thr)-G-G - 07	807	3726	1603	21437	5187	75983
peptide-Tn	Ac-S-Tn(Thr)-G-G - 19	1138	5464	1880	17270	5193	57758
peptide-Tn	Ac-S-Tn(Thr)-S-G - 04	915	1729	923	12589	1857	45191
peptide-Tn	Ac-S-Tn(Thr)-S-G HSA-04	320	1216	420	5187	892	36760
peptide-Tn	Ac-S-Tn(Thr)-S-G HSA-23	1742	12817	4698	35642	10403	87200
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 05	275	466	517	4308	789	28838
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 09	352	761	731	5046	1220	26627
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 22	930	3795	4267	25924	5330	68708
peptide-Tn	Ac-S-Tn(Thr)-V-G - 04	909	2379	1151	4172	1482	14862
peptide-Tn	Ac-S-Tn(Thr)-V-G - 22	2581	9917	4261	22356	5372	55694
peptide-Tn	Ac-Tn(Ser)Tn(Ser)Tn(Ser)-G - 03	243	180	139	187	380	2815
peptide-Tn	Ac-Tn(Ser)-Tn(Ser)-Tn(Ser)-G -	1055	3792	2540	15523	9378	56261

	16						
peptide-Tn	Ac-Tn(Ser)Tn(Ser)Tn(Ser)-G -						
	27	2983	5488	6424	27776	15650	86997
peptide-Tn	Ac-Tn(Thr)-G - 21	4883	12286	11549	42914	16200	99715
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G -						
	05	318	232	262	542	565	6086
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G -						
	08	219	236	318	2765	1089	23155
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G -						
	20	591	720	1184	9112	2648	34948
peptide-Tn	Ac-T-Tn(Thr)-P-G - 04	307	398	276	2266	842	4641
peptide-Tn	Ac-T-Tn(Thr)-P-G - 08	310	244	212	3097	920	5278
peptide-Tn	Ac-T-Tn(Thr)-P-G - 21	1181	3529	1044	28275	6900	42175
peptide-Tn	Ac-V-Tn(Thr)-S-G - 04	431	689	436	1505	1015	19382
peptide-Tn	Ac-V-Tn(Thr)-S-G - 08	911	2293	831	8680	3970	45208
peptide-Tn	Ac-V-Tn(Thr)-S-G - 19	1801	8509	2966	31053	11712	76953
peptide-Tn	R-Tn(Ser)-Tn-						
	hydroxyethylamide	10458	15907	16976	51959	12310	111598
y-glycoprotein	AGE60	442	117	143	290	564	642
y-glycoprotein	Alpha-1-acid glycoprotein	248	104	131	100	125	114
y-glycoprotein	Alpha-fetoprotein	201	205	242	143	235	295

y-glycoprotein	BSM	1753	912	2060	1369	1599	1585
y-glycoprotein	BSM (asialo)	1152	1027	903	758	1733	4147
y-glycoprotein	BSM (deacetylated)	1253	289	609	861	859	487
y-glycoprotein	BSM (ox)	283	100	136	153	140	101
y-glycoprotein	FABP	1201	785	931	781	1833	1520
y-glycoprotein	fetuin	137	109	100	100	188	115
y-glycoprotein	fetuin (asialo)	158	127	104	100	208	110
y-glycoprotein	Fetuin (ox)	161	100	102	100	122	100
y-glycoprotein	glycophorin (asialo)	319	165	126	316	288	295
y-glycoprotein	Glycophorin A	206	173	133	261	187	530
y-glycoprotein	hsp90	205	202	134	135	225	218
y-glycoprotein	KLH	328	192	110	100	190	136
y-glycoprotein	KLH (oxidized)	129	144	120	123	113	186
y-glycoprotein	OSM	179	278	432	1311	342	5942
y-glycoprotein	OSM (asialo)	1098	5780	3195	7408	6345	46416
y-glycoprotein	OSM (ox)	208	100	100	104	118	112
y-glycoprotein	ovalbumin	206	230	256	136	221	123
y-glycoprotein	Ovalbumin (ox)	244	168	182	144	395	186
y-glycoprotein	PSA	343	397	389	471	1102	814
y-glycoprotein	Tgl	258	299	201	136	222	375
z-control	BSA	275	207	271	175	331	213

z-control	BSA - C5 (Alkyne) - 10	231	357	217	682	618	273
z-control	BSA - C5 (Alkyne) - 23	435	941	366	2212	2305	533
z-control	Cy3	2576	4026	4620	6603	5146	2937
z-control	Cy5	52446	66286	60739	75705	66885	73480
z-control	HSA	687	712	1096	553	1392	1261
z-control	HSA (recomb)	499	186	309	195	750	585
z-control	PEG-linker	272	307	338	192	511	285
z-control	Triazole linker from Xuefei	1132	4027	32381	26570	16370	5691

b) IgG binding results

anti-IgG	**vaccination group =**	**PRE**	**Qb-propanol**	**Qb-Glc**	**Qb-Tn 1ug**	**Qb-Tn 4ug**	**Qb-Tn 20ug**
Family	**Array component**	AVE	AVE	AVE	AVE	AVE	AVE
Blood Group A	2'F-A type 2-Sp - 05	100	1218	165	432	1706	271
Blood Group A	2'F-A type 2-Sp - 13	100	3604	297	1225	2536	451
Blood Group A	A tetra type 1-Sp - 05	100	2019	190	221	368	470
Blood Group A	A tetra type 1-Sp - 15	100	2054	225	318	638	298
Blood Group A	A tetra type 2-Sp - 05	100	1088	145	190	329	156

Blood Group A	A tetra type 2-Sp - 07	100	2043	210	454	460	239
Blood Group A	A tetra type 2-Sp - 17	100	6131	614	888	2679	538
Blood Group A	Adi - 04	100	407	184	588	248	567
Blood Group A	Adi - 17	100	3124	594	1250	903	5786
Blood Group A	A-LeB hexa	100	344	144	236	168	192
Blood Group A	BG-A	100	2256	704	497	389	991
Blood Group A	BG-A1	100	189	140	160	131	126
Blood Group A	Globo A	17376	43700	29865	44761	34965	38851
Blood Group B	2'F-B type 2-Sp - 03	100	796	141	125	231	240
Blood Group B	2'F-B type 2-Sp - 07	100	2127	348	596	652	670
Blood Group B	2'F-B type 2-Sp - 15	100	1173	145	422	463	317
Blood Group B	B tetra type 1-Sp - 04	100	2167	214	477	736	616
Blood Group B	B tetra type 1-Sp - 16	100	2021	268	548	823	352
Blood Group B	B tetra type 2-Sp - 05	100	1339	132	242	689	183
Blood Group B	B tetra type 2-Sp - 07	100	3045	387	460	1327	477
Blood Group B	B tetra type 2-Sp - 20	100	3510	274	695	1309	368
Blood Group B	BG-B (Dextra)	100	11237	483	1455	770	1234
Blood Group H	2'FucLac (BG-H6)	100	244	173	199	174	189
Blood Group H	BG-H1	100	285	139	180	216	197
Blood Group H	BG-H2	100	205	290	173	198	157
Blood Group H	Globo H	101	925	1230	577	1427	424

Blood Group H	Sia-LNF V	100	211	146	177	135	144
Blood Group H	TFiLNO(1-2,1-2,1-3)	100	313	173	254	167	191
Blood Group H	TFiLNO(1-2,1-2,1-4)	100	373	172	167	171	246
carb-Fuc	Fuc-a - 04	100	494	206	334	293	282
carb-Fuc	Fuc-a - 22	100	4453	1101	1521	817	947
carb-Gal	Gal-a	100	11983	3137	3183	1525	1474
carb-Gal	Gala1-4Galb	1406	7892	1916	1558	4547	4923
carb-Gal	Gal-b	102	7093	13001	2385	2369	1060
Carb-Gal	Lactose	100	379	116	172	239	147
Carb-Gal	Lactose-C5 - 05	100	18968	2338	6205	9245	10324
Carb-Gal	Lactose-C5 - 14	100	30397	2610	9245	15153	15279
carb-GalNAc	GalNAc-a - 04	100	429	200	4525	329	880
carb-GalNAc	GalNAc-a - 22	100	5147	3250	15206	4296	15806
carb-GalNAc	GalNAca1-6Galb - 04	100	653	208	2695	405	1355
carb-GalNAc	GalNAca1-6Galb - 22	100	1445	751	31098	1770	12680
carb-GalNAc	GalNAc-b	101	3579	1127	1170	1288	2892
carb-GalNAc	LDN-Sp - 05	100	2236	182	324	689	181
carb-GalNAc	LDN-Sp - 14	101	4827	460	1074	1898	898
carb-Glc	Glc-a	100	10707	40088	2901	1371	1616
carb-Glc	Glc-a - 05	100	725	13610	689	193	237
carb-Glc	Glca1-6Glca1-4Glca1-4Glcb	100	262	123	179	205	208

carb-Glc	Glc-b	103	12476	68424	3454	2524	1487
carb-Glc	Isomaltose	101	937	455	834	579	366
carb-Glc	Maltopentaose	100	327	112	177	143	172
carb-Glc	Maltose	100	8716	1201	2544	944	781
carb-GlcNAc	3'GN type1-Sp - 04	100	3510	357	547	1108	355
carb-GlcNAc	3'GN-Di-LacNAc-Sp - 06	107	1313	417	696	875	423
carb-GlcNAc	3'GN-Di-LacNAc-Sp - 14	146	1772	564	643	977	442
carb-GlcNAc	GlcNAca1-4Galb - 03	100	325	183	264	222	271
carb-GlcNAc	GlcNAca1-4Galb - 20	103	1120	303	671	344	390
carb-GlcNAc	GlcNAc-b	538	3179	4376	1201	2435	1928
carb-GlcNAc	GNLacNAc-Sp - 06	100	2136	384	713	975	359
carb-GlcNAc	GNLacNAc-Sp - 16	102	4979	827	1136	2451	777
carb-GlcNAc	LNT-2-Sp - 06	100	5538	729	1443	2453	1729
carb-GlcNAc	LNT-2-Sp - 15	100	13260	932	2023	3385	1540
carb-Man	Man-a	100	6921	1015	2013	1077	1299
carb-Man	Man-a - 05	100	1143	230	868	210	417
carb-Man	Mana1-6Man-a	100	862	299	919	680	382
carb-Man	Mana1-6Man-a - 04	100	565	166	914	230	236
carb-Man	ManT	100	465	224	202	685	243
carb-Sia	3'KDNLacNAc-Sp - 05	100	2725	210	659	1123	264
carb-Sia	3'KDNLacNAc-Sp - 12	100	4217	292	699	1214	588

carb-Sia	3'-KDNLeC-Sp - 04	100	2500	445	612	935	514
carb-Sia	3'-KDNLeC-Sp - 12	100	2143	354	490	878	373
carb-Sia	3'S(Gc)LacNAc-Sp - 06	100	2049	240	296	670	188
carb-Sia	3'S(Gc)LacNAc-Sp - 10	103	3710	369	651	1254	419
carb-Sia	3'S(Gc)LeC-Sp - 05	100	2466	349	430	834	160
carb-Sia	3'S(Gc)LeC-Sp - 12	100	2397	402	640	891	213
carb-Sia	3'S-Di-LacNAc-Sp - 06	100	999	110	201	329	130
carb-Sia	3'S-Di-LacNAc-Sp - 13	105	1334	150	255	588	171
carb-Sia	3'Sia-3-FL	100	221	157	184	145	177
carb-Sia	3'SLacNAc	100	321	195	197	356	217
carb-Sia	3'SLacNAc-Sp - 05	100	2823	428	433	842	324
carb-Sia	3'SLacNAc-Sp - 10	100	3355	407	646	1202	333
carb-Sia	3'SLDN-Sp - 05	100	1799	171	283	702	183
carb-Sia	3'SLDN-Sp - 11	100	3089	289	540	1044	300
carb-Sia	3'SLeC-Sp - 05	100	1874	345	575	723	416
carb-Sia	3'SLeC-Sp - 12	100	3030	405	696	1225	352
carb-Sia	6'S(Gc)LacNAc-Sp - 05	100	2269	244	356	594	269
carb-Sia	6'S-Di-LacNAc-Sp - 05	100	1524	163	271	448	193
carb-Sia	6'S-Di-LacNAc-Sp - 13	100	1418	162	363	841	175
carb-Sia	6'SLac	100	304	164	202	167	212
carb-Sia	6'SLacNAc-Sp - 05	100	7455	1333	1790	2665	2228

carb-Sia	6'SLacNAc-Sp - 11	100	2456	226	495	733	268
carb-Sia	6'SLDN-Sp - 05	102	1621	234	304	617	379
carb-Sia	6'SLDN-Sp - 13	100	2775	413	581	992	505
carb-Sia	9OAc3'SLacNAc-Sp - 04	100	2779	407	597	889	484
carb-Sia	9OAc3'SLacNAc-Sp - 10	100	3755	436	602	1217	341
carb-Sia	9OAc3'SLeC-Sp - 05	100	1943	332	354	718	169
carb-Sia	9OAc3'SLeC-Sp - 12	100	3697	456	825	1284	448
carb-Sia	CT/Sda-Sp - 05	100	4436	230	521	908	293
carb-Sia	CT/Sda-Sp - 13	100	6658	276	941	2001	645
carb-Sia	DSLNT	100	199	126	179	130	130
carb-Sia	LSTa	100	146	114	148	127	145
carb-Sia	LSTb	100	146	116	149	121	147
carb-Sia	LSTc	100	191	127	152	132	164
carb-Sia	Sia-LNnT	100	218	131	199	125	137
carb-type 1	iLNO	100	312	171	220	194	180
carb-type 1	LNT - 05	100	218	145	189	147	187
carb-type 1	LNT - 21	100	149	424	196	124	153
carb-type 1	LNT-Sp - 06	100	2093	252	444	587	292
carb-type 1	LNT-Sp - 15	100	2799	635	507	1169	276
carb-type 1	MFiLNO(1-3)	100	219	225	214	130	172
carb-type 1	pLNH - 07	100	272	143	213	148	157

carb-type 1	pLNH - 21	100	165	406	231	125	136
carb-type 1+2	LNH - 13	100	257	132	151	133	146
carb-type 2	Di-LacNAc-Sp - 06	100	1694	237	294	462	192
carb-type 2	Di-LacNAc-Sp - 16	100	2367	314	461	914	255
carb-type 2	LacNAc	100	340	354	202	667	242
carb-type 2	LacNAc (trimeric)	100	205	102	173	143	154
carb-type 2	LacNAc-Sp - 06	100	4627	343	816	1500	400
carb-type 2	LacNAc-Sp - 15	100	8243	611	1231	2335	847
carb-type 2	LNnH - 11	100	282	113	155	141	162
carb-type 2	LNnT - 04	100	277	123	165	169	194
carb-type 2	LNnT - 14	100	199	117	156	127	138
GAG	Hep-5000	100	331	170	252	173	256
GAG	Hep-N-acetylated	100	366	160	259	200	252
GAG	Hya8	100	424	205	233	205	229
GAG	Hya9	100	261	261	269	169	145
glycolipid	Fuc-GM1a - 08	100	685	314	292	230	340
glycolipid	GA1 - 06	100	210	147	166	171	202
glycolipid	GA1 - 20	100	183	115	204	149	128
glycolipid	GA1di	100	177	177	157	154	114
glycolipid	GA2di - 16	100	4824	3069	1522	1460	535
glycolipid	GA2di - 37	100	10611	4624	2635	2104	1121

glycolipid	GA2di (accurate)	100	426	159	169	230	171
glycolipid	Gb4	100	199	136	154	161	176
glycolipid	Gb4 tetra (P1 tetra)-Sp - 06	100	2291	359	352	998	267
glycolipid	Gb4 tetra (P1 tetra)-Sp - 15	100	1333	301	354	1163	282
glycolipid	Gb5/SSEA3 - 04	100	294	181	244	147	186
glycolipid	Gb5/SSEA3 - 12	100	235	140	296	145	164
glycolipid	GD1a-Sp - 05	100	2109	226	321	961	156
glycolipid	GD1a-Sp - 10	100	1714	172	365	961	261
glycolipid	GD1b	100	201	137	182	111	150
glycolipid	GD2-Sp - 04	100	3988	262	479	1107	523
glycolipid	GD2-Sp - 10	100	157	127	173	118	220
glycolipid	GD3-Sp - 04	100	2573	308	438	800	398
glycolipid	GD3-Sp - 08	100	7742	751	1161	2854	740
glycolipid	GM1a	100	179	115	141	123	168
glycolipid	GM2-Sp - 04	100	2999	200	247	939	231
glycolipid	GM2-Sp - 07	100	3002	231	521	1025	353
glycolipid	GM2-Sp - 14	100	1794	157	283	571	214
glycolipid	GM3	100	302	182	232	184	232
glycolipid	GM3(Gc)-Sp - 05	100	3665	286	427	1210	267
glycolipid	GM3(Gc)-Sp - 14	100	12769	777	2028	4339	998
glycolipid	GM3-Sp - 04	100	4209	342	578	1085	506

glycolipid	GM3-Sp - 11	100	8884	473	1458	2729	755
glycolipid	GQ2-Sp - 03	100	2870	157	402	592	219
glycolipid	GQ2-Sp - 06	100	2478	133	425	562	230
glycolipid	GT2-Sp - 03	120	2275	287	455	851	362
glycolipid	GT2-Sp - 08	100	3576	198	476	1289	356
glycolipid	GT3-Sp - 03	100	4078	199	361	867	281
glycolipid	GT3-Sp - 07	100	2164	144	269	419	133
glycolipid	P1	100	398	382	179	260	369
glycolipid	Pk or Gb3	100	254	289	255	191	166
glycolipid	SSEA-4-Sp - 05	100	2078	233	333	811	216
glycolipid	SSEA-4-Sp - 12	100	1360	223	381	756	270
Lewis	3'-sulpho-LeA	100	227	148	204	143	169
Lewis	3'-sulpho-LeX	100	407	185	348	184	315
Lewis	6'-sulpho-LeA	100	468	151	213	196	188
Lewis	6'-sulpho-LeX	100	945	237	422	643	537
Lewis	DFLNH(c)	100	222	146	241	127	139
Lewis	DFLNnH	100	285	174	238	335	348
Lewis	DFpLNH I	100	153	104	149	120	112
Lewis	Di-LeC-Sp - 06	100	1334	280	375	558	366
Lewis	Di-LeC-Sp - 16	100	3633	436	780	1408	410
Lewis	LeA	100	472	313	250	332	220

Lewis	LeA-LeX	100	176	141	192	123	138
Lewis	LeB	100	270	148	208	145	140
lewis	LeC-Sp - 06	100	4182	343	637	1130	441
Lewis	LeC-Sp - 07	100	4507	439	906	1148	405
Lewis	LeC-Sp - 15	100	10307	694	1852	2965	1353
Lewis	LeX (dimeric)	101	1013	955	483	1292	479
Lewis	LeX (monomeric)	100	1034	608	404	817	508
Lewis	LeY	100	402	223	208	217	296
Lewis	MFLNH I	100	408	137	238	160	129
Lewis	MFLNH III	100	283	154	296	143	191
Lewis	MSMFLNH I	100	211	114	153	130	134
Lewis	MSMFLnNH	100	180	125	185	134	124
Lewis	Sialyl LeA	100	284	147	206	147	151
Lewis	Sialyl LeX	100	562	274	293	400	362
Lewis+Sia	Fuc, Sia-LNnH-APD-HSA	100	198	133	186	128	157
N-linked	GlcNAc-Man3	100	371	158	316	204	279
N-linked	GlcNAc-Man5	100	331	156	194	176	231
N-linked	Hybrid-M5N4B	100	382	206	252	195	278
N-linked	LacNAc-Man5	100	312	194	217	181	254
N-linked	Man1 - 04	100	592	244	296	248	346
N-linked	Man1 - 12	100	284	184	235	292	201

N-linked	Man3	100	232	123	155	149	183
N-linked	Man5	100	238	130	165	147	140
N-linked	Man6 - I	100	300	149	197	158	187
N-linked	Man6 - II	100	252	140	215	178	184
N-linked	Man7D1	100	211	128	129	138	155
N-linked	Man7D3	100	196	136	168	138	158
N-linked	Man8D1D3	100	177	146	151	127	145
N-linked	Man9	100	266	110	270	183	189
N-linked	NA2	100	228	115	165	134	234
N-linked	NA3	100	217	129	169	130	157
N-linked	NA4	100	206	116	154	137	161
N-linked	NGA2	100	258	117	181	142	162
N-linked	NGA2B	100	207	125	216	147	172
N-linked	NGA3	100	281	149	180	180	212
N-linked	NGA3B	100	263	124	154	185	196
N-linked	NGA4	100	219	125	171	142	140
N-linked	NGA4(B)2	100	513	162	235	308	173
N-linked	NGA5B	100	421	151	262	289	214
non-human	alpha-Gal tetra - 04	100	197	130	185	140	196
non-human	alpha-Gal tetra - 17	100	253	170	235	137	144
non-human	Ara5	107	476	937	253	356	590

non-human	B6 di - 06	100	451	176	229	177	231
non-human	B6 di - 16	100	281	112	299	154	192
non-human	Bdi	100	396	240	279	719	261
non-human	Cellobiose	100	3027	2257	1447	1173	554
non-human	Cellotriose	100	452	921	219	503	302
non-human	Chito 3	100	221	216	376	240	174
non-human	Chito 3 - 20	109	462	625	1758	754	373
non-human	Forssman Di - 04	100	330	134	361	196	319
non-human	Forssman Di - 21	100	791	258	1167	366	1186
non-human	Forssman Di - 31	100	1290	306	1002	446	2011
non-human	Forssman Tetra-BSA - 05	100	362	172	294	179	252
non-human	Forssman Tetra-BSA - 13	100	158	128	259	129	214
non-human	Fuc-b - 04	100	593	265	399	325	334
non-human	Fuc-b - 22	100	12032	1248	2165	1358	1542
non-human	G2M4	100	207	132	158	184	130
non-human	Gala1-2Gal	100	372	231	296	256	303
non-human	Galb1-4Gal	100	261	124	202	276	177
non-human	Galb1-6Man-a	123	903	328	832	1396	412
non-human	Manb4	163	325	308	278	388	421
non-human	Rha-a	831	8560	2005	4642	3602	3779
non-human	Rha-b	431	13605	1766	1889	3797	3098

non-human	X3Glc4	100	492	318	188	401	187
non-human	Xylb4	100	839	1232	437	741	575
non-human-aGal	alphaGal	100	263	144	183	203	205
non-human-aGal	alphaGal-6-deoxy	100	209	134	239	121	117
non-human-aGal	Gal3	100	215	137	155	139	145
non-human-aGal	Gala3-type1	100	199	145	205	136	159
non-human-aGal	Galilli	100	240	166	178	138	165
peptide	Ac-S-S-S-G	100	471	191	162	285	1483
peptide	Ac-S-Thr-S-G - 18	100	397	174	250	244	584
peptide	GTSSASTGHATPLPVTD	100	379	560	279	290	372
peptide-GlcNAca	Ac-S-Ser(GlcNAca)-S-G - 07	128	552	403	496	434	633
peptide-GlcNAca	Ac-S-Ser(GlcNAca)-S-G - 24	129	621	491	475	863	1762
peptide-GlcNAcb	Ac-S-Ser(GlcNAcb)-S-G - 07	100	387	165	343	186	302
peptide-GlcNAcb	Ac-S-Ser(GlcNAcb)-S-G - 24	102	736	284	691	832	1320
peptide-TF	Ac-S-TF(Ser)-S-G - 04	100	276	156	193	176	233
peptide-TF	Ac-S-TF(Ser)-S-G - 16	100	183	106	148	120	185
peptide-TF	Ac-S-TF(Ser)-S-G - 28	100	146	101	163	114	195
peptide-TF	Ac-TF(Ser)-G - 04	100	297	157	200	190	317
peptide-TF	Ac-TF(Ser)-G - 24	100	233	125	191	162	386
peptide-TF	GTSSAS-TF(Thr)-GHATPLPVTD	100	524	364	286	252	266
peptide-TF	GTSSASTGHA-TF(Thr)-PLPVTD	100	1525	3007	1104	1462	3402

peptide-TF	GTSSA-TF(Ser)-TF(Thr)-GHATPLPVTD	100	434	1892	280	390	792
peptide-TF	GTSSA-TF(Ser)-TGHATPLPVTD	100	640	1920	332	609	920
peptide-Tn	Ac-A-Tn(Thr)-S-G - 05	100	452	216	442	413	3373
peptide-Tn	Ac-A-Tn(Thr)-S-G - 23	100	523	193	510	610	5851
peptide-Tn	Ac-G-V-Tn(Thr)-S-A-G - 04	100	556	304	329	303	3958
peptide-Tn	Ac-G-V-Tn(Thr)-S-A-G - 21	100	399	162	1416	345	8016
peptide-Tn	Ac-P-Tn(Thr)-T-G - 05	100	386	150	232	644	14505
peptide-Tn	Ac-P-Tn(Thr)-T-G - 08	100	425	196	350	1265	19810
peptide-Tn	Ac-P-Tn(Thr)-T-G - 22	100	593	218	656	3013	31011
peptide-Tn	Ac-S-Tn(Ser)-S-G - 04	100	430	162	428	772	727
peptide-Tn	Ac-S-Tn(Ser)-S-G - 22	100	1004	903	6665	3436	4937
peptide-Tn	Ac-S-Tn(Ser)-S-G - 33	100	831	446	6512	4126	4107
peptide-Tn	Ac-S-Tn(Thr)-A-G - 04	100	283	137	207	196	1672
peptide-Tn	Ac-S-Tn(Thr)-A-G - 08	100	554	209	606	872	7683
peptide-Tn	Ac-S-Tn(Thr)-A-G - 22	112	787	373	1026	2266	16960
peptide-Tn	Ac-S-Tn(Thr)-G-G - 03	100	479	185	455	1146	13859
peptide-Tn	Ac-S-Tn(Thr)-G-G - 07	100	562	171	601	2267	18637
peptide-Tn	Ac-S-Tn(Thr)-G-G - 19	100	714	176	539	2292	20660
peptide-Tn	Ac-S-Tn(Thr)-S-G - 04	100	406	150	463	351	2342
peptide-Tn	Ac-S-Tn(Thr)-S-G HSA-04	100	369	153	392	261	1811
peptide-Tn	Ac-S-Tn(Thr)-S-G HSA-23	107	540	253	812	1259	6894

peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 05	100	297	152	314	262	3751
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 09	100	261	157	286	253	3599
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 22	100	284	181	598	686	10314
peptide-Tn	Ac-S-Tn(Thr)-V-G - 04	100	416	265	385	358	1085
peptide-Tn	Ac-S-Tn(Thr)-V-G - 22	100	1308	503	764	745	2691
peptide-Tn	Ac-Tn(Ser)Tn(Ser)Tn(Ser)-G - 03	100	463	174	352	441	458
peptide-Tn	Ac-Tn(Ser)-Tn(Ser)-Tn(Ser)-G - 16	100	443	212	705	1474	2007
peptide-Tn	Ac-Tn(Ser)Tn(Ser)Tn(Ser)-G - 27	100	437	291	1004	2560	3154
peptide-Tn	Ac-Tn(Thr)-G - 21	100	823	612	9524	6072	32480
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G - 05	100	225	115	186	172	1156
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G - 08	100	183	122	362	257	1758
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G - 20	100	187	131	386	243	3398
peptide-Tn	Ac-T-Tn(Thr)-P-G - 04	100	309	141	345	224	543
peptide-Tn	Ac-T-Tn(Thr)-P-G - 08	100	251	140	289	222	764
peptide-Tn	Ac-T-Tn(Thr)-P-G - 21	100	364	144	1030	845	2811
peptide-Tn	Ac-V-Tn(Thr)-S-G - 04	100	351	166	246	326	5982
peptide-Tn	Ac-V-Tn(Thr)-S-G - 08	100	388	190	464	821	12298
peptide-Tn	Ac-V-Tn(Thr)-S-G - 19	100	548	199	823	2283	19963
peptide-Tn	R-Tn(Ser)-Tn-hydroxyethylamide	101	834	840	36770	30487	28729
y-glycoprotein	AGE60	100	232	165	161	147	236
y-glycoprotein	Alpha-1-acid glycoprotein	100	248	103	294	144	201

y-glycoprotein	Alpha-fetoprotein	100	267	211	168	156	170
y-glycoprotein	BSM	100	143	169	170	143	113
y-glycoprotein	BSM (asialo)	100	208	125	208	179	144
y-glycoprotein	BSM (deacetylated)	100	198	123	180	151	139
y-glycoprotein	BSM (ox)	100	222	111	202	141	164
y-glycoprotein	FABP	101	372	294	303	385	309
y-glycoprotein	fetuin	100	136	126	146	113	102
y-glycoprotein	fetuin (asialo)	100	160	101	175	133	128
y-glycoprotein	Fetuin (ox)	100	197	128	142	136	128
y-glycoprotein	glycophorin (asialo)	100	252	154	442	218	327
y-glycoprotein	Glycophorin A	100	289	149	151	179	138
y-glycoprotein	hsp90	100	238	147	225	159	190
y-glycoprotein	KLH	100	215	120	224	163	183
y-glycoprotein	KLH (oxidized)	100	205	156	175	135	125
y-glycoprotein	OSM	100	139	100	112	109	176
y-glycoprotein	OSM (asialo)	100	257	255	181	454	627
y-glycoprotein	OSM (ox)	100	223	132	162	133	109
y-glycoprotein	ovalbumin	100	267	168	201	168	176
y-glycoprotein	Ovalbumin (ox)	100	241	151	198	182	160
y-glycoprotein	PSA	100	243	175	189	390	192
y-glycoprotein	Tgl	100	247	122	212	156	174

z-control	BSA	100	256	156	243	178	201
z-control	BSA - C5 (Alkyne) - 10	100	798	192	357	341	434
z-control	BSA - C5 (Alkyne) - 23	100	7540	225	1008	3652	4736
z-control	Cy3	19717	20427	19987	17032	19602	19957
z-control	Cy5	1771	2681	2473	1807	2604	2231
z-control	HSA	101	654	480	341	416	474
z-control	HSA (recomb)	100	284	188	195	209	308
z-control	PEG-linker	100	403	211	236	218	284
z-control	Triazole linker from Xuefei	101	112414	67406	97386	92479	119813

c) Description of microarray components

Family	**Array component**	**Description**	**Linker**	**Core**	**Sugar Ratio**
Blood Group A	2'F-A type 2-Sp - 05	GalNAca1-3[Fuca1-2]Galb1-4[Fuca1-3]GlcNAcb-Sp	Sp	BSA	5
Blood Group A	2'F-A type 2-Sp - 13	GalNAca1-3[Fuca1-2]Galb1-4[Fuca1-3]GlcNAcb-Sp	Sp	BSA	13
Blood Group A	A tetra type 1-Sp - 05	GalNAca1-3[Fuca1-2]Galb1-3GlcNAcb-Sp	Sp	BSA	5
Blood Group A	A tetra type 1-Sp - 15	GalNAca1-3[Fuca1-2]Galb1-3GlcNAcb-Sp	Sp	BSA	15
Blood Group A	A tetra type 2-Sp - 05	GalNAca1-3[Fuca1-2]Galb1-4GlcNAcb-Sp	Sp	BSA	5
Blood Group A	A tetra type 2-Sp - 07	GalNAca1-3[Fuca1-2]Galb1-4GlcNAcb-Sp	Sp	BSA	7
Blood Group A	A tetra type 2-Sp - 17	GalNAca1-3[Fuca1-2]Galb1-4GlcNAcb-Sp	Sp	BSA	17

Blood Group A	Adi - 04	GalNAca1-3Galb-BSA (Adi)	MEAG	BSA	4
Blood Group A	Adi - 17	GalNAca1-3Galb-BSA (Adi)	MEAG	BSA	17
Blood Group A	A-LeB hexa	GalNAca1-3(Fuca1-2)Galb1-3(Fuca1-4)GlcNAcb1-3Galb1-	(Glc)	BSA	6
Blood Group A	BG-A	GalNAca1-3(Fuca1-2)Galb- -BSA [BG-A]	6 atom spacer	BSA	19
Blood Group A	BG-A1	GalNAca1-3(Fuca1-2)Galb1-3GlcNAcb1-3Galb1-4(Glc)-APD-HSA (BG-A1)	APD	HSA	5
Blood Group A	Globo A	GalNAca1-3(Fuca1-2)Galb1-3GalNAcb1-3Gala1-4Galb1-BSA	(Glc)	BSA	9
Blood Group B	2'F-B type 2-Sp - 03	Gala1-3[Fuca1-2]Galb1-4[Fuca1-3]GlcNAcb-Sp	Sp	BSA	3
Blood Group B	2'F-B type 2-Sp - 07	Gala1-3[Fuca1-2]Galb1-4[Fuca1-3]GlcNAcb-Sp	Sp	BSA	7
Blood Group B	2'F-B type 2-Sp - 15	Gala1-3[Fuca1-2]Galb1-4[Fuca1-3]GlcNAcb-Sp	Sp	BSA	15
Blood Group B	B tetra type 1-Sp - 04	Gala1-3[Fuca1-2]Galb1-3GlcNAcb-Sp	Sp	BSA	4
Blood Group B	B tetra type 1-Sp - 16	Gala1-3[Fuca1-2]Galb1-3GlcNAcb-Sp	Sp	BSA	16
Blood Group B	B tetra type 2-Sp - 05	Gala1-3[Fuca1-2]Galb1-3GlcNAcb-Sp	Sp	BSA	5
Blood Group B	B tetra type 2-Sp - 07	Gala1-3[Fuca1-2]Galb1-4GlcNAcb-Sp	Sp	BSA	7
Blood Group B	B tetra type 2-Sp - 20	Gala1-3[Fuca1-2]Galb1-4GlcNAcb-Sp	Sp	BSA	20
Blood Group B	BG-B (Dextra)	Gala1-3(Fuca1-2)Galb-BSA [BG-B] from Dextra	6 atom spacer	BSA	13
Blood Group H	2'FucLac (BG-H6)	Fuca1-2Galb1-4Glc-BSA	3 atom	BSA	7
Blood Group H	BG-H1	Fuca1-2Galb1-3GlcNAcb1-3Galb1-4Glcb–APD-HSA [BG-H1]	APD-	HSA	20

Blood Group H	BG-H2	Fuca1-2Galb1-4GlcNAcb-HSA (BG-H2)	unknown	HSA	16
Blood Group H	Globo H	Fuca1-2Galb1-3GalNAcb1-3Gala1-4Galb1-BSA	(Glc)	BSA	10
Blood Group H	Sia-LNF V	Fuca1-2Galb1-3(Neu5Aca2-6)GlcNAcb1-3Galb1-APD-HSA	APD	HSA	12 to 15
Blood Group H	TFiLNO(1-2,1-2,1-3)	Fuca1-2Galb1-3GlcNAcb1-3Galb1-4(Fuca1-3)GlcNAcb1-6(Fuca1-2Galb1-3GlcNAcb1-3)Galb-BSA	(Glc)	BSA	4
Blood Group H	TFiLNO(1-2,1-2,1-4)	Fuca1-2Galb1-3GlcNAcb1-3Galb1-4GlcNAcb1-6[Fuca1-2Galb1-3(Fuca1-4)GlcNAcb1-3]Galb-BSA	(Glc)	BSA	6
carb-Fuc	Fuc-a - 04	Fuc-a - BSA	MEAG	BSA	4
carb-Fuc	Fuc-a - 22	Fuc-a - BSA	MEAG	BSA	22
carb-Gal	Gal-a	Gal-a - BSA	MEAG	BSA	24
carb-Gal	Gala1-4Galb	Gala1-4Galb-CETE-BSA	CETE	BSA	11
carb-Gal	Gal-b	Gal-b - BSA	MEAG	BSA	21
Carb-Gal	Lactose	Galb1-4Glcb – BSA (Lac)	unknown	BSA	33
Carb-Gal	Lactose-C5 - 05	Galb1-4Glcb – BSA (Lac)	C5	BSA	5
Carb-Gal	Lactose-C5 - 14	Galb1-4Glcb – BSA (Lac)	C5	BSA	14
carb-GalNAc	GalNAc-a - 04	GalNAc-a - BSA	MEAG		4
carb-GalNAc	GalNAc-a - 22	GalNAc-a - BSA	MEAG	BSA	22
carb-GalNAc	GalNAca1-6Galb - 04	GalNAca1-6Galb-BSA	MEAG		4
carb-GalNAc	GalNAca1-6Galb - 22	GalNAca1-6Galb-BSA	MEAG	BSA	22
carb-GalNAc	GalNAc-b	GalNAc-b - BSA	MEAG	BSA	21
carb-GalNAc	LDN-Sp - 05	GalNAcb1-4GlcNAcb-Sp	Sp	BSA	5

carb-GalNAc	LDN-Sp - 14	GalNAcb1-4GlcNAcb-Sp	Sp	BSA	14
carb-Glc	Glc-a	Glc-a - BSA	MEAG	BSA	22
carb-Glc	Glc-a - 05	Glc-a - BSA	MEAG	BSA	5
carb-Glc	Glca1-6Glca1-4Glca1-4Glcb	Glca1-6Glca1-4Glca1-4Glcb-CETE-BSA	CETE	BSA	15
carb-Glc	Glc-b	Glc-b - BSA	MEAG	BSA	23
carb-Glc	Isomaltose	Glca1-6Glcb-BSA	MEAG	BSA	13
carb-Glc	Maltopentaose	Glca1-4Glca1-4Glca1-4Glca1-4Glca-BSA (Malto5)	(Glc)	BSA	11
carb-Glc	Maltose	Glca1-4Glcb-BSA (Maltose)	MEAG	BSA	23
carb-GlcNAc	3'GN type1-Sp - 04	GlcNAcb1-3Galb1-3GlcNAcb-Sp	Sp	BSA	4
carb-GlcNAc	3'GN-Di-LacNAc-Sp - 06	GlcNAcb1-3(Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	6
carb-GlcNAc	3'GN-Di-LacNAc-Sp - 14	GlcNAcb1-3(Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	14
carb-GlcNAc	GlcNAca1-4Galb - 03	GlcNAca1-4Galb-BSA	MEAG	BSA	3
carb-GlcNAc	GlcNAca1-4Galb - 20	GlcNAca1-4Galb-BSA	MEAG	BSA	20
carb-GlcNAc	GlcNAc-b	GlcNAc-b - BSA	MEAG	BSA	21
carb-GlcNAc	GNLacNAc-Sp - 06	GlcNAcb1-3Galb1-4GlcNAcb-Sp	Sp	BSA	6
carb-GlcNAc	GNLacNAc-Sp - 16	GlcNAcb1-3Galb1-4GlcNAcb-Sp	Sp	BSA	16
carb-GlcNAc	LNT-2-Sp - 06	GlcNAcb1-3Galb1-4Glcb-Sp	Sp	BSA	6
carb-GlcNAc	LNT-2-Sp - 15	GlcNAcb1-3Galb1-4Glcb-Sp	Sp	BSA	15
carb-Man	Man-a	Man-a - BSA	MEAG	BSA	20
carb-Man	Man-a - 05	Man-a - BSA	MEAG	BSA	5
carb-Man	Mana1-6Man-a	Mana1-6Man-a - BSA	MEAG	BSA	15

carb-Man	Mana1-6Man-a - 04	Mana1-6Man-a - BSA	MEAG	BSA	4
carb-Man	ManT	Mana1-6[Mana1-3]Manb -BSA [ManT]	14 atom spacer	BSA	26
carb-Sia	3'KDNLacNAc-Sp - 05	KDNa2-3Galb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	3'KDNLacNAc-Sp - 12	KDNa2-3Galb1-4GlcNAcb-Sp	Sp	BSA	12
carb-Sia	3'-KDNLeC-Sp - 04	KDNa2-3Galb1-3GlcNAcb-Sp	Sp	BSA	4
carb-Sia	3'-KDNLeC-Sp - 12	KDNa2-3Galb1-3GlcNAcb-Sp	Sp	BSA	12
carb-Sia	3'S(Gc)LacNAc-Sp - 06	Neu5Gca2-3Galb1-4GlcNAcb-Sp	Sp	BSA	6
carb-Sia	3'S(Gc)LacNAc-Sp - 10	Neu5Gca2-3Galb1-4GlcNAcb-Sp	Sp	BSA	10
carb-Sia	3'S(Gc)LeC-Sp - 05	Neu5Gca2-3Galb1-3GlcNAcb-Sp	Sp	BSA	5
carb-Sia	3'S(Gc)LeC-Sp - 12	Neu5Gca2-3Galb1-3GlcNAcb-Sp	Sp	BSA	12
carb-Sia	3'S-Di-LacNAc-Sp - 06	Neu5Aca2-3(Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	6
carb-Sia	3'S-Di-LacNAc-Sp - 13	Neu5Aca2-3(Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	13
carb-Sia	3'Sia-3-FL	Siaa2-3Galb1-4(Fuca1-3)Glc -BSA	3 atom	BSA	7
carb-Sia	3'SLacNAc	Sialyla2-3Galb1-4GlcNAc – BSA (3'SLacNAc)	unknown	BSA	19
carb-Sia	3'SLacNAc-Sp - 05	Neu5Aca2-3Galb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	3'SLacNAc-Sp - 10	Neu5Aca2-3Galb1-4GlcNAcb-Sp	Sp	BSA	10
carb-Sia	3'SLDN-Sp - 05	Neu5Aca2-3GalNAcb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	3'SLDN-Sp - 11	Neu5Aca2-3GalNAcb1-4GlcNAcb-Sp	Sp	BSA	11
carb-Sia	3'SLeC-Sp - 05	Neu5Aca2-3Galb1-3GlcNAcb-Sp	Sp	BSA	5
carb-Sia	3'SLeC-Sp - 12	Neu5Aca2-3Galb1-3GlcNAcb-Sp	Sp	BSA	12

carb-Sia	6'S(Gc)LacNAc-Sp - 05	Neu5Gca2-6Galb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	6'S-Di-LacNAc-Sp - 05	Neu5Aca2-6[Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	5
carb-Sia	6'S-Di-LacNAc-Sp - 13	Neu5Aca2-6[Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	13
carb-Sia	6'SLac	Sialyla2-6Galb1-4Glc-APD-HSA (6'Slac)	APD	HSA	nd
carb-Sia	6'SLacNAc-Sp - 05	Neu5Aca2-6Galb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	6'SLacNAc-Sp - 11	Neu5Aca2-6Galb1-4GlcNAcb-Sp	Sp	BSA	11
carb-Sia	6'SLDN-Sp - 05	Neu5Aca2-6GalNAcb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	6'SLDN-Sp - 13	Neu5Aca2-6GalNAcb1-4GlcNAcb-Sp	Sp	BSA	13
carb-Sia	9OAc3'SLacNAc-Sp - 04	Neu5Ac(9Ac)a2-3Galb1-4GlcNAcb-Sp	Sp	BSA	4
carb-Sia	9OAc3'SLacNAc-Sp - 10	Neu5Ac(9Ac)a2-3Galb1-4GlcNAcb-Sp	Sp	BSA	10
carb-Sia	9OAc3'SLeC-Sp - 05	Neu5Ac(9Ac)a2-3Galb1-3GlcNAcb-Sp	Sp	BSA	5
carb-Sia	9OAc3'SLeC-Sp - 12	Neu5Ac(9Ac)a2-3Galb1-3GlcNAcb-Sp	Sp	BSA	12
carb-Sia	CT/Sda-Sp - 05	Neu5Aca2-3[GalNAcb1-4]Galb1-4GlcNAcb-Sp	Sp	BSA	5
carb-Sia	CT/Sda-Sp - 13	Neu5Aca2-3[GalNAcb1-4]Galb1-4GlcNAcb-Sp	Sp	BSA	13
carb-Sia	DSLNT	Siaa2-3Galb1-3(Siaa2-6)GlcNAcb1-3Galb1-BSA (DSLNT)	(Glc)	BSA	5.6
carb-Sia	LSTa	Siaa2-3Galb1-3GlcNAcb1-3Galb1-BSA (LSTa)	(Glc)	BSA	10
carb-Sia	LSTb	Galb1-3(Siaa2-6)GlcNAcb1-3Galb1-BSA (LSTb)	(Glc)	BSA	11
carb-Sia	LSTc	Siaa2-6Galb1-3GlcNAcb1-3Galb1-BSA (LSTc)	(Glc)	BSA	7
carb-Sia	Sia-LNnT	Siaa2-3Galb1-4GlcNAcb1-3Galb1-APD-HSA	APD	HSA	9
carb-type 1	LNT-Sp - 06	Galb1-3GlcNAcb1-3Galb1-4GlcNAcb-Sp	Sp	BSA	6
carb-type 1	LNT-Sp - 15	Galb1-3GlcNAcb1-3Galb1-4GlcNAcb-Sp	Sp	BSA	15

carb-type 1	MFiLNO(1-3)	Galb1-3GlcNAcb1-3Galb1-4(Fuca1-3)GlcNAcb1-6 (Galb1-3GlcNAcb1-3)Galb1-	(Glc)	BSA	9
carb-type 1+2	LNH - 13	Galb1-4GlcNAcb1-6(Galb1-3GlcNAcb1-3)Galb1-BSA	(Glc)	BSA	13
carb-type 2	Di-LacNAc-Sp - 06	(Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	6
carb-type 2	Di-LacNAc-Sp - 16	(Galb1-4GlcNAcb1-3)2b-Sp	Sp	BSA	16
carb-type 2	LacNAc-Sp - 06	Galb1-4GlcNAcb-Sp	Sp	BSA	6
carb-type 2	LacNAc-Sp - 15	Galb1-4GlcNAcb-Sp	Sp	BSA	15
carb-type1	iLNO	Galb1-3GlcNAcb1-3Galb1-4GlcNAcb1-6 (Galb1-3GlcNAcb1-3)Galb1-	(Glc)	BSA	6
carb-type1	LNT - 05	Galb1-3GlcNAcb1-3Galb-BSA (LNT)	(Glc)	BSA	5
carb-type1	LNT - 21	Galb1-3GlcNAcb1-3Galb-BSA (LNT)	(Glc)	BSA	21
carb-type1	pLNH - 07	Galb1-3GlcNAcb1-3Galb1-4GlcNAcb1-3Galb1-BSA (pLNH)	(Glc)	BSA	7
carb-type1	pLNH - 21	Galb1-3GlcNAcb1-3Galb1-4GlcNAcb1-3Galb1-BSA (pLNH)	(Glc)	BSA	21
carb-type2	LacNAc	Galb1-4GlcNAc – BSA (LacNAc)	14 atom spacer	BSA	22
carb-type2	LacNAc (trimeric)	Galb1-4GlcNAcb1-3Galb1-4GlcNAcb1-3Galb1-4GlcNAcb-APE-HSA (TriLacNAc)	APE	HSA	8
carb-type2	LNnH - 11	Galb1-4GlcNAcb1-6(Galb1-4GlcNAcb1-3)Galb1-BSA	(Glc)	BSA	11
carb-type2	LNnT - 04	Galb1-4GlcNAcb1-3Galb1-BSA (LNnT)	(Glc)	BSA	4
carb-type2	LNnT - 14	Galb1-4GlcNAcb1-3Galb1-BSA (LNnT)	(Glc)	BSA	14
GAG	Hep-5000	heparin polysaccharide (MW ~5000)	na	BSA	1

GAG	Hep-N-acetylated	fully N-acetylated heparin polysaccharide	na	BSA	1
GAG	Hya8	$(GlcNAcb1\text{-}4GlcAb1\text{-}3)_4b1$-	(GlcNAc)	BSA	3
GAG	Hya9	$(GlcAb1\text{-}3GlcNAcb1\text{-}4)_4b1\text{-}3GlcAb1$-	(GlcNAc)	BSA	3
glycolipid	Fuc-GM1a - 08	Fuca1-2Galb1-3GalNAcb1-4(Siaa2-3)Galb1-4	(Glc)	BSA	8
glycolipid	GA1 - 06	Galb1-3GalNAcb1-4Galb1-BSA (GA1tri or asialo-GM1)	(Glc)		6
glycolipid	GA1 - 20	Galb1-3GalNAcb1-4Galb1-BSA (GA1tri or asialo-GM1)	(Glc)	BSA	20
glycolipid	GA1di	Galb1-3GalNAcb – HSA (GA1di)	3 atom spacer)	HSA	11
glycolipid	GA2di - 16	GalNAcb1-4Galb - BSA (GA2di or asialo-GM2)	MEAG	BSA	16
glycolipid	GA2di - 37	GalNAcb1-4Galb - BSA (GA2di or asialo-GM2	MEAG	BSA	37
glycolipid	GA2di (accurate)	GalNAcb1-4Galb - BSA (GA2di or asialo-GM2)	unknown	BSA	28
glycolipid	Gb4	GalNAcb1-3Gala1-4Galb1-BSA (Gb4 or P antigen)	(Glc)	BSA	9
glycolipid	Gb4 tetra (P1 tetra)-Sp - 06	GalNAcb1-3Gala1-4Galb1-4GlcNAcb-Sp	Sp	BSA	6
glycolipid	Gb4 tetra (P1 tetra)-Sp - 15	GalNAcb1-3Gala1-4Galb1-4GlcNAcb-Sp	Sp	BSA	15
glycolipid	Gb5/SSEA3 - 04	Galb1-3GalNAcb1-3Gala1-4Galb1-	(Glc)	BSA	4
glycolipid	Gb5/SSEA3 - 12	Galb1-3GalNAcb1-3Gala1-4Galb1-	(Glc)	BSA	12
glycolipid	GD1a-Sp - 05	Neu5Aca2-3[Neu5Aca2-3Galb1-3GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	5
glycolipid	GD1a-Sp - 10	Neu5Aca2-3[Neu5Aca2-3Galb1-3GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	10
glycolipid	GD1b	Siaa2-8Siaa2-3(Galb1-3GalNAcb1-4)Galb1-4-BSA	(Glc)	BSA	5
glycolipid	GD2-Sp - 04	Neu5Aca2-8Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	4

glycolipid	GD2-Sp - 10	Neu5Aca2-8Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	10
glycolipid	GD3-Sp - 04	Neu5Aca2-8Neu5Aca2-3Galb1-4Glcb-Sp	Sp	BSA	4
glycolipid	GD3-Sp - 08	Neu5Aca2-8Neu5Aca2-3Galb1-4Glcb-Sp	Sp	BSA	8
glycolipid	GM1a	Galb1-3GalNAcb1-4(Siaa2-3)Galb1-4(Glc)HSA	(Glc)	HSA	29
glycolipid	GM2-Sp - 04	Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	4
glycolipid	GM2-Sp - 07	Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	7
glycolipid	GM2-Sp - 14	Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	14
glycolipid	GM3	Sialyla2-3Galb1-4Glc-APD-HSA	APD	HSA	12-15
glycolipid	GM3(Gc)-Sp - 05	Neu5Gca2-3Galb1-4Glcb-Sp	Sp	BSA	5
glycolipid	GM3(Gc)-Sp - 14	Neu5Gca2-3Galb1-4Glcb-Sp	Sp	BSA	14
glycolipid	GM3-Sp - 04	Neu5Aca2-3Galb1-4Glcb-Sp	Sp	BSA	4
glycolipid	GM3-Sp - 11	Neu5Aca2-3Galb1-4Glcb-Sp	Sp	BSA	11
glycolipid	GQ2-Sp - 03	Neu5Aca2-8Neu5Aca2-8Neu5Aca2-8Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	3
glycolipid	GQ2-Sp - 06	Neu5Aca2-8Neu5Aca2-8Neu5Aca2-8Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	6
glycolipid	GT2-Sp - 03	Neu5Aca2-8Neu5Aca2-8Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	3
glycolipid	GT2-Sp - 08	Neu5Aca2-8Neu5Aca2-8Neu5Aca2-3[GalNAcb1-4]Galb1-4Glcb-Sp	Sp	BSA	8
glycolipid	GT3-Sp - 03	Neu5Aca2-8Neu5Aca2-8Neu5Aca2-3Galb1-4Glcb-Sp	Sp	BSA	3

glycolipid	GT3-Sp - 07	Neu5Aca2-8Neu5Aca2-8Neu5Aca2-3Galb1-4Glcb-Sp	Sp	BSA	7
glycolipid	P1	Gala1-4Galb1-4GlcNAc-BSA (P1)		BSA	9
glycolipid	Pk or Gb3	Gala1-4Galb1-4Glc-HSA [Pk or Gb3 or CD77]		HSA	13
glycolipid	SSEA-4-Sp - 05	Neu5Aca2-3Galb1-3GalNAcb1-3Gala1-4Galb1-4Glcb-Sp	Sp	BSA	5
glycolipid	SSEA-4-Sp - 12	Neu5Aca2-3Galb1-3GalNAcb1-3Gala1-4Galb1-4Glcb-Sp	Sp	BSA	12
Lewis	3'-sulpho-LeA	3-SO3-Galb1-3[Fuca1-4)GlcNAc-	3 atom	BSA	15
Lewis	3'-sulpho-LeX	3-SO3-Galb1-4[Fuca1-3)GlcNAc-	3 atom	BSA	15
Lewis	6'-sulpho-LeA	6-SO3-Galb1-3[Fuca1-4)GlcNAc-	3 atom	BSA	16
Lewis	6'-sulpho-LeX	6-SO3-Galb1-4[Fuca1-3)GlcNAc-	3 atom	BSA	8
Lewis	DFLNH(c)	Galb1-4GlcNAcb1-6[Fuca1-2Galb1-3(Fuca1-4)GlcNAcb1-3]Galb1-BSA	(Glc)	BSA	8
Lewis	DFLNnH	Galb1-4(Fuca1-3)GlcNAcb1-6[Galb1-4(Fuca1-3)GlcNAcb1-3]Galb1-BSA	(Glc)	BSA	10
Lewis	DFpLNH I	Fuca1-2Galb1-3(Fuca1-4)GlcNAcb1-3Galb1-4GlcNAcb1-3Galb-BSA	(Glc)	BSA	9
Lewis	Di-LeC-Sp - 06	Galb1-3GlcNAcb1-3Galb1-3GlcNAcb-Sp	Sp	BSA	6
Lewis	Di-LeC-Sp - 16	Galb1-3GlcNAcb1-3Galb1-3GlcNAcb-Sp	Sp	BSA	16
Lewis	LeA	Galb1-3[Fuca1-4)GlcNAcb1-3Galb1-4Glcb- BSA (Lea)	3 atom spacer	BSA	18
Lewis	LeA-LeX	Galb1-3(Fuca1-4)GlcNAcb1-3Galb1-4(Fuca1-3)GlcNAcb1-3Galb1-APD-HSA	APD	HSA	21

Lewis	LeB	Fuca1-2Galb1-3[Fuca1-4)GlcNAcb1-3Galb1-4Glcb-BSA (Leb)	3 atom spacer	BSA	9
lewis	LeC-Sp - 06	Galb1-3GlcNAcb-Sp	Sp	BSA	6
Lewis	LeC-Sp - 07	Galb1-3GlcNAcb-Sp	Sp	BSA	7
Lewis	LeC-Sp - 15	Galb1-3GlcNAcb-Sp	Sp	BSA	15
Lewis	LeX (dimeric)	Galb1-4[Fuca1-3)GlcNAcb1-3Galb1-4(Fuca1-3)GlcNAcb1-3Galb1-APE-BSA	APE	BSA	7
Lewis	LeX (monomeric)	Galb1-4[Fuca1-3)GlcNAc-APD-HSA (Lex)	APD	HSA	nd
Lewis	LeY	Fuca1-2Galb1-4[Fuca1-3)GlcNAc –HSA (Ley)	unknown	HSA	8
Lewis	MFLNH I	Galb1-4GlcNAcb1-6 (Fuca1-2Galb1-3GlcNAcb1-3)Galb1-	(Glc)	BSA	11
Lewis	MFLNH III	Galb1-4(Fuca1-3)GlcNAcb1-6 (Galb1-3GlcNAcb1-3)Galb1-	(Glc)	BSA	14
Lewis	MSMFLNH I	Siaa2-6Galb1-4GlcNAcb1-6 (Fuca1-2Galb1-3GlcNAcb1-3)Galb1-	(Glc)	BSA	11
Lewis	MSMFLnNH	Galb1-4(Fuca1-3)GlcNAcb1-6 (Siaa2-6Galb1-4GlcNAcb1-3)Galb1-	(Glc)	BSA	9
Lewis	Sialyl LeA	Siaa2-3Galb1-3[Fuca1-4)GlcNAcb1-3Galb1-APD-HSA (SLeA)	APD	HSA	12
Lewis	Sialyl LeX	Sialyla2-3Galb1-4[Fuca1-3)GlcNAc – BSA	14 atom spacer	BSA	9
Lewis+Sia	Fuc, Sia-LNnH-APD-HSA	Galb1-4[Fuca1-3]GlcNAcb1-6[Neu5Aca2-6Galb1-4GlcNAcb1-3]Galb1-APD-HSA	APD	HSA	12 to 15

N-linked	GlcNAc-Man3	Mana1-6(GlcNAcb1-2Mana1-3)Manb1-4GlcNAcb-BSA	(GlcNAc)	BSA	2
N-linked	GlcNAc-Man5	Mana1-6(Mana1-3)Mana1-6(GlcNAcb1-2Mana1-3)Manb1-4GlcNAcb-BSA	(GlcNAc)	BSA	3
N-linked	Hybrid-M5N4B	GlcNAcb1-2Mana1-3[Mana1-3(Mana1-6)Mana1-6](GlcNAcb1-4)Manb1-4GlcNAcb1-	(GlcNAc)	BSA	3
N-linked	LacNAc-Man5	Mana1-6(Mana1-3)Mana1-6(Galb1-4GlcNAcb1-2Mana1-3)Manb1-4GlcNAcb-BSA	(GlcNAc)	BSA	2
N-linked	Man1 - 04	Manβ1-4GlcNAcβ1-4GlcNAcβ1-	4HB	BSA	4
N-linked	Man1 - 12	Manβ1-4GlcNAcβ1-4GlcNAcβ1-	4HB	BSA	12
N-linked	Man3	Mana1-6(Mana1-3)Manb1-4GlcNAc -BSA (Man3)	(GlcNAc)	BSA	5
N-linked	Man5	Mana1-6(Mana1-3)Mana1-6(Mana1-3)Manb1-4GlcNAc-BSA (Man5)	(GlcNAc)	BSA	5
N-linked	Man6 - I	Mana1-6(Mana1-3)Mana1-6(Mana1-2Mana1-3)Manb1-BSA	(GlcNAc)	BSA	4
N-linked	Man6 - II	Mana1-2Mana1-3Mana1-6(Mana1-2Mana1-3)Manb1-BSA (Man6 - II)	(GlcNAc)	BSA	5
N-linked	Man7D1	Mana1-6(Mana1-3)Mana1-6(Mana1-2Mana1-2Mana1-3)Manb1-4GlcNAc-BSA	(GlcNAc)	BSA	10
N-linked	Man7D3	Mana1-2Mana1-6(Mana1-3)Mana1-6(Mana1-2Mana1-3)Manb1-4GlcNAc-BSA	(GlcNAc)	BSA	8
N-linked	Man8D1D3	Mana1-2Mana1-6(Mana1-3)Mana1-6(Mana1-2Mana1-	(GlcNAc)	BSA	9

		2Mana1-3)Manb1-4GlcNAc-BSA			
N-linked	Man9	Mana1-2Mana1-6(Mana1-2Mana1-3)Mana1-6(Mana1-2Mana1-2Mana1-3)Manb1-4GlcNAc-BSA	(GlcNAc)	BSA	5
N-linked	NA2	Galb1-4GlcNAcb1-2Mana1-6[Galb1-4GlcNAcb1-2Mana1-3]Manb1-4GlcNAc -BSA (NA2)	(GlcNAc)	BSA	8
N-linked	NA3	Galb1-4GlcNAcb1-2Mana1-6[Galb1-4GlcNAcb1-2(Galb1-4GlcNAcb1-4)Mana1-3]Manb1-4GlcNAc -BSA (NA3)	(GlcNAc)	BSA	5
N-linked	NA4	Galb1-4GlcNAcb1-2(Galb1-4GlcNAcb1-6)Mana1-6[Galb1-4GlcNAcb1-2(Galb1-4GlcNAcb1-4)Mana1-3]Manb1-4GlcNAc -BSA (NA4)	(GlcNAc)	BSA	5
N-linked	NGA2	GlcNAcb1-2Mana1-6(GlcNAcb1-2Mana1-3)Manb1-4GlcNAc -BSA (NGA2)	(GlcNAc)	BSA	7
N-linked	NGA2B	GlcNAcb1-2Mana1-6(GlcNAcb1-2Mana1-3)(GlcNAcb1-4)Manb1-4GlcNAc -BSA (NGA2B)	(GlcNAc)	BSA	5
N-linked	NGA3	GlcNAcb1-2Mana1-6[GlcNAcb1-2(GlcNAcb1-4)Mana1-3]Manb1-4GlcNAc -BSA (NGA3)	(GlcNAc)	BSA	1
N-linked	NGA3B	GlcNAcb1-2Mana1-6[GlcNAcb1-2(GlcNAcb1-4)Mana1-3](GlcNAcb1-4)Manb1-4GlcNAc -BSA (NA3)	(GlcNAc)	BSA	6
N-linked	NGA4	GlcNAcb1-2(GlcNAcb1-6)Mana1-6[GlcNAcb1-2(GlcNAcb1-4)Mana1-3]Manb1-4GlcNAc -BSA	(GlcNAc)	BSA	6

N-linked	NGA4(B)2	GlcNAcb1-2(GlcNAcb1-4)(GlcNAcb1-6)Mana1-6[GlcNAcb1-2Mana1-3](GlcNAcb1-4)Manb1-4GlcNAc -BSA [NGA4(B)2]	(GlcNAc)	BSA	4
N-linked	NGA5B	GlcNAcb1-2(GlcNAcb1-4)(GlcNAcb1-6)Mana1-6[GlcNAcb1-2(GlcNAcb1-4)Mana1-3](GlcNAcb1-4)Manb1-4GlcNAc -BSA (NGA5B)	(GlcNAc)	BSA	2
non-human	alpha-Gal tetra - 04	Gala1-3Galb1-4GlcNAcb1-3Galb1-	(Glc)	BSA	4
non-human	alpha-Gal tetra - 17	Gala1-3Galb1-4GlcNAcb1-3Galb1-	(Glc)	BSA	17
non-human	Ara5	Araa1-5Araa1-5Araa1-5Araa1-5Araa1-BSA (Ara5)	(Ara)	BSA	20
non-human	B6 di - 06	Gala1-3Galb– BSA (Bdi)	(Glc)	BSA	6
non-human	B6 di - 16	Gala1-3Galb– BSA (Bdi)	(Glc)	BSA	16
non-human	Bdi	Gala1-3Gal– BSA (Bdi)	14 atom spacer	BSA	23
non-human	Cellobiose	Glcb1-4Glcb-BSA (Cellobiose)	(Glc)	BSA	13
non-human	Cellotriose	Glcb1-4Glcb1-4Glcb-BSA (Cello3)	(Glc)	BSA	13
non-human	Chito 3	GlcNAcb1-4GlcNAcb1-4GlcNAcb-BSA (Chito 3)	(GlcNAc)	BSA	8
non-human	Chito 3 - 20	GlcNAcb1-4GlcNAcb1-4GlcNAcb-BSA (Chito 3)	(GlcNAc)	BSA	20
non-human	Forssman Di - 04	GalNAca1-3GalNAcb1-BSA	MEAG	BSA	4
non-human	Forssman Di - 21	GalNAca1-3GalNAcb1-BSA	MEAG	BSA	21
non-human	Forssman Di - 31	GalNAca1-3GalNAcb1-BSA	MEAG	BSA	31
non-human	Forssman Tetra-BSA - 05	GalNAca1-3GalNAcb1-3Gala1-4Galb-BSA	(Glc)	BSA	5
non-human	Forssman Tetra-BSA - 13	GalNAca1-3GalNAcb1-3Gala1-4Galb-BSA	(Glc)	BSA	13

non-human	Fuc-b - 04	Fuc-b - BSA	MEAG	BSA	4
non-human	Fuc-b - 22	Fuc-b - BSA	MEAG	BSA	22
non-human	G2M4	Manb1-4(Gala1-6)Manb1-4(Gala1-6)Manb1-4Manb1-BSA (G2M4)	(man)	BSA	7
non-human	Gala1-2Gal	Gala1-2Gal	3 atom	BSA	13
non-human	Galb1-4Gal	Galb1-4Gal-BSA	3 atom spacer	BSA	nd
non-human	Galb1-6Man-a	Galb1-6Man-a - BSA	MEAG	BSA	13
non-human	Manb4	Manb1-4Manb1-4Manb1-4Manb1-BSA (Manb4)	(Man)	BSA	14
non-human	Rha-a	Rha-a – BSA	MEAG	BSA	18
non-human	Rha-b	Rha-b - BSA	MEAG	BSA	21
non-human	X3Glc4	Xyla1-6Glcb1-4(Xyla1-6)Glcb1-4(Xyla1-6)Glcb1-BSA (X3Glc3)	(Glc)	BSA	15
non-human	Xylb4	Xylb1-4Xylb1-4Xylb1-4Xylb1-BSA (Xylb4)	(xyl)	BSA	22
non-human-aGal	alphaGal	Gala1-3Galb1-4GlcNAc-BSA (alphaGal)	14 atom spacer	BSA	8
non-human-aGal	alphaGal-6-deoxy	Gala1-3Galb1-4(6deoxy-GlcNAc)-HSA (alphaGal)	3 atom spacer	HSA	11
non-human-aGal	Gal3	Gala1-3Galb1-4Gala-BSA (Gal3)	(1-3Gal)	BSA	7
non-human-aGal	Gala3-type1	Gala1-3Galb1-3GlcNAc-BSA	3 atom	BSA	9
non-human-aGal	Galilli	Gala1-3Galb1-4Glc-BSA	3 atom	BSA	21
peptide	Ac-S-S-S-G	SerSerSerGly-BSA	hex	BSA	24

peptide	Ac-S-Thr-S-G - 18	Ac-Ser-Thr-Ser-Gly-Hex	hex	BSA	18
peptide	GTSSASTGHATPLPVTD	BSA-PEG7-Gly-Thr-Ser-Ser-Ala-Ser-Thr-Gly-His-Ala-Thr-Pro-Leu-Pro-Val-Thr-Asp	PEG-linker	BSA	6
peptide-GlcNAca	Ac-S-Ser(GlcNAca)-S-G - 07	AcSer-(GlcNAcα)Ser-Ser-Gly-Hex-BSA	hex	BSA	7
peptide-GlcNAca	Ac-S-Ser(GlcNAca)-S-G - 24	AcSer-(GlcNAcα)Ser-Ser-Gly-Hex-BSA	hex	BSA	24
peptide-GlcNAcb	Ac-S-Ser(GlcNAcb)-S-G - 07	AcSer-(GlcNAcβ)Ser-Ser-Gly-Hex-BSA	hex	BSA	7
peptide-GlcNAcb	Ac-S-Ser(GlcNAcb)-S-G - 24	AcSer-(GlcNAcβ)Ser-Ser-Gly-Hex-BSA	hex	BSA	24
peptide-TF	Ac-S-TF(Ser)-S-G - 04	AcSer-(Galb1-3GalNAca)Ser-Ser-Gly-Hex-BSA (S-TF-S)	hex	BSA	4
peptide-TF	Ac-S-TF(Ser)-S-G - 16	AcSer-(Galb1-3GalNAca)Ser-Ser-Gly-Hex-BSA (S-TF-S)	hex	BSA	16
peptide-TF	Ac-S-TF(Ser)-S-G - 28	AcSer-(Galb1-3GalNAca)Ser-Ser-Gly-Hex-BSA (S-TF-S)	hex	BSA	28
peptide-TF	Ac-TF(Ser)-G - 04	Ac(Galb1-3GalNAca)Ser-Gly-Hex-BSA	hex	BSA	4
peptide-TF	Ac-TF(Ser)-G - 24	Ac(Galb1-3GalNAca)Ser-Gly-Hex-BSA	hex	BSA	24
peptide-TF	GTSSAS-TF(Thr)-GHATPLPVTD	BSA-PEG7-Gly-Thr-Ser-Ser-Ala-Ser-(Galb1-3GalNAca)Thr-Gly-His-Ala-Thr-Pro-Leu-Pro-Val-Thr-Asp	PEG-linker	BSA	4
peptide-TF	GTSSASTGHA-TF(Thr)-PLPVTD	BSA-PEG7-Gly-Thr-Ser-Ser-Ala-Ser-Thr-Gly-His-Ala-(Galb1-3GalNAca)Thr-Pro-Leu-Pro-Val-Thr-Asp	PEG-linker	BSA	5
peptide-TF	GTSSA-TF(Ser)-TF(Thr)-GHATPLPVTD	BSA-PEG7-Gly-Thr-Ser-Ser-Ala-(Galb1-3GalNAca)Ser-(Galb1-3GalNAca)Thr-Gly-His-Ala-Thr-Pro-Leu-Pro-Val-Thr-Asp	PEG-linker	BSA	5
peptide-TF	GTSSA-TF(Ser)-TGHATPLPVTD	BSA-PEG7-Gly-Thr-Ser-Ser-Ala-(Galb1-3GalNAca)Ser-Thr-Gly-His-Ala-Thr-Pro-Leu-Pro-Val-Thr-Asp	PEG-linker	BSA	4

peptide-Tn	Ac-A-Tn(Thr)-S-G - 05	Ac-Ala-(GalNAca)Thr-Ser-Gly-Hex (muc4)	hex	BSA	5
peptide-Tn	Ac-A-Tn(Thr)-S-G - 23	Ac-Ala-(GalNAca)Thr-Ser-Gly-Hex (muc4)	hex	BSA	23
peptide-Tn	Ac-G-V-Tn(Thr)-S-A-G - 04	Ac-Gly-Val-(GalNAca)Thr-Ser-Ala-Gly-Hex (muc1)	hex	BSA	4
peptide-Tn	Ac-G-V-Tn(Thr)-S-A-G - 21	Ac-Gly-Val-(GalNAca)Thr-Ser-Ala-Gly-Hex (muc1)	hex	BSA	21
peptide-Tn	Ac-P-Tn(Thr)-T-G - 05	Ac-Pro-(GalNAca)Thr-Thr-Gly-Hex (muc2)	hex	BSA	5
peptide-Tn	Ac-P-Tn(Thr)-T-G - 08	Ac-Pro-(GalNAca)Thr-Thr-Gly-Hex (muc2)	hex	BSA	8
peptide-Tn	Ac-P-Tn(Thr)-T-G - 22	Ac-Pro-(GalNAca)Thr-Thr-Gly-Hex (muc2)	hex	BSA	22
peptide-Tn	Ac-S-Tn(Ser)-S-G - 04	AcSer-(GalNAca)Ser-Ser-Gly-Hex-BSA (STnS)	hex	BSA	4
peptide-Tn	Ac-S-Tn(Ser)-S-G - 22	AcSer-(GalNAca)Ser-Ser-Gly-Hex-BSA (STnS)	hex	BSA	22
peptide-Tn	Ac-S-Tn(Ser)-S-G - 33	AcSer-(GalNAca)Ser-Ser-Gly-Hex-BSA (STnS)	hex	BSA	33
peptide-Tn	Ac-S-Tn(Thr)-A-G - 04	Ac-Ser-(GalNAca)Thr-Ala-Gly-Hex (muc1)	hex	BSA	4
peptide-Tn	Ac-S-Tn(Thr)-A-G - 08	Ac-Ser-(GalNAca)Thr-Ala-Gly-Hex (muc1)	hex	BSA	8
peptide-Tn	Ac-S-Tn(Thr)-A-G - 22	Ac-Ser-(GalNAca)Thr-Ala-Gly-Hex (muc1)	hex	BSA	22
peptide-Tn	Ac-S-Tn(Thr)-G-G - 03	Ac-Ser-(GalNAca)Thr-Gly-Gly-Hex (muc4)	hex	BSA	3
peptide-Tn	Ac-S-Tn(Thr)-G-G - 07	Ac-Ser-(GalNAca)Thr-Gly-Gly-Hex (muc4)	hex	BSA	7
peptide-Tn	Ac-S-Tn(Thr)-G-G - 19	Ac-Ser-(GalNAca)Thr-Gly-Gly-Hex (muc4)	hex	BSA	19
peptide-Tn	Ac-S-Tn(Thr)-S-G - 04	AcSer-(GalNAca)Thr-Ser-Gly-Hex-BSA (STnS)	hex	BSA	4
peptide-Tn	Ac-S-Tn(Thr)-S-G HSA-04	AcSer-(GalNAca)Thr-Ser-Gly-Hex-HSA (STnS)	hex	HSA	4
peptide-Tn	Ac-S-Tn(Thr)-S-G HSA-23	AcSer-(GalNAca)Thr-Ser-Gly-Hex-HSA (STnS)	hex	HSA	23
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 05	Ac-Ser-(GalNAca)Thr-(GalNAca)Thr-Gly-Hex (muc2)	hex	BSA	5
peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 09	Ac-Ser-(GalNAca)Thr-(GalNAca)Thr-Gly-Hex (muc2)	hex	BSA	9

peptide-Tn	Ac-S-Tn(Thr)-Tn(Thr)-G - 22	Ac-Ser-(GalNAca)Thr-(GalNAca)Thr-Gly-Hex (muc2)	hex	BSA	22
peptide-Tn	Ac-S-Tn(Thr)-V-G - 04	Ac-Ser-(GalNAca)Thr-Val-Gly-Hex	hex	BSA	4
peptide-Tn	Ac-S-Tn(Thr)-V-G - 22	Ac-Ser-(GalNAca)Thr-Val-Gly-Hex	hex	BSA	22
peptide-Tn	Ac-Tn(Ser)Tn(Ser)Tn(Ser)-G - 03	Ac(GalNAca)Ser-(GalNAca)Ser-(GalNAca)Ser-Gly-Hex-BSA (Tn3)	hex	BSA	3
peptide-Tn	Ac-Tn(Ser)-Tn(Ser)-Tn(Ser)-G - 16	Ac(GalNAca)Ser-(GalNAca)Ser-(GalNAca)Ser-Gly-Hex-BSA (Tn3)	hex	BSA	16
peptide-Tn	Ac-Tn(Ser)Tn(Ser)Tn(Ser)-G - 27	Ac(GalNAca)Ser-(GalNAca)Ser-(GalNAca)Ser-Gly-Hex-BSA (Tn3)	hex	BSA	27
peptide-Tn	Ac-Tn(Thr)-G - 21	Ac(GalNAca)Thr-Gly-Hex-BSA	hex	BSA	21
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G - 05	Ac-(GalNAca)Thr-(GalNAca)Thr-(GalNAca)Thr-Gly-Hex (muc2)	hex	BSA	5
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G - 08	Ac-(GalNAca)Thr-(GalNAca)Thr-(GalNAca)Thr-Gly-Hex (muc2)	hex	BSA	8
peptide-Tn	Ac-Tn(Thr)-Tn(Thr)-Tn(Thr)-G - 20	Ac-(GalNAca)Thr-(GalNAca)Thr-(GalNAca)Thr-Gly-Hex (muc2)	hex	BSA	20
peptide-Tn	Ac-T-Tn(Thr)-P-G - 04	Ac-Thr-(GalNAca)Thr-Pro-Gly-Hex (muc2,6,7)	hex	BSA	4
peptide-Tn	Ac-T-Tn(Thr)-P-G - 08	Ac-Thr-(GalNAca)Thr-Pro-Gly-Hex (muc2,6,7)	hex	BSA	8
peptide-Tn	Ac-T-Tn(Thr)-P-G - 21	Ac-Thr-(GalNAca)Thr-Pro-Gly-Hex (muc2,6,7)	hex	BSA	21
peptide-Tn	Ac-V-Tn(Thr)-S-G - 04	Ac-Val-(GalNAca)Thr-Ser-Gly-Hex (muc1)	hex	BSA	4
peptide-Tn	Ac-V-Tn(Thr)-S-G - 08	Ac-Val-(GalNAca)Thr-Ser-Gly-Hex (muc1)	hex	BSA	8
peptide-Tn	Ac-V-Tn(Thr)-S-G - 19	Ac-Val-(GalNAca)Thr-Ser-Gly-Hex (muc1)	hex	BSA	19
peptide-Tn	R-Tn(Ser)-Tn-hydroxyethylamide	BSA-linker-Tn(Ser)-hydroxyethylamide	adipic acid	BSA	36

y-glycoprotein	AGE60	Advanced glycation endproducts day 60 (AGE60)	na	BSA	na
y-glycoprotein	Alpha-1-acid glycoprotein	alpha1 Acid Glycoprotein	na		na
y-glycoprotein	Alpha-fetoprotein	alpha fetoprotein (AFP)	na		na
y-glycoprotein	BSM	Bovine submaxillary mucin (STn, STF, S-GlcNAcb1-3, ~20% of Sia is acetylated at 7,8, or 9)	na	BSM	na
y-glycoprotein	BSM (asialo)	Asialo-Bovine submaxillary mucin (aBSM, Tn, TF, GlcNAcb1-3GalNAc)	na	BSM	na
y-glycoprotein	BSM (deacetylated)	Deacetylated-Bovine submaxillary mucin	na	BSM	na
y-glycoprotein	BSM (ox)	periodate oxidized bovine submaxillary mucin	na		na
y-glycoprotein	FABP	Fatty Acid Binding Protein (FABP)	na		na
y-glycoprotein	fetuin	fetuin (Sia2-3LacNAc, Sia2-6LacNAc, SiaLeC, STF)	na		na
y-glycoprotein	fetuin (asialo)	asialofetuin (Galb1-4GlcNAc, Galb1-3GlcNAc, Galb1-3GalNAc; mostly NA2 and NA3)	na		na
y-glycoprotein	Fetuin (ox)	periodate oxidized fetuin	na		na
y-glycoprotein	glycophorin (asialo)	asialo-glycophorin A (aGn)	na	Gn	na
y-glycoprotein	Glycophorin A	Glycophorin A (Gn)	na	Gn	na
y-glycoprotein	hsp90	Heat Shock Protein 90 (hsp90)	na		na
y-glycoprotein	KLH	Keyhole limpet hemocyanin	na	KLH	na
y-glycoprotein	KLH (oxidized)	periodate oxidized Keyhole limpet hemocyanin	na	KLH	na
y-glycoprotein	OSM	Ovine submaxillary mucin (94% STn, 4% TF, 2% Fuca1-	na	OSM	na

		2Galb1-3GalNAc)			
y-glycoprotein	OSM (asialo)	asialo-Ovine submaxillary mucin (aOSM)	na	OSM	na
y-glycoprotein	OSM (ox)	periodate oxidized ovine submaxillary mucin	na		na
y-glycoprotein	ovalbumin	ovalbumin (56% Man5+Man6)	na		na
y-glycoprotein	Ovalbumin (ox)	periodate oxidized ovalbumin	na		na
y-glycoprotein	PSA	Prostate Specific Antigen (PSA); human seminal fluid	na		na
y-glycoprotein	Tgl	Thyroglobulin (Tgl)	na		na
z-control	BSA	Bovine serum albumin	na	BSA	na
z-control	BSA - C5 (Alkyne) - 10	DF-168B-175-1	C5	BSA	10
z-control	BSA - C5 (Alkyne) - 23	DF-168C-16-B5	C5	BSA	23
z-control	Cy3	Cy3-BSA (20mg/mL + BSA, 125mg/mL total)	na	BSA	
z-control	Cy5	Cy5-BSA (30mg/mL+ BSA, 125mg/mL total)	na	BSA	
z-control	HSA	Human serum albumin (isolated from serum)	na	HSA	na
z-control	HSA (recomb)	human serum albumin (recombinant)	na	HSA	na
z-control	PEG-linker	OH-(CH2)2-NH-Gly-CO-PEG7-NH-(CO)Hept-SH-Mal-Cychex-CO-BSA	PEG-linker	BSA	6
z-control	Triazole linker	BSA-linker-triazole from Xuefei	adipic acid	BSA	43