

The list of Supplementary Materials for the Article

“The GlycoFilter: A Simple and Comprehensive Sample Preparation Platform for N-glycome and N-glycoproteome”

Hui Zhou, John W. Froehlich, Andrew C. Briscoe, Richard S. Lee

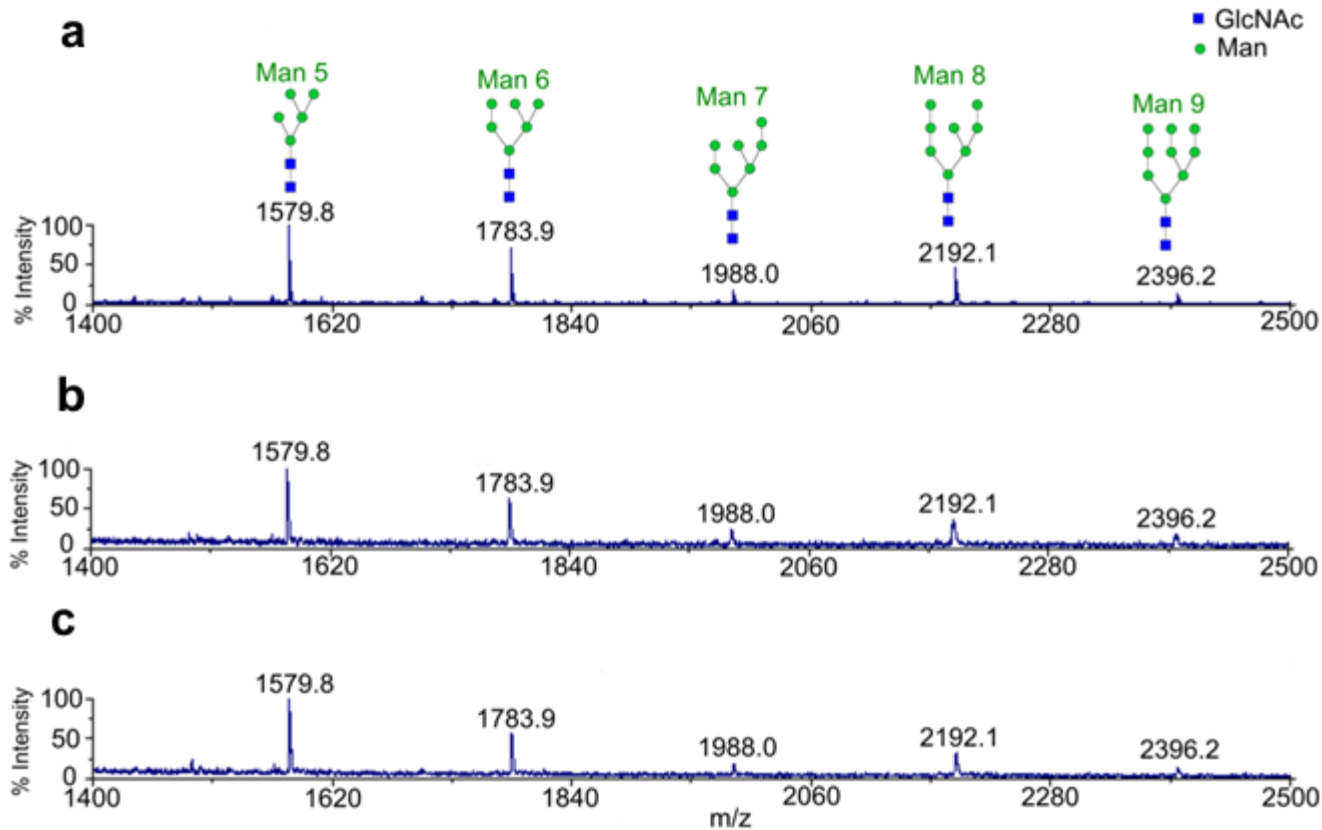
Supplementary Figure S1	MALDI-MS of N-glycans of RNase B (a) 1 ug, (b) 5 ug, and (c) 10 ug
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Supplementary Table S6

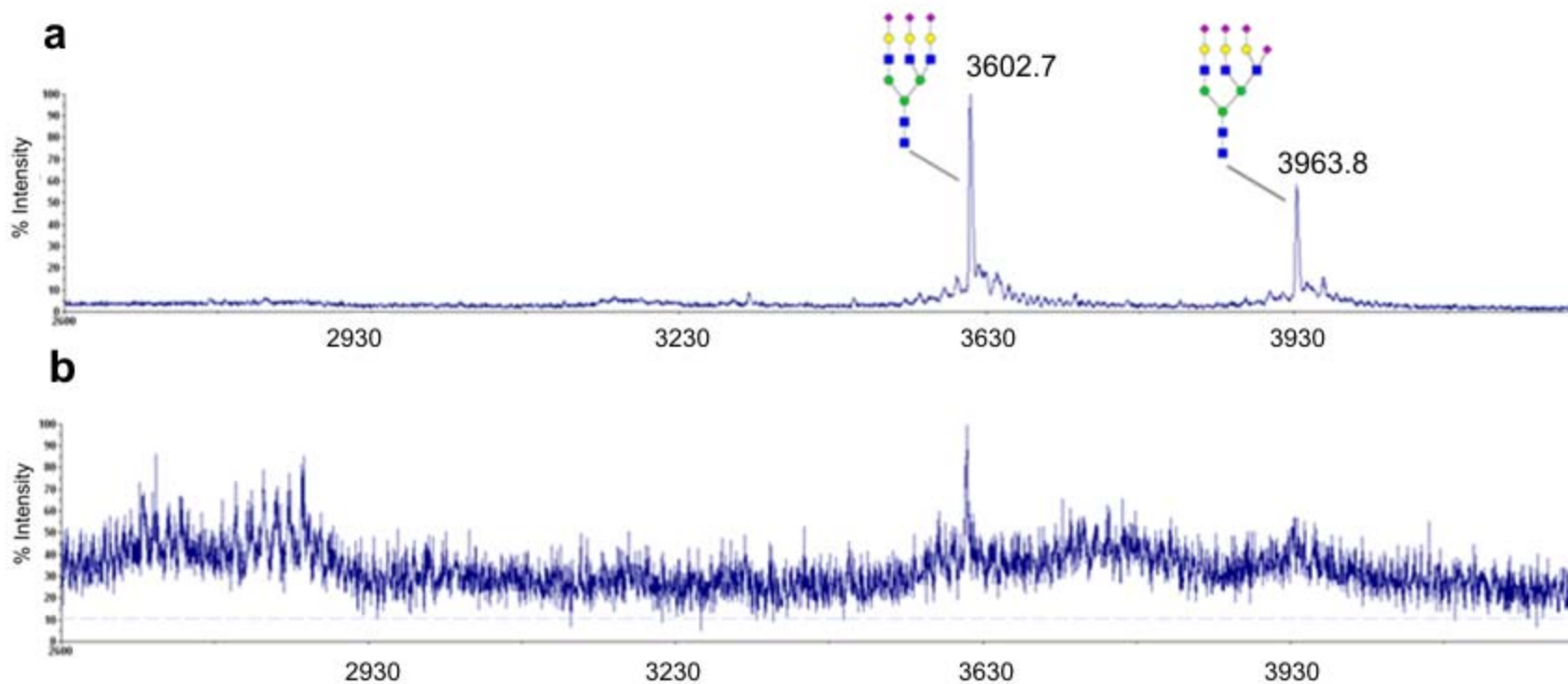
The summary of proteome and glycoproteome of three human plasma samples

Supplementary Table S7

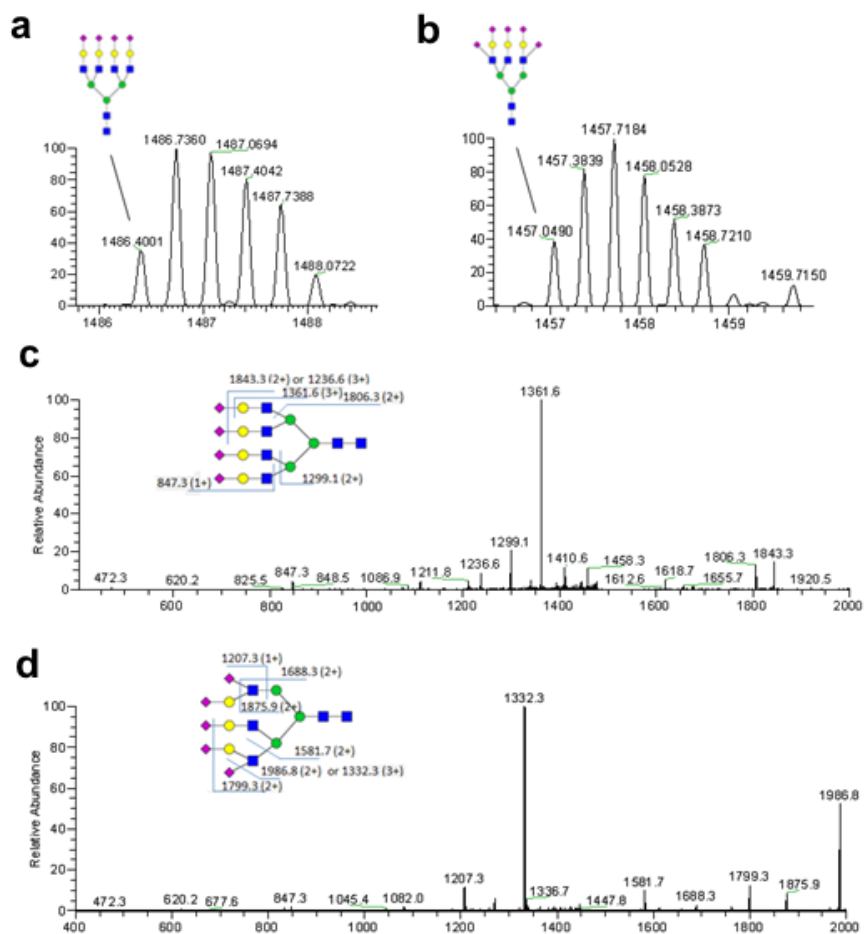
The list of identified glycosites from three plasma samples



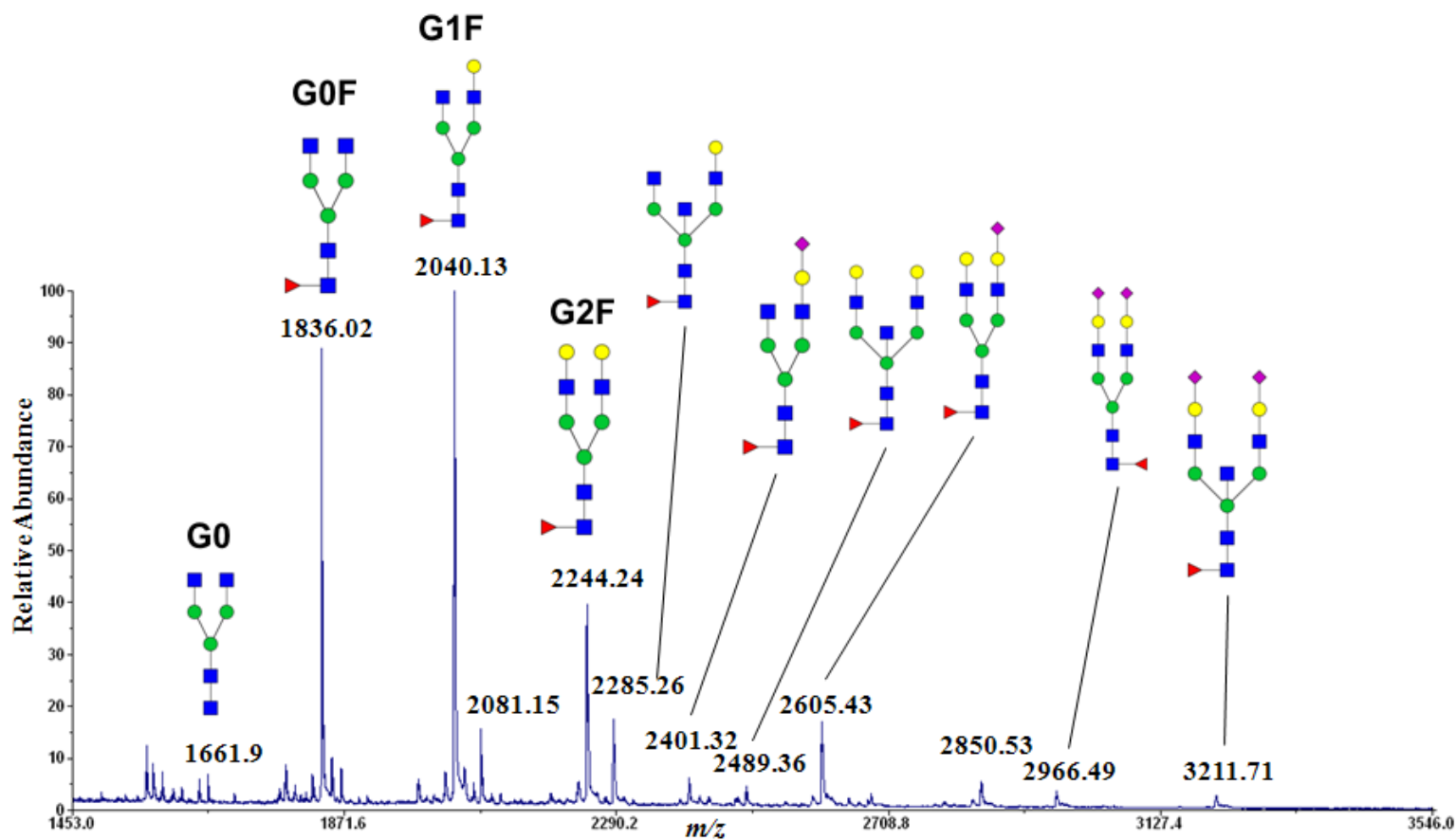
Supplementary Figure S1 | The MALDI-MS of permethylated N-glycans from bovine RNase B at **a)** 1 ug, **b)** 5 ug, and **c)** 10 ug, which were collected separately using the GlycoFilter platform. All known high-mannose type N-glycans (**Man 5**, **Man 6**, **Man 7**, **Man 8**, and **Man 9**) were detected in all samples with the same peak intensity pattern as previously reported(1). All ions were single sodium adducts $[M+Na]^+$ and the monoisotopic peak was annotated.



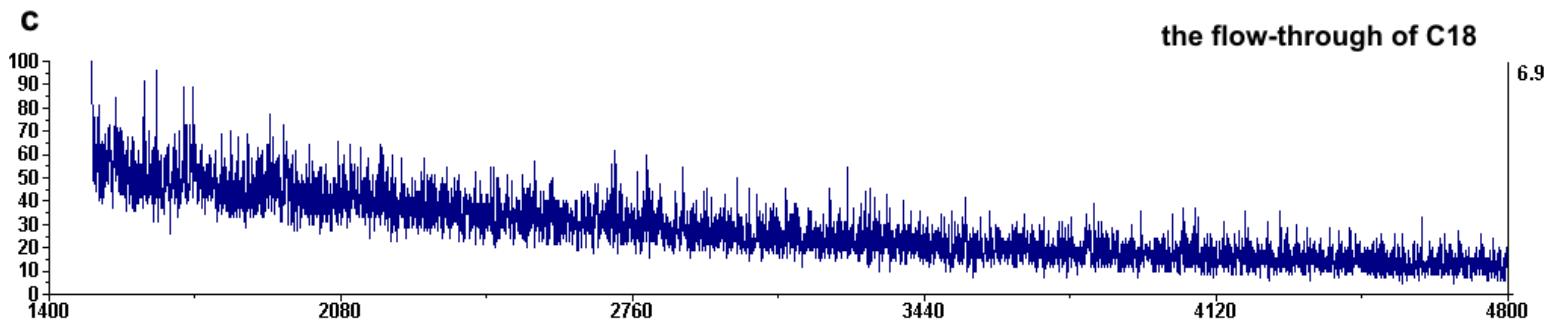
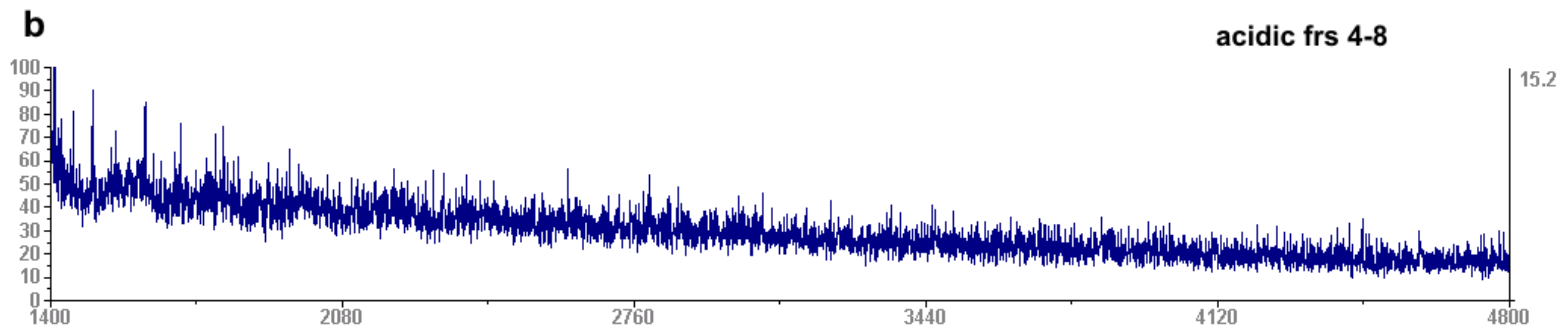
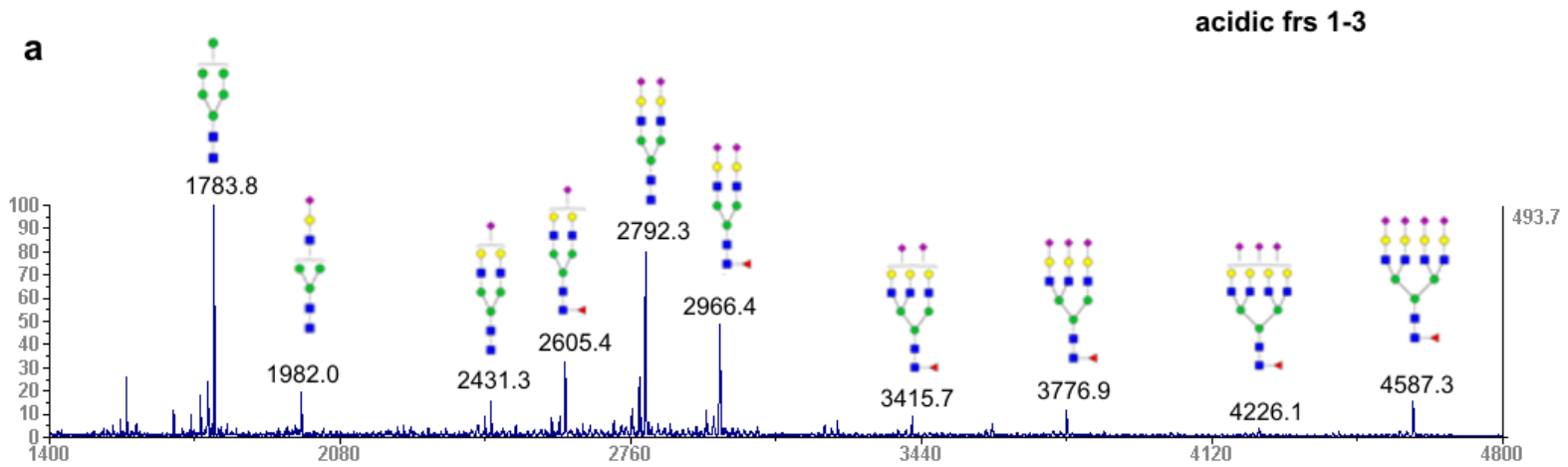
Supplementary Figure S2 | The MALDI-MS of permethylated N-glycans of bovine fetuin. **(a)** The remaining N-glycans in the sample chamber of the filter device without acidification; and **(b)** the remaining N-glycans in the sample chamber of the filter device after acidification. Highly sialic acidic N-glycans were selectively retained in the sample chamber **(a)** due to the ionic interactions between the glycans and protein at neutral or basic conditions. After acidifying, these interactions were effectively interrupted, allowing the elution of large glycans with multiple sialic acid residues by filtration **(b)**. All ions were single sodium adducts $[M+Na]^+$ and the monoisotopic peak was annotated.



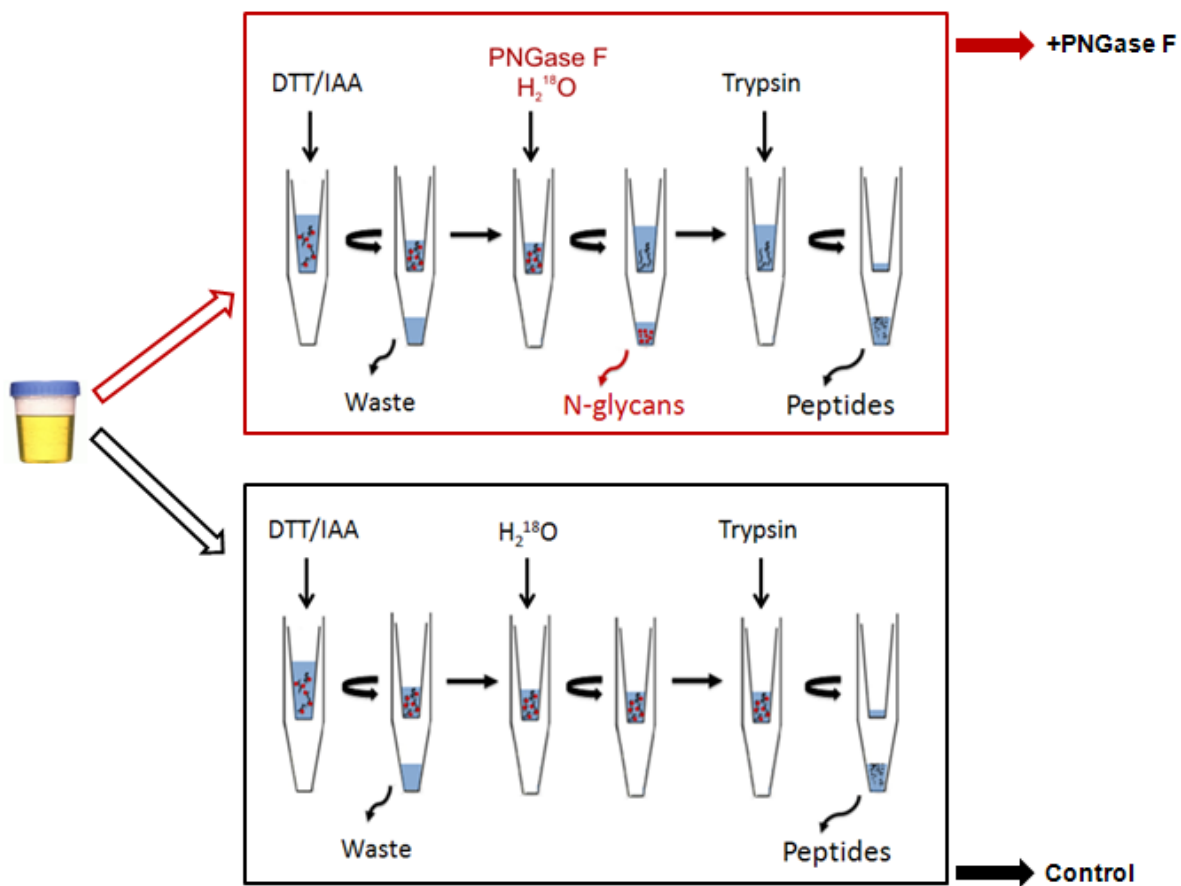
Supplementary Figure S3 | High mass accuracy ESI-MS and CID MS/MS spectra of two unreported N-glycans released from bovine fetuin: m/z 1486.4001 (3+, $\Delta = 8$ ppm), Hex₇HexNAc₆Neu5Ac₄ (**a, c**); and m/z 1457.0490 (3+, $\Delta = 8$ ppm), Hex₆HexNAc₅Neu5Ac₅ (**b, d**). The charge state of the fragment ions are annotated in parenthesis. All ions were sodium adducts and the monoisotopic peak was annotated.



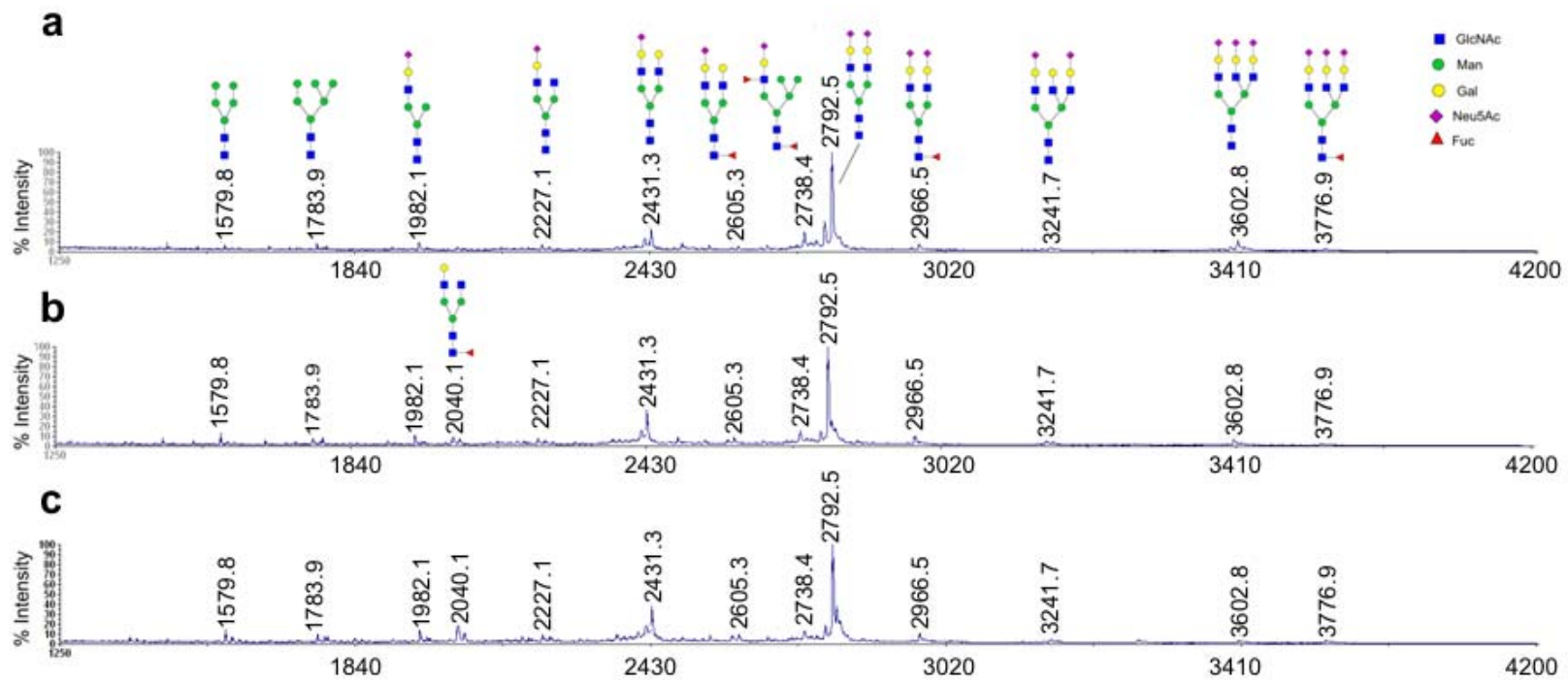
Supplementary Figure S4 | The MALDI-MS of permethylated N-glycans from serum IgG. As expected, three IgG-type N-glycans, G0F, G1F, and G2F, are the most abundant peaks, and the overall intensity pattern and other minor components were the same as other reports (2). All ions were single sodium adducts $[M+Na]^+$ and the monoisotopic peak was annotated.



Supplementary Figure S5 | An additional urine sample was obtained from the donor of **U1**, and processed by the GlycoFilter platform. The N-glycans were eluted by additional acidic washes (X8) to determine if there were residual glycans not captured. The initial three elutions and the remaining five elutions were respectively combined. Furthermore, the deglycosylated proteins were recovered from the sample chamber of the filter and passed through a C18 SPE cartridge to determine if there were residual glycans with the protein sample. The MALDI-MS of permethylated urinary N-glycans were depicted: **(a)** the combined first three acidic elutions; **(b)** the remaining five acidic elutions; and **(c)** the remaining N-glycans from the protein solution. It clearly demonstrates that three acidic elutions effectively separate the vast majority of urinary N-glycans (including the complex and large acidic glycans) from the proteins by filtration **(a)**. N-glycans were not detected in the additional acidic elutions **(b)**, or in the remaining protein sample processed by C18 SPE **(c)**. All ions were single sodium adducts $[M+Na]^+$ and the monoisotopic peak was annotated.



Supplementary Figure S6 | To evaluate the impact of PNGase F on general proteomic performance, three biological urine samples were each divided into two equivalent aliquots. One aliquot was processed with the addition of PNGase F (**+PNGase F**). The other aliquot was processed in parallel except that there was no addition of PNGase F (**Control**). The peptides obtained from both aliquots were similarly analyzed by LC-MS/MS to assess the impact of PNGase F on proteomic performance. (DTT: dithiothreitol; IAA: iodoacetamide)



Supplementary Figure S7 | MALDI-MS of permethylated N-glycans of three biological plasma samples **(a)** Plasma 1, **(b)** Plasma 2, and **(c)** Plasma 3 separately collected by the GlycoFilter platform. All ions were single sodium adducts $[M+Na]^+$ and the monoisotopic peak was annotated.

Supplementary Table S1 | The monosaccharide compositions of permethylated N-glycans from sample **U1**. The glycans were detected by high mass accuracy ESI-MS. The possible N-glycan composition was determined using the online GlycoMod tool (<http://web.expasy.org/glycomod/>) with the following parameter limits: 1) all returned compositions were assumed to have a core structure of Man₃GlcNAc₂, 2) all ions existed as sodium adducts, and 3) the mass error is less than 10 ppm to the theoretical calculation of proposed composition(3). No further verifications were conducted. The number in the parenthesis annotates the charge state of ions. **H** (Hex): hexose; **N** (HexNAc): N-acetyl hexosamine; **F** (Fuc): fucose; **A** (Neu5Ac): N-acetylneuraminic acid.

Glycans	Monosaccharide composition	Theoretical (1+)	Observed (2+)	Observed (3+)
1	H16N4A2	5037.4812		1694.4924
2	H8N7F1A3	4675.3247		1573.77
3	H7N6F1A4	4587.2724		1544.4178
4	H7N6A4	4413.1832		1486.3867
5	H16N4	4315.1336		1453.7136
6	H7N6F1A3	4226.0986		1424.0246
7	H6N5F1A4	4138.0463		1394.6776
8	H7N6A3	4052.0094		1365.9952
9	H6N6F1A3	4021.9988		1355.9896
10	H6N5F2A3	3950.9617		1332.3132
11	H7N6F1A2	3864.9248		1303.6342
12	H7N5A3	3806.8831		1284.2864
13	H6N5F1A3	3776.8725	1899.9268	1274.2826
14	H10N6F1	3754.8766		1266.9561
15	H7N6A2	3690.8356		1245.6038
16	H6N6F1A2	3660.825		1235.6006
17	H6N6F3A1	3647.8296		1231.2625
18	H6N5A3	3602.7833	1812.886	1216.2532
19	H7N6F1A1	3503.751		1183.243
20	H6N6A2	3486.7358		1177.5708
21	H6N6F2A1	3473.7404		1173.2303

22	H7N5A2	3445.7093		1163.8964
23	H6N5F1A2	3415.6987	1719.342	1153.8923
24	H10N5	3335.6611		1127.2164
25	H5N4F1A3	3327.6464	1675.3169	1124.5475
26	H6N6F1A1	3299.6512		1115.2097
27	H6N5A2	3241.6095	1632.3006	1095.8619
28	H5N5F1A2	3211.5989	1617.2924	1085.8586
29	H6N4F1A2	3170.5724		1072.1839
30	H5N4F2A2	3140.5618		1062.1793
31	H6N6A1	3125.562		1057.179
32	H6N6F2	3112.5666	1567.7746	1052.8407
33	H7N5A1	3084.5355		1043.5046
34	H6N5F1A1	3054.5249	1538.7569	1033.501
35	H5N5A2	3037.5097		1027.8294
36	H5N5F2A1	3024.5143	1523.7511	1023.4971
37	H4N5F1A2	3007.4991		1017.8246
38	H6N4A2	2996.4832	1509.7359	1014.1536
39	H5N4F1A2	2966.4726	1494.7299	1004.1501
40	H6N5A1	2880.4357	1451.7097	975.4707
41	H5N5F1A1	2850.4251	1436.7086	965.4683
42	H5N5F3	2837.4297		961.1346
43	H4N5F4	2807.4191		951.1247
44	H5N4A2	2792.3834	1407.6851	946.1203
45	H6N5F1	2693.3511		913.1102
46	H5N5A1	2676.3359	1349.6651	907.4393
47	H4N5F1A1	2646.3253	1334.6577	897.4326
48	H6N4A1	2635.3094	1329.1497	893.7627
49	H5N4F1A1	2605.2988	1314.1434	883.7587
50	H4N4A2	2588.2836	1305.6373	
51	H5N3A2	2547.2571	1285.1222	864.4116
52	H5N5F1	2489.2513		845.0767

53	H4N5A1	2472.2361	1247.6106	
54	H5N4A1	2431.2096	1227.0989	825.729
55	H4N4F1A1	2401.199	1212.0939	815.7257
56	H9N2	2396.1824	1209.5819	
57	H6N3A1	2390.1831	1206.5847	
58	H5N3F1A1	2360.1725	1191.5802	
59	H3N6F1	2326.178	1174.5813	
60	H6N4	2274.1356	1148.5603	
61	H5N4F1	2244.125	1133.5577	
62	H4N4F1	2040.0252	1031.5117	
63	H4N4A1	2227.1098	1125.0487	
64	H3N4F1A1	2197.0992	1110.0443	
65	H8N2	2192.0826	1107.5344	
66	H5N3A1	2186.0833	1104.5356	
67	H4N3F1A1	2156.0727	1089.5306	
68	H3N3A2	2139.0575	1081.0231	
69	H4N5	2111.0623	1067.0246	
70	H5N4	2070.0358	1046.5129	
71	H7N2	1987.9828	1987.979 (1)	
72	H4N3A1	1981.9835	1981.9794 (1)	
73	H3N3F1A1	1951.9729	987.4805	
74	H3N4F1	1835.9254	929.4585	
75	H5N3	1824.9095	923.9495	
76	H4N3F1	1794.8989	908.9457	
77	H6N2	1783.883	903.4346	
78	H3N3A1	1777.8837	900.4362	
79	H3N4	1661.8362	842.4131	
80	H4N3	1620.8097	821.8994	
81	H3N3F1	1590.7991	806.8941	
82	H5N2	1579.7832	801.3859	
83	H3N2A1	1532.7574	777.8726	

84	H3N3	1416.7099	719.8489
85	H4N2	1375.6834	1375.6831 (1)
86	H3N2F1	1345.6728	1345.6725 (1)
87	H3N2	1171.5836	1171.5844 (1)

Supplementary Table S2 | The monosaccharide compositions of permethylated N-glycans from sample **U2**. The glycans were detected by high mass accuracy ESI-MS. The possible N-glycan composition was determined using the online GlycoMod tool (<http://web.expasy.org/glycomod/>) with the following parameter limits: 1) all returned compositions were assumed to have a core structure of Man₃GlcNAc₂, 2) all ions existed as sodium adducts, and 3) the mass error is less than 10 ppm to the theoretical calculation of proposed composition(3). No further verifications were conducted. The number in the parenthesis annotates the charge state of ions. **H** (Hex): hexose; **N** (HexNAc): N-acetyl hexosamine; **F** (Fuc): fucose; **A** (Neu5Ac): N-acetylneuraminic acid.

Glycans	Monosaccharide composition	Theoretical (1+)	Observed (2+)	Observed (3+)
1	H13N11F1A1	5953.9813		1505.7388 (4+)
2	H12N10A1	5330.666		1792.2243
3	H8N8F6	4707.3397		1584.4523
4	H8N8F5	4533.2505		1526.4176
5	H7N7F5	4084.0244		1376.6821
6	H7N6F4	3664.8448		1236.9391
7	H6N6F4	3460.745	1741.8633	1168.906
8	H6N6F3	3286.6558	1654.8181	1110.8761
9	H6N5F4	3215.6187		1087.1967
10	H6N6F2	3112.5666	1567.7749	
11	H5N6F3	3082.556	1552.7699	
13	H5N5F4	3011.5189	1517.2513	
14	H6N6F1	2938.4774	1480.7307	
15	H5N6F2	2908.4668	1465.7241	
16	H6N5F2	2867.4403	1445.212	
18	H5N5F3	2837.4297	1430.2068	
20	H5N4A2	2792.3834	1407.6919	
21	H6N6	2764.3882	1393.6865	
22	H6N5F1	2693.3511	1358.1688	
23	H3N6F3	2674.3564	1348.6761	
24	H5N5F2	2663.3405	1343.1629	

28	H4N6F1	2530.2778	1276.6336	
29	H6N5	2519.2619	1271.1238	
30	H5N5F1	2489.2513	1256.1191	
31	H4N5F2	2459.2407	1241.1133	
32	H6N4F1	2448.2248	1235.6085	
33	H5N4F2	2418.2142	1220.6005	
34	H9N2	2396.1824	1209.578	
35	H4N4F3	2388.2036	1205.6067	811.3966
36	H3N6F1	2326.178	1174.586	
37	H4N5F1	2285.1515	1154.0694	
38	H6N4	2274.1356	1148.5621	
39	H5N4F1	2244.125	1133.5562	
40	H4N4F2	2214.1144	1118.5515	
41	H8N2	2192.0826	1107.5326	
42	H3N4F3	2184.1038	1103.5477	
43	H4N5	2111.0623	1067.0246	
44	H3N5F1	2081.0517	1052.0195	
45	H5N4	2070.0358	1046.5121	
46	H4N4F1	2040.0252	1031.506	
47	H3N4F2	2010.0146	1016.5012	
48	H5N3F1	1998.9987	1010.9938	
49	H7N2	1987.9828	1005.4849	
50	H3N5	1906.9625	964.9765	
51	H4N4	1865.936	944.4627	
52	H3N4F1	1835.9254	929.4564	
53	H6N2	1783.883	903.4352	
54	H3N3F2	1764.8883	893.9376	
55	H3N4	1661.8362	842.4115	
56	H4N3	1620.8097	821.8983	
57	H3N3F1	1590.7991	806.8929	
58	H5N2	1579.7832	801.3851	

59	H4N2	1375.6834	1375.6826
60	H3N2F1	1345.6728	1345.6710 (1+)
61	H3N2	1171.5836	1171.5821

Supplementary Table S3 | The monosaccharide compositions of permethylated N-glycans from sample **U3**. The glycans were detected by high mass accuracy ESI-MS. The possible N-glycan composition was determined using the online GlycoMod tool (<http://web.expasy.org/glycomod/>) with the following parameter limits: 1) all returned compositions were assumed to have a core structure of Man₃GlcNAc₂, 2) all ions existed as sodium adducts, and 3) the mass error is less than 10 ppm to the theoretical calculation of proposed composition(3). No further verifications were conducted. The number in the parenthesis annotates the charge state of ions. **H** (Hex): hexose; **N** (HexNAc): N-acetyl hexosamine; **F** (Fuc): fucose; **A** (Neu5Ac): N-acetylneuraminic acid.

Glycans	Monosaccharide composition	Theoretical (1+)	Observed (2+)	Observed (3+)
1	H12N10A1	5330.666		1792.2294
2	H8N8F6	4707.3397		1584.4523
3	H7N7F5	4084.0603		1376.6918
4	H11N6	3784.8872	1903.9352	1276.9489
5	H6N5F1A3	3776.8725		1274.2952
6	H7N6A2	3690.8356		1245.617
7	H6N6F4	3460.745	1741.8821	
8	H6N5F1A2	3415.6987	1719.359	
9	H6N6F3	3286.6558	1654.8354	
10	H5N6F4	3256.6452	1639.8211	
11	H6N5F2A1	3228.6141	1625.812	
12	H5N5F1A2	3211.5989	1617.3088	
13	H6N4F1A2	3170.5724	1596.7837	
14	H6N6F2	3112.5666	1567.7921	
15	H5N6F3	3082.556	1552.7827	
16	H6N5F1A1	3054.5249	1538.7705	
17	H5N5F2A1	3024.5143	1523.7503	
18	H5N5F4	3011.5189	1517.2657	
19	H12N2	3008.4818	1515.738	
20	H6N4A2	2996.4832	1509.75	1014.1637
21	H5N4F1A2	2966.4726	1494.7438	1004.159

22	H6N6F1	2938.4774	1480.7455	994.8271
23	H5N6F2	2908.4668	1465.7373	
24	H6N5A1	2880.4357	1451.7252	975.4798
25	H6N5F2	2867.4403		971.1467
26	H5N5F1A1	2850.4251	1436.721	
27	H5N5F3	2837.4297		961.1442
28	H4N5F2A1	2820.4145	1421.6994	
29	H5N4A2	2792.3834	1407.6986	946.1288
30	H6N6	2764.3882	1393.6993	
31	H5N6F1	2734.3776	1378.6849	
32	H6N5F1	2693.3511	1358.1821	
33	H5N5F2	2663.3405	1343.176	
34	H4N5F1A1	2646.3253	1334.67	
35	H4N5F3	2633.3299	1328.1699	
36	H5N4F1A1	2605.2988	1314.1556	883.7664
37	H5N3A2	2547.2571	1285.1347	864.4191
38	H6N5	2519.2619	1271.1357	
39	H5N5F1	2489.2513	1256.1313	
40	H4N5A1	2472.2361	1247.6244	
41	H4N5F2	2459.2407	1241.1263	
42	H5N4A1	2431.2096	1227.11	825.736
43	H5N4F2	2418.2142	1220.6105	
44	H4N4F1A1	2401.199	1212.0925	
45	H4N4F3	2388.2036	1205.6073	
46	H4N5F1	2285.1515	1154.0691	
47	H6N4	2274.1356	1148.5725	
48	H5N4F1	2244.125	1133.5675	
49	H4N4F2	2214.1144	1118.5614	
50	H8N2	2192.0826	1107.5447	
51	H5N3A1	2186.0833	1104.5459	
52	H3N4F3	2184.1038	1103.5467	

53	H4N5	2111.0623	1067.0359
54	H3N5F1	2081.0517	1052.0302
55	H5N4	2070.0358	1046.5231
56	H4N4F1	2040.0252	1031.5176
57	H3N4F2	2010.0146	1016.5022
58	H7N2	1987.9828	1009.4959
59	H4N4	1865.936	944.4722
60	H3N4F1	1835.9254	929.4658
61	H4N3F1	1794.8989	908.9522
62	H6N2	1783.883	903.4439
63	H3N3A1	1777.8837	900.444
64	H3N3F2	1764.8883	1764.888 (1+)
65	H3N4	1661.8362	842.42
66	H4N3	1620.8097	821.9062
67	H3N3F1	1590.7991	806.9007
68	H5N2	1579.7832	801.3928
69	H4N2	1375.6834	1375.6828 (1+)
70	H3N2F1	1345.6728	1345.6715 (1+)
71	H3N2	1171.5836	1171.5824 (1+)

Supplementary Table S4 | A summary of the urinary proteins co-identified in both **+PNGase F** and **Control** aliquots (**Supplementary Fig. S6**). The urinary proteins were divided into two distinct groups, glycoproteins and other proteins. Glycoproteins were defined as proteins being identified by at least one deglycopeptide from **+PNGase F** aliquots. Other proteins were defined as protein identified without any deglycopeptides. The unique peptide count for every co-identified protein was calculated and averaged into two groups: glycoproteins and other proteins. Approximately 2 or more additional unique peptides per protein were identified for the glycoproteins due to the effect of upfront de-N-glycosylation. There was no increase in unique peptides for other proteins after de-N-glycosylation.

Urine Sample	Co-identified proteins	Co-identified proteins		Ave. unique peptide count (+ PNGase F vs. Control)	
		Glycoproteins	Other proteins	Glycoproteins	Other proteins
U1	846	250	596	12.7 vs. 10.2	5.6 vs. 5.3
U2	880	272	608	11.0 vs. 9.5	5.4 vs. 5.6
U3	966	310	656	11.6 vs. 9.8	5.6 vs. 5.6
Total	2692	832	1860	11.7 vs. 9.8	5.5 vs. 5.5

Supplementary Table S5 | The complete list of non-redundant N-glycosites (865), spanning in 458 glycoproteins, identified in three urine samples (**U1**, **U2** and **U3**). G: the site was detected as the deglycosylated form only (¹⁸O-incorporated aspartic acid); N: the glycosite was detected as the non-glycosylated form only (asparagine); P: the glycosite was detected as both the non-glycosylated and deglycosylated forms; (-): the glycosite was not detected. Glycosites reported and annotated in the database UniProtKB (<http://www.uniprot.org/>) are annotated as (+). Those which have never been confirmed as glycosylated in UniProtKB are annotated as (-). A glycosite was considered as partially occupied (**PO**) as long as its non-glycosylated form (asparagine) was detected in any sample.

Gene name	Accession #	Glycosite #	Consensus Sequence	UniProt Status	U1	U2	U3
1A03	P01893	110	YNQSE	+	G	-	-
4F2	P08195	365	QNITK	+	-	-	G
4F2	P08195	424	LNATG	+	G	-	G
A1AG1	P02763	72	PNKTE	+	P	G	P
A1AG1	P02763	93	YNTTY	+	G	G	P
A1AG2	P19652	93	YNSSY	+	P	G	P
A1AT	P01009	107	FNLTE	+	P	-	-
A1BG	P04217	179	GNYSY	+	G	-	G
A2GL	P02750	186	ANFTL	+	P	-	G
A2GL	P02750	269	SNNSL	+	P	-	-
A2GL	P02750	325	QNDTR	+	G	G	-
AACT	P01011	106	FNLTE	+	P	-	P
AACT	P01011	127	LNQSS	+	-	-	G
ABP1	P19801	538	ENITN	+	-	G	-
ACAM	Q9H6B4	74	NNLTE	-	-	G	G
ACE	P12821	111	QNFTD	+	-	G	G
ACE	P12821	445	TNDTE	+	-	G	-
ACE	P12821	509	RNETH	+	-	G	G
ACE	P12821	695	ANHTL	+	G	-	-
ACE	P12821	714	QNTTI	+	-	G	-
ACE2	Q9BYF1	103	QNGSS	+	-	G	G
ACE2	Q9BYF1	546	SNSTE	+	G	G	G
ACE2	Q9BYF1	690	KNVSD	-	-	-	G

ADAM9	Q13443	125	HNSI	-	-	-	G
ADAM9	Q13443	144	ENASY	-	-	-	G
ADAM9	Q13443	154	QNSSH	-	-	-	G
AFAM	P43652	33	FNSTQ	+	-	-	G
AFAM	P43652	402	FNETT	+	-	G	G
AGAL	P06280	139	GNKTC	+	-	G	G
AGAL	P06280	192	LNRTG	+	G	-	-
AGRIN	O00468	932	ANATK	-	-	-	G
AMBP	P02760	250	YNGTS	+	P	G	P
AMPE	Q07075	324	ANITK	+	G	-	G
AMPE	Q07075	589	DNITS	-	-	G	G
AMPE	Q07075	597	FNRSE	-	-	G	G
AMPE	Q07075	607	LNSSN	+	G	G	G
AMPE	Q07075	828	KNVTL	-	-	G	-
AMPN	P15144	128	LNRTL	+	N	G	G
AMPN	P15144	234	FNITL	+	G	G	G
AMPN	P15144	265	WNVTE	+	G	G	G
AMPN	P15144	681	LNNTL	+	G	-	-
AMPN	P15144	735	RNNTN	-	G	-	-
AMPN	P15144	818	RNATL	+	G	G	G
AMY1	P04745	476	GNCTG	-	P	P	P
ANAG	P54802	261	VNVTK	-	G	-	-
ANAG	P54802	503	YNCSG	-	G	G	G
ANGT	P01019	47	HNEST	+	G	-	G
ANPRC	P17342	394	WNRTF	+	G	-	G
ANT3	P01008	128	CNDTL	+	G	G	-
ANT3	P01008	187	FNETY	+	G	G	G
ANT3	P01008	224	SNKTE	+	G	G	G
ANTR1	Q9H6X2	184	FNETQ	+	G	G	-
ANTR1	Q9H6X2	262	INDSV	-	-	-	G
APLP2	Q06481	541	RNQLS	-	G	-	-

APOA	P08519	61	HNRTT	-	G	-	G
APOD	P05090	65	ANYSL	+	P	G	P
APOD	P05090	98	VNLTE	+	G	G	G
APOF	Q13790	118	VNATQ	-	G	-	-
APOH	P02749	162	GNNSL	+	G	G	G
APOH	P02749	253	GNWSA	+	P	G	G
APOM	O95445	135	LNETG	+	-	G	-
ASAH1	Q13510	259	ENSTS	+	G	G	-
ASAH1	Q13510	286	GNQSG	+	N	G	G
ASGR2	P07307	170	SNGSQ	+	G	G	G
ASM3A	Q92484	222	LNKTD	+	G	-	-
ASM3A	Q92484	238	LNNSQ	-	-	G	-
ASPG	P20933	38	KNATE	+	-	G	G
ATRN	O75882	264	SNSSD	+	-	G	G
ATRN	O75882	300	CNSSD	+	-	G	G
ATRN	O75882	325	ANQSF	-	-	G	G
ATRN	O75882	416	GNVTN	+	G	G	G
ATRN	O75882	428	HNESW	+	G	-	G
ATRN	O75882	575	HNDTS	+	G	-	-
ATRN	O75882	731	RNHSC	+	P	G	P
ATRN	O75882	914	LNGSV	-	G	G	G
ATRN	O75882	923	ANHSA	-	G	G	G
ATRN	O75882	1043	LNSSM	+	-	G	G
ATRN	O75882	1054	YNWSF	-	G	G	G
ATRN	O75882	1073	INQSI	-	N	G	-
ATRN	O75882	1082	ENLTT	-	P	G	G
ATRN	O75882	1198	INASK	+	N	P	P
AVR2B	Q13705	42	TNQSG	-	-	G	-
B3GN1	O43505	204	TNVSY	-	G	-	G
B3GN2	Q9NY97	79	TNQTG	+	-	G	G
B3GN2	Q9NY97	89	SNISH	-	G	G	-

B3GN2	Q9NY97	127	RNYSL	-	-	G	-
B3GN2	Q9NY97	173	GNQTV	-	-	G	-
BAMBI	Q13145	87	RNHSG	-	-	G	G
BASI	P35613	160	LNDSA	+	G	G	G
BCAM	P50895	377	LNSSA	-	G	G	G
BCAM	P508965	383	VNCSV	-	G	G	G
BCAM	P50895	439	QNFTL	+	-	G	G
BGAL	P16278	247	SNITD	-	-	-	G
BGAL	P16278	464	LNITG	+	G	G	G
BGLR	P08236	272	ANGTG	+	P	N	N
BMPR2	Q13873	55	ENGTI	-	G	G	-
BST1	Q10588	66	KNCTA	-	-	G	G
BST2	Q10589	65	RNVTH	+	G	G	G
BT2A1	Q7KYR7	114	HNITA	+	P	P	P
BT2A1	Q7KYR7	120	ENGTY	+	P	P	P
BTD	P43251	119	FNFTR	+	G	G	G
BTD	P43251	150	FNDTE	+	G	G	G
BTD	P43251	203	NNGTL	+	-	-	G
BTD	P43251	349	ENATG	+	G	G	G
BTD	P43251	402	DNFTL	+	G	-	-
C163A	Q86VB7	105	ANSSA	+	-	G	G
C163A	Q86VB7	123	GNESA	-	-	G	G
C163A	Q86VB7	140	SNCTH	+	-	G	G
C1RL	Q9NZP8	147	ENKTA	+	G	-	G
C1RL	Q9NZP8	166	VNYSQ	+	-	-	G
C1RL	Q9NZP8	242	QNQTT	+	-	G	G
C1RL	Q9NZP8	296	KNQSV	+	G	G	G
C1RL	Q9NZP8	331	QNESH	-	G	-	-
C1RL	Q9NZP8	335	HNFSG	-	G	-	-
C1RL	Q9NZP8	363	DNETL	-	G	-	-
CA159	Q96HA4	104	NGTTL	-	-	-	G

CA159	Q96HA4	111	YNGSE	-	-	-	G
CA2D1	P54289	824	ENFTK	-	-	G	-
CA2D1	P54289	888	VNISV	-	-	-	G
CA2D1	P54289	895	FNKSY	-	-	-	G
CAD11	P55287	540	PNFTV	-	G	-	-
CAD13	P55290	52	LNLTF	-	G	-	G
CAD13	P55290	500	VNATD	+	-	G	-
CAD13	P55290	638	INNTH	+	G	-	-
CAD15	P55291	531	RNWSL	-	-	-	G
CAD15	P552921	538	VNVSH	-	-	-	G
CADH2	P19022	325	NNETG	-	-	-	G
CADH2	P19022	402	ANLTV	+	G	-	-
CADH2	P19022	692	SNISI	+	P	G	-
CADH6	P55285	455	HNITV	-	G	-	-
CADM1	Q9BY67	67	VNKSD	-	G	G	G
CADM1	Q9BY67	101	LNFS	+	G	G	G
CADM1	Q9BY67	113	TNVS	+	G	G	G
CADM1	Q9BY67	165	VNCTA	-	-	G	-
CADM1	Q9BY67	304	LNKTD	+	G	P	P
CADM1	Q9BY67	308	DNGTYR	-	-	G	-
CADM2	Q8N3J6	51	DNTSL	-	-	-	G
CADM2	Q8N3J6	287	LNKTD	-	-	-	G
CADM3	Q8N126	290	LNKSD	+	-	-	G
CADM4	Q8NFZ8	67	FNGTR	-	G	G	G
CADM4	Q8NFZ8	262	GNESL	-	G	P	P
CADM4	Q8NFZ8	286	DNGTY	-	-	G	G
CADM4	Q8NFZ8	375	LNGSD	-	-	G	-
CAP7	P20160	171	VNVTV	+	-	G	-
CATB	P07858	38	RNTTW	-	-	-	G
CATC	P53634	53	VNCSV	+	G	-	G
CATC	P53634	119	CNETM	+	G	G	G

CATH	P09668	101	QNCSA	+	-	G	G
CATL1	P07711	221	ANDTG	+	G	G	G
CATZ	Q9UBR2	184	RNYTL	+	-	G	-
CBG	P08185	96	FNLTE	+	P	G	G
CBPB2	Q96IY4	73	VNASD	+	G	G	G
CBPE	P16870	139	GNETI	-	N	G	N
CBPE	P16870	390	ANATI	-	-	G	G
CBPM	P14384	38	QNYSS	+	G	G	G
CBPM	P14384	115	INSTR	+	G	-	-
CBPM	P14384	164	NNVSR	+	-	G	G
CBPM	P14384	384	QNFSA	-	-	N	G
CBPZ	Q66K79	57	YNHTT	-	G	G	G
CD14	P08571	151	RNVSW	+	P	G	P
CD14	P08571	282	LNLSF	+	P	-	G
CD177	Q8N6Q3	46	KNTSC	-	-	-	G
CD177	Q8N6Q3	189	LNGTQ	-	-	G	-
CD177	Q8N6Q3	382	LNHTR	-	-	-	G
CD27	P26842	95	RNCTI	-	G	G	G
CD276	Q5ZPR3	91	ANRTA	-	G	G	G
CD276	Q5ZPR3	104	GNASL	-	G	-	G
CD276	Q5ZPR3	215	ANGTY	-	G	G	G
CD276	Q5ZPR3	309	ANRTA	-	-	G	-
CD33	P20138	100	NNCSL	-	G	G	G
CD34	P28906	194	QNKTS	-	G	-	-
CD34	P28906	194	QNKTS	-	-	G	-
CD44	P16070	57	FNSTL	+	P	G	G
CD47	Q08722	73	LNKST	+	-	G	-
CD47	Q08722	111	GNYTC	+	-	G	-
CD59	P13987	43	VNCSS	+	G	G	P
CD63	P08962	130	NNHTA	+	G	G	G
CD63	P08962	150	ANYTD	-	-	G	-

CD68	P34810	199	PNKTK	+	-	G	-
CD7	P09564	96	DNLTI	+	P	G	G
CD83	Q01151	96	RNTTS	-	-	G	G
CD97	P48960	33	QNSSC	-	-	G	G
CD97	P48960	38	VNATA	-	-	G	G
CD97	P48960	108	KNESE	-	-	-	G
CDHR2	Q9BYE9	632	HNFSL	-	G	-	-
CDHR5	Q9HBB8	81	LVNTP	+	G	G	G
CDHR5	Q9HBB8	140	VNSTV	-	-	G	G
CDHR5	Q9HBB8	297	VNGTF	-	-	G	-
CDHR5	Q9HBB8	308	GNLTV	+	-	G	-
CEAM6	P40199	197	GNMTL	+	G	-	G
CERU	P00450	138	DNTTD	+	G	G	G
CERU	P00450	358	CNKSS	+	P	-	G
CERU	P00450	397	ENLTA	+	G	G	G
CERU	P00450	762	QNVSN	+	G	G	P
CETP	P11597	257	KNVSE	+	-	-	G
CETP	P11597	358	VNSSV	+	-	-	P
CF072	Q9NU53	46	INVTT	-	G	G	G
CF072	Q9NU53	166	SNYTL	-	-	-	G
CFAH	P08603	882	INSSR	+	G	-	-
CFAH	P08603	911	ENETT	+	-	-	G
CFAI	P05156	70	KNGTA	+	-	G	-
CFAI	P05156	103	NNGTC	+	G	-	G
CHL1	O00533	87	SNSNG	-	G	-	-
CHL1	O00533	562	INGTE	+	-	-	G
CHL1	O00533	767	TNHTL	+	G	-	G
CHL1	O00533	1026	VNLTQ	+	-	-	G
CLC14	Q86T13	189	SNLSY	-	P	-	G
CLC4G	Q6UXB4	159	QNNSC	-	-	-	G
CLN5	O75503	203	DNETG	-	-	G	-

CLN5	O75503	352	RNKTL	-	G	-	-
CLUL1	Q15846	311	QNLSR	-	-	G	-
CLUS	P10909	86	LNETR	+	-	G	G
CLUS	P10909	103	CNETM	+	G	G	G
CLUS	P10909	145	LNQSS	+	G	-	G
CLUS	P10909	354	LNTSS	+	P	-	-
CLUS	P10909	374	ANLTQ	+	G	G	G
CNTN1	Q12860	208	GNYSK	-	-	-	G
CNTN1	Q12860	494	ANSTG	+	-	G	G
CO3	P01034	85	GNVTF	+	G	G	G
CO4A	P0C0L4	1328	LVNVL	+	G	G	G
CO5A3	P25940	102	ANQSV	+	-	G	G
CO5A3	P25940	141	VNLTD	+	G	-	-
CO6A1	P12109	212	RNFTA	+	G	G	G
CO6A1	P12109	804	KNVTA	+	G	G	G
CO6A1	P12109	896	QNYTA	+	G	-	-
CO6A3	P12111	3037	QNLTV	-	G	G	-
CO7	P10643	754	RNYTL	+	G	G	G
COCH	O43405	100	ENYSS	-	-	G	G
COMP	P49747	121	GNGSH	-	-	G	G
CPN2	P22792	74	PNLTK	-	N	G	N
CPN2	P22792	348	NNLTA	+	-	G	G
CPN2	P22792	359	QNLSK	+	-	G	G
CPVL	Q9H3G5	81	VNKTY	+	G	G	-
CPVL	Q9H3G5	307	QNVTV	-	G	G	G
CPVL	Q9H3G5	346	GNQTF	+	-	P	-
CR1	P17927	447	VNYTC	-	-	G	-
CR3L3	Q68CJ9	427	RNATE	+	G	-	G
CREG1	O75639	160	VNETE	+	-	-	G
CREL1	Q96HD1	205	RNASH	-	-	-	G
CRIM1	Q9NZV1	71	RNESC	-	-	G	-

CRUM2	Q5IJ48	786	DNSSQ	-	-	G	G
CSF1	P09603	154	FNETK	-	G	G	G
CSF1	P09603	172	CNNSF	-	-	-	G
CSF1R	P07333	153	TNYSF	-	G	-	-
CSPG2	P13611	1442	QNFSO	-	-	G	-
CSPG4	Q6UVK1	348	TNASL	-	G	G	G
CTL2	Q8IWA5	200	KNITD	+	G	G	G
CTL2	Q8IWA5	417	SNESR	-	-	G	G
CTL4	Q53GD3	69	RNSTG	-	-	G	G
CTL4	Q53GD3	405	INTSC	-	-	G	G
CTL4	Q53GD3	416	VNSSC	-	-	G	G
CUBN	O60494	105	QNISS	-	G	G	G
CUBN	O60494	711	GNYTD	-	-	G	G
CUBN	O60494	781	GNGTI	-	G	G	G
CUBN	O60494	1802	GNATG	-	G	G	G
CUBN	O60494	2085	FNASF	-	G	-	G
CUBN	O60494	2400	DNHTS	-	-	G	G
CUBN	O60494	2531	VNVSN	-	-	G	G
CUBN	O60494	2923	SNFTG	-	G	G	G
CUBN	O60494	3103	ANTSD	-	G	-	-
CUBN	O60494	3125	SNNSM	-	G	P	P
CUBN	O60494	3357	RNASA	-	G	-	-
CUBN	O60494	3457	RNGSN	-	G	G	G
CXL16	Q9H2A7	168	PNETT	-	-	G	G
CYTM	Q15828	137	QNSSQ	-	P	-	P
DAF	P08174	95	CNRSC	+	G	P	G
DAG1	Q14118	141	ANGSH	-	G	-	G
DIAC	Q01459	299	INSSI	+	P	G	G
DKK3	Q9UBP4	106	GNNTI	-	-	-	G
DMB	P28068	110	TNRTR	+	G	-	-
DNAS1	P24855	128	GNDTF	-	G	G	G

DNER	Q8NFT8	223	QNTSV	+	-	-	G
DNER	Q8NFT8	361	NNASC	-	-	G	G
DPEP1	P16444	57	ANLTT	+	G	G	G
DPEP1	P16444	279	ANLSQ	+	G	G	G
DPEP1	P16444	332	RNWTE	+	G	G	G
DPEP1	P16444	358	SNLTQ	-	-	N	G
DPP2	Q9UHL4	315	YNASG	+	-	G	G
DPP4	P27487	150	PNNTQ	+	-	G	G
DPP4	P27487	520	LNETK	+	-	P	G
DSC2	Q02487	392	ANYTI	+	G	G	G
DSC2	Q02487	546	YNITV	+	-	-	G
DSC2	Q02487	629	INDTA	+	-	G	G
DSG2	Q14126	182	INATD	+	-	G	G
EFNA1	P20827	26	WNSSN	-	G	G	G
EFNA2	O43921	42	WNRSN	-	-	-	G
EFNA4	P52798	33	WNSSN	-	G	-	-
EFNA5	P52803	37	WNSSN	+	G	-	-
EFNB1	P98172	139	SNGSL	-	G	G	G
EGF	P01133	104	LNGSR	-	G	G	-
EGF	P01133	148	GNNSH	-	G	G	G
EGF	P01133	324	GNCSS	-	P	G	P
EGF	P01133	404	RNVSE	-	-	P	G
EGF	P01133	596	ENISQ	-	P	P	-
EGF	P01133	815	DNITE	-	-	G	G
EGF	P01133	926	ENASC	-	-	G	-
EMR2	Q9UHX3	41	VNATA	-	-	-	G
ENPP2	Q13822	525	NNGTH	-	G	-	-
ENPP7	Q6UWV6	100	YNTTS	+	G	-	-
EPCR	Q9UNN8	47	GNASL	-	G	-	-
EPCR	Q9UNN8	64	TNTTI	+	G		
EPCR	Q9UNN8	136	VNGSS	+	G	-	-

EPCR	Q9UNN8	172	YNRTR	+	P	-	-
EPHA1	P21709	338	RNLSF	-	-	-	G
EPHB2	P29323	265	ENGTV	-	-	G	G
EPHB2	P29323	482	YNATA	-	-	G	G
EPHB3	P54753	445	VNITT	-	-	G	G
EPHB4	P54760	203	VNLTR	-	G	-	N
EPHB4	P54760	335	LNGSS	-	-	-	G
ERBB4	Q15303	576	DNCTK	+	-	G	G
ESAM	Q96AP7	169	ANVTL	+	G	-	G
ESAM	Q96AP7	213	TNLSS	-	P	-	P
FA12	P00748	433	RNHSC	+	-	G	G
FA5	P12259	821	LNSST	+	-	G	-
FAM3B	P58499	120	GNVTA	-	G	-	-
FAT4	Q6V0I7	615	DNGTV	-	-	G	-
FAT4	Q6V0I7	1225	ANLTQ	-	-	G	G
FBLN1	P23142	98	DNASL	-	G	G	-
FBLN2	P98095	180	GNFSD	-	G	G	G
FBLN4	O95967	198	NNRSC	-	-	G	-
FBLN5	Q9UBX5	296	RNHTC	-	G	G	G
FBN1	P35555	1581	VNTSE	+	-	G	G
FBN1	P35555	1703	DNQTC	-	G	G	G
FBN1	P35555	1713	FNMTK	-	G	G	G
FBN1	P35555	2077	RNHSK	-	G	-	-
FBN1	P35555	2178	GNGTC	-	-	-	G
FBN1	P35555	2734	TNETD	-	G	-	G
FBN1	P35555	2750	ANVSL	-	G		G
FBN1	P35555	2767	FNISH	-	G	G	G
FCERA	P12319	46	ENVTL	+	-	-	G
FCGBP	Q9Y6R7	1830	PNGTL	-	-	-	G
FETUA	P02765	156	LNDTR	+	G	G	G
FETUA	P02765	176	NNGSN	+	G	G	G

FGFR1	P11362	77	SNRTR	-	G	-	-
FGFR1	P11362	296	VNGSK	+	-	G	-
FGFR1	P11362	317	VNTTD	-	-	-	G
FGFR2	P21802	83	NNRTV	-	G	-	G
FGL2	Q14314	263	TNFTR	-	-	G	G
FGL2	Q14314	336	YNGTA	+	G	G	G
FHR1	Q03591	126	NNISC	+	N	N	P
FHR2	P36980	126	NNISC	+	N	N	P
FIBA	P02671	686	FNRTW	+	G	G	G
FIBG	P02679	78	ENKTS	+	-	G	-
FINC	P03751	528	VNDTF	+	-	G	G
FINC	P03751	542	LNCTC	+	G	G	G
FOLR1	P15328	69	TNTSQ	-	G	G	G
FOLR1	P15328	161	WNWTS	+	P	G	N
FREM2	Q5SZK8	2121	INDSV	-	-	G	-
FSTL1	Q12841	144	SNYSE	-	-	-	G
FZD4	Q9ULV1	59	YNVTK	-	G	G	G
FZD4	Q9ULV1	144	LNCSK	-	G	G	G
GALNS	P34059	423	QNVSG	+	G	-	G
GAS1	P54826	117	LNHTR	-	-	-	G
GGT1	P19440	120	FNSSE	+	-	G	G
GGT1	P19440	344	RNMTS	+	-	G	G
GGT1	P19440	511	PNVTT	+	G	G	G
GGTL1	Q9BX51	167	PNVTT	-	G	G	G
GLCM	P04062	185	HNFSL	+	-	G	-
GLCM	P04062	309	ANSTH	+	G	-	-
GLHA	P01315	76	KNVTS	+	-	G	G
GLHA	P01315	102	ENHTA	+	-	-	G
GLTL4	Q6P9A3	320	ENSTA	-	-	-	G
GNS	P15586	111	VNNTL	-	G	-	G
GNS	P15586	117	GNCSS	-	G	-	G

GNS	P15586	279	TNSSI	+	-	G	G
GNS	P15586	405	SNLTW	-	G	G	G
GOLM1	Q8NBJ4	109	NNITT	+	G	G	G
GOLM1	Q8NBJ4	144	KNQTN	-	-	-	G
GP116	Q8IZF2	256	LNQTY	+	G	G	G
GP116	Q8IZF2	301	SNVSW	-	G	-	G
GP116	Q8IZF2	315	QNSSR	+	-	G	G
GP116	Q8IZF2	627	FNASS	-	-	G	-
GP116	Q8IZF2	649	ANNSV	-	G	-	-
GP116	Q8IZF2	666	ENITC	-	-	-	G
GP126	Q86SQ4	818	WNTSG	-	-	-	G
GP2	P55259	216	LNSSD	-	-	G	-
GPC1	P35052	79	ANRSH	-	-	-	G
GPC1	P35052	116	LNDSE	-	-	-	G
GPC3	P51654	241	INTTD	-	G	-	-
GPR56	Q9Y653	303	KNSSQ	-	-	G	-
GPR56	Q9Y653	324	ANLTE	-	G	G	-
GPR64	Q8IZP9	194	LNNTM	-	-	G	-
GPV	P40197	181	NNLTH	+	G	-	-
GRN	P28799	236	PNATC	-	G	G	G
GRN	P28799	265	ENATT	+	G	G	G
GRN	P28799	530	DNQTC	-	-	G	-
GSLG1	Q92896	165	LNLTT	-	-	-	G
H6ST2	Q96MM7	460	YNTTR	-	G	-	-
HAVR2	Q8TDQ0	99	ENVTL	-	-	-	G
HECA2	A8MNVW5	201	KNGRP	-	G	-	G
HEG1	Q9ULI3	159	ENLTL	+	G	G	G
HEG1	Q9ULI3	279	RNSSG	-	G	-	G
HEG1	Q9ULI3	314	LNNST	-	G	G	G
HEG1	Q9ULI3	520	LNSSA	+	-	P	P
HEMO	P02790	187	GNCSS	+	P	G	G

HEMO	P02790	240	RNGTG	+	G	G	G
HEMO	P02790	246	GNSTH	+	G	G	G
HEMO	P02790	453	QNVTS	+	P	G	G
HEP2	P05546	49	KNLSM	+	G	-	G
HEXA	P06865	157	INKTE	+	-	-	G
HG2A	P04233	136	GNMTE	+	-	-	G
HG2A	P04233	270	HNCSE	-	-	-	G
HGFA	Q04756	290	GNGTG	-	G	G	G
HMCN2	Q8NDA2	2468	CNVTG	-	G	G	G
HMCN2	Q8NDA2	2507	ANLSS	-	G	-	-
HPT	P00738	184	HNLTT	+	P	-	-
HPTR	P00739	126	HNLTT	-	P	-	-
HPTR	P00739	149	LNHSE	-	-	G	-
HRG	P04196	344	NNSSD	+	G	-	-
HYOU1	Q9Y4L1	830	LNHSS	+	G	-	G
HYOU1	Q9Y4L1	862	INETW	+	-	G	-
HYOU1	Q9Y4L1	931	LNASA	+	-	G	-
I10R2	Q08334	49	GNLTF	-	G	-	G
I13R1	P78552	105	TNESE	-	-	-	P
I18BP	O95998	79	LNGTL	-	G	-	G
I18BP	O95998	147	TNFSC	-	P	G	G
IBP3	P17936	116	VNASA	+	G	G	G
IC1	P05155	25	PNATS	+	G	-	-
IC1	P05155	69	TNSTT	+	G	G	G
IC1	P05155	238	VNASR	+	G	-	G
IC1	P05155	253	SNNSD	+	G	P	P
ICAM1	P05362	145	ANLTV	+	G	G	G
ICAM1	P05362	267	GNDSF	+	-	G	G
ICAM2	P13598	47	VNCST	+	-	G	-
ICAM2	P13598	82	SNISH	+	G	-	G
ICAM2	P13598	105	SNVSV	+	-	G	G

ICAM2	P13598	153	GNETL	+	G	G	G
ICAM2	P13598	176	FNSTA	+	-	-	G
ICAM2	P13598	187	RNFSC	+	-	G	G
ICOSL	O75144	70	QNSSL	+	G	G	-
ICOSL	O75144	102	FNVTP	+	G	N	-
ICOSL	O75144	186	QNDTV	+	P	G	G
ICOSL	O75144	225	QNLTV	-	-	-	G
IDS	P22304	115	GNFST	+	-	-	G
IGHA1	P01876	144	ANLTC	+	P	-	-
IGHA1	P01876	340	VNVSV	+	P	G	P
IGHA2	P01877	205	ANITK	+	-	P	G
IGHG1	P01857	180	YNSTY	+	G	N	N
IGHM	P01871	46	KNNSD	+	G	G	G
IGJ	P01591	71	ENISD	+	G	G	G
IL2RA	P01589	70	GNSSH	+	-	-	G
IL2RG	P31785	159	ENLTL	+	G	-	G
IL4RA	P24394	53	TNCST	-	-	G	G
IL6RA	P08887	93	GNYSC	+	G	-	-
IL6RB	P40189	131	KNLSC	+	G	G	-
IL6RB	P40189	157	TNFTL	+	-	G	-
IL6RB	P40189	227	HNLVS	+	P	G	P
IL6RB	P40189	379	QNYTV	+	G	G	G
IL6RB	P40189	383	VNATK	+	G	G	G
IL6RB	P40189	390	VNLTN	+	-	G	G
INAR1	P17181	81	QNITS	-	G	G	-
INAR2	P48551	58	KNHSI	-	G	-	-
IPSP	P05154	262	GNATA	+	P	G	G
ISLR	O14498	309	ANGSL	-	-	G	G
ITB1	P05556	520	ENSSE	-	-	-	G
ITB1	P05556	669	FNITK	+	-	G	-
ITIH1	P19827	285	QNLTN	+	G	-	-

ITM2B	Q9Y287	170	LNTSI	+	G	G	G
JAG1	P78504	559	KNCSH	-	-	G	G
JAM3	Q9BX67	192	RNSSF	+	G	-	-
KAIN	P29622	157	LNDTM	+	-	P	-
KAIN	P29622	238	ENTTV	+	-	P	-
KI2L1	P43626	178	VNGTF	-	G	-	-
KIRR1	Q96J84	46	LNYSG	-	G	-	-
KIRR1	Q96J84	140	HNLTC	-	G	-	-
KIRR1	Q96J84	297	TNVST	+	-	-	P
KLK1	P06870	102	FNMSL	+	G	-	G
KLK1	P06870	108	ENHTR	+	G	-	G
KLK1	P06870	165	ENFSF	+	P	-	P
KLK11	Q9UBX7	131	FNNSL	-	-	-	G
KLK11	Q9UBX7	197	ANITI	-	-	G	-
KLK3	P07288	69	RNKSV	+	G	G	G
KLKB1	P03952	494	LNYTE	+	G	-	-
KLOT	Q9UEF7	630	VNITP	-	P	-	-
KNG1	P01042	48	QNQSN	+	P	P	P
KNG1	P01042	169	NNNTQ	+	P	G	P
KNG1	P01042	205	TNCSK	+	P	P	P
KNG1	P01042	294	NNATF	+	P	P	P
L1CAM	P32004	247	TNSSS	-	G	-	-
L1CAM	P32004	479	ANGTL	-	G	G	-
L1CAM	P32004	726	GNETT	-	-	G	G
L1CAM	P32004	979	HNLTD	-	G	-	G
LAIR1	Q6GTX8	69	YNDTE	+	G	G	G
LAMA5	O15330	95	PNQTI	-	-	-	G
LAMB1	P07943	1041	CNGSD	-	-	G	-
LAMP1	P11279	62	KNMTF	+	G	G	G
LAMP1	P11279	76	LNRSS	+	G	G	G
LAMP1	P11279	84	KENTS	+	G	G	G

LAMP1	P11279	121	YNLSD	+	P	-	-
LAMP1	P11279	130	PNASS	+	P	-	-
LAMP1	P11279	261	PNKTS	+	G	G	G
LAMP2	P13473	58	TNKTY	+	-	G	-
LAMP2	P13473	75	YNGSI	+	G	G	G
LAMP2	P13473	101	ANFTK	+	G	-	-
LAMP2	P13473	257	PNTTH	+	G	G	G
LAMP3	Q9UQV4	232	LNGSR	-	N	P	N
LAMP3	Q9UQV4	266	PNATQ	-	G	-	G
LAYN	Q6UX15	117	SNSTA	-	-	-	G
LCAT	P04180	44	SNHTR	+	G	G	G
LCAT	P04180	296	FNYTG	+	-	-	G
LEPR	P48357	56	KNTSN	+	-	G	-
LEPR	P48357	73	FNSSG	+	-	G	-
LEPR	P48357	81	SNLSK	+	-	G	-
LEPR	P48357	98	RNCSL	+	-	G	-
LFA3	P19256	169	RNSTS	-	G	G	G
LG3BP	Q08380	69	ENATQ	+	G	G	P
LG3BP	Q08380	125	TNETR	+	G	G	G
LG3BP	Q08380	192	SNVTM	+	G	G	G
LG3BP	Q08380	398	LNLTE	+	G	G	G
LG3BP	Q08380	551	TNSSK	+	G	G	G
LG3BP	Q08380	580	TNSSG	+	G	G	G
LICH	P38571	161	LNKTG	+	-	G	-
LIFR	P42702	64	WNCSW	-	-	-	G
LIRB1	Q8NHL6	281	ANFTL	-	-	-	G
LMAN2	Q12907	183	NNGSL	+	G	-	G
LRC15	Q8TF66	369	QNISL	-	-	G	-
LRC19	Q9H756	32	CNFTE	-	-	G	G
LRC19	Q9H756	37	KNYTL	-	-	G	G
LRP1	Q07954	2502	VNCSC	-	-	G	-

LRP1	Q07954	2905	CNASS	-	-	-	G
LRP1	Q07954	4364	CNCTD	-	-	G	G
LRP10	Q7Z4F1	56	ANCTW	-	G	-	G
LRP2	P98164	178	INCTE	-	-	G	G
LRP2	P98164	299	ENNTS	-	G	G	G
LRP2	P98164	341	HNDSR	-	G	-	-
LRP2	P98164	388	ANDSF	-	-	G	G
LRP2	P98164	866	INTTL	-	G	-	-
LRP2	P98164	1144	CNSTE	-	P	G	G
LRP2	P98164	1186	LNCTA	-	G	-	G
LRP2	P98164	1383	ANDSK	-	G	G	G
LRP2	P98164	1496	QNGTD	-	-	-	G
LRP2	P98164	1675	GNQSV	-	G	-	-
LRP2	P98164	2224	TNRTV	-	-	-	G
LRP2	P98164	2499	SNRTV	-	-	G	G
LRP2	P98164	2781	CNATT	-	G	G	G
LRP2	P98164	2809	DNNTS	-	-	-	G
LRP2	P98164	2947	QNCSD	-	P	P	G
LRP2	P98164	3315	ANNTF	-	-	G	G
LRP2	P98164	3355	TNKSU	-	-	G	-
LRP2	P98164	3446	VNTTH	-	G	-	G
LRP2	P98164	4068	YNLSS	-	-	G	G
LSAMP	Q13449	40	DNITV	-	G	G	G
LSAMP	Q13449	300	TNASL	+	G	G	G
LUM	P51884	88	ENVTD	+	G	-	-
LUM	P51884	127	NNLTE	-	P	-	G
LYAG	P10253	140	ENLSS	+	G	G	G
LYAG	P10253	390	ENMTR	+	G	G	G
LYAG	P10253	470	TNETG	+	G	G	G
LYAG	P10253	882	RNNTI	+	G	G	P
LYAG	P10253	925	SNFTY	+	P	G	P

LYAM1	P14151	60	DNYTD	+	-	G	G
LYAM1	P14151	104	TNKSL	+	G	-	G
LYPD3	O95374	163	YNASD	-	-	G	-
LYVE1	Q9Y5Y7	53	LNFTF	+	P	G	P
MA2B2	Q9Y2E5	748	VNNSI	-	-	G	G
MADCA	Q13477	83	RNASL	-	G	G	G
MCA32	Q7Z6M3	51	QNVSM	-	-	-	G
MEGF8	Q7Z7M0	217	HNVSA	-	-	-	G
MEGF8	Q7Z7M0	421	VNSTE	-	G	-	-
MEGF8	Q7Z7M0	637	HNESC	-	N	G	G
MEGF8	Q7Z7M0	1115	CNRTC	-	G	G	G
MEGF8	Q7Z7M0	1201	GNATG	-	G	G	G
MEGF8	Q7Z7M0	1271	TNVSS	+	G	G	G
MEGF8	Q7Z7M0	1887	CNQSG	-	-	G	-
MEGF9	Q9H1U4	218	CNQTT	-	G	G	G
MERTK	Q12866	329	SNGSV	-	-	-	G
MERTK	Q12866	336	FNTSA	-	-	-	G
MERTK	Q12866	454	HNATC	-	G	-	-
MFAP4	P55083	137	ENNTA	+	G	-	-
MGA	O43451	977	ENCTA	-	-	G	G
MGA	O43451	1323	GNETQ	-	G	G	G
MGA	O43451	1672	RNVTA	-	G	G	G
MMRN1	Q13201	97	RNQTL	-	-	G	G
MMRN1	Q13201	114	QNLTL	+	G	G	G
MMRN1	Q13201	120	TNASI	+	G	G	G
MMRN1	Q13201	136	SNSTL	+	G	G	G
MMRN2	Q9H8L6	845	FNTTY	+	P	-	P
MPRI	P11717	435	CNKTA	-	-	G	-
MPRI	P11717	1656	RNGSS	-	G	G	-
MPRI	P11717	2136	VNGTI	-	-	-	G
MPZL1	O95397	50	ANGTQ	+	-	G	-

MRC2	Q9UBG0	69	CNTSL	+	G	G	G
MRC2	Q9UBG0	140	SNISK	-	G	G	G
MRF	Q9Y2G1	1129	ANCSS	-	G	-	-
MSLN	Q13421	388	WNVTS	-	G	G	-
MSLN	Q13421	523	QNVSM	-	G	-	-
MUC18	P43121	56	GNLSH	-	-	G	G
MUC18	P43121	418	LNRTQ	-	G	G	G
MXRA8	Q9BRK3	306	GNGSS	-	G	-	-
NAGAB	P17050	177	LNATG	+	G	-	-
NAGAB	P17050	201	VNYSL	+	G	-	-
NAPSA	O96009	133	ANGTK	-	G	G	-
NBL1	P41271	38	KNITQ	-	G	G	G
NCAM1	P13591	459	SNYSN	+	-	G	G
NCAM1	P13591	488	YNCTA	-	-	G	-
NCAM2	O15394	177	INKSD	-	-	-	G
NEGR1	Q7Z3B1	275	QNFST	-	P	P	P
NEGR1	Q7Z3B1	286	TNVTQ	-	G	-	G
NEGR1	Q7Z3B1	294	GNYTC	-	G	-	G
NEO1	Q92859	73	LNCSA	+	-	G	G
NEO1	Q92859	210	SNATE	-	-	G	G
NEP	P08473	145	INESA	+	-	G	G
NEP	P08473	285	ANATA	+	-	G	G
NEUS	Q99574	157	ENNTN	-	-	-	G
NKG2D	P26718	131	QNASL	-	-	G	-
NKG2D	P26718	202	ENCST	-	-	-	G
NOTC2	Q04721	46	HNGTG	-	-	G	-
NPC2	P61916	58	VNVTF	-	P	-	-
NPTN	Q9Y639	197	KNASN	-	-	G	-
NPTN	Q9Y639	229	ANATI	+	-	-	G
NRX3A	Q9Y4C0	105	VNDSS	-	G	-	G
NTRI	Q9P121	44	DNVTV	-	G	G	G

NTRK2	Q16620	67	ENITE	+	-	G	-
NTRK2	Q16620	95	RNLTI	+	-	G	-
NTRK2	Q16620	241	MNETS	+	G	G	G
NTRK2	Q16620	254	TNISS	+	G	G	G
NTRK2	Q16620	325	LNESK	-	G	-	-
OLFM4	Q6UX06	72	SNFTG	-	-	G	P
OLFM4	Q6UX06	352	VNLTT	-	-	G	G
OLFM4	Q6UX06	411	LNDTT	-	-	G	-
OMD	Q99983	316	MNLTV	-	G	-	-
OPCM	Q14982	44	DNVTV	-	G	G	G
OPCM	Q14982	285	FNVSE	-	-	G	G
OPCM	Q14982	293	GNYTC	-	-	G	G
OSCAR	Q8IYS5	156	RNMSF	-	P	P	G
P3IP1	Q96FE7	66	GNHSY	-	G	P	P
PAG15	Q8NCC3	289	INYTL	-	G	-	G
PAPP2	Q9BXP8	857	TNKSL	-	G	-	G
PAPP2	Q9BXP8	1408	VNCTS	-	-	-	G
PCD16	Q96JQ0	217	ENRSH	-	-	-	G
PCD16	Q96JQ0	256	FNQSR	-	-	-	G
PCDGK	Q9UN70	245	FNQSL	-	-	-	G
PCDGK	Q9UN70	424	YNLSI	-	-	G	-
PCDH1	Q08174	305	ANDSD	+	-	-	G
PCDH1	Q08174	813	VNETL	+	-	-	G
PCDH1	Q08174	818	ANRTL	+	-	-	G
PCP	P42785	47	KNYSV	-	G	G	G
PCP	P42785	415	KNISS	+	-	-	G
PD1L2	Q9BQ51	189	RNFSC	-	G	G	G
PEAR1	Q5VY43	575	VNCSN	-	-	G	-
PECA1	P16284	84	YNISS	+	-	-	G
PECA1	P16284	151	VNCSV	+	-	-	G
PERM	P05164	355	RNMSN	+	-	G	-

PERM	P05164	729	VNCST	+	-	G	-
PGCA	P16112	333	ANQTG	-	-	-	G
PGCA	P16112	657	PNQTG	+	G	G	G
PGCP	Q9Y646	179	INYSR	+	P	G	P
PGFRA	P16234	42	LNSSF	-	G	-	G
PGRP2	Q96PD5	367	ANATK	+	G	G	G
PGS1	P31810	270	ENGSL	+	-	G	G
PI16	Q6UXB8	114	YNLSA	-	G	-	G
PI16	Q6UXB8	403	PNTSA	-	G	-	G
PI16	Q6UXB8	409	ANATG	-	G	-	G
PIGR	P01833	83	ANLTN	+	G	G	G
PIGR	P01833	90	ENGTF	+	G	G	G
PIGR	P01833	421	GNGTF	+	P	-	-
PIGR	P01833	469	GNVTA	+	G	G	G
PIGR	P01833	499	WNNTG	+	P	P	P
PLBL2	Q8NHP8	88	ANLTN	+	-	G	G
PLBL2	Q8NHP8	465	RNQSL	+	G	G	G
PLD3	Q8IV08	387	DNHTH	-	-	-	G
PLDX1	Q8IU5K	115	ANRSQ	-	-	-	G
PLXB2	O15031	528	QNMSR	-	G	G	G
PLXD1	Q9Y4D7	583	TNSSQ	-	-	G	G
PODXL	O00593	360	LNLTG	-	-	G	G
PPAL	P11117	167	QNETR	+	G	G	G
PPAL	P11117	177	QNESS	+	G	N	P
PPAL	P11117	267	KNLTL	+	-	G	P
PPAL	P11117	331	RNESD	+	-	G	-
PPAP	P15309	94	LNESY	+	P	P	G
PPAP	P15309	220	HNFTL	+	G	G	G
PPAP	P15309	333	RNETQ	+	P	P	P
PPGB	P10619	333	TNTTA	+	-	G	-
PPIC	P45877	190	TNCIS	-	-	-	G

PPT1	P50897	197	RNHSI	+	-	G	G
PPT2	Q9UMR5	289	SNRTL	-	-	G	G
PRG2	P13737	86	KNLTC	+	G	-	G
PRIO	P04156	197	ENFTE	+	-	G	G
PRND	Q9UKY0	110	INATQ	-	-	G	G
PROM1	O43490	206	LNETP	-	N	-	G
PROM1	O43490	220	YNTTK	-	-	-	G
PROM1	O43490	274	MNSTL	-	-	G	G
PROM1	O43490	395	DNVTQ	-	-	G	-
PROM2	Q8N271	540	KNISI	-	-	G	G
PROM2	Q8N271	725	RNVSE	-	-	G	-
PTGDS	P41222	51	SNSSW	+	P	G	G
PTGDS	P41222	78	LNLTS	+	P	G	P
PTK7	Q13308	116	ANASF	+	G	-	-
PTK7	Q13308	175	SNHTV	+	-	G	G
PTK7	Q13308	283	ANGSL	+	-	-	G
PTPRG	P23470	156	SNGSA	-	G	G	-
PTPRG	P23470	444	ANTTR	+	-	-	G
PTPRJ	Q12913	142	SNDTA	-	-	G	G
PTPRJ	Q12913	351	ANGTE	+	-	G	-
PTPRJ	Q12913	413	LNVSE	+	-	-	G
PTPRJ	Q12913	937	TNITF	+	G	-	G
PTPRK	Q15262	140	WNVTG	-	-	-	G
PTPRM	P28827	131	WNISG	+	-	G	-
PTPRM	P28827	598	LNQTD	-	-	-	G
PTPRZ	P23471	677	TNYTE	-	-	G	G
PTTG	P53801	54	KNVSC	-	-	G	G
PTTG	P53801	54	KNVSC	-	-	G	G
PVRL1	Q15223	286	LNGSL	-	-	G	-
PVRL4	Q96NY8	281	YNWTR	-	-	G	G
PXDC2	Q6UX71	160	VNLSF	+	P	-	-

QPCT	Q16769	49	LNSSA	+	G	G	G
QPCT	Q16769	296	QNYSY	-	P	G	P
QSOX1	O00391	575	RNSTL	-	-	G	G
RAB14	P61106	111	RNLTN	-	N	-	P
RAMP3	O60896	103	SNCTV	-	G	-	-
RGMA	Q96B86	114	HNCSK	-	-	G	G
RN149	Q8NC42	131	RNASA	-	-	G	P
RN149	Q8NC42	145	GNITL	-	G	-	-
RNAS1	P07998	104	SNSSM	+	P	P	P
RNAS1	P07998	116	TNGSR	+	G	G	-
RNAS2	P10153	86	PNMTC	+	G	G	G
RNAS2	P10153	92	SNKTR	+	G	G	G
RNAS2	P10153	111	CNLTT	+	G	G	P
RNAS2	P10153	119	QNISN	+	G	G	P
RNAS6	Q93091	55	NNYTQ	-	G	-	-
RNF13	O43567	88	DNSSG	+	-	G	-
RNT2	O00584	212	QNCTE	-	G	G	G
ROBO4	Q8WZ75	360	GNGTV	-	G	-	G
ROR1	Q01973	315	YNSTG	-	-	G	G
ROR2	Q01974	70	NNITI	-	G	-	-
RTN4R	Q9BZR6	179	GNLTH	+	G	-	G
S28A1	O00337	643	YNHTI	-	G	G	G
S39AE	Q15043	77	GNVTQ	+	G	-	-
SAP	P07602	80	DNATE	+	G	G	G
SAP	P07602	101	PNMSA	+	G	G	G
SAP	P07602	215	TNSTF	+	P	P	P
SAP	P07602	332	NNKTE	+	-	-	G
SAP	P07602	426	KNSTK	+	G	G	G
SDK1	Q7Z5N4	271	ENKTS	-	G	-	G
SDK1	Q7Z5N4	301	GNRSV	-	-	-	G
SE6L2	Q6UXD5	247	ANSSM	-	-	G	-

SE6L2	Q6UXD5	373	PNLTC	-	-	G	G
SEM4B	Q9NPR2	520	ANCSL	-	G	-	-
SEM5A	Q13591	142	TNRSL	-	-	G	P
SEM5A	Q13591	147	SNLTE	-	-	-	G
SFRP4	Q6FHJ7	116	YNHSW	-	-	G	-
SHBG	P04278	380	LNRSH	+	G	-	G
SHPS1	P78324	245	ANLSE	+	P	P	P
SHPS1	P78324	270	VNVTC	+	-	G	G
SHPS1	P78324	292	GNVSR	+	-	G	G
SHSA7	A6NL88	59	ANGTR	-	-	G	G
SIA10	Q9Y274	308	HNVTA	+	-	G	-
SIAE	Q9HAT2	267	CNMTL	-	G	-	-
SIAE	Q9HAT2	401	KNLTF	+	G	G	G
SIRB1	O00241	244	ANLSE	+	-	G	G
SIRB1	O00341	291	GNVSR	-	-	G	G
SIRBL	Q5TFQ8	244	ANLSE	-	P	P	P
SIRBL	Q5TFQ8	291	GNVSR	-	-	G	G
SLAF1	Q13291	102	ENLTL	-	-	-	G
SLAF5	Q9UIB8	146	VNSTC	-	-	-	G
SLAF5	Q9UIB8	150	CNVTL	-	G	-	-
SLIK1	Q96PX8	253	LNETT	-	G	-	G
SMO	Q99835	188	FNSSG	-	-	G	-
SN	Q9BZZ2	265	VNSSY	-	-	-	G
SODE	P08294	107	PNSSS	+	-	G	-
SORL	Q92673	674	SNCSC	-	-	G	G
SORL	Q92673	871	VNSSV	-	G	-	G
SORT	Q99523	162	INNTF	+	-	G	G
SORT	Q99523	406	TNVTS	+	-	-	G
SPIT2	O43291	94	ENATG	-	-	P	G
SPRC	P09486	116	DNKTF	+	G	-	-
SPRL1	Q14515	169	RNYSH	-	G	-	G

SPRL1	Q14515	176	LNRSS	-	G	-	G
SPRL1	Q14515	412	ENSSN	+	-	G	P
SPRL1	Q14515	476	DNQTY	-	-	G	-
STAB1	Q9NY15	133	RNGTC	-	-	G	-
STAB2	Q8WWQ8	1275	NNDTT	-	-	G	-
SUSD2	Q9UGT4	162	VNETR	-	G	G	-
SUSD2	Q9UGT4	494	SNGTE	-	G	-	G
SUSD5	O60379	354	KNDSK	-	G	G	G
SVEP1	Q4LDE5	3186	ENITH	-	-	-	G
T132A	Q24JP5	71	ANSSL	-	-	G	-
TARSH	Q7Z7G0	313	KNETL	-	-	-	G
TARSH	Q7Z7G0	892	TNQTF	-	G	G	-
TARSH	Q7Z7G0	904	PNTSY	-	G	G	-
TENA	P24821	166	GNFST	-	-	-	G
TENA	P24821	184	PNCSE	+	-	G	G
TENA	P24821	327	INGTC	-	-	G	-
TENA	P24821	1485	YNISG	+	-	-	G
TENR	Q92752	55	YNTSS	-	-	G	G
TENR	Q92752	198	KNCSE	-	-	G	G
TENX	P22105	3965	PNLTS	+	G	-	-
TFPI1	P10646	145	NNQTK	+	G	-	G
TGFR2	P37173	70	SNCSI	-	G	-	G
TGFR2	P37173	94	ENITL	-	G	-	-
TGON3	O43493	39	GNVST	-	-	G	-
THBG	P05543	36	PNATL	+	-	G	G
THBG	P05543	165	SNISA	+	-	G	G
THRB	P00734	121	VNITR	+	G	-	-
THRB	P00734	143	INSTT	+	G	P	G
THY1	P04216	42	ENTSS	+	G	G	P
THY1	P04216	119	QNVTV	+	G	G	G
TIMP1	P01033	101	HNRSE	+	-	G	-

TINAL	Q9GZM7	78	CNRTV	+	-	G	G
TIP	Q8TB96	482	KNGSA	-	G	-	-
TMED9	Q9BVK6	125	SNSTK	+	G	-	-
TMEM9	Q9P0T7	38	RNISG	-	G	G	G
TMM25	Q86YD3	106	LNCSL	-	-	-	G
TMPS3	O15393	213	LNTSA	-	-	G	-
TMPS3	O15393	249	LNSSR	-	-	-	G
TNR11	Q9Y6Q6	105	GNSTT	-	G	-	-
TNR11	Q9Y6Q6	174	TNCTF	-	G	-	G
TNR19	Q9NS68	105	ANCSA	-	-	G	-
TNR1A	P19438	54	QNNSI	-	G	G	G
TNR3	P36941	177	QNTSS	-	G	-	-
TPP1	O14773	443	FNASG	+	G	G	G
TPST2	O60704	368	QNSTS	-	-	G	G
TR10C	O14798	77	TNASN	-	-	G	G
TRBM	P07204	115	NNTSY	-	-	G	G
TRBM	P07204	382	LNQTS	-	G	-	G
TRFE	P02787	432	YNKSD	+	G	-	G
TRFL	P02788	156	LNWTG	+	G	-	-
TRFL	P02788	497	FNQTG	+	G	G	-
TRFL	P02788	642	RNGSD	+	-	P	-
TRFM	P08582	38	GNMSE	-	-	G	G
TRFM	P08582	515	FNASC	-	G	-	-
TRHDE	Q9UKU6	684	INQTG	-	-	-	G
TSN1	O60635	141	WNTTM	+	-	G	-
TSN1	O60635	154	TNYTD	+	G	G	G
TSN8	P19075	118	VNETL	+	-	G	-
TTYH3	Q9C0H2	351	LNGTE	-	-	-	G
TWSG1	Q9GZX9	52	GNCSG	-	G	G	G
TWSG1	Q9GZX9	81	RNYSD	-	G	G	G
TYRO3	Q06418	63	LNCSV	-	-	G	G

TYRO3	Q06418	191	LNVTG	-	G	G	G
TYRO3	Q06418	230	FNITV	-	G	-	G
TYRO3	Q06418	240	SNASV	-	-	G	G
TYRO3	Q06418	293	TNYSL	-	-	-	G
TYRO3	Q06418	380	ANLTG	-	-	G	G
UFO	P30530	157	FNLSC	-	G	-	G
UFO	P30530	198	LNKTS	-	-	G	-
UFO	P30530	339	ENISA	-	G	G	P
UFO	P30530	345	RNGSQ	-	G	G	G
UPAR	Q03405	184	NNDTF	+	G	-	-
UPAR	Q03405	222	GNSTH	-	-	G	G
UROK	P00749	322	ENSTD	+	-	G	G
UROM	P07911	232	LNGTH	+	P	P	P
UROM	P07911	275	YNLTA	+	G	G	-
UROM	P07911	322	FNITD	-	P	P	P
UROM	P07911	513	SNATD	-	G	G	G
VAS1	Q15904	170	LNASL	-	G	G	G
VASN	Q6EMK4	117	TNETF	+	G	G	G
VASN	Q6EMK4	273	SNLSL	+	P	-	-
VASN	Q6EMK4	500	RNLSG	-	N	P	P
VASN	Q6EMK4	528	PNATY	-	G	-	G
VCAM1	P19320	273	GNATL	-	G	-	N
VNN1	O95497	283	PNSSR	+	-	-	G
VTCN1	Q7Z7D3	160	YNASS	-	-	G	G
VTNC	P04004	86	NNATV	+	-	G	G
VTNC	P04004	169	KNGSL	+	G	G	G
VTNC	P04004	242	RNISD	+	G	G	G
VWF	P04275	1515	FNRSK	+	-	-	G
VWF	P04275	2223	GNVSS	+	-	G	-
VWF	P04275	2357	PNFTC	+	G	-	-
WFDC2	Q14508	44	QNCTQ	+	G	G	P

WISP1	O95388	86	DNCTE	-	-	G	-
YK047	Q68D85	216	LNSSQ	-	-	-	G
ZA2G	P25311	109	YNDSN	+	P	G	P
ZA2G	P25311	112	SNGSH	+	P	G	P
ZA2G	P25311	128	NNRSS	+	G	P	P

Supplementary Table S6 | The proteomic and glycoproteomic performance of the GlycoFilter platform on three human plasma samples (**P1**, **P2** and **P3**). ¹⁸O-incorporated peptides designated those peptides containing deamidated asparagine with one ¹⁸O-atom. Deglycopeptides were defined by meeting two criteria: 1) the asparagine was deamidated and incorporated by one ¹⁸O-atom, and 2) such specific asparagine was in a N-glycosylation consensus motif “NXS/T” (X is any amino acid except proline).

Sample	Proteins	Peptides	¹⁸O-incorporated peptides	Deglycopeptides (NXS/T)	Glycoproteins
P1	306	3556	262	238	115
P2	327	3879	293	259	125
P3	317	3762	251	225	119

Supplementary Table S7 | The complete list of non-redundant N-glycosites (295), spanning in 141 glycoproteins, identified in three biological plasma samples (**P1**, **P2** and **P3**). G: the site was detected as the deglycosylated form only (¹⁸O-incorporated aspartic acid); N: the glycosite was detected as the non-glycosylated form only (asparagine); P: the glycosite was detected as both the non-glycosylated and deglycosylated forms; (-): the glycosite was not detected in specific sample. Glycosites reported in the database UniProtKB (<http://www.uniprot.org/>) are annotated as (+). Those have not been confirmed as glycosylated in UniProtKB are annotated as (-). A glycosite was considered as partially occupied (**PO**) if its non-glycosylated form (asparagine) was detected in any sample.

Gene name	Accession #	Glycosite #	Consensus Sequence	Status in UniProt	P1	P2	P3
A1AG1	P02763	56	YNKSV	+	G	G	G
A1AG1	P02763	72	PNKTE	+	G	G	G
A1AG1	P02763	93	YNTTY	+	P	P	G
A1AG2	P19652	56	YNKSV	+	G	G	G
A1AG2	P19652	72	PNKTE	+	G	G	G
A1AG2	P19652	93	YNSSY	+	G	P	P
A1AT	P01009	271	GNATA	+	-	P	P
A1BG	P04217	179	GNYSC	+	-	G	-
A1BG	P04217	363	HNISV	+	G	G	-
A1BG	P04217	371	ANYSC	+	G	G	-
A2GL	P02750	186	ANFTL	+	G	G	G
A2GL	P02750	325	QNDTR	+	G	G	G
A2MG	P01023	55	LNETV	+	G	P	-
A2MG	P01023	396	SNATT	+	G	G	G
A2MG	P01023	410	INTTN	+	G	G	G
A2MG	P01023	869	VNFTV	+	P	P	P
AACT	P01011	106	FNLTE	+	P	P	G
AACT	P01011	127	LNQSS	+	G	G	G
AACT	P01011	271	GNASA	+	G	G	G
AFAM	P43652	33	FNSTQ	+	G	G	G
AFAM	P43652	109	HNFHS	+	G	G	-
AFAM	P43652	402	FNETT	+	G	G	G

ALS	P35858	368	MNLSG	+	G	G	G
AMBP	P02760	250	YNGTS	+	G	G	G
AMPN	P15144	234	FNITL	+	-	-	G
AMPN	P15144	818	RNATL	+	G	-	G
ANGT	P01019	47	HNEST	+	P	P	P
ANT3	P01008	128	CNDTL	+	G	P	G
ANT3	P01008	187	FNETY	+	G	G	G
ANT3	P01008	224	SNKTE	+	G	G	G
AOC3	Q16853	592	SNHSN	+	G	G	-
APMAP	Q9HDC9	160	PNGTL	+	-	G	-
APOA	P08519	61	HNRTT	-	-	-	G
APOB	P04114	185	GNCST	+	G	G	G
APOB	P04114	983	SNASS	-	G	-	-
APOB	P04114	1523	FNSSY	+	P	G	G
APOB	P04114	2982	LNFSK	+	P	P	P
APOB	P04114	3411	HNSTV	+	-	N	G
APOB	P04114	3895	YNATW	+	G	P	G
APOC4	P55056	63	VNRTR	+	P	P	P
APOD	P05090	65	ANYSL	+	P	P	P
APOD	P05090	98	VNLTE	+	G	G	G
APOF	Q13790	118	VNATQ	-	-	G	-
APOH	P02749	162	GNNSL	+	G	G	G
APOH	P02749	183	GNDTI	+	G	G	G
APOH	P02749	193	GNWTK	+	G	G	G
APOH	P02749	253	GNWSA	+	G	P	P
APOM	O95445	135	LNETG	+	P	G	P
ATRN	O75882	264	SNSSD	+	G	G	-
ATRN	O75882	300	CNSSD	+	-	-	G
ATRN	O75882	325	ANQSF	-	-	G	G
ATRN	O75882	383	LNRSV	+	-	-	G
ATRN	O75882	428	HNESW	+	G	G	G

ATRN	O75882	731	RNHSC	+	G	P	-
ATRN	O75882	914	LNGSV	-	G	G	G
ATRN	O75882	923	ANHSA	-	G	G	G
ATRN	O75882	1043	LNSSM	+	G	G	G
ATRN	O75882	1054	YNWSF	-	G	G	G
ATRN	O75882	1073	INQSI	-	G	G	G
ATRN	O75882	1082	ENLTT	-	P	-	-
ATRN	O75882	1198	INASK	+	P	P	N
ATS13	Q76LX8	552	DNSTC	-	G	-	G
BTD	P43251	119	FNFTTR	+	G	G	G
BTD	P43251	150	FNDTE	+	G	G	G
BTD	P43251	203	NNGTL	+	-	G	-
BTD	P43251	349	ENATG	+	G	G	G
C163A	Q86VB7	105	ANSSA	+	-	G	G
C163A	Q86VB7	123	GNESA	-	-	G	-
C1QA	P02745	146	QNHSG	+	G	G	G
C1R	P00736	221	CNYSI	+	G	G	G
C1R	P00736	514	SNASL	+	G	G	G
C1RL	Q9NZP8	296	KNQSV	+	N	G	G
C1S	P09871	174	VNCSG	+	G	G	G
C4BPA	P04003	221	ENETI	+	G	G	-
C4BPA	P04003	506	ENVTI	+	-	G	G
C4BPA	P04003	528	GNRTW	+	-	G	G
C4BPB	P20851	71	DNTTT	+	-	G	-
C4BPB	P20851	98	VNVSD	+	G	G	G
CAD13	P55290	638	INNTH	+	G	G	G
CBG	P08185	96	FNLTE	+	G	G	G
CBG	P08185	369	LNLTS	+	G	G	-
CBPB2	Q96IY4	73	VNASD	+	G	-	G
CD14	P08571	151	RNVSW	+	-	G	G
CD44	P16070	57	FNSTL	+	G	G	G

CERU	P00450	138	DNTTD	+	G	G	-
CERU	P00450	358	CNKSS	+	P	P	P
CERU	P00450	397	ENLTA	+	G	G	G
CERU	P00450	762	QNVSN	+	G	P	P
CFAB	P00751	122	YNVSD	+	G	G	G
CFAB	P00751	285	SNFTG	+	G	-	-
CFAB	P00751	378	WNRTR	+	G	G	G
CFAH	P08603	529	LNDTL	+	G	G	-
CFAH	P08603	802	VNCSM	+	G	G	-
CFAH	P08603	822	HNMTT	+	G	G	-
CFAH	P08603	882	INSSR	+	P	G	G
CFAH	P08603	911	ENETT	+	G	P	G
CFAH	P08603	1029	SNVTC	+	G	P	P
CFAI	P05156	70	KNGTA	+	G	G	G
CFAI	P05156	103	NNGTC	+	G	G	G
CFAI	P05156	177	INSTE	+	P	P	P
CFAI	P05156	464	PNDTC	+	-	G	G
CHL1	O00533	767	TNHTL	+	G	-	-
CHLE	P06276	85	WNATK	+	G	G	G
CHLE	P06276	369	DNNSI	+	-	G	G
CLUS	P10909	86	LNETR	+	P	G	G
CLUS	P10909	103	CNETM	+	G	G	G
CLUS	P10909	145	LNQSS	+	G	G	G
CLUS	P10909	354	LNTSS	+	G	G	-
CLUS	P10909	374	ANLTQ	+	G	G	G
CNDP1	Q96KN2	382	MNVSA	+	G	G	-
CO2	P06681	112	GNVSF	+	-	G	G
CO2	P06681	333	ENGTG	+	G	G	G
CO2	P06681	467	GNMSA	+	G	-	-
CO2	P06681	471	ANASD	+	G	-	-
CO2	P06681	621	LNGSK	+	G	G	G

CO2	P06681	651	PNLTD	+	G	-	-
CO3	P01034	85	GNVTF	+	G	G	G
CO3	P01034	939	MNKTV	+	-	-	G
CO4A	POCOL4	226	SNSST	+	G	G	G
CO4A	POCOL4	1328	LNVTL	+	G	G	G
CO4A	POCOL4	1391	KNTTC	+	G	P	G
CO4B	POCOL5	226	SNSST	+	G	G	G
CO4B	POCOL5	1328	LNVTL	+	G	G	G
CO4B	POCOL5	1391	KNTTC	+	G	G	G
CO7	P10643	754	RNYTL	+	G	G	G
CO8A	P07357	437	QNRST	+	G	P	G
CO8B	P07358	101	CNFSD	-	N	P	P
CO9	P02748	415	VNITS	+	-	G	-
COMP	P49747	121	GNGSH	-	G	G	-
CPN2	P22792	74	PNLTK	-	-	-	G
CPN2	P22792	348	NNLTA	+	G	G	G
CPN2	P22792	359	QNL SK	+	G	G	G
CR2	P20023	823	MNGSR	-	-	-	G
CR2	P20023	911	VNCSS	-	-	-	G
DOPO	P09172	184	INGSG	+	-	G	-
DOPO	P09172	566	CNKSS	-	-	G	G
DPP4	P27487	150	PNNTQ	+	G	G	G
ECM1	Q16610	444	HNM TA	+	-	G	-
ENPP2	Q13822	411	ANLTC	-	G	G	-
F13B	P05160	162	GNYST	+	G	G	G
FA10	P00743	231	NNLTR	+	G	G	G
FA11	P03951	126	YNSSV	+	G	G	G
FA11	P03951	491	VNYTD	+	G	G	G
FA12	P00748	249	RNVTA	+	-	-	G
FA12	P00748	433	RNHSC	+	P	P	P
FA5	P12259	1559	INSSR	+	-	-	G

FBLN1	P23142	98	DNASL	-	G	-	G
FCGBP	Q9Y6R7	1743	TNISI	+	-	G	-
FCGBP	Q9Y6R7	1830	PNGTL	-	-	G	-
FCGBP	Q9Y6R7	5242	ANLTT	-	-	G	-
FCN3	O75636	189	GNRTF	+	G	G	-
FETUA	P02765	156	LNDTR	+	G	G	G
FETUA	P02765	176	NNGSN	+	P	G	G
FETUB	Q9UGM5	37	CNDSO	+	G	-	G
FETUB	Q9UGM5	136	YNCTL	+	G	G	G
FHR1	Q03591	126	NNISC	+	P	P	P
FHR1	Q03591	194	GNWTE	+	G	-	G
FHR2	P36980	126	NNISC	+	P	P	P
FHR3	Q02985	108	GNSTE	+	G	G	G
FHR5	Q9BXR6	400	QNMTT	-	-	-	G
FIBA	P02671	686	FNRTW	+	-	G	G
FIBG	P02679	78	ENKTS	+	G	G	G
FINC	P03751	528	VNDTF	+	G	G	G
FINC	P03751	542	LNCTC	+	P	G	G
FINC	P02751	1236	DNLSP	-	G	-	-
FINC	P02751	1244	YNVSV	+	G	-	-
HEMO	P02790	64	DNGTM	+	G	P	G
HEMO	P02790	187	GNCSS	+	P	P	P
HEMO	P02790	240	RNGTG	+	G	P	G
HEMO	P02790	246	GNSTH	+	G	P	G
HEMO	P02790	453	QNVTS	+	P	P	P
HEP2	P05546	49	KNLSM	+	G	G	G
HEP2	P05546	188	VNASS	+	-	G	G
HGFA	Q04756	290	GNGTG	-	G	G	G
HGFL	P26927	72	YNVSS	-	-	-	G
HGFL	P26927	296	ANTTT	+	G	G	G
HGFL	P26927	615	GNDTV	+	G	G	-

HPT	P00738	184	HNLTT	+	G	P	P
HPT	P00738	207	LNHSE	+	G	G	G
HPT	P00738	211	ENATA	+	G	G	G
HPT	P00738	241	PNYSQ	+	P	P	P
HPTR	P00739	126	HNLTT	-	G	P	P
HPTR	P00739	149	LNHSE	-	G	G	G
HRG	P04196	125	FNCTT	+	P	P	P
HRG	P04196	344	NNSSD	+	G	-	-
IBP3	P17936	116	VNASA	+	G	G	P
IBP3	P17936	199	QNFSS	+	-	-	G
IC1	P05155	238	VNASR	+	G	G	G
IC1	P05155	253	SNNSD	+	G	P	G
ICAM2	P13598	47	VNCST	+	G	G	-
ICAM2	P13598	82	SNISH	+	G	G	G
ICAM2	P13598	153	GNETL	+	G	-	-
ICAM2	P13598	187	RNFSC	+	G	G	G
ICOSL	O75144	102	FNVTP	+	G	-	-
IGHA1	P01876	144	ANLTC	+	-	G	-
IGHA1	P01876	340	VNVSV	+	-	G	G
IGHM	P01871	46	KNNSD	+	G	G	G
IGHM	P01871	209	QNASS	+	G	G	G
IGHM	P01871	272	TNISE	+	-	G	-
IGHM	P01871	279	PNATF	+	-	G	-
IGHM	P01871	439	YNVSL	+	G	P	-
IL6RB	P40189	379	QNYTV	+	G	G	G
IL6RB	P40189	383	VNATK	+	G	G	G
ITB1	P05556	212	QNCTS	+	G	G	-
ITIH1	P19827	285	QNLTN	+	G	G	G
ITIH1	P19827	588	ANLSS	+	G	G	-
ITIH2	P19823	118	SNFSM	+	P	P	P
ITIH4	Q14624	517	QNITF	+	G	G	G

KAIN	P29622	108	FNLTE	+	G	G	G
KAIN	P29622	157	LNDTM	+	G	P	G
KAIN	P29622	238	ENTTV	+	P	P	-
KLKB1	P03952	127	FNVSK	+	G	-	G
KLKB1	P03952	308	LNVTF	+	G	G	G
KLKB1	P03952	453	LNLSD	+	P	P	P
KLKB1	P03952	494	LNYTE	+	G	G	G
KNG1	P01042	48	QNQSN	+	P	P	P
KNG1	P01042	169	NNNTQ	+	P	P	-
KNG1	P01042	205	TNCSK	+	P	P	G
KNG1	P01042	294	NNATF	+	G	G	G
LAMP1	P11279	84	KENTS	+	G	-	-
LAMP2	P13473	257	PNTTH	+	G	G	G
LCAT	P04180	44	SNHTR	+	-	G	G
LCAT	P04180	296	FNYTG	+	G	-	G
LG3BP	Q08380	125	TNETR	+	-	-	G
LUM	P51884	88	ENVTD	+	G	P	G
LUM	P51884	127	NNLTE	-	P	G	G
LUM	P51884	160	VNLTF	+	-	G	-
LYAM1	P14151	60	DNYTD	+	G	G	G
LYAM1	P14151	104	TNKSL	+	G	-	G
LYVE1	Q9Y5Y7	53	LNFTF	+	G	G	G
MASP1	P48740	178	DNRTC	+	-	G	G
MASP1	P48740	407	NNNTG	+	-	G	-
MMRN1	Q13201	136	SNSTL	+	-	G	G
MUC18	P43121	56	GNLSH	-	G	-	G
NCAM2	O15394	474	YNCTA	-	G	-	-
NRP1	O14786	522	NNGSD	+	-	G	-
PCSK9	Q8NBP7	533	ANCSV	+	G	G	-
PCYOX	Q9UHG3	196	LNRTL	+	G	-	G
PGRP2	Q96PD5	367	ANATK	+	G	G	G

PGRP2	Q96PD5	485	GNYTA	+	G	G	G
PHLD	P80108	94	LNASV	+	G	G	-
PHLD	P80108	307	RNLTT	-	G	G	-
PHLD	P80108	568	ANWTV	-	G	G	G
PHLD	P80108	591	DNRTL	-	G	G	G
PHLD	P80108	659	MNGT	+	G	G	G
PI16	Q6UXB8	114	YNLSA	-	-	-	G
PI16	Q6UXB8	403	PNTSA	-	G	G	G
PI16	Q6UXB8	409	ANATG	-	G	G	G
PLMN	P00747	308	HN RTP	+	N	G	-
PLTP	P55058	64	YNI SE	+	G	P	G
PLTP	P55058	143	SNV SC	+	G	G	G
PLTP	P55058	398	SNH SA	+	G	N	G
PON1	P27169	253	ANW TL	+	G	G	G
PON1	P27169	324	ENG TV	+	P	P	G
PON3	Q15166	323	NNG SV	+	G	G	G
PRG4	Q92954	1159	RNG TL	+	G	G	G
PTGDS	P41222	51	SNSS W	+	-	-	G
PTGDS	P41222	78	LNL TS	+	G	-	G
PTPRJ	Q12913	391	DNE SS	+	G	G	G
PTPRJ	Q12913	396	SNY TY	+	G	G	G
QSOX1	O00391	130	KNG SG	+	P	P	P
SAP	P07602	215	TNST F	+	-	G	-
SEM4B	Q9NPR2	520	ANCS L	-	-	-	G
SEPP1	P49908	83	SNIS Y	+	P	P	P
SEPP1	P49908	119	ENQ TD	+	G	G	G
SEPP1	P49908	128	LNG SK	+	G	G	G
SEPP1	P49908	174	GNCS L	-	G	G	G
SHBG	P04278	380	LNR SH	+	P	P	-
SHBG	P04278	396	GNG TD	+	G	G	G
SLAF5	Q9UIB8	150	CNV TL	-	G	-	-

TENA	P24821	184	PNCSE	+	-	-	G
TFR1	P02786	251	VNGSI	+	-	G	-
THBG	P05543	36	PNATL	+	G	G	G
THBG	P05543	165	SNISA	+	G	G	-
THRB	P00734	121	VNITR	+	-	G	-
THRB	P00734	143	INSTT	+	G	G	G
THRB	P00734	416	KNFTE	+	G	G	-
TRFE	P02787	630	SNVTD	+	P	P	P
VASN	Q6EMK4	117	TNETF	+	-	-	G
VNN1	O95497	283	PNSSR	+	-	G	G
VNN1	O95497	353	GNYTV	+	-	-	G
VTDB	P02774	288	DNLST	-	P	P	P
VTNC	P04004	86	NNATV	+	G	G	-
VTNC	P04004	169	KNGSL	+	P	P	P
VTNC	P04004	242	RNISD	+	G	G	G
VWF	P04275	211	CNISS	-	G	-	G
VWF	P04275	666	CNLTC	-	G	G	P
VWF	P04275	1515	FNRSK	+	G	G	G
VWF	P04275	2223	GNVSS	+	-	-	G
VWF	P04275	2546	RNVSC	+	G	-	-
ZA2G	P25311	109	YNDNS	+	G	G	G
ZA2G	P25311	112	SNGSH	+	G	G	G
ZA2G	P25311	128	NNRSS	+	G	G	P
ZPI	Q9UK55	295	GNATM	+	-	G	-

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