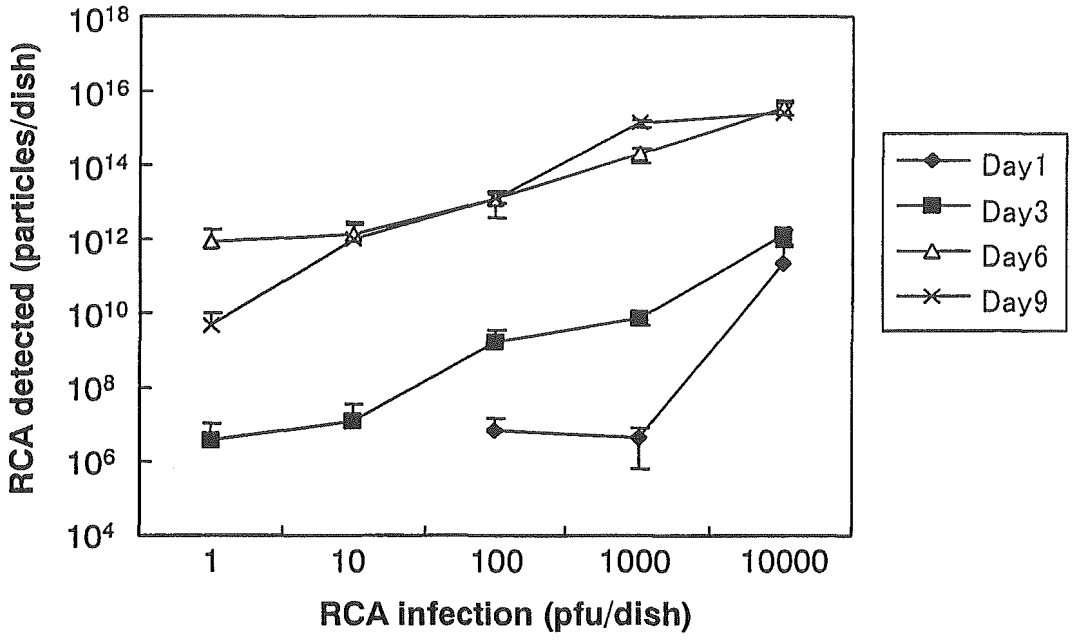


Fig. 7 RCA growth curve in HeLa cells.
HeLa cells were infected with serial log dilution of RCA. Cells were harvested on day 1, 3, 6, and 9, and viral DNA were extracted by glass beads and then amount of RCA were determined by real-time quantitative PCR.
Data were the mean ± S.D. (n=3).

Table 3 Comparison of CPE assay and infectivity PCR in detecting RCA

A) CPE method

pfu/dish	Day1	Day3	Day6	Day9
10000	0/3	0/3	3/3	3/3
1000	0/3	0/3	3/3	3/3
100	0/3	0/3	0/3	3/3
10	0/3	0/3	0/3	0/3
1	0/3	0/3	0/3	0/3
0.1	0/3	0/3	0/3	0/3
0	0/3	0/3	0/3	0/3

B) Infectivity PCR

pfu/dish	Day1	Day3	Day6	Day9
10000	3/3	3/3	3/3	3/3
1000	3/3	3/3	3/3	3/3
100	3/3	3/3	3/3	3/3
10	0/3	2/3	3/3	3/3
1	0/3	1/3	2/3	2/3
0.1	0/3	0/3	0/3	0/3
0	0/3	0/3	0/3	0/3

Serial dilutions of RCA in medium were infected into HeLa cells. (A) CPE was observed under microscopy and (B) E1 DNA in DNA extracted with glass beads was detected by reat-time quantitative PCR.
Number of CPE or E1 DNA positive samples were presented. (n=3)

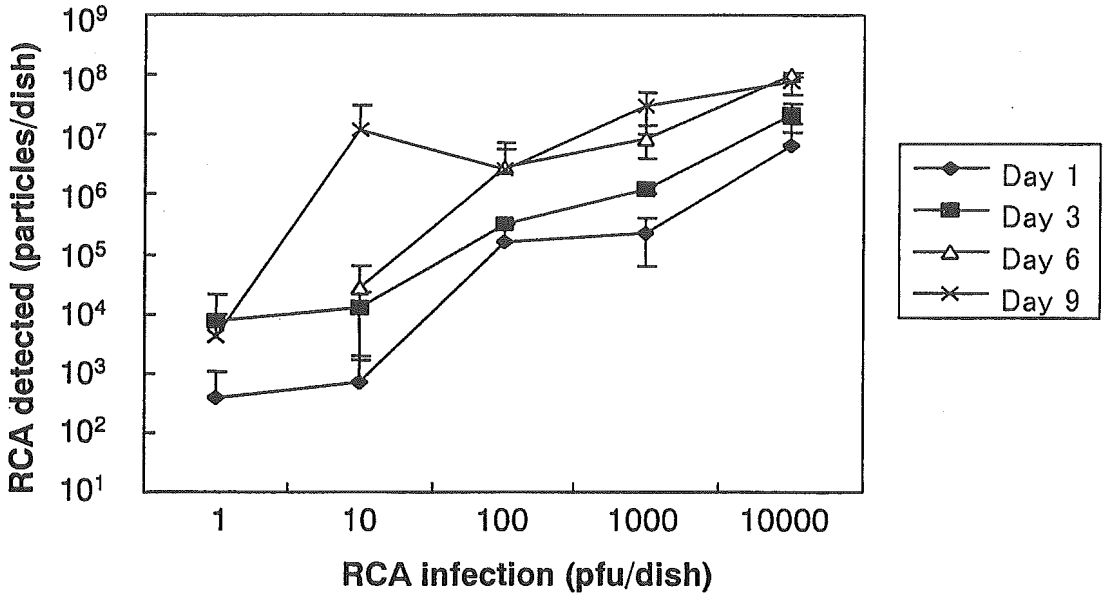


Fig. 8 Detection of RCA spiked in adenovirus vectors by infectivity PCR and glass beads extraction.

HeLa cells were infected with serial log dilution of RCA spiked in AdHM10LacZ-3 adenovirus vectors. Cells were harvested on day 1, 3, 6, and 9, and then viral DNA were extracted with glass beads. Amount of RCA of each sample was determined by real-time quantitative PCR.
Data were the mean ± S.D. (n=3).

Table 4 Comparison of CPE assay and infectivity PCR in detecting RCA spiked in adenovirus vectors

A) CPE method

pfu/dish	Day1	Day3	Day6	Day9
10000	0/3	0/3	0/3	1/3
1000	0/3	0/3	0/3	0/3
100	0/3	0/3	0/3	0/3
10	0/3	0/3	0/3	0/3
1	0/3	0/3	0/3	0/3
0.1	0/3	0/3	0/3	0/3
0	0/3	0/3	0/3	0/3

B-1) Infectivity PCR (TaqMan PCR)

pfu/dish	Day1	Day3	Day6	Day9
10000	3/3	3/3	3/3	3/3
1000	3/3	3/3	3/3	3/3
100	3/3	3/3	3/3	3/3
10	1/3	2/3	3/3	3/3
1	1/3	1/3	0/3	2/3
0.1	0/3	0/3	0/3	0/3
0	0/3	0/3	0/3	0/3

B-2) Infectivity PCR(Nested PCR)

pfu/dish	Day1	Day3	Day6	Day9
1	2/3	2/3	1/3	2/3

Serial dilutions of RCA spiked in 10^9 particles of Adenovirus vectors were infected into HeLa cells.
(A) CPE was observed under microscopy and (B-1) E1 DNA in DNA extracted with glass beads was detected by reat-time quantitative PCR. (B-2) E1 DNA was detected by nested PCR using DNA extracted from HeLa cells infected with 1 pfu of RCA. Number of CPE or E1 DNA positive samples was presented (n=3).

α subunit

β subunit

: Carbohydrate, ( )*: only in r-TSH.

Fig. 9 Amino acid sequence and glycosylation sites of TSH

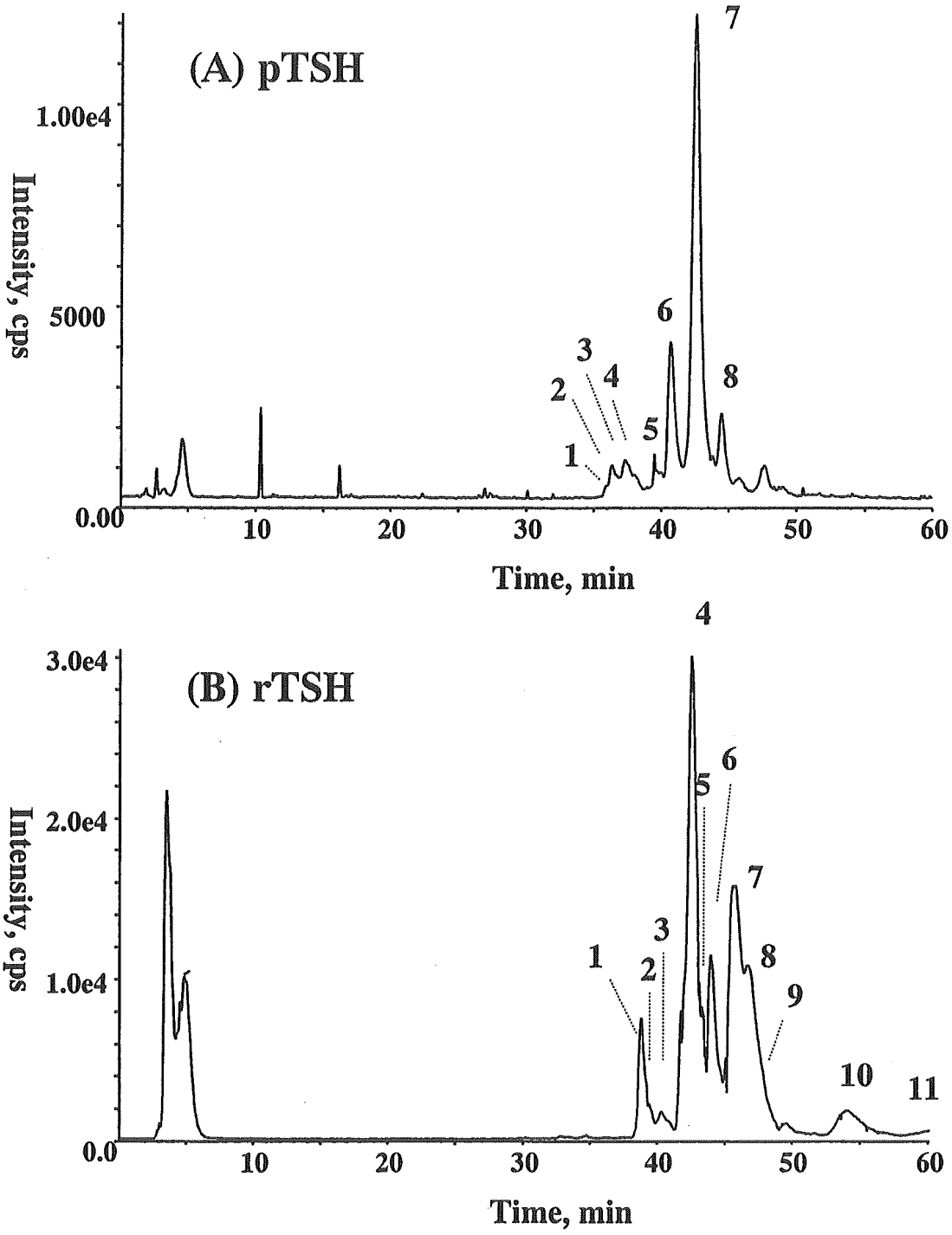
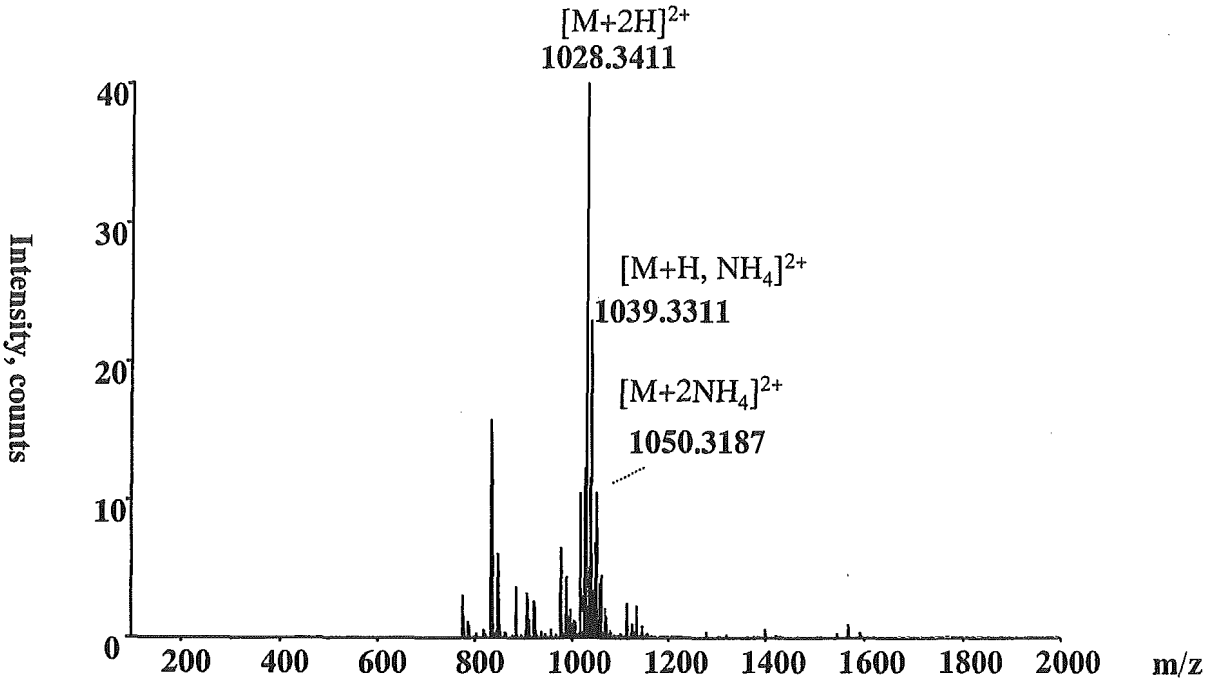


Fig. 10 Oligosaccharide profiles of pTSH (A) and rTSH (B)

N-linked oligosaccharides from pTSH and rTSH were analyzed by CapLC-ESI-Q/TOFMS

(A) Mass spectrum of peak 7 in Fig. 10A



(B) Product ion spectrum of peak 7 in Fig. 10A

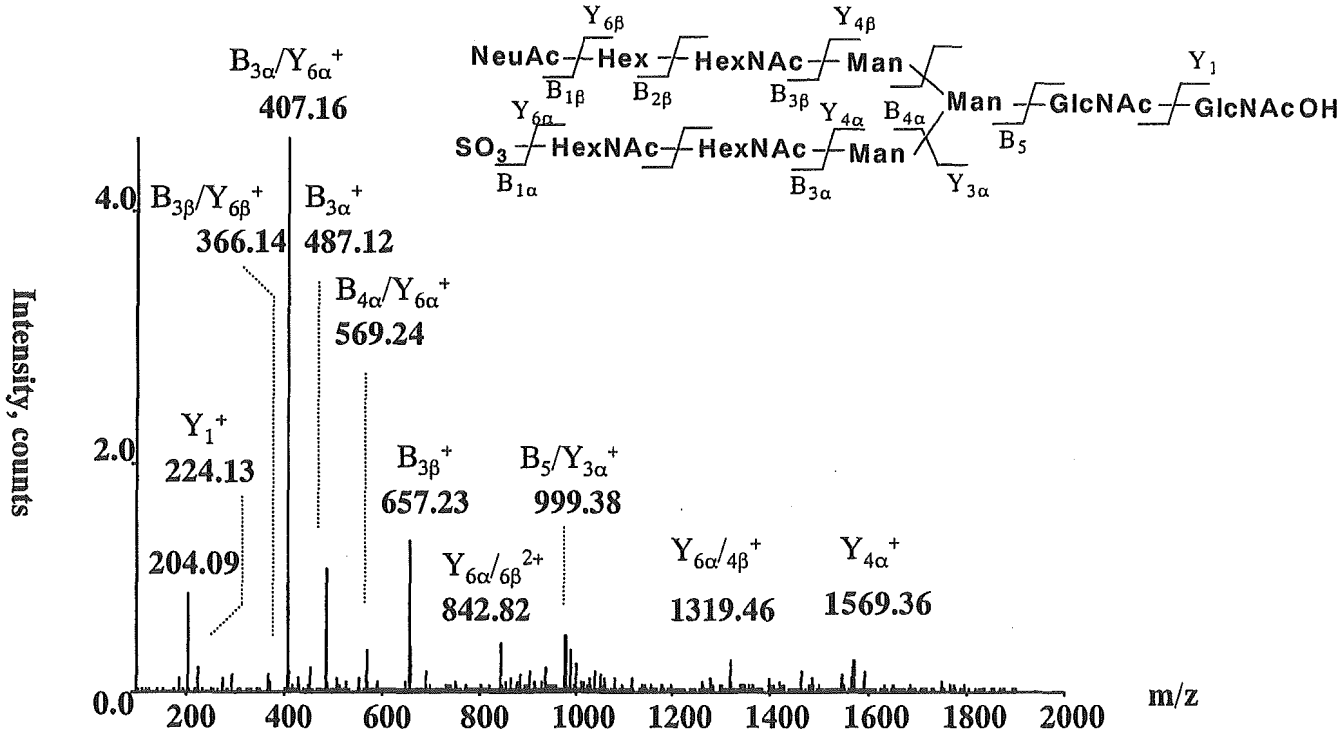


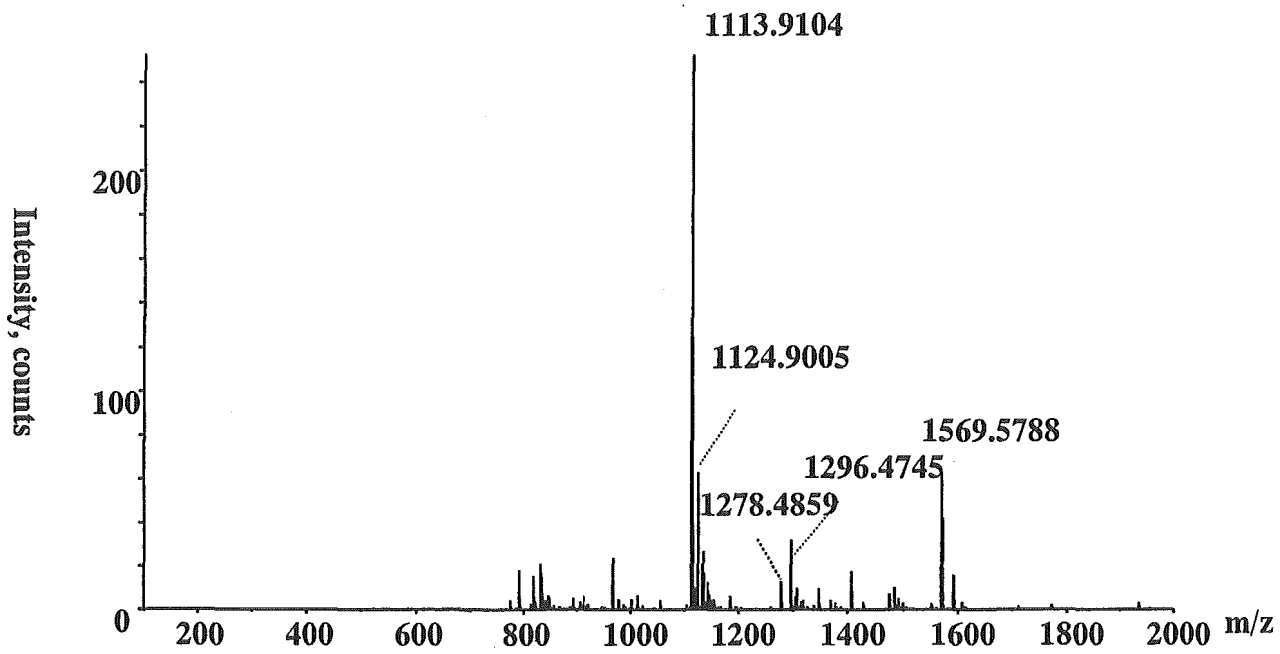
Fig. 11 Mass spectrum (A) and product ion spectrum (B) of peak 7 in Fig. 10A

Table 5 Carbohydrate compositions, and theoretical and calculated masses of peaks in Fig. 10A

Peak No.	Carbohydrate composition	Deduced carbohydrate structure[a]	Theoretical mass[b]	Calculated mass	Charge state	Observed *m/z*
1	$[dHex]_0[Hex]_4[HexNAc]_4[NeuAc]_0$	SO_3-Hybrid(2)	1560.51	1560.53	1+	1561.53
2	$[dHex]_0[Hex]_3[HexNAc]_4[NeuAc]_0$	SO_3-Bi(4)	1398.46	1398.47	1+	1399.48
3	$[dHex]_0[Hex]_3[HexNAc]_5[NeuAc]_0$	SO_3-Bi(5)	1601.57	1601.57	1+	1602.58
	$[dHex]_0[Hex]_5[HexNAc]_4[NeuAc]_0$	SO_3-Hybrid(3)	1722.58	1722.58	2+	862.30
	$[dHex]_1[Hex]_6[HexNAc]_6[NeuAc]_0$	SO_3-FBi(3)	1950.70	1950.70	2+	976.36
4	$[dHex]_0[Hex]_4[HexNAc]_5[NeuAc]_0$	SO_3-Bi(2)	1763.62	1763.62	2+	882.82
5	$[dHex]_1[Hex]_3[HexNAc]_2[NeuAc]_0$	FCore	1058.41	1058.41	1+	1059.42
	$[dHex]_0[Hex]_4[HexNAc]_5[NeuAc]_1$	SO_3-Bi(2)NA_1	2054.69	2054.74	2+	1028.38
	$[dHex]_1[Hex]_4[HexNAc]_5[NeuAc]_0$	SO_3-FBi(2)	1909.69	1909.66	2+	955.84
	$[dHex]_1[Hex]_4[HexNAc]_5[NeuAc]_1$	FBi(2)NA_1	2120.79	2120.82	2+	1061.42
	$[dHex]_0[Hex]_4[HexNAc]_5[NeuAc]_0$	$(SO_3)_2$-Bi(2)	1843.55	1843.56	2+	922.79
6	$[dHex]_0[Hex]_3[HexNAc]_6[NeuAc]_0$	$(SO_3)_2$-Bi(3)	1884.57	1884.60	2+	943.31
7	$[dHex]_0[Hex]_4[HexNAc]_5[NeuAc]_1$	SO_3-Bi(2)NA_1	2054.69	2054.68	2+	1028.34
	$[dHex]_1[Hex]_3[HexNAc]_6[NeuAc]_0$	$(SO_3)_2$-FBi(3)	2030.68	2030.66	2+	1016.34
8	$[dHex]_1[Hex]_4[HexNAc]_5[NeuAc]_1$	SO_3-FBi(2)NA_1	2200.74	2200.78	2+	1101.40

[a]Deduced carbohydrate structures are presented in Table 9 ; [b]monoisotopic mass value.

(A) Mass spectrum of peak 4 in Fig. 10B $[M+H]^{2+}$



(B) Product ion spectrum of peak 4 in Fig. 10B

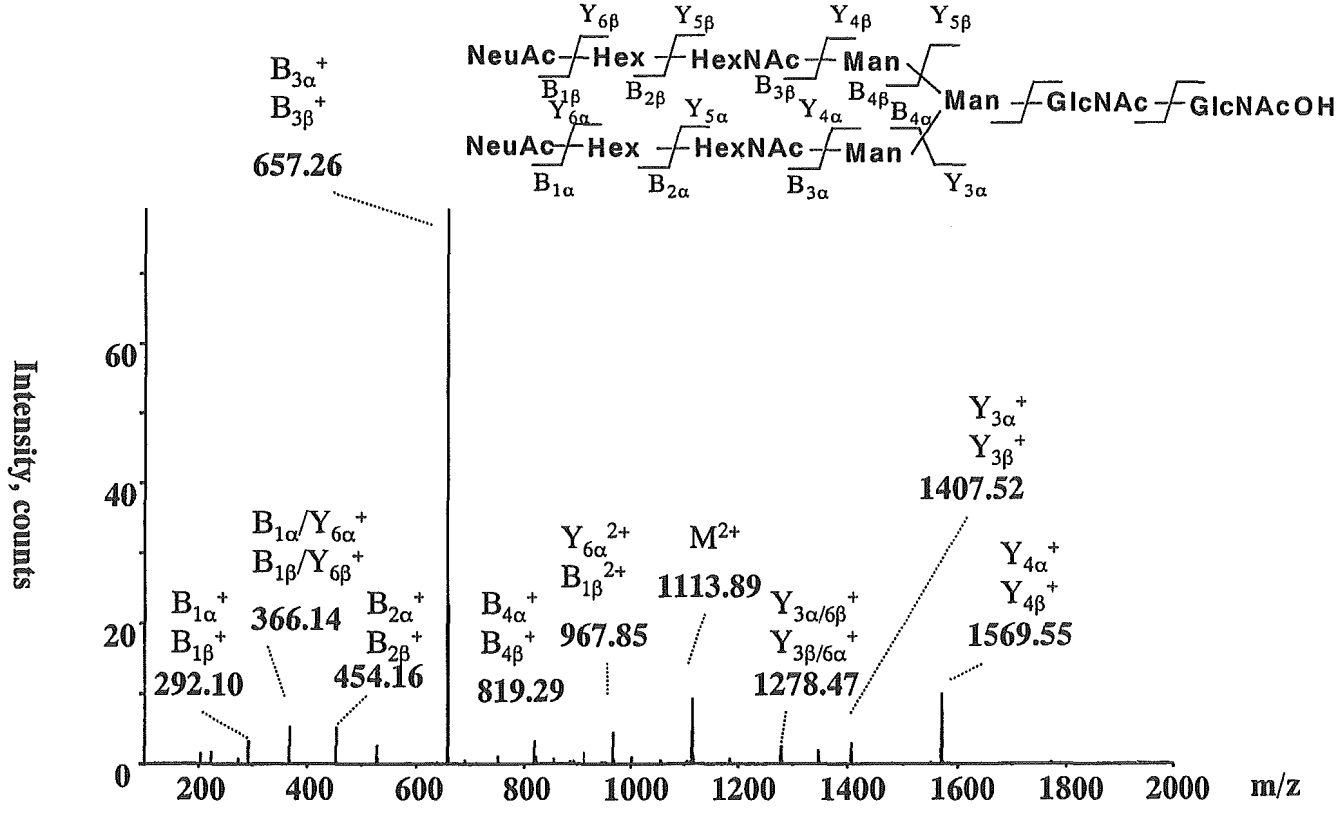


Fig. 12 Mass spectrum (A) and product ion spectrum (B) of peak 4 in Fig. 10B

Table 6 Carbohydrate compositions, and theoretical and calculated masses of peaks in Fig. 10B

Peak No.	Carbohydrate composition	Deduced carbohydrate structure[a]	Theoretical mass[b]	Calculated mass	Charge state	Observed *m/z*
1	$[dHex]_0[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	1933.70	1933.68	1+	1934.69
2	$[dHex]_0[Hex]_6[HexNAc]_4[NeuAc]_1$	$Hybrid(4)NA_1$	2095.76	2095.74	2+	1048.88
3	$[dHex]_1[Hex]_5[HexNAc]_4[NeuAc]_1$	$FBiNA_1$	2079.76	2079.78	2+	1040.90
4	$[dHex]_0[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	2224.80	2224.80	2+	1113.41
5	$[dHex]_0[Hex]_6[HexNAc]_5[NeuAc]_2$	$FTriNA_2$, $FBiLacNA_2$	2735.99	2735.98	2+	1369.00
6	$[dHex]_1[Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	2370.86	2370.86	2+	1186.44
7	$[dHex]_0[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	2881.03	2881.02	2+	1441.52
8	$[dHex]_1[Hex]_6[HexNAc]_5[NeuAc]_3$	$FTriNA_3$	3027.08	3027.08	2+	1514.55
9	$[dHex]_1[Hex]_7[HexNAc]_6[NeuAc]_3$	$FTetraNA_3$, $FTriLacNA_3$	3393.22	3393.26	2+	1697.64
10	$[dHex]_1[Hex]_7[HexNAc]_6[NeuAc]_4$	$FTetraNA_4$	3683.31	3683.42	2+	1842.72
11	$[dHex]_1[Hex]_8[HexNAc]_7[NeuAc]_4$	$FTetraLac_1NA_4$	4048.44	4048.45	3+	1350.49

[a]Deduced carbohydrate structures are presented in Table 13 ; [b]monoisotopic mass value.

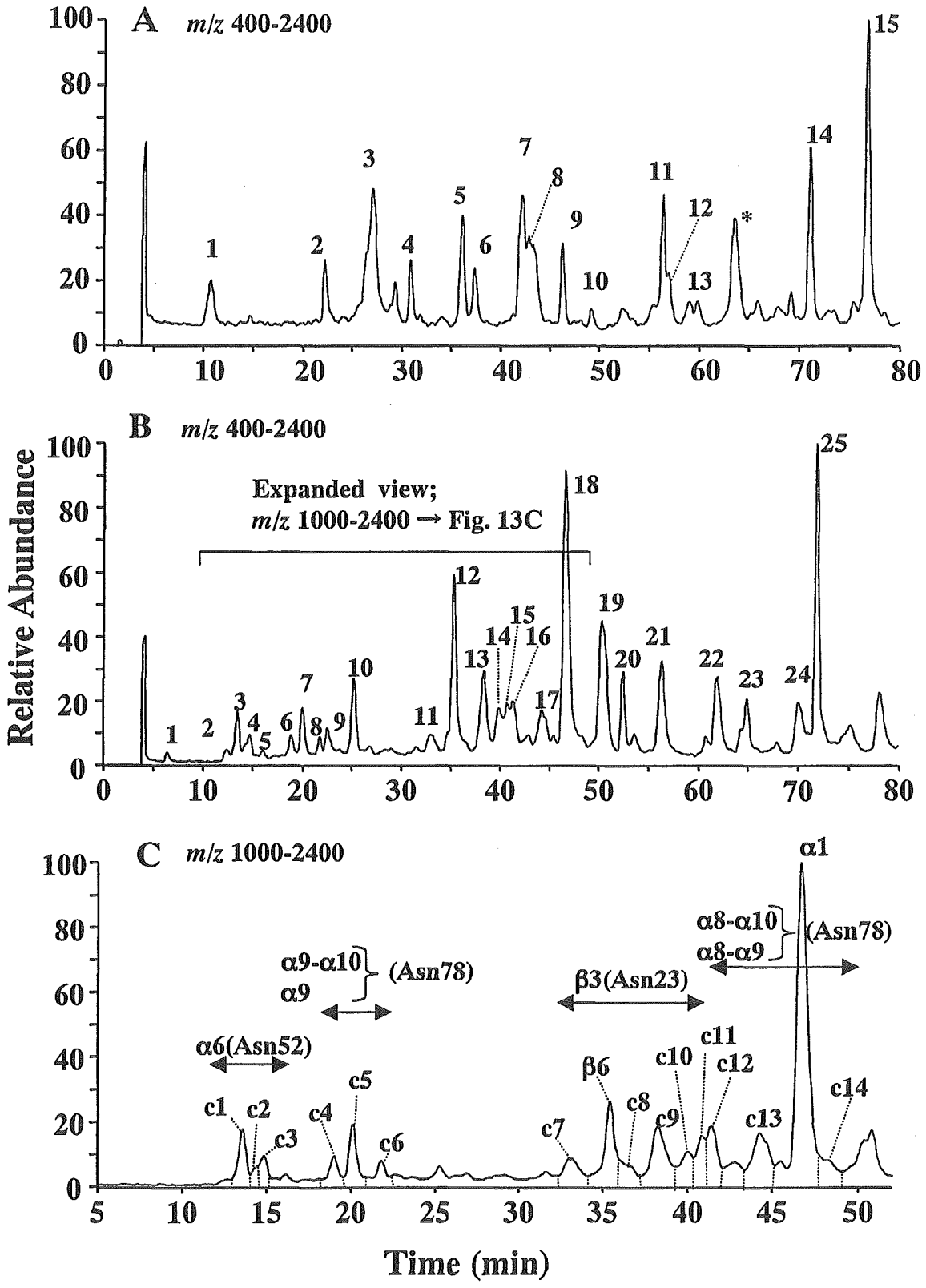


Fig.13 (A) Peptide/glycopeptide map of trypsin digested-rTSH obtained by elution with TFA
(B) Peptide/glycopeptide map of trypsin digested-rTSH obtained by elution with ammonium acetate
(C) Glycopeptide map of trypsin digested-rTSH obtained by elution with ammonium acetate

Table 7 Structural assignments of peaks in Fig 13A

Peak No.	Amino acid residues	Theoretical mass[a]	Observed m/z		
			M^{1+}	M^{2+}	M^{3+}
1	α7	538.6	539.3		
	β4	545.6	546.4		
2	β11	1140.2	1140.7	571.0	
3[b]	α6(Asn52)	–			
	α9 (Asn78) and α9-α10 (Asn78)	–			
4	α5	718.9	719.5		
5	α2	817.0	817.6	409.3	
6	β7	712.8	713.4		
7	β6	1376.5	1377.4	689.0	
	β10	1727.8	1728.4	864.6	576.9
8[b]	α8	838.0	838.6	419.8	
	α8-α9 (Asn78) and α8-α10 (Asn78)	–			
9	β5	616.8	617.5		
10	β8-2[c]	1172.4	1172.5	587.1	
11	β1	1697.9	1698.4	849.7	566.9
12[b]	β3 (Asn23)	–			
	β8-1[c]	1553.8	1554.3	777.6	
13	β12	871.0	871.6		
14	β8	2708.1		1354.8	903.5
15	α1	4123.4		2062.8	1375.2

[a] average mass value, [b] glycopeptides,

[c] β8 was partly hydrolyzed to β8-1 and β8-2, α3, α4, β2 and β9 were not detected.

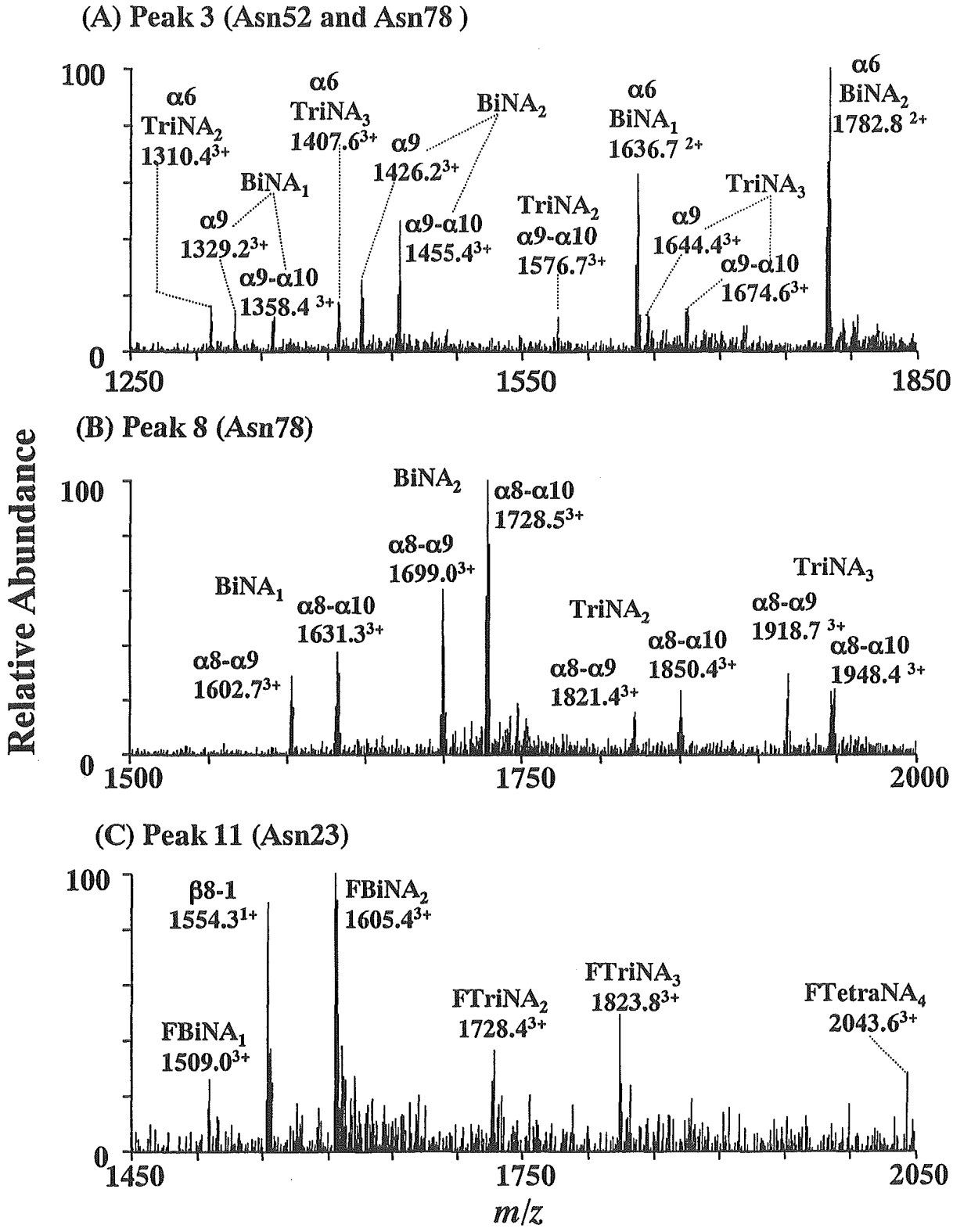


Fig.14 Mass spectra of peaks 3, 8 and 12 in Fig. 13A

Table 8 Peptides and carbohydrate compositions of peaks 3, 8, and 12 in Fig. 13A

Peak No.[a]	Glyco-peptides	Carbohydrate composition[b]	Deduced carbohydrate structure[c]	Theoretical mass[d]	Observed *m/z*		
					M^{2+}	M^{3+}	M^{4+}
3	α6 (Asn52)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	4,220.0		1,407.6	
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	3,563.4	1,782.8	1,189.1	
		$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	3,928.8		1,310.4	
		$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	3,272.2	1,636.7	1091.5[e]	
	α9 (Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	4,932.7		1,644.4	
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	4,276.1	2,139.2	1,426.2	1,070.0
		$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	3,984.9	1,992.6	1,329.2	
	α9-α10 (Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	5,019.8		1,674.6	
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	4,363.2	2,182.9	1,455.4	1091.5[e]
		$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	4728.5		1576.7	
		$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	4,071.9	2,036.3	1,358.4	
8	α8-α9 (Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	5,752.7		1,918.7	1,439.4
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	5,096.1		1,699.0	1,275.1
		$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	5,461.5		1,821.4	1,366.7
		$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	4,804.9		1,602.7	
	α8-α10 (Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	5,839.8		1,948.4	1,461.0
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	5,183.2		1,728.5	1,296.6
		$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	5,548.6		1,850.4	1,388.2
		$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	4,892.0		1,631.3	
12	β3 (Asn23)	$[Fuc][Hex]_7[HexNAc]_6[NeuAc]_4$	$FTetra\ NA_4$	6,128.0		2,043.6	
		$[Fuc][Hex]_6[HexNAc]_5[NeuAc]_3$	$FTriNA_3$	5,471.5		1,823.8	
		$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	4,814.9		1,605.4	
		$[Fuc][Hex]_6[HexNAc]_5[NeuAc]_2$	$FTriNA_2$, $FBiLac_1NA_2$	5,180.2		1,728.4	
		$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_1$	$FBiNA_1$	4,523.6	2,262.2	1,509.0	

[a] Mass spectra are shown in Fig. 14. [b] Hex, hexose; Fuc, fucose; HexNAc, *N*-acetylhexosamine; NeuAc, *N*-acetylneuramic acid. [c] See Table 13,
[d] avarage mass value.

Table 9 Structural assignments of peaks in Fig. 13B

Peak No.	Amino acid residues	Theoretical mass[a]	observed m/z		
			M^{1+}	M^{2+}	M^{3+}
1	β4	545.6	546.2		
2	α7	538.6	539.2		
3[b]	α6(Asn52)	–			
4[b]	α6(Asn52)	–			
5[b]	α6(Asn52)	–			
6[b]	α9(Asn78) and α9-α10(Asn78)	–			
7[b]	α9(Asn78) and α9-α10(Asn78)	–			
8[b]	α9(Asn78) and α9-α10(Asn78)	–			
9	β11	1140.2	1140.6	570.9	
10	β10	1727.8	1728.0	864.5	
11[b]	β3(Asn23)	–			
12[c]	β6	1376.5	1377.2	689.0	
	β3(Asn23)	–			
13[c]	β7	712.8	713.4		
	β3(Asn23)	–			
14[c]	α5	718.9	719.4		
	β3(Asn23)	–			
15[b]	β3(Asn23)	–			
16[b]	α8-α9 (Asn78) and α8-α10 (Asn78)	–			
17[b]	α8-α9 (Asn78) and α8-α10 (Asn78)	–			
18	α1	4123.4		2061.5	1375.6
19	α2	817.0	817.5	409.2	
20	β8-1[d]	1553.8	1554.1	777.5	
21	β1	1697.9	1698.0	849.6	
	β8-2[d]	1172.4	1172.5	586.9	
22	α8	838.0	838.5		
23	β12	871.0	871.5		
24	β5	616.8	617.4		
25	β8	2708.1		1355.4	903.5

[a] average mass value, [b] glycopeptide, [c] glcopeptide and peptide,
[d] β8 was partly hydrolyzed to β8–1 and β8–2, α3, α4,β2 and β9 were not detected.

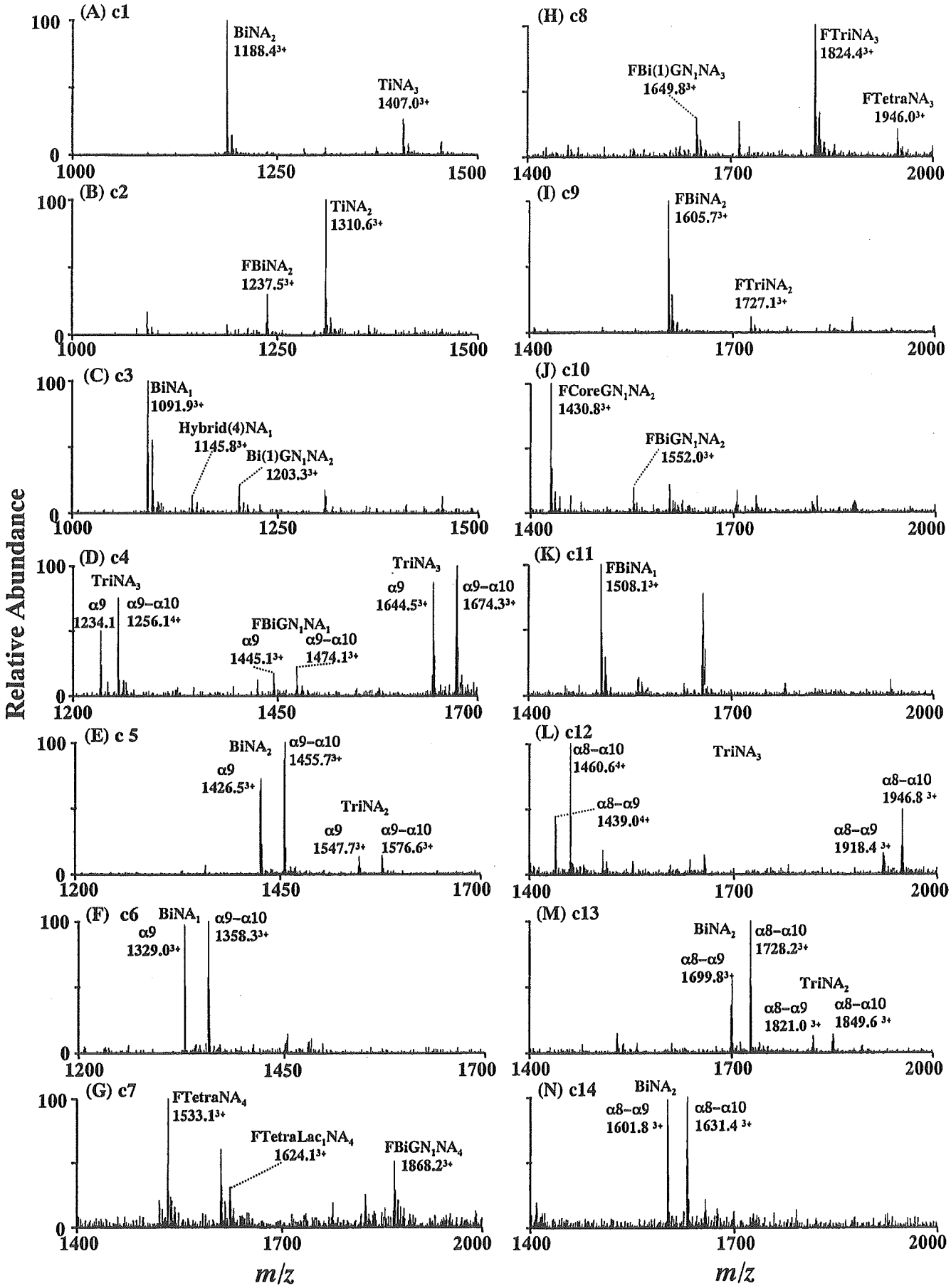


Fig. 15 Mass spectra of peaks c1-c14 in Fig. 13C

Table 10 Peptides and carbohydrate compositions of peaks in Fig. 13C

Peak No.[a]	Glyco-peptides	Carbohydrate composition[b]	Deduced carbohydrate structure[c]	Theoretical mass[d]	Observed *m/z*		
					M^{2+}	M^{3+}	M^{4+}
c1	α6(Asn52)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	4,220.0		1407.0	
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	3,563.4	1781.7	1188.4	
c2	α6(Asn52)	$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	3,928.8	1964.5	1310.6	
		$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	3,709.6	1854.8	1237.5	
c3	α6(Asn52)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	3,272.2	1637.3	1091.9	
		$[Hex]_6[HexNAc]_4[NeuAc]_1$	Hybrid $(4)NA_1$, Hybrid $(2)Lac_1NA_1$	3,434.3	1718.6	1145.8	
		$[Hex]_4[HexNAc]_5[NeuAc]_2$	$Bi(1)GN_2NA_2$	3,604.5		1203.3	
c4	α9(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	4,932.7		1644.5	1234.1
	α9-α10(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	5,019.8		1674.3	1256.1
	α9(Asn78)	$[Fuc][Hex]_5[HexNAc]_5[NeuAc]_1$	$FBiGN_1NA_1$	4,334.2		1445.1	
	α9-α10(Asn78)	$[Fuc][Hex]_5[HexNAc]_5[NeuAc]_1$	$FBiGN_1NA_1$	4,421.3		1474.1	1105.9
c5	α9(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	4,276.1		1426.5	1070.0
	α9-α10(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	4,343.2		1455.7	1092.2
	α9(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	4,641.5		1547.7	
	α9-α10(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	4,728.5		1576.6	1183.3
c6	α9(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	3,984.9		1329.0	
	α9-α10(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	4,071.9		1358.3	1019.4
c7	β3(Asn23)	$[Fuc][Hex]_7[HexNAc]_6[NeuAc]_4$	$FTetra\ NA_4$	6,128.0		2043.7	1533.1
		$[Fuc][Hex]_5[HexNAc]_5[NeuAc]_4$	$FBiGN_1NA_4$	5,600.6		1868.2	
		$[Fuc][Hex]_8[HexNAc]_7[NeuAc]_4$	$FTetraLac_1NA_4$	6,493.4		2165.5	1624.1
c8	β3(Asn23)	$[Fuc][Hex]_6[HexNAc]_5[NeuAc]_3$	$FTriNA_3$	5,471.5		1824.4	1368.7
		$[Fuc][Hex]_7[HexNAc]_6[NeuAc]_3$	FTetraNA3, $FTriLac_1NA_3$	5,836.8		1946.0	
		$[Fuc][Hex]_4[HexNAc]_4[NeuAc]_3$	$FBi\ (1)GN_1NA_3$	4,944.0		1649.8	
c9	β3(Asn23)	$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	4,814.9		1605.7	
		$[Fuc][Hex]_6[HexNAc]_5[NeuAc]_2$	$FTriNA_2$, $FBiLac_1NA_2$	5,180.2		1727.1	
c10	β3(Asn23)	$[Fuc][Hex]_3[HexNAc]_3[NeuAc]_2$	$FCore\ GN_1NA_2$	4,287.4	2145.1	1430.8	
		$[Fuc][Hex]_4[HexNAc]_4[NeuAc]_2$	$FBi(1)\ GN_1NA_2$	4,652.7		1552.0	
c11	β3(Asn23)	$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_1$	$FBiNA_1$	4,523.6		1508.1	
c12	α8-α9(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	5,752.7		1918.4	1439.0
	α8-α10(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	5,839.8		1946.8	1460.6
c13	α8-α9(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	5,096.1		1699.8	1274.7
	α8-α10(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	5,183.2		1728.2	1296.3
	α8-α9(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	5,461.5		1821.0	1366.3
	α8-α10(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	5,548.6		1849.6	1388.1
c14	α8-α9(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	4,804.9		1601.8	1202.3
	α8-α10(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	4,892.0		1631.4	1223.5

[a] Mass spectra are shown in Fig.15. [b] See Table 8. [c] See Table 13, [d] avarage mass value.

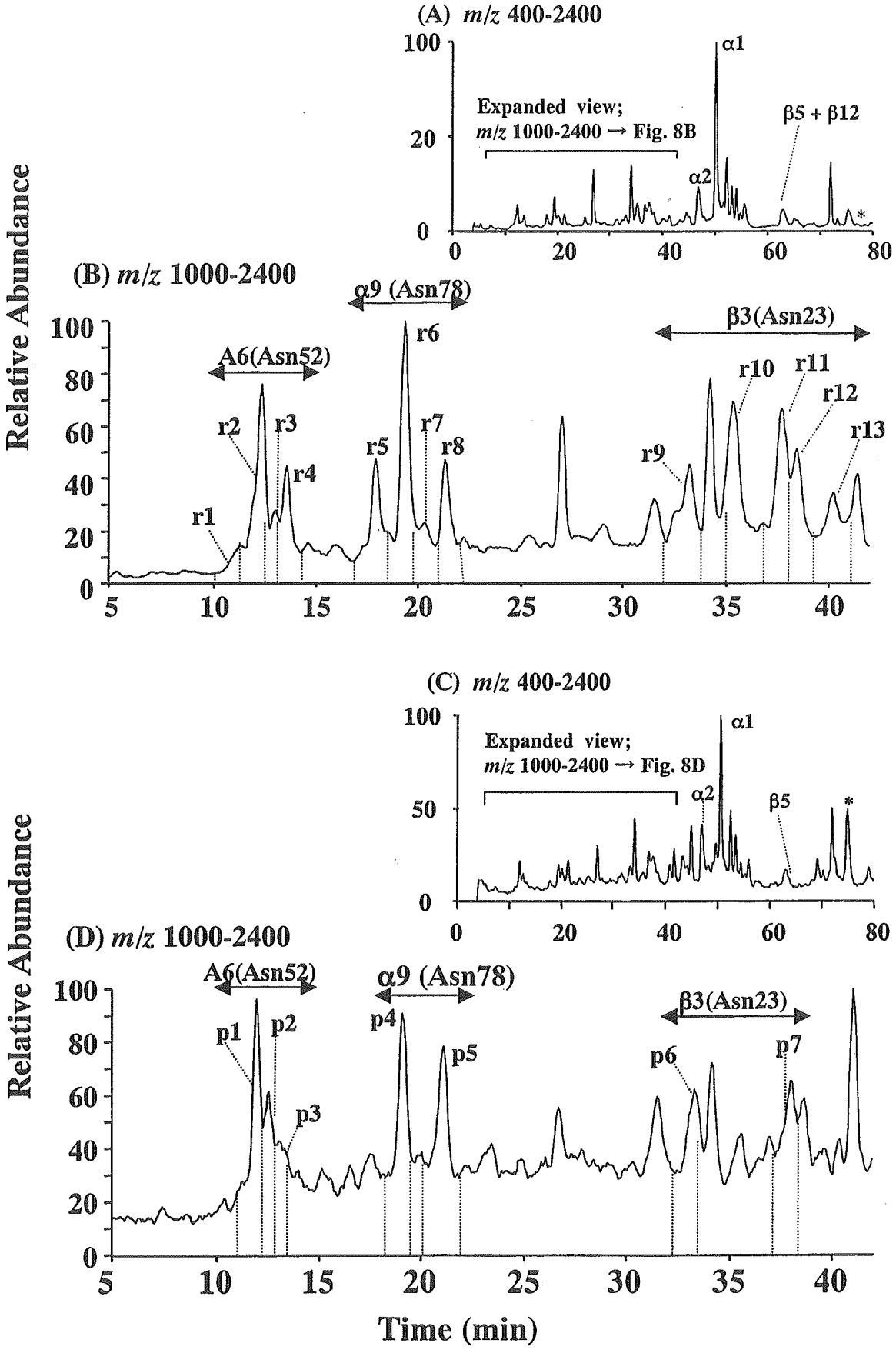


Fig. 16 Peptide/glycopeptide maps of rTSH (A) and pTSH (C), and Glycopeptide maps of rTSH (B) and pTSH (D)

Table 11 Peptides and carbohydrate compositions of peaks in Fig. 16B

Peak No.	Glyco-peptides	Carbohydrate composition[a]	Deduded carbohydrate structure[b]	Theoretical mass[c]	Observed *m/z*		
					M^{2+}	M^{3+}	M^{4+}
r1	α6(Asn52)	$[Hex]_9[HexNAc]_4[NeuAc]_3$	Hybrid (7)NA_3, Hybrid (1)Lac_1NA_3	4,503.2		1,501.6	
		$[Hex]_8[HexNAc]_3[NeuAc]_2$	Hybrid (1)NA_2	3,846.6	1,925.1	1,283.4	
r2	α6(Asn52)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	4,220.0		1,407.8	
		$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	3,563.4	1,782.0	1,188.6	
r3	α6(Asn52)	$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	3,928.8	1,965.2	1,310.9	
		$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	3,709.6	1,855.2	1,237.5	
		$[Hex]_7[HexNAc]_5[NeuAc]_2$	Hybrid (8)NA_2, Hybrid (4)Lac_1NA_2, Hybrid (2)Lac_2NA_2	4,090.9		1,365.1	
r4	α6(Asn52)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	3,272.2	1,636.6	1,091.4	
		$[Hex]_6[HexNAc]_4[NeuAc]_1$	Hybrid (4)NA_1, Hybrid (2)Lac_1NA_1	3,434.3	1,717.4	1,145.4	
		$[Hex]_4[HexNAc]_5[NeuAc]_2$	Bi(1)GN_2NA_2	3,604.5	1,803.1	1,202.9	
r5	α9(Asn78)	$[Hex]_6[HexNAc]_5[NeuAc]_3$	$TriNA_3$	4,932.7		1,644.7	1,233.9
		$[Fuc][Hex]_5[HexNAc]_5[NeuAc]_1$	$FBiGN_1NA_1$	4,334.2		1,445.1	
r6	α9(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_2$	$BiNA_2$	4,276.1	2,139.3	1,426.0	1,069.8
		$[Hex]_6[HexNAc]_5[NeuAc]_2$	$TriNA_2$, $BiLac_1NA_2$	4,641.5		1,547.9	1,160.9
r7	α9(Asn78)	$[Hex]_4[HexNAc]_5[NeuAc]_2$	Bi(1)GN_2NA_2	4,317.2		1,440.1	1,080.1
r8	α9(Asn78)	$[Hex]_5[HexNAc]_4[NeuAc]_1$	$BiNA_1$	3,984.9	1,992.8	1,329.4	
		$[Hex]_6[HexNAc]_5[NeuAc]_1$	$TriNA_1$, $BiLac_1NA_1$	4,350.2		1,450.6	
r9	β3(Asn23)	$[Fuc][Hex]_7[HexNAc]_6[NeuAc]_4$	FTetra NA_4	6,128.0		2,043.1	1,532.7
		$[Fuc][Hex]_5[HexNAc]_5[NeuAc]_4$	$FBiGN_1NA_4$	5,600.6		1,868.0	
		$[Fuc][Hex]_8[HexNAc]_7[NeuAc]_4$	$FTetraLac_1NA_4$	6,493.4		2,164.6	1,624.2
r10	β3(Asn23)	$[Fuc][Hex]_6[HexNAc]_5[NeuAc]_3$	$FTriNA_3$	5,471.5		1,824.8	1,368.5
		$[Fuc][Hex]_7[HexNAc]_6[NeuAc]_3$	FTetraNA3, $FTriLac_1NA_3$	5,836.8		1,946.1	
		$[Fuc][Hex]_4[HexNAc]_4[NeuAc]_3$	FBi (1)GN_1NA_3	4,944.0		1,649.1	
		$[Fuc][Hex]_5[HexNAc]_5[NeuAc]_3$	$FBiGN_1NA_3$	5,309.3		1771.5	
r11	β3(Asn23)	$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	4,814.9		1,606.0	1,205.1
		$[Fuc][Hex]_6[HexNAc]_5[NeuAc]_2$	$FTriNA_2$, $FBiLac_1NA_2$	5,180.2		1,727.7	
r12	β3(Asn23)	$[Fuc][Hex]_3[HexNAc]_3[NeuAc]_2$	FCore GN_1NA_2	4,287.4	2,145.2	1,430.3	
		$[Fuc][Hex]_4[HexNAc]_4[NeuAc]_2$	FBi(1) GN_1NA_2	4,652.7		1,552.7	
r13	β3(Asn23)	$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_1$	$FBiNA_1$	4,523.6	2,263.5	1,508.7	
		$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	4,814.9		1,606.0	

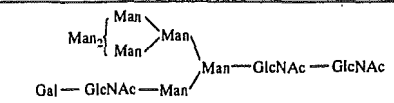
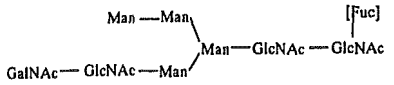
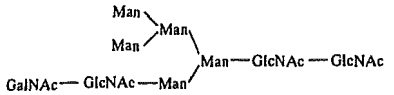
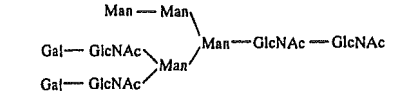
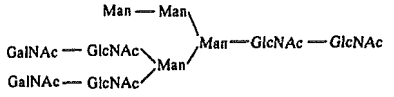
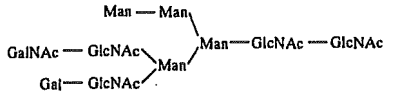
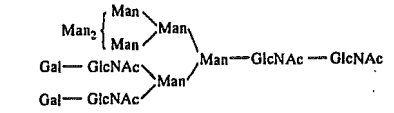
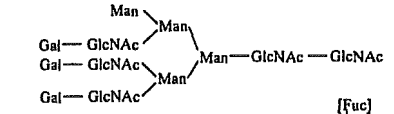
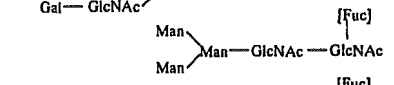
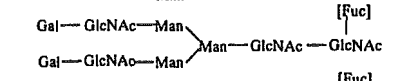
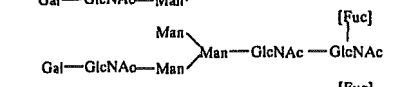
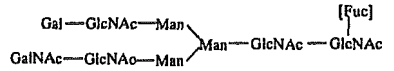
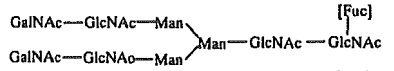
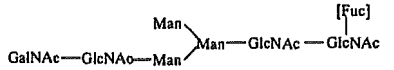
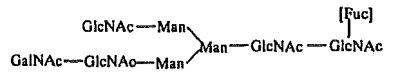
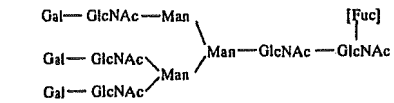
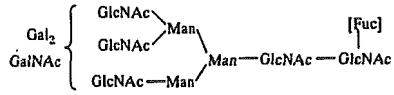
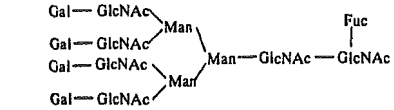
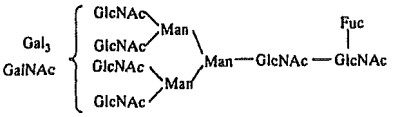
[a] See Table 8. [b] See Table 13, [c] avarage mass value.

Table 12 Peptides and carbohydrate compositions of peaks in Fig. 16D

Peak No.	Glyco-peptides	Carbohydrate composition[a]	Deduced carbohydrate composition[b]	Theoretical mass[c]	Observed *m/z* M^{2+}	Observed *m/z* M^{3+}
p1	α6(Asn52)	$[Hex]_3[HexNAc]_6[SO_3]_2$	$Bi(3)(SO_3)_2$	3,223.1	1,612.4	1,075.6
		$[Hex]_4[HexNAc]_5[SO_3]_1[NeuAc]_1$	$Bi(2)(SO_3)_1NA_1$	3,393.3	1,696.9	1,132.1
		$[Hex]_3[HexNAc]_5[SO_3]_2$	$Bi(4)GN_1(SO3)_2$	3,019.9	1,510.8	
p2	α6(Asn52)	$[Hex]_4[HexNAc]_4[SO_3]_1$	$Hybrid(2)(SO_3)_1$	2,898.8	1,450.1	
		$[Hex]_5[HexNAc]_4[SO_3]_1$	$Hybrid(3)(SO_3)_1$	3,061.0	1,531.1	
		$[Hex]_3[HexNAc]_4[SO_3]_1$	$Bi(4)(SO3)_1$	2,736.7	1,368.7	
p3	α6(Asn52)	$[Hex]_3[HexNAc]_5[SO_3]_1$	$Bi(4)GN_1(SO3)_1$	2,939.9	1,470.6	
		$[Hex]_4[HexNAc]_5[SO_3]_1$	$Bi(2)(SO_3)_1$, $Hybrid(2)GN_1(SO_3)_1$	3,102.0	1,552.1	
p4	α9(Asn78)	$[Hex]_4[HexNAc]_5[SO_3]_1[NeuAc]_1$	$Bi(2)(SO_3)_1NA_1$	4,106.0	2,053.8	1,369.7
		$[Hex]_5[HexNAc]_6[SO_3]_1[NeuAc]_1$	$Tri(1)(SO_3)_1NA_1$, $Bi(2)Lac_1(SO_3)_1NA_1$	4,471.3		1,491.3
		$[Hex]_4[HexNAc]_5[NeuAc]_2$	$Bi(2)NA_2$	4,317.2		1440.6
		$[Hex]_4[HexNAc]_5[SO_3]_2$	$Bi(2)(SO_3)_2$	3,894.8		1298.9
		$[Hex]_4[HexNAc]_5[SO_3]_1$	$Bi(2)(SO_3)_1$	3,814.7		1271.8
		$[Hex]_3[HexNAc]_6[SO_3]_2$	$Bi(3)(SO_3)_2$	3,935.8		1,313.6
		$[Hex]_6[HexNAc]_7[SO_3]_1[NeuAc]_1$	$Tri(1)Lac_1(SO_3)_1NA_1$,$Tetra(1)(SO_3)_1NA_1$	4,836.6		1,613.0
p5	α9(Asn78)	$[Hex]_3[HexNAc]_4[SO_3]_1$	$Bi(4)(SO_3)_1$	3,449.4	1,726.0	1,150.9
		$[Hex]_3[HexNAc]_5[SO_3]_1$	$Bi(5)(SO_3)_1$	3,652.6	1,827.0	1,219.1
		$[Fuc][Hex]_4[HexNAc]_5[SO_3]_1$	$FBi(2)(SO_3)_1$, $FHybrid(2)GN_1(SO_3)_1$	3,960.9		1,321.4
		$[Hex]_4[HexNAc]_5[SO_3]_1$	$Bi(2)(SO_3)_1$, $Hybrid(2)GN_1(SO_3)_1$	3,814.7		1,273.0
p6	β3(N23)	$[Hex]_4[HexNAc]_6[SO_3]_2$	$Hybrid\ (5)(SO_3)_2$	4,490.6		1497.3
		$[Hex]_5[HexNAc]_5[SO_3]_1[NeuAc]_1$	$Hybrid\ (6)(SO_3)_1NA_1$	4,660.7		1554.2
p7	β3(N23)	$[Fuc][Hex]_3[HexNAc]_6[SO_3]_2$	$FBi(3)(SO_3)_2$	4,474.6		1,492.3
		$[Fuc][Hex]_3[HexNAc]_6[SO_3]_1$	$FBi(3)(SO_3)_1$	4,394.5		1,465.6
		$[Fuc][Hex]_4[HexNAc]_5[SO_3]_1[NeuAc]_1$	$FBi(2)(SO_3)_1NA_1$	4,644.7		1,548.8
		$[Fuc][Hex]_4HexNAc]_5[SO_3]_1[NeuAc]_2$	$FBi(2)(SO_3)_1NA_2$	4,936.0		1,645.6
		$[Fuc][Hex]_5[HexNAc]_4[NeuAc]_2$	$FBiNA_2$	4,814.9		1,606.5
		$[Fuc][Hex]_5[HexNAc]_6[SO_3]_1[NeuAc]_1$	$FTri(1)(SO_3)_1NA_1$	5,010.1		1,671.4
		$[Fuc][Hex]_3[HexNAc]_4[SO_3]_1$	$FBi(4)(SO_3)_1$	3,988.1	1,994.8	1,330.5
		$[Fuc][Hex]_3[HexNAc]_3[NeuAc]_2$	$FCoreGN_1NA_2$	4,287.4		1,430.1

[a] See Table 8, [b] See Table 13. [c] avarage mass value.

Table 13 Deduced carbohydrate structures presented in Table 5, 6, 8, and 10-12

Abbreviation [a]	Structure [b]
Hybrid(1)	
Hybrid(2) [FHybrid(2)]	
Hybrid(3)	
Hybrid(4)	
Hybrid(5)	
Hybrid(6)	
Hybrid(7)	
Hybrid(8)	
FCore	
Bi [FBi]	
Bi(1) [FBi(1)]	
Bi(2) [FBi(2)]	
Bi(3) [FBi(3)]	
Bi(4) [FBi(4)]	
Bi(5) [FBi(5)]	
Tri [FTri]	
Tri(1) [FTri(1)]	
FTetra	
Tetra (1)	

[a] F, fucose; Bi, biantennary; Tri, triantennary; Tetra, tetraantennary.

[b] Man, mannose; Fuc, fucose; Gal, galactose; GalNAc, *N*-acetylgalactosamine; GlcNAc, *N*-acetylglucosamine.

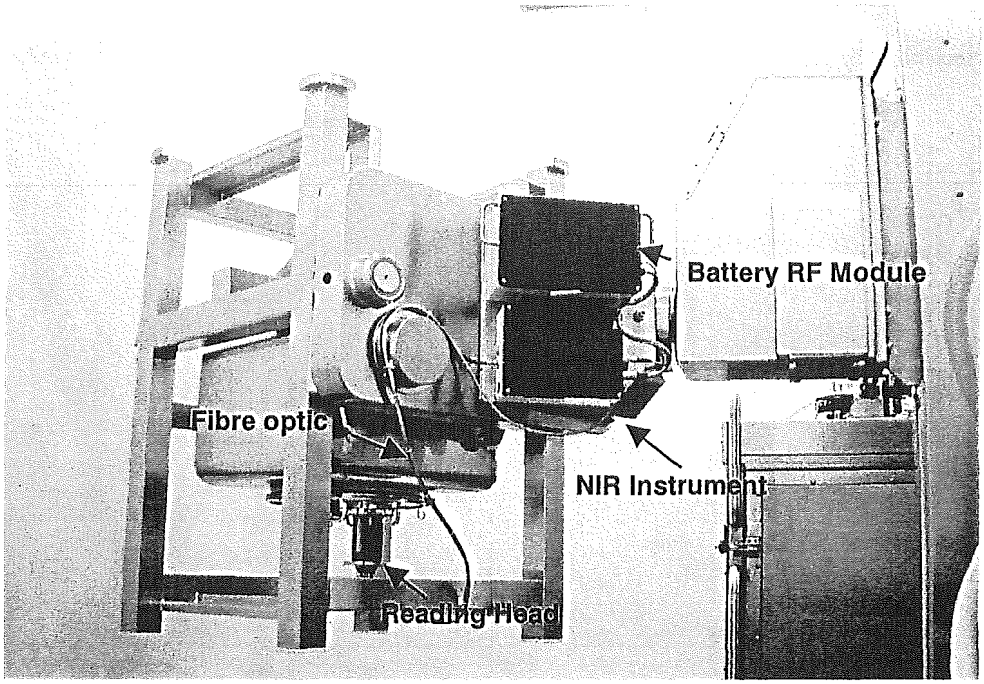


Fig. 17 On- line NIR bin blender

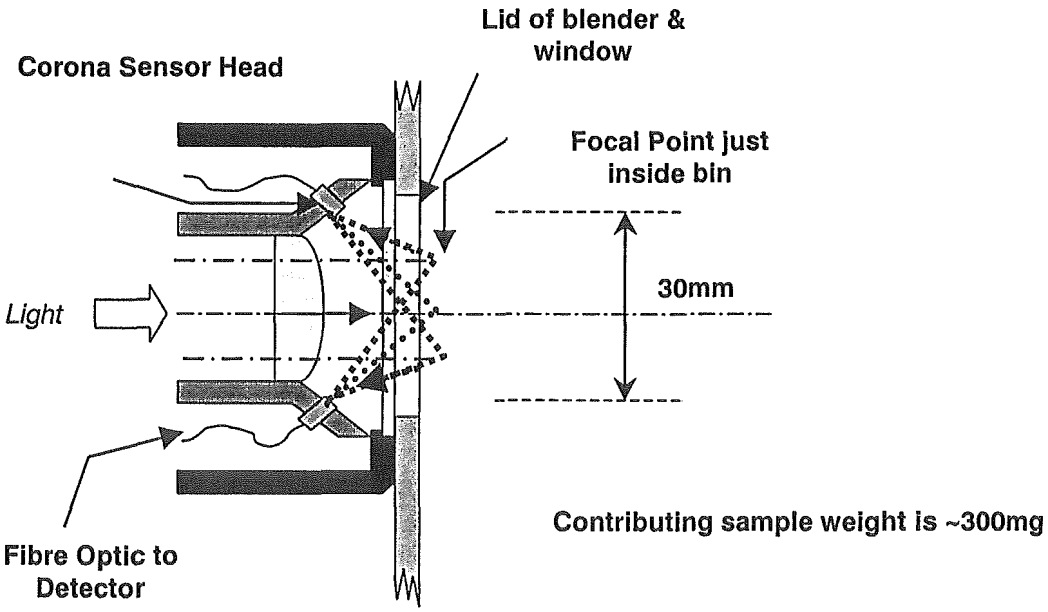


Fig. 18 Corona Sensor Head