

A Cyclodecapeptide Ligand to Vitamin B₁₂

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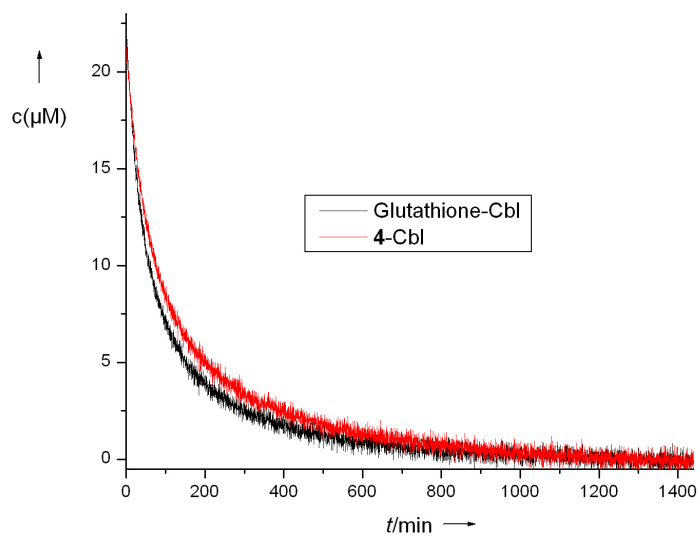
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Berne, Switzerland.*

Supporting Information:

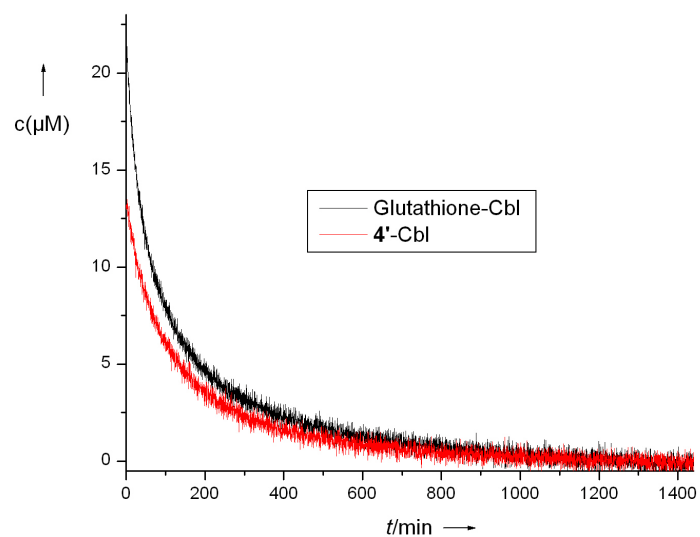
1. Plots of exchange kinetic with cyanide
2. HPLC traces of bead analysis (amino acid analysis) for the hits
3. Table S1: List of non-hits
4. Table S2 Non-hits amino acid percentage occurrence
5. Amino acid analysis of non-hits in Table S1
6. Table S3: Sequences picked randomly
7. Analytical HPLC profiles and mass spectra (+ESI-MS) data

1. Plots of exchange kinetics with cyanide

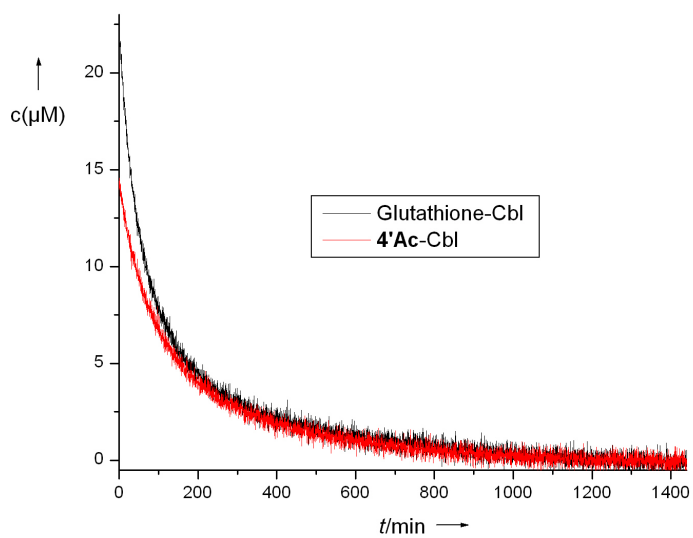
Cyclic peptide 4



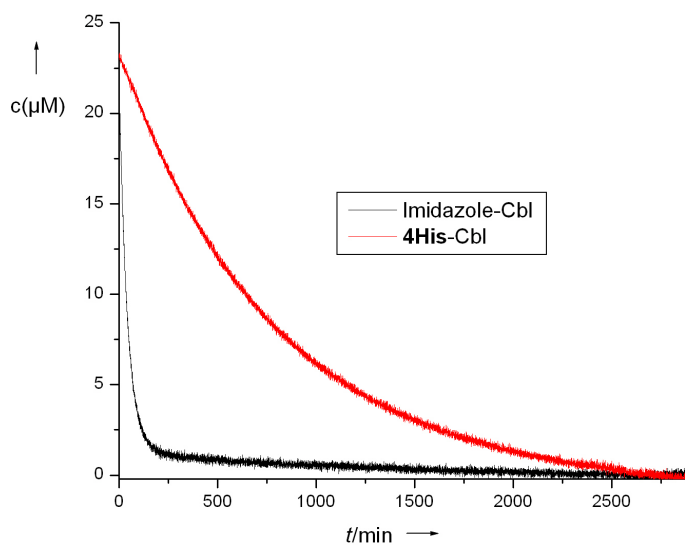
Linear peptide 4'



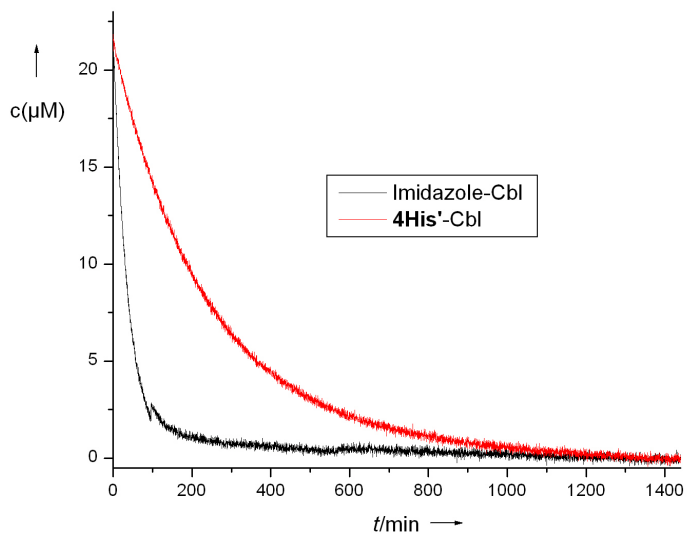
Linear peptide acetylated 4'Ac



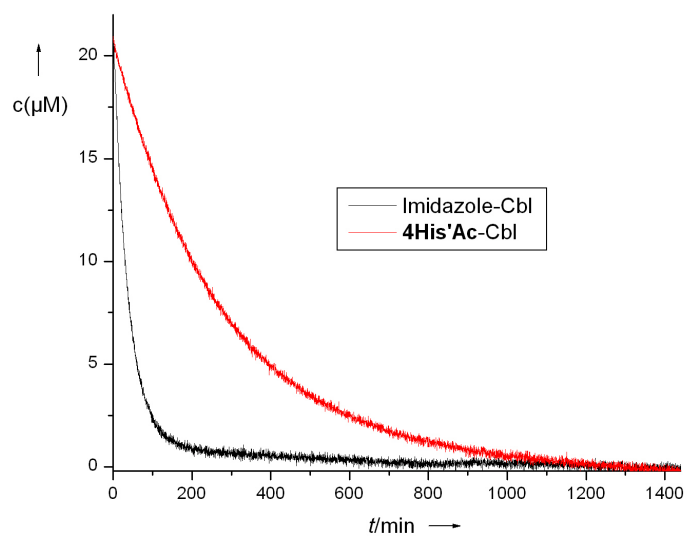
Cyclic peptide 4His



Linear peptide 4His'

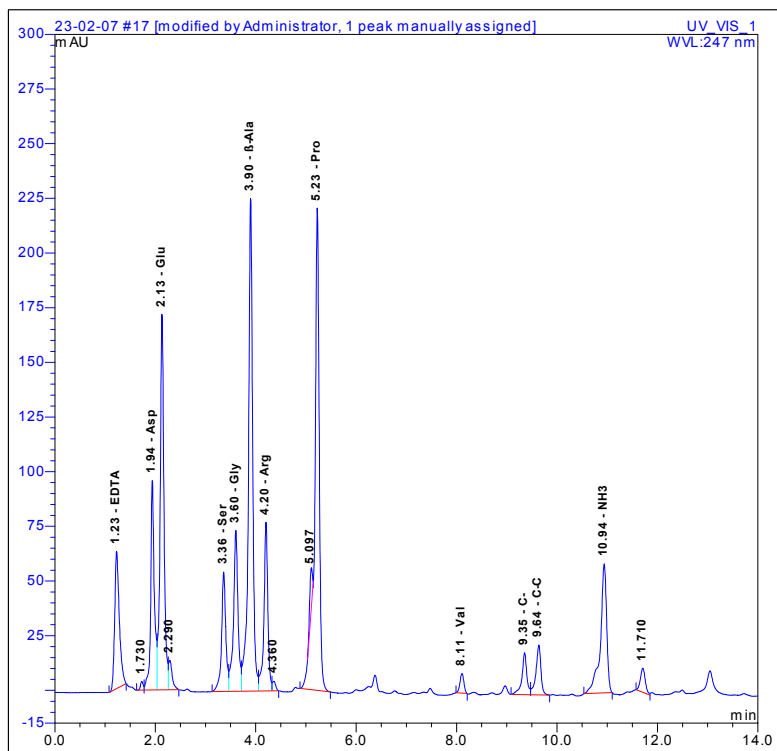


Linear peptide acetylated 4His'Ac



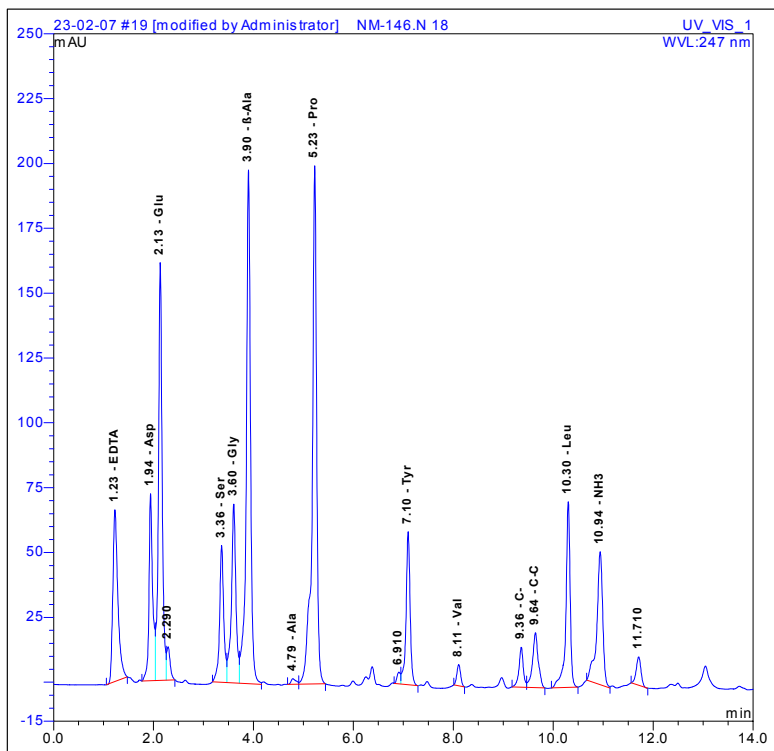
2. HPLC traces of bead analysis (amino acid analysis) for the hits

Hit 1 c(SDEPGERCPq).



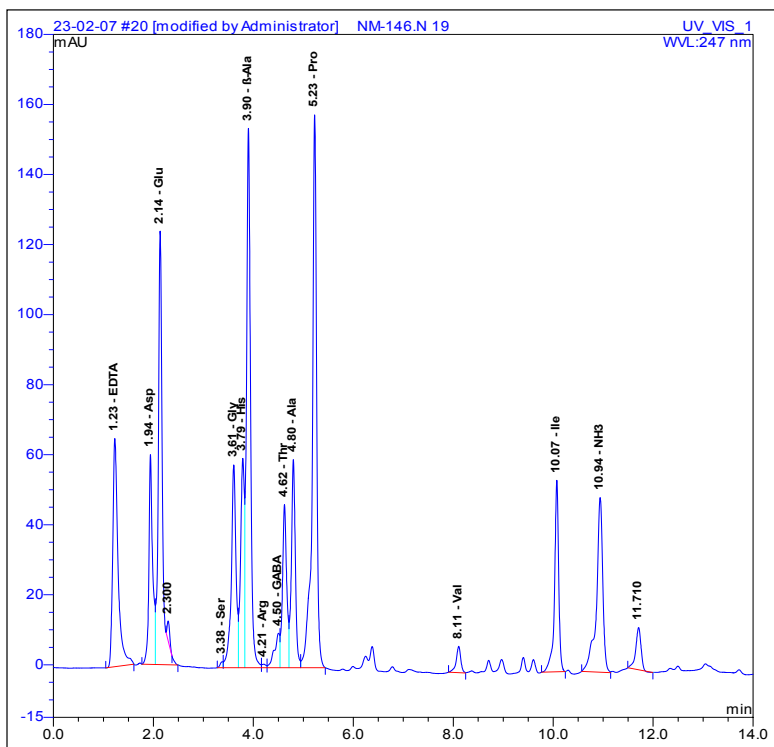
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.093	6.67	62.76	284.5	EDTA
1.94	1.95	0.066	8.09	95.72	530.1	Asp
2.13	2.14	0.075	15.40	171.65	1043.9	Glu
3.36	3.37	0.080	5.37	54.57	380.7	Ser
3.60	3.61	0.086	7.85	73.55	507.7	Gly
3.90	3.91	0.080	22.29	225.27	1594.6	β-Ala
4.20	4.21	0.075	7.17	77.17	513.7	Arg
5.23	5.24	0.079	24.01	220.52	1255.8	Pro
8.11	8.11	0.083	0.80	9.00	58.4	Val
9.35	9.36	0.087	2.19	19.17	78.5	C-
9.64	9.66	0.097	2.64	22.82	93.4	C-C
10.94	10.96	0.112	8.65	58.94	750.8	NH3
Total:			111.121	1091.151	7092.16	

Hit 2a c(SYLPGEDCPq) and 2b c(SDYPGELCPq).



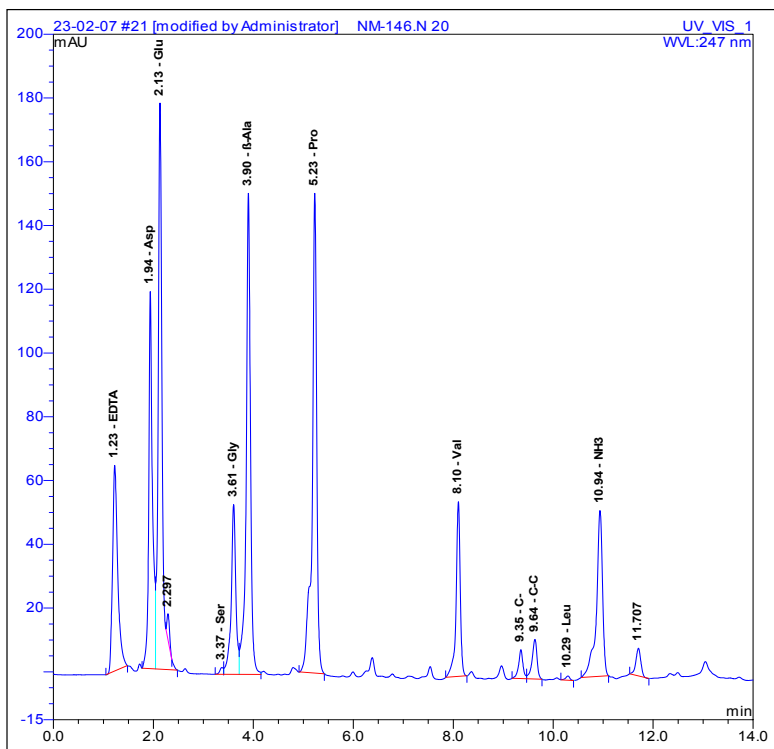
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.100	7.67	66.21	300.2	EDTA
1.94	1.95	0.069	6.22	72.05	399.0	Asp
2.13	2.14	0.073	13.97	160.97	979.0	Glu
3.36	3.37	0.080	5.10	52.77	368.1	Ser
3.60	3.61	0.086	7.37	68.93	475.9	Gly
3.90	3.91	0.080	19.65	198.07	1402.0	β-Ala
4.79	4.81	0.123	0.25	2.19	14.7	Ala
5.23	5.24	0.079	20.80	199.73	1137.4	Pro
7.10	7.11	0.079	5.58	58.95	399.6	Tyr
8.11	8.11	0.083	0.72	8.14	52.8	Val
9.36	9.36	0.083	1.54	15.43	63.1	C-
9.64	9.66	0.111	2.83	21.13	86.5	C-C
10.30	10.31	0.079	7.16	71.52	493.9	Leu
10.94	10.96	0.112	7.09	51.23	652.6	NH3
Total:			105.954	1047.320	6824.82	

Hit 3a c(HITPGEDAPq) and 3b c(HDEPGIATPq).



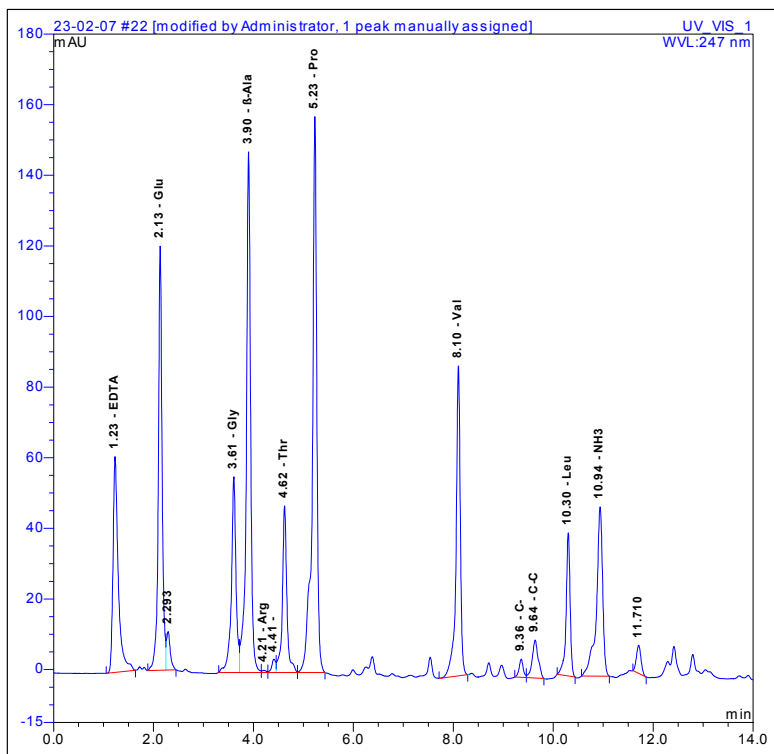
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.102	8.07	65.14	295.3	EDTA
1.94	1.95	0.071	5.28	59.89	331.6	Asp
2.14	2.14	0.074	11.67	123.78	752.8	Glu
3.38	3.37	n.a.	0.11	1.71	11.9	Ser
3.61	3.61	0.089	6.34	57.89	399.6	Gly
3.79	3.79	n.a.	5.30	59.78	402.5	His
3.90	3.91	0.084	14.45	154.00	1090.1	β-Ala
4.21	4.21	n.a.	0.09	1.01	6.7	Arg
4.50	4.50	n.a.	1.21	9.83	62.6	GABA
4.62	4.63	0.088	4.61	46.57	370.0	Thr
4.80	4.81	0.081	5.57	59.40	399.5	Ala
5.23	5.24	0.079	16.14	157.83	898.8	Pro
8.11	8.11	0.090	0.81	7.53	48.9	Val
10.07	10.09	0.079	5.33	54.69	352.1	Ile
10.94	10.96	0.113	7.36	49.83	634.8	NH3
Total:			92.349	908.893	6057.26	

Hit 4 c(VDEPGEDCPq).



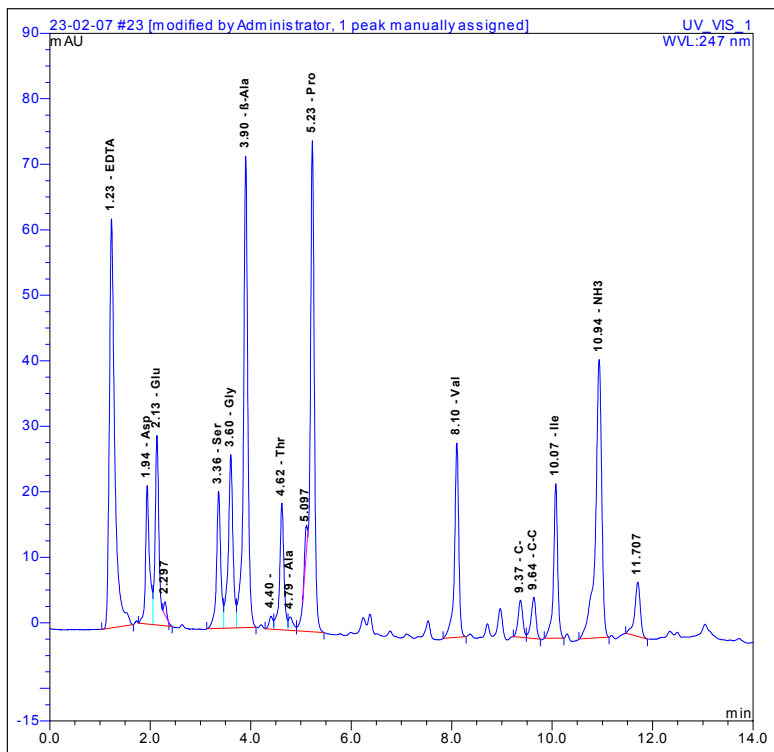
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.104	7.71	64.52	292.5	EDTA
1.94	1.95	0.069	10.30	118.25	654.9	Asp
2.13	2.14	0.074	16.55	177.57	1080.0	Glu
3.37	3.37	n.a.	0.17	2.13	14.9	Ser
3.61	3.61	0.086	5.78	53.23	367.4	Gly
3.90	3.91	0.081	15.15	150.88	1068.0	β-Ala
5.23	5.24	0.079	15.83	150.47	856.9	Pro
8.10	8.11	0.079	5.28	54.81	355.4	Val
9.35	9.36	0.085	0.92	9.08	37.2	C-
9.64	9.66	0.101	1.43	12.45	51.0	C-C
10.29	10.31	0.084	0.13	1.33	9.2	Leu
10.94	10.96	0.112	7.43	51.95	661.7	NH3
Total:			86.690	846.676	5449.08	

Hit 5 c(VCEPGE LTPq).



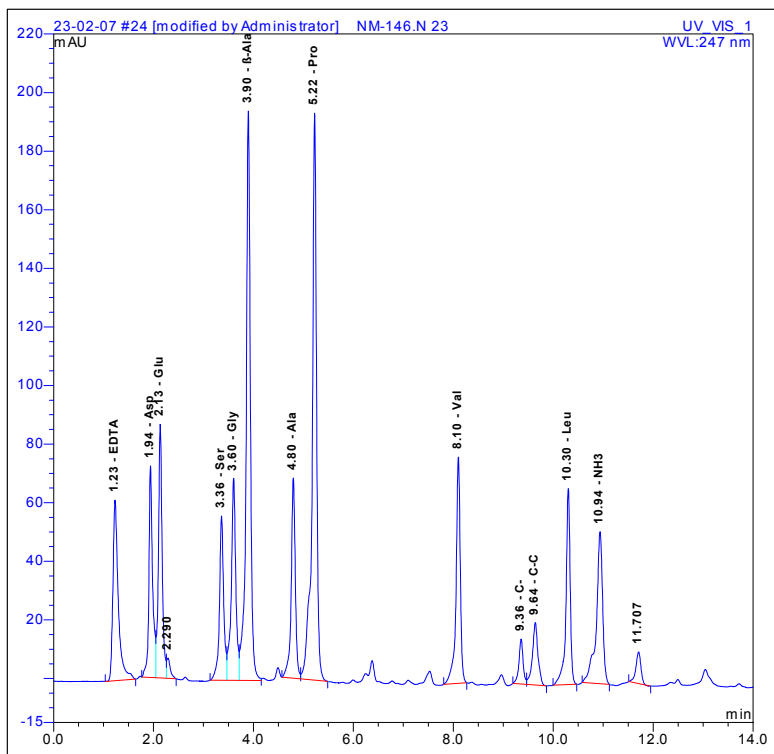
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.098	7.43	61.12	277.1	EDTA
2.13	2.14	0.073	10.60	120.09	730.4	Glu
3.61	3.61	0.085	6.00	55.45	382.8	Gly
3.90	3.91	0.080	14.66	147.44	1043.7	β-Ala
4.21	4.21	n.a.	0.06	0.61	4.1	Arg
4.62	4.63	0.081	4.93	47.15	374.6	Thr
5.23	5.24	0.079	16.37	157.42	896.5	Pro
8.10	8.11	0.079	8.66	87.72	568.9	Val
9.36	9.36	0.082	0.49	5.17	21.2	C-
9.64	9.66	0.121	1.50	10.74	44.0	C-C
10.30	10.31	0.078	3.77	40.57	280.2	Leu
10.94	10.96	0.113	6.99	47.94	610.6	NH3
Total:			81.456	781.425	5233.91	

Hit 6a c(VSEPGIDTPq) and 6b c(SIEPGVDTPq).



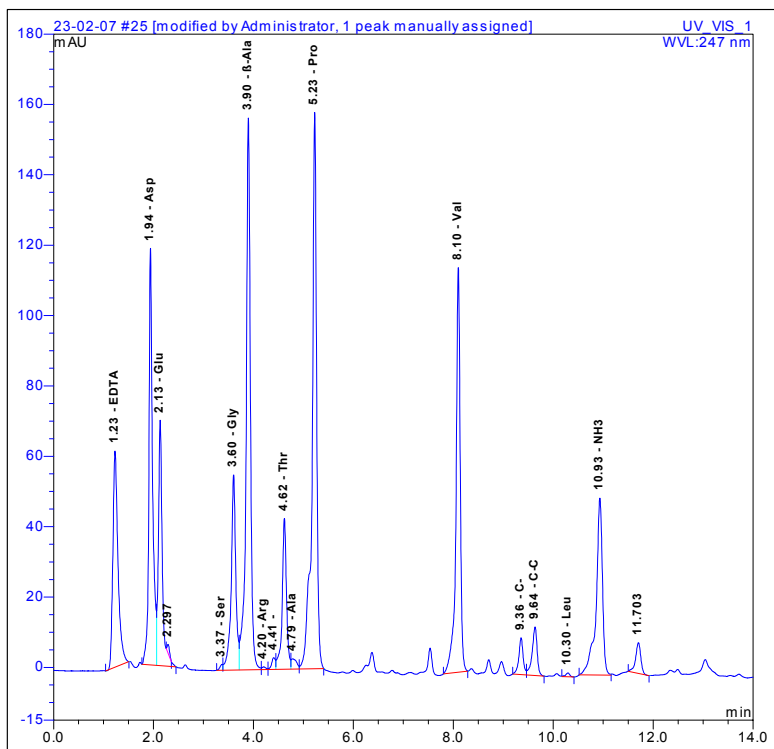
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.101	7.78	62.44	283.1	EDTA
1.94	1.95	0.072	1.95	21.10	116.9	Asp
2.13	2.14	0.074	2.68	28.89	175.7	Glu
3.36	3.37	0.081	2.06	20.90	145.8	Ser
3.60	3.61	0.087	2.89	26.49	182.9	Gly
3.90	3.91	0.082	7.22	71.98	509.5	β-Ala
4.62	4.63	0.081	1.93	19.31	153.4	Thr
4.79	4.81	n.a.	0.23	2.06	13.9	Ala
5.23	5.24	0.080	8.10	74.96	426.9	Pro
8.10	8.11	0.080	2.91	29.66	192.4	Val
9.37	9.36	0.099	0.61	5.66	23.1	C-
9.64	9.66	0.099	0.70	6.32	25.9	C-C
10.07	10.09	0.079	2.26	23.59	151.8	Ile
10.94	10.96	0.113	6.14	42.49	541.3	NH3
Total:			47.461	435.845	2942.45	

Hit 7a c(VSLPGEDAPq) and 7b c(SDEPGVLAPq).



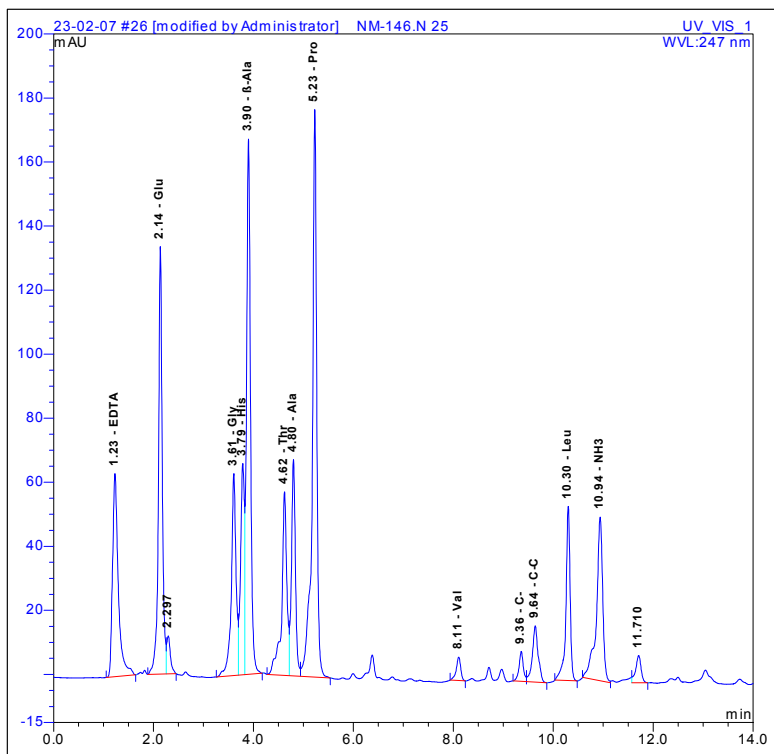
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.101	7.67	61.59	279.2	EDTA
1.94	1.95	0.069	6.27	72.22	400.0	Asp
2.13	2.14	0.074	7.56	86.56	526.5	Glu
3.36	3.37	0.081	5.54	56.04	390.9	Ser
3.60	3.61	0.086	7.36	68.90	475.6	Gly
3.90	3.91	0.080	19.39	194.33	1375.6	β -Ala
4.80	4.81	0.080	6.55	68.31	459.5	Ala
5.22	5.24	0.079	19.94	193.53	1102.1	Pro
8.10	8.11	0.080	7.63	77.25	501.0	Val
9.36	9.36	0.082	1.50	15.35	62.8	C-
9.64	9.66	0.106	2.75	21.33	87.3	C-C
10.30	10.31	0.079	6.58	66.90	462.0	Leu
10.94	10.96	0.113	7.64	51.84	660.3	NH3
Total:			106.392	1034.155	6782.81	

Hit 8 c(VDEPGVDTPq).



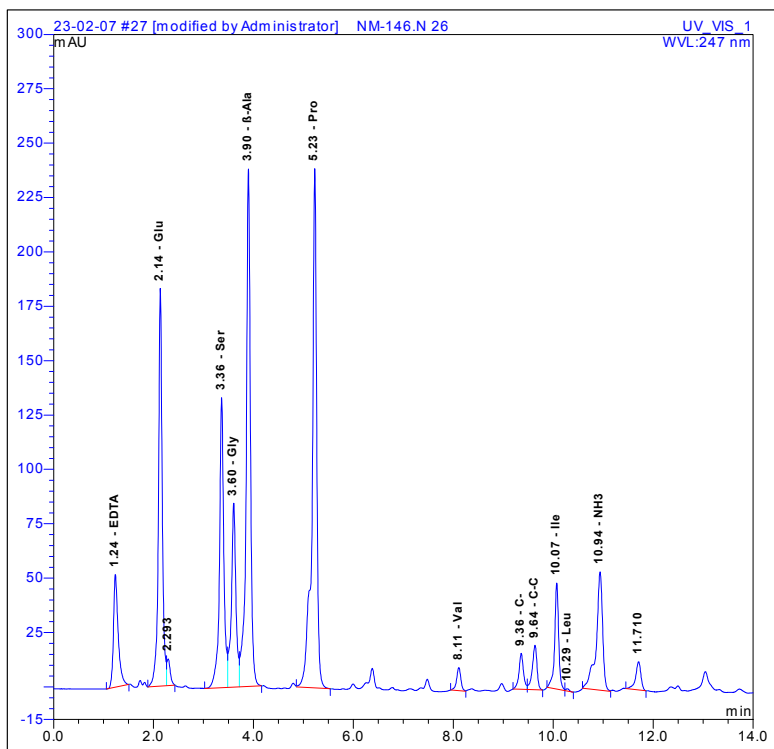
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.101	7.23	61.41	278.4	EDTA
1.94	1.95	0.067	10.20	118.38	655.6	Asp
2.13	2.14	0.075	6.40	69.76	424.2	Glu
3.37	3.37	n.a.	0.11	1.64	11.4	Ser
3.60	3.61	0.086	5.99	55.42	382.6	Gly
3.90	3.91	0.081	15.70	156.80	1109.9	β-Ala
4.20	4.21	n.a.	0.07	0.73	4.9	Arg
4.62	4.63	0.082	4.31	42.83	340.3	Thr
4.79	4.81	n.a.	0.36	2.90	19.5	Ala
5.23	5.24	0.079	16.63	158.07	900.2	Pro
8.10	8.11	0.080	11.34	114.98	745.7	Val
9.36	9.36	0.084	1.04	10.44	42.8	C-
9.64	9.66	0.099	1.61	13.83	56.6	C-C
10.30	10.31	0.082	0.10	1.10	7.6	Leu
10.93	10.96	0.114	7.47	50.30	640.8	NH3
Total:			88.558	858.602	5620.45	

Hit 9a c(HCTPGELAPq) and 9b c(HCLPGEATPq).



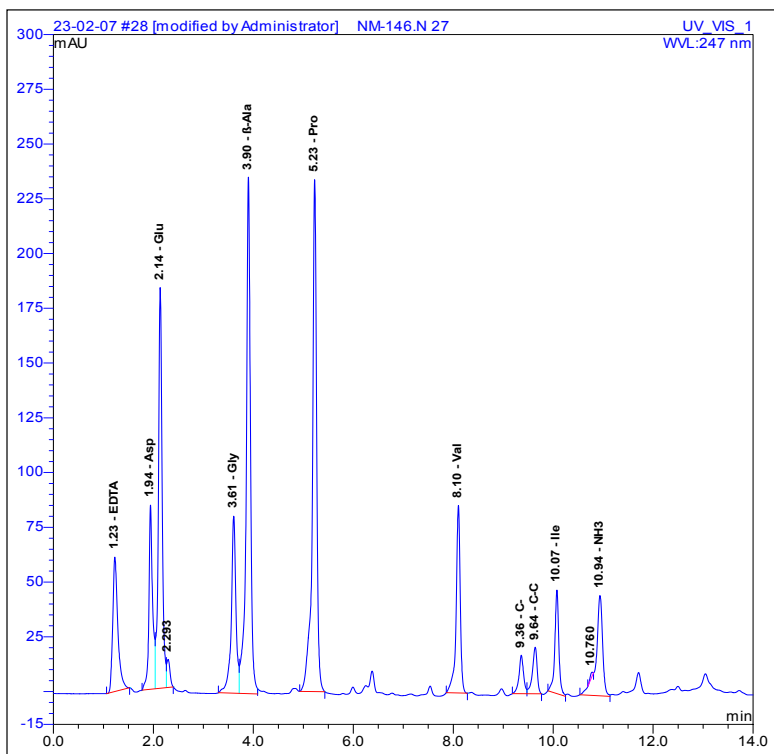
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.112	8.47	63.47	287.7	EDTA
2.14	2.14	0.073	11.91	133.47	811.7	Glu
3.61	3.61	0.089	6.98	63.10	435.6	Gly
3.79	3.79	n.a.	5.81	65.97	444.1	His
3.90	3.91	0.083	15.53	167.17	1183.3	β -Ala
4.62	4.63	0.087	6.88	57.32	455.4	Thr
4.80	4.81	0.081	6.22	67.49	453.9	Ala
5.23	5.24	0.079	18.41	177.21	1009.2	Pro
8.11	8.11	0.090	0.76	7.32	47.4	Val
9.36	9.36	0.084	0.93	9.34	38.2	C-
9.64	9.66	0.110	2.37	17.57	71.9	C-C
10.30	10.31	0.079	5.30	54.38	375.6	Leu
10.94	10.96	0.113	7.53	51.11	651.0	NH3
Total:			97.084	934.921	6265.19	

Hit 10 c(SIEPGEWCPq).



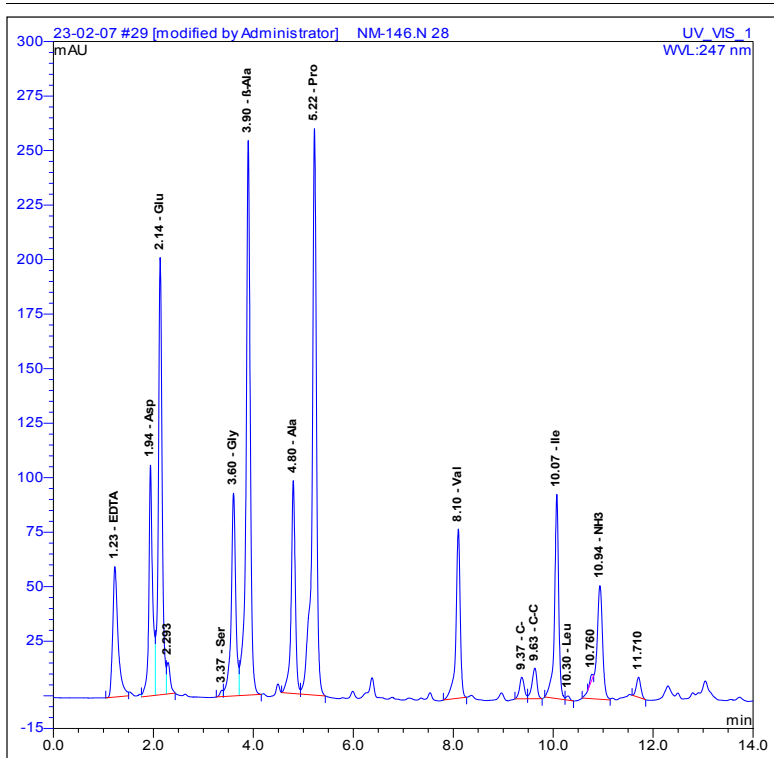
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.24	1.23	0.091	5.62	51.76	234.7	EDTA
2.14	2.14	0.073	16.28	182.80	1111.8	Glu
3.36	3.37	0.080	13.40	133.34	930.2	Ser
3.60	3.61	0.086	9.04	84.50	583.3	Gly
3.90	3.91	0.080	23.60	237.87	1683.8	β-Ala
5.23	5.24	0.079	25.80	238.70	1359.3	Pro
8.11	8.11	0.086	1.05	10.62	68.9	Val
9.36	9.36	0.089	1.73	16.49	67.5	C-
9.64	9.66	0.096	2.24	20.47	83.8	C-C
10.07	10.09	0.078	4.58	48.77	314.0	Ile
10.29	10.31	0.091	0.08	1.01	7.0	Leu
10.94	10.96	0.113	8.12	54.35	692.3	NH3
Total:			111.544	1080.695	7136.49	

Hit 11 c(VIEPGEDCPq).



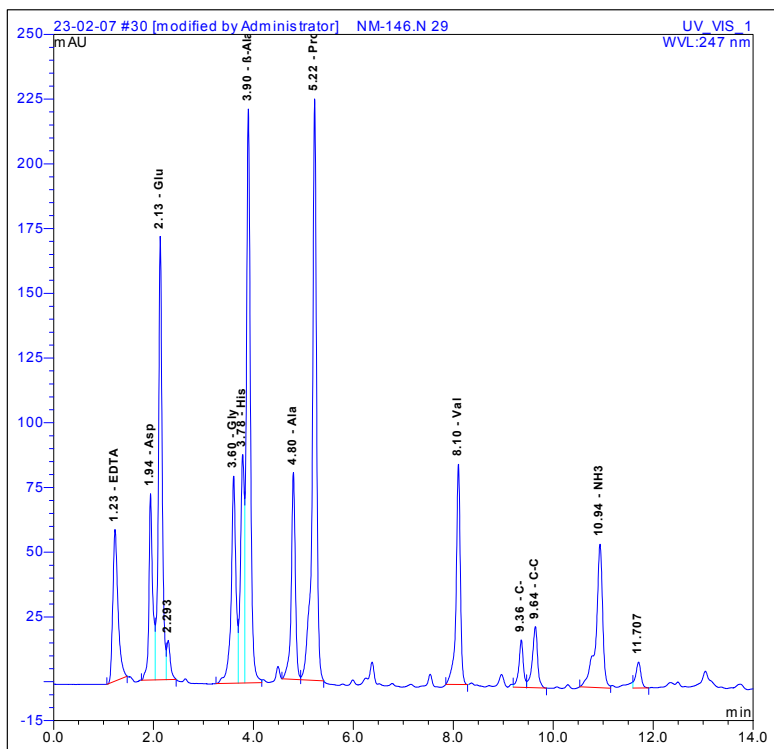
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.102	7.24	61.35	278.2	EDTA
1.94	1.95	0.069	7.27	84.04	465.4	Asp
2.14	2.14	0.073	15.97	182.92	1112.5	Glu
3.61	3.61	0.086	8.81	80.86	558.2	Gly
3.90	3.91	0.080	23.52	235.80	1669.1	β-Ala
5.23	5.24	0.079	23.32	233.75	1331.1	Pro
8.10	8.11	0.079	8.26	85.62	555.3	Val
9.36	9.36	0.091	1.89	17.60	72.0	C-
9.64	9.66	0.097	2.35	21.27	87.1	C-C
10.07	10.09	0.078	4.44	47.28	304.4	Ile
10.94	10.96	0.114	7.03	45.79	583.3	NH3
Total:			110.101	1096.276	7016.52	

Hit 12 c(VIEPGEDAPq).



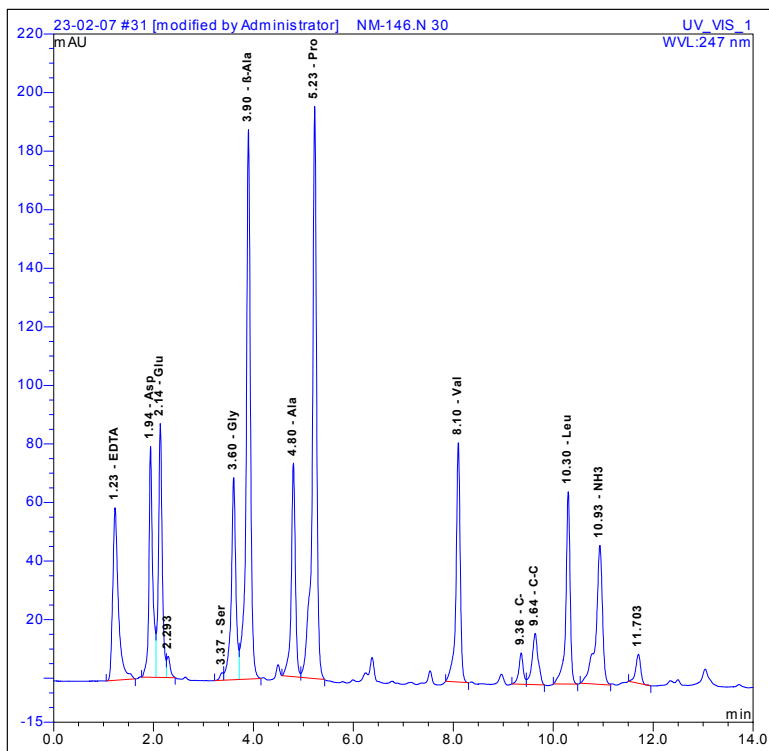
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.103	7.40	59.79	271.1	EDTA
1.94	1.95	0.069	9.28	105.78	585.8	Asp
2.14	2.14	0.073	17.51	200.46	1219.1	Glu
3.37	3.37	n.a.	0.21	2.92	20.4	Ser
3.60	3.61	0.085	9.88	93.05	642.3	Gly
3.90	3.91	0.079	24.94	254.33	1800.3	β-Ala
4.80	4.81	0.079	9.33	97.58	656.3	Ala
5.22	5.24	0.079	26.64	259.74	1479.1	Pro
8.10	8.11	0.080	7.69	77.55	503.0	Val
9.37	9.36	0.101	1.10	9.89	40.5	C-
9.63	9.66	0.104	1.60	13.99	57.2	C-C
10.07	10.09	0.079	9.11	93.61	602.6	Ile
10.30	10.31	0.093	0.16	1.92	13.2	Leu
10.94	10.96	0.114	7.73	52.08	663.4	NH3
Total:			132.594	1322.690	8554.44	

Hit 13a c(VDHPGEACPq), 13b c(HDEPGVACPq), 13c c(VCHPGEDAPq) and 13d c(HCEPGVDAPq).



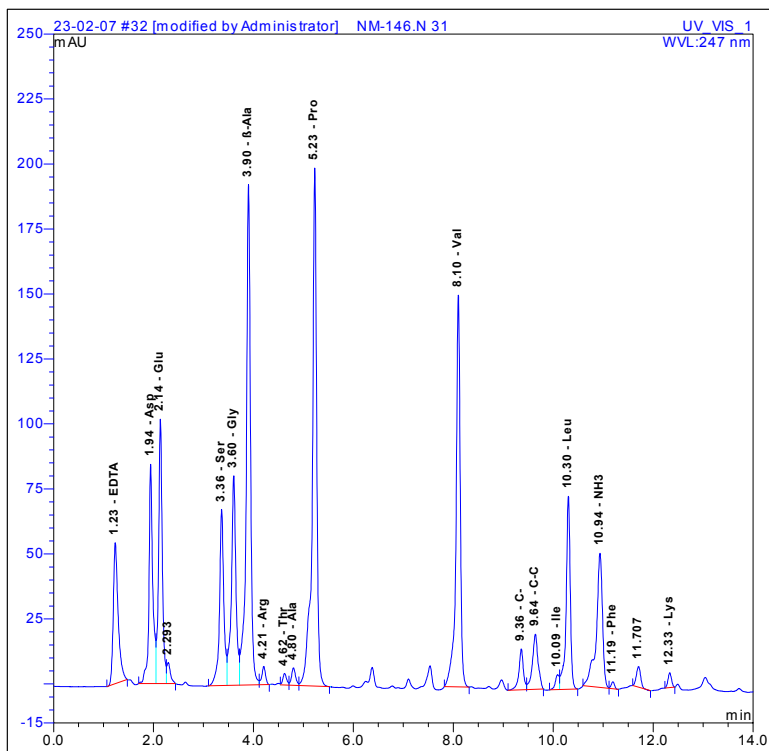
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.103	6.97	58.54	265.4	EDTA
1.94	1.95	0.070	6.30	71.94	398.4	Asp
2.13	2.14	0.074	15.03	171.26	1041.6	Glu
3.60	3.61	0.090	8.87	79.97	552.1	Gly
3.78	3.79	n.a.	7.92	88.26	594.2	His
3.90	3.91	0.084	20.70	221.60	1568.6	β -Ala
4.80	4.81	0.079	7.51	79.87	537.2	Ala
5.22	5.24	0.079	22.41	224.58	1278.9	Pro
8.10	8.11	0.080	8.34	85.07	551.7	Val
9.36	9.36	0.086	1.92	18.36	75.2	C-
9.64	9.66	0.103	2.91	23.69	97.0	C-C
10.94	10.96	0.115	8.65	55.42	705.9	NH3
Total:			117.536	1178.568	7666.09	

Hit 14a c(VDLPGEACPq) and 14b c(VCLPGEDAPq).



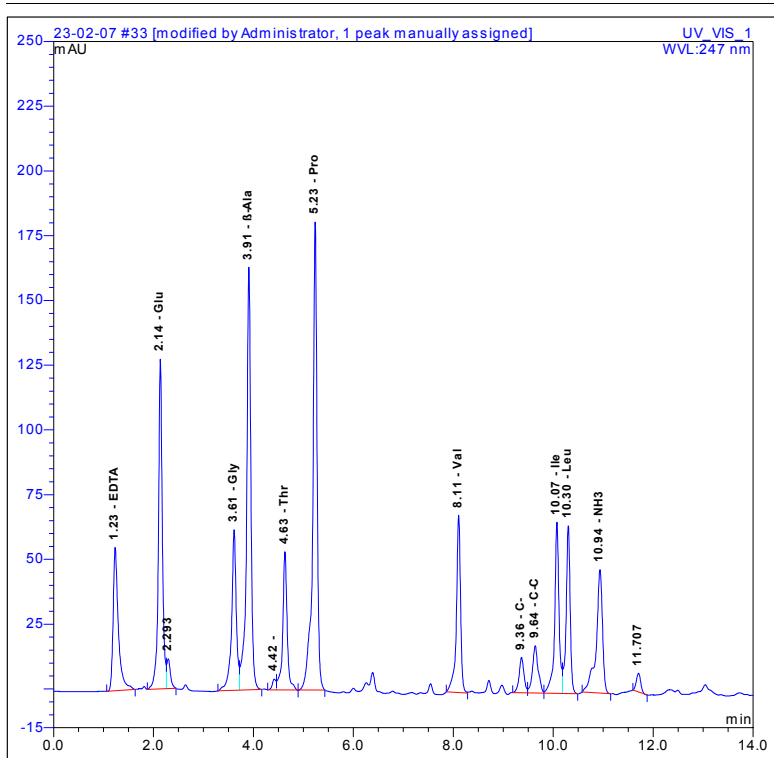
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.107	7.69	58.95	267.2	EDTA
1.94	1.95	0.069	6.88	78.80	436.4	Asp
2.14	2.14	0.074	7.57	86.65	527.0	Glu
3.37	3.37	n.a.	0.21	2.55	17.8	Ser
3.60	3.61	0.086	7.44	69.00	476.3	Gly
3.90	3.91	0.080	18.65	187.48	1327.1	β -Ala
4.80	4.81	0.079	6.92	72.91	490.4	Ala
5.23	5.24	0.079	19.92	195.34	1112.4	Pro
8.10	8.11	0.080	7.97	81.70	529.9	Val
9.36	9.36	0.086	1.09	10.66	43.6	C-
9.64	9.66	0.119	2.46	17.50	71.6	C-C
10.30	10.31	0.080	6.52	65.65	453.4	Leu
10.93	10.96	0.113	7.27	47.45	604.5	NH3
Total:			100.589	974.649	6357.62	

Hit 15a c(VSLPGEDCPq) and 15b c(SDEPGVLCpq).



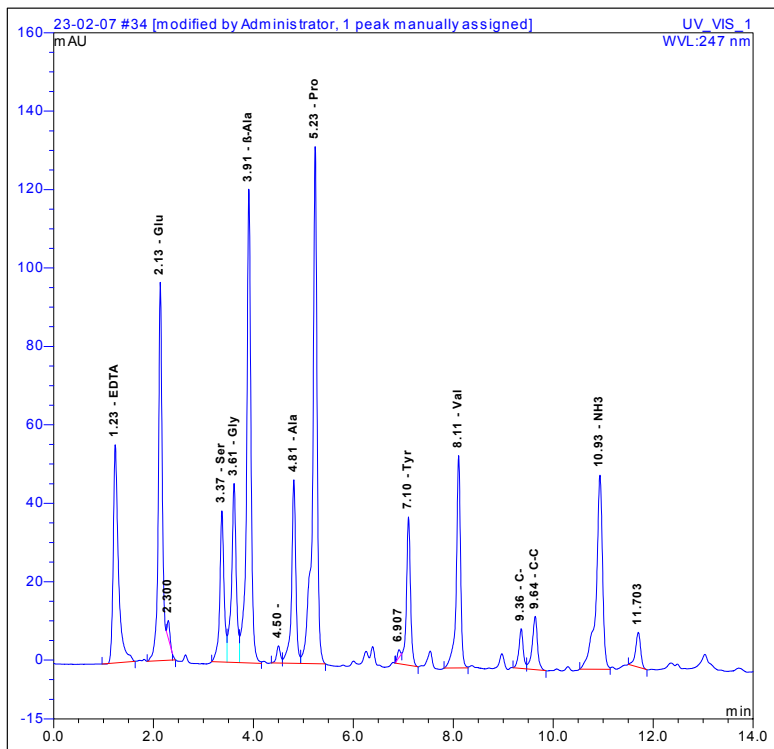
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.095	6.09	54.19	245.7	EDTA
1.94	1.95	0.068	7.49	84.34	467.1	Asp
2.14	2.14	0.074	8.82	101.63	618.1	Glu
3.36	3.37	0.081	6.82	67.79	472.9	Ser
3.60	3.61	0.086	8.71	80.60	556.4	Gly
3.90	3.91	0.080	19.27	192.53	1362.8	β-Ala
4.21	4.21	0.077	0.61	7.03	46.8	Arg
4.62	4.63	0.079	0.39	4.45	35.3	Thr
4.80	4.81	0.084	0.64	6.75	45.4	Ala
5.23	5.24	0.079	20.68	199.30	1135.0	Pro
8.10	8.11	0.079	14.85	150.73	977.6	Val
9.36	9.36	0.085	1.65	15.73	64.4	C-
9.64	9.66	0.111	2.81	21.20	86.8	C-C
10.09	10.09	n.a.	0.53	5.73	36.9	Ile
10.30	10.31	0.080	7.20	74.27	512.9	Leu
10.94	10.96	0.112	7.54	51.65	657.9	NH3
11.19	11.20	0.072	0.21	2.74	19.1	Phe
12.33	12.34	0.077	0.46	5.65	22.0	Lys

Hit 16 c(VIEPGELTPq).



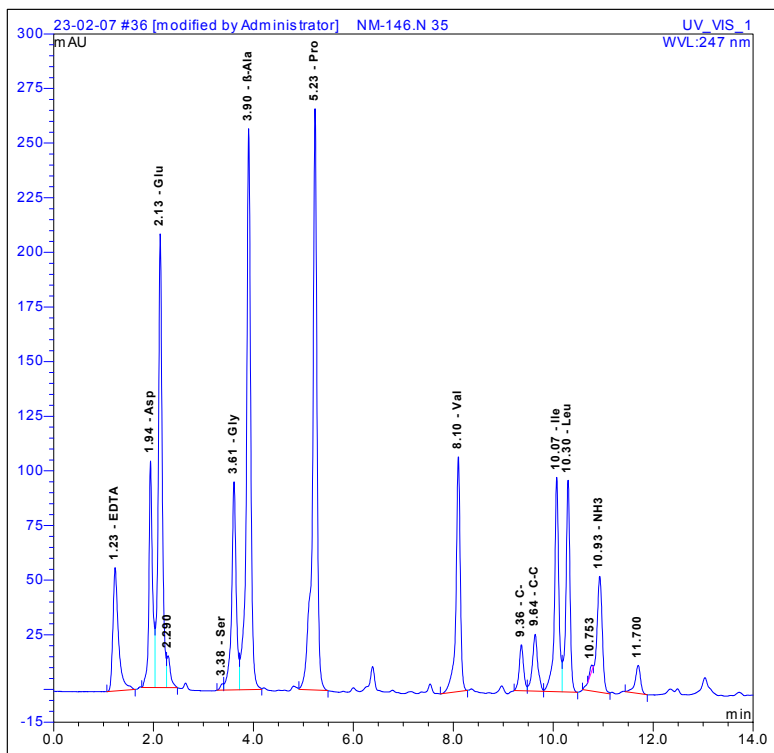
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.098	6.69	55.35	250.9	EDTA
2.14	2.14	0.076	11.66	127.33	774.4	Glu
3.61	3.61	0.086	6.81	61.96	427.8	Gly
3.91	3.91	0.080	16.23	163.23	1155.4	β-Ala
4.63	4.63	0.081	5.49	53.32	423.7	Thr
5.23	5.24	0.078	18.12	180.71	1029.1	Pro
8.11	8.11	0.079	6.68	68.48	444.1	Val
9.36	9.36	0.099	1.52	13.59	55.6	C-
9.64	9.66	0.111	2.40	18.23	74.6	C-C
10.07	10.09	0.081	6.76	66.02	425.0	Ile
10.30	10.31	0.080	6.07	64.76	447.2	Leu
10.94	10.96	0.112	6.98	47.61	606.5	NH3
Total:			95.427	920.594	6114.37	

Hit 17a c(VSYPGEACPq) and 17b c(SYEPGVACPq).



RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.096	6.68	55.68	252.4	EDTA
2.13	2.14	0.076	9.44	96.46	586.7	Glu
3.37	3.37	0.082	3.84	38.55	268.9	Ser
3.61	3.61	0.088	5.05	45.64	315.1	Gly
3.91	3.91	0.081	12.24	120.79	855.0	β-Ala
4.81	4.81	0.079	4.58	46.74	314.4	Ala
5.23	5.24	0.078	13.93	131.86	750.9	Pro
7.10	7.11	0.079	3.73	37.81	256.3	Tyr
8.11	8.11	0.080	5.39	54.16	351.3	Val
9.36	9.36	0.086	1.01	10.12	41.4	C-
9.64	9.66	0.102	1.64	13.58	55.6	C-C
10.93	10.96	0.113	7.49	49.49	630.4	NH3
Total:			75.019	700.889	4678.35	

Hit 18a c(VILPGEDCPq) and 18b c(VDEPGILCPq).



RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.104	7.22	56.46	255.9	EDTA
1.94	1.95	0.068	8.74	103.62	573.8	Asp
2.13	2.14	0.077	19.04	207.52	1262.1	Glu
3.38	3.37	n.a.	0.22	2.94	20.5	Ser
3.61	3.61	0.085	10.19	95.26	657.6	Gly
3.90	3.91	0.079	25.33	256.65	1816.7	β -Ala
5.23	5.24	0.079	27.67	266.04	1515.0	Pro
8.10	8.11	0.080	10.71	107.41	696.6	Val
9.36	9.36	0.089	2.14	21.04	86.1	C-
9.64	9.66	0.104	3.25	26.02	106.5	C-C
10.07	10.09	0.081	10.05	98.16	631.9	Ile
10.30	10.31	0.080	9.10	96.95	669.6	Leu
10.93	10.96	0.113	7.77	53.08	676.1	NH3
Total:			141.433	1391.136	8968.54	

Table S1. Non-Hits from cyclodecapeptide library X¹⁰X⁹X⁸Pro-Gly-X³X⁵X⁴-Pro-gln.

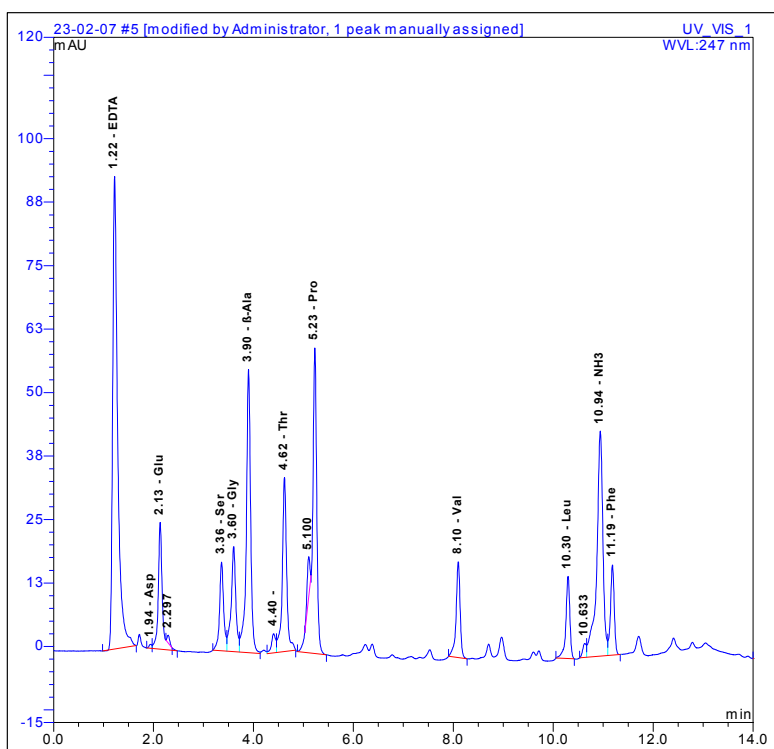
	X ¹⁰	X ⁹	X ⁸	X ⁵	X ⁴	X ³
1	Val	Ser	Thr	Glu	Leu	Phe
2	Val	Ile	Thr	Arg	Arg	Ala
3a	Val	Ser	Tyr	Ile	Trp	Phe
3b	Ser	Ile	Tyr	Val	Trp	Phe
4a	Phe	Ile	Leu	Glu	Asp	Phe
4b	Phe	Asp	Glu	Ile	Leu	Phe
5	Phe	Ser	Leu	Val	Trp	Phe
6a	Val	Ser	Tyr	Ile	Arg	Thr
6b	Ser	Ile	Tyr	Val	Arg	Thr
7	Phe	Ile	Leu	Lys	Leu	Phe

Table S2. Non-Hits percentage occurrence of the amino acid at the given position.

	AA	X ¹⁰	X ⁹	X ⁸	X ⁵	X ⁴	X ³
1	Tyr		0%	29%			
2	His	0%		0%			
3	Phe	43%					71%
4	Cys		0%				0%
5	Glu			7%	21%		
6	Ile		50%		21%		
7	Lys				14%		0%
8	Asp		7%			7%	
9	Ser	14%	43%				
10	Val	43%			29%		
11	Ala					0%	14%
12	Leu			36%		36%	
13	Thr			29%			14%
14	Trp	0%				29%	
15	Arg				14%	29%	

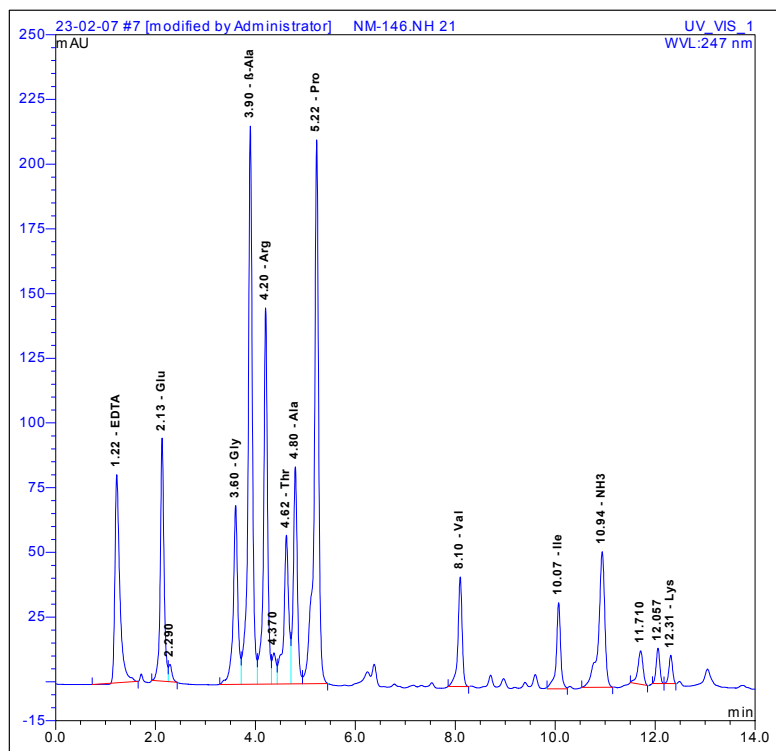
5. Amino acid analysis of non-hits in Table S1

N1 c(VSTPGELFPq).



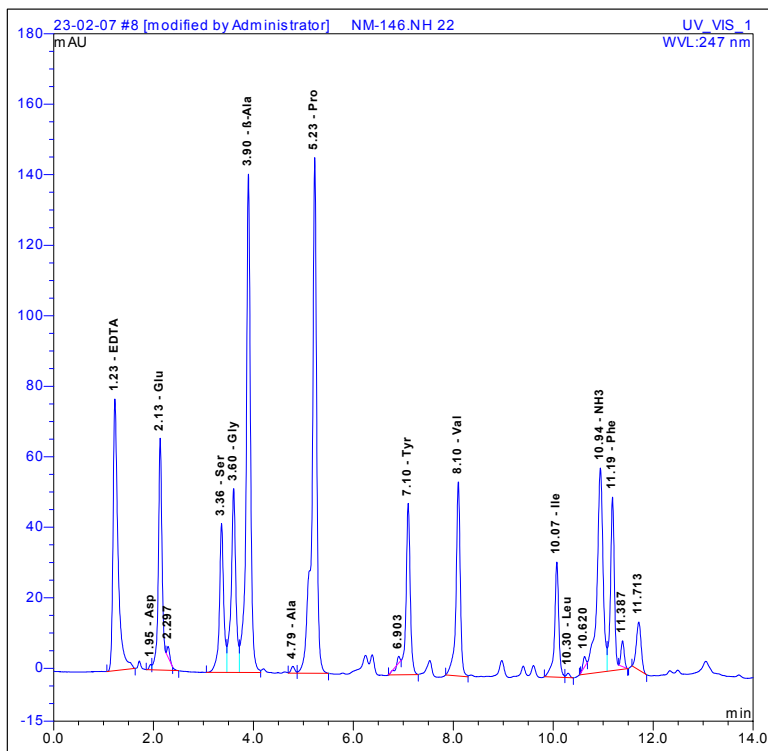
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.22	1.23	0.096	10.79	93.07	422.0	EDTA
1.94	1.95	n.a.	0.05	0.78	4.3	Asp
2.13	2.14	0.073	2.36	24.95	151.7	Glu
3.36	3.37	0.079	1.66	17.46	121.8	Ser
3.60	3.61	0.087	2.26	20.68	142.8	Gly
3.90	3.91	0.081	5.60	55.74	394.6	β -Ala
4.62	4.63	0.081	3.49	34.29	272.4	Thr
5.23	5.24	0.079	6.71	60.17	342.6	Pro
8.10	8.11	0.079	1.76	18.86	122.3	Val
10.30	10.31	0.078	1.50	16.18	111.8	Leu
10.94	10.96	0.113	6.36	44.30	564.3	NH3
11.19	11.20	0.079	1.57	17.77	123.6	Phe
Total:			44.105	404.265	2774.24	

N2 c(VITPGRRAPq).



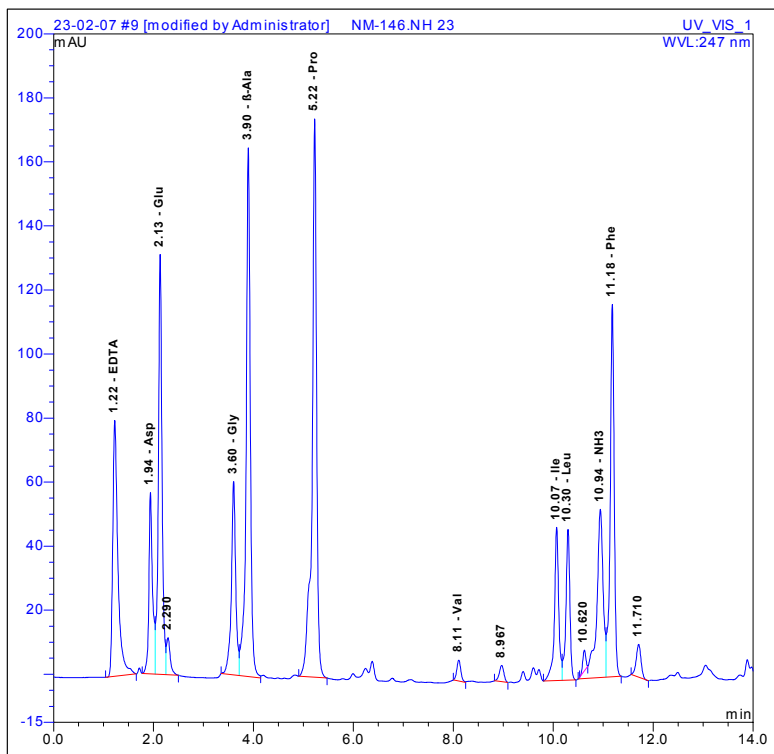
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.22	1.23	0.094	9.08	80.44	364.7	EDTA
2.13	2.14	0.073	8.14	93.88	571.0	Glu
3.60	3.61	0.085	7.42	68.98	476.2	Gly
3.90	3.91	0.079	21.23	215.58	1526.0	β-Ala
4.20	4.21	0.075	13.56	145.26	967.0	Arg
4.62	4.63	0.090	6.73	57.39	456.0	Thr
4.80	4.81	0.081	7.76	83.78	563.5	Ala
5.22	5.24	0.079	21.95	210.09	1196.4	Pro
8.10	8.11	0.081	4.15	42.31	274.4	Val
10.07	10.09	0.080	3.40	33.31	214.4	Ile
10.94	10.96	0.113	7.75	52.34	666.8	NH3
12.31	12.34	0.078	0.91	10.90	42.4	Lys
Total:			112.083	1094.265	7318.72	

N3a c(VSYPGIWFPq) and N3b c(SIYPGVWFPq).



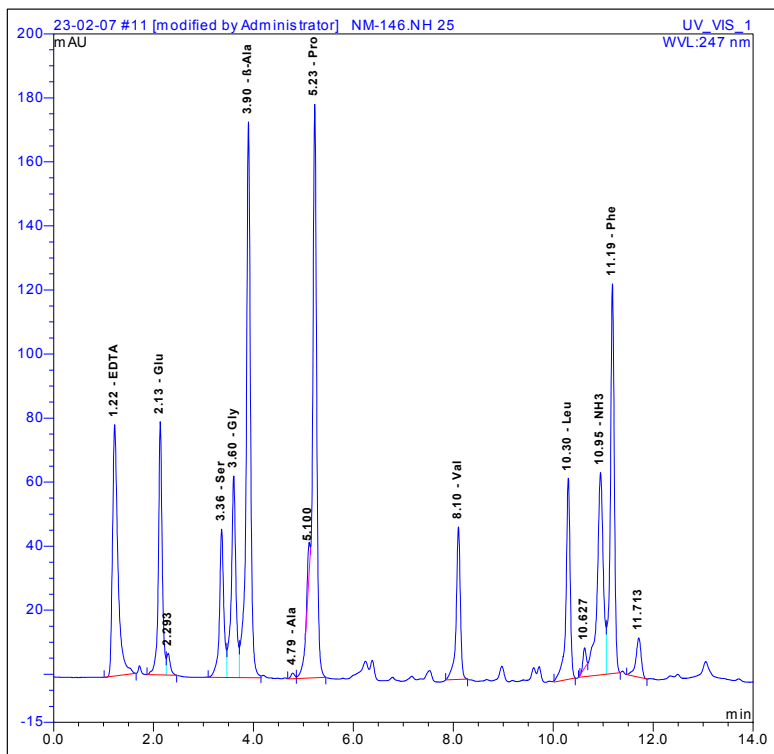
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.093	8.80	77.01	349.1	EDTA
1.95	1.95	n.a.	0.08	1.49	8.2	Asp
2.13	2.14	0.073	6.21	65.77	400.0	Glu
3.36	3.37	0.081	4.25	42.26	294.8	Ser
3.60	3.61	0.087	5.69	52.13	359.9	Gly
3.90	3.91	0.081	14.19	141.41	1001.0	β-Ala
4.79	4.81	0.081	0.17	1.95	13.1	Ala
5.23	5.24	0.079	15.91	146.29	833.1	Pro
7.10	7.11	0.080	5.21	48.57	329.2	Tyr
8.10	8.11	0.080	5.43	55.08	357.2	Val
10.07	10.09	0.079	3.20	32.62	210.0	Ile
10.30	10.31	0.077	0.10	1.23	8.5	Leu
10.94	10.96	0.113	8.57	57.92	737.7	NH3
11.19	11.20	0.079	4.58	49.18	342.0	Phe
Total:			82.411	772.915	5243.93	

N4a c(FILPGEDFPq) and N4b c(FDEPGILFPq).



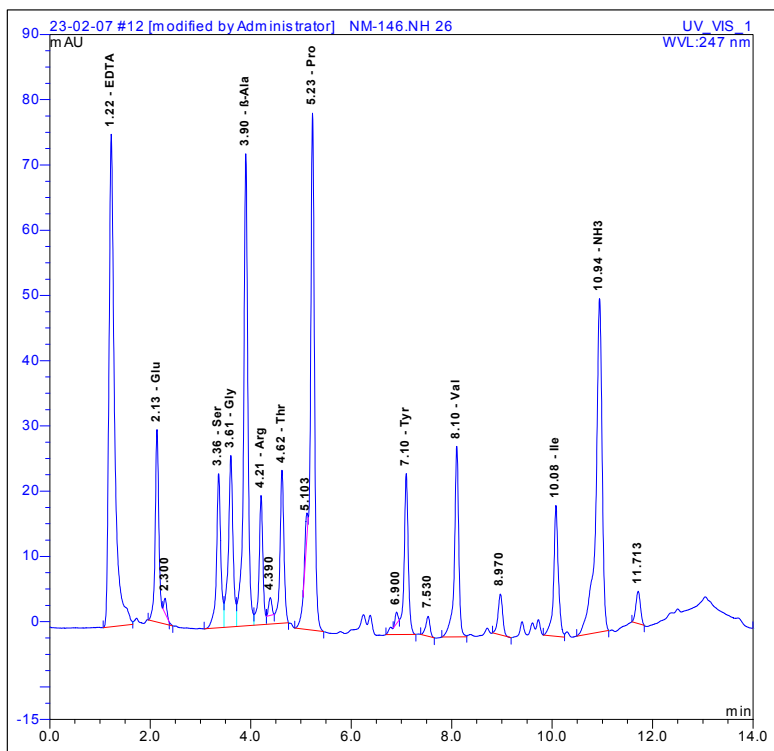
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.22	1.23	0.098	9.54	79.92	362.3	EDTA
1.94	1.95	0.069	4.84	56.58	313.4	Asp
2.13	2.14	0.073	11.33	131.09	797.3	Glu
3.60	3.61	0.083	6.16	60.34	416.6	Gly
3.90	3.91	0.079	16.20	165.07	1168.5	β-Ala
5.22	5.24	0.079	18.18	174.31	992.6	Pro
8.11	8.11	0.085	0.61	6.54	42.4	Val
10.07	10.09	0.080	4.80	47.85	308.0	Ile
10.30	10.31	0.079	4.32	47.05	324.9	Leu
10.94	10.96	0.118	8.12	52.54	669.2	NH3
11.18	11.20	0.080	10.86	116.27	808.6	Phe
Total:			94.962	937.572	6203.82	

N5 c(FSLPGVWFPq).



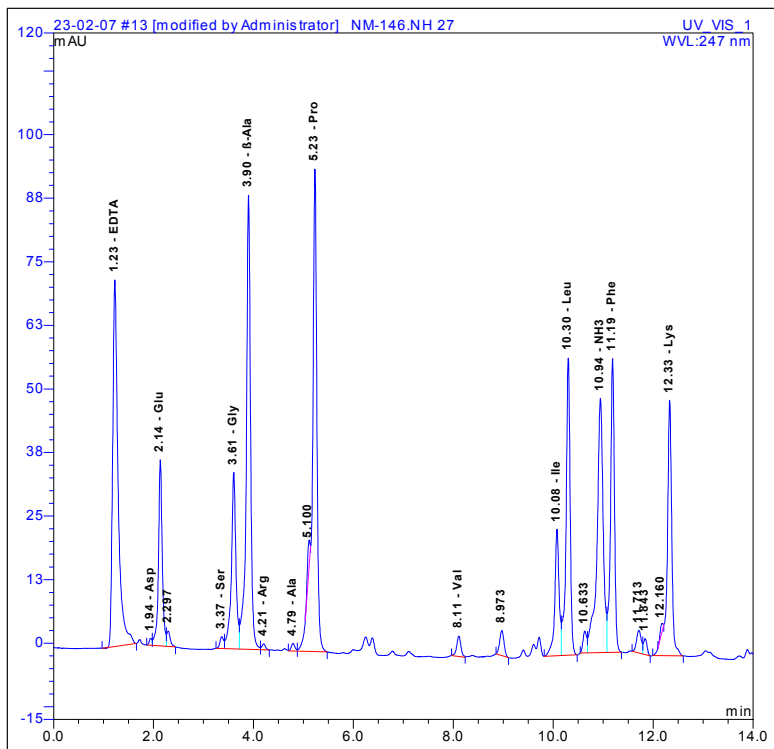
RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.22	1.23	0.104	9.81	78.42	355.5	EDTA
2.13	2.14	0.073	7.00	79.08	480.9	Glu
3.36	3.37	0.081	4.67	46.32	323.1	Ser
3.60	3.61	0.086	6.81	62.96	434.7	Gly
3.90	3.91	0.080	17.32	173.50	1228.1	β-Ala
4.79	4.81	0.083	0.16	1.75	11.8	Ala
5.23	5.24	0.079	19.61	179.07	1019.7	Pro
8.10	8.11	0.079	4.64	47.70	309.4	Val
10.30	10.31	0.078	6.11	62.78	433.6	Leu
10.95	10.96	0.116	9.57	63.13	804.2	NH3
11.19	11.20	0.079	11.18	121.63	845.8	Phe
Total:			96.861	916.335	6246.73	

N6a c(VSYPGIRTPq) and N6b c(SIYPGVRTPq).



RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.22	1.23	0.107	9.80	75.46	342.1	EDTA
2.13	2.14	0.073	2.72	29.49	179.4	Glu
3.36	3.37	0.081	2.35	23.61	164.7	Ser
3.61	3.61	0.087	2.88	26.28	181.4	Gly
3.90	3.91	0.081	7.24	72.35	512.1	β-Ala
4.21	4.21	0.074	1.77	19.81	131.9	Arg
4.62	4.63	0.079	2.40	23.44	186.3	Thr
5.23	5.24	0.079	8.53	79.24	451.3	Pro
7.10	7.11	0.080	2.67	24.67	167.2	Tyr
8.10	8.11	0.080	2.95	29.23	189.6	Val
10.08	10.09	0.087	2.19	20.07	129.2	Ile
10.94	10.96	0.112	7.46	51.09	650.8	NH3
Total:			52.967	474.738	3285.83	

N7 c(FILPGKLFp_q).



RT min	RT (STD) min	PW(50%) min	Area mAU*min	Height mAU	Amount pmol	Peak Name
1.23	1.23	0.104	9.04	72.05	326.7	EDTA
1.94	1.95	n.a.	0.08	1.35	7.5	Asp
2.14	2.14	0.074	3.25	36.61	222.7	Glu
3.37	3.37	n.a.	0.20	2.34	16.3	Ser
3.61	3.61	0.085	3.72	34.70	239.5	Gly
3.90	3.91	0.079	8.87	89.31	632.2	β-Ala
4.21	4.21	0.081	0.10	1.16	7.7	Arg
4.79	4.81	0.080	0.13	1.49	10.0	Ala
5.23	5.24	0.079	10.37	94.87	540.2	Pro
8.11	8.11	0.086	0.39	4.02	26.1	Val
10.08	10.09	0.084	2.53	24.86	160.0	Ile
10.30	10.31	0.079	5.51	58.42	403.4	Leu
10.94	10.96	0.114	7.25	49.99	636.7	NH3
11.19	11.20	0.079	5.33	57.76	401.6	Phe
12.33	12.34	0.083	5.47	50.23	195.5	Lys
Total:			62.240	579.135	3826.22	

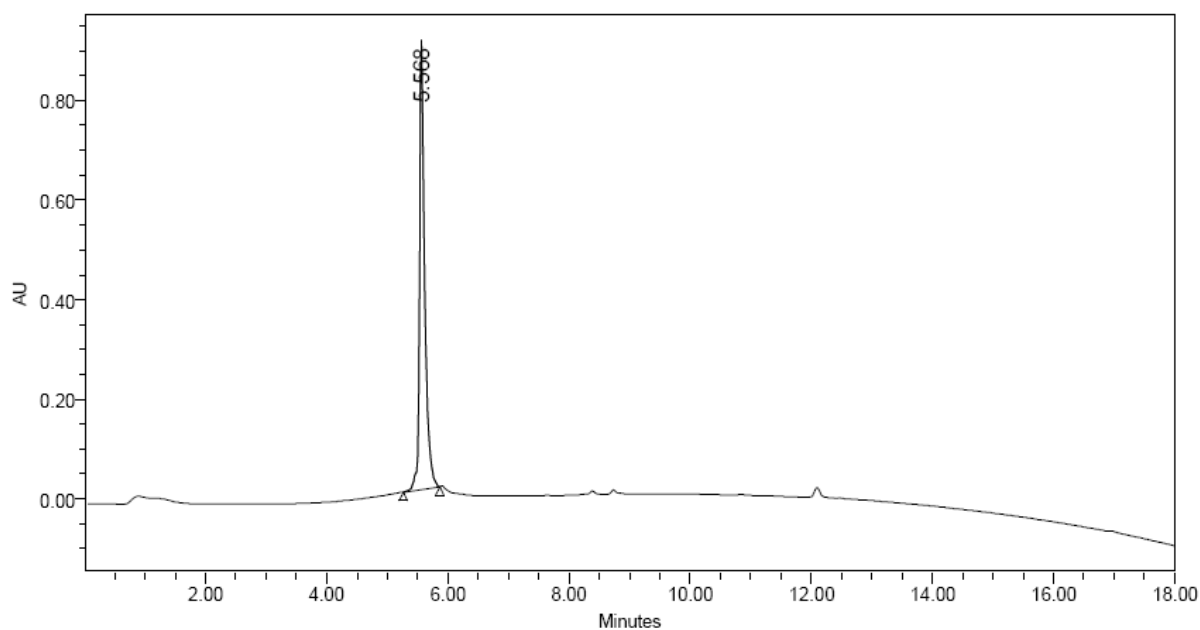
Table S3: Sequences picked randomly

	X ¹⁰	X ⁹	X ⁸	X ⁵	X ⁴	X ³
1	Trp	Tyr	Leu	Arg	Leu	Thr
2a	Trp	Ile	Tyr	Glu	Asp	Lys
2b	Trp	Tyr	Glu	Ile	Asp	Lys
3a	Phe	Tyr	Glu	Val	Arg	Thr
3b	Val	Tyr	Thr	Glu	Arg	Phe
4	Phe	Ser	Leu	Arg	Arg	Thr
5	Phe	Cys	His	Arg	Trp	Phe
6a	Phe	Cys	His	Val	Trp	Thr
6b	His	Cys	Thr	Val	Trp	Phe
7a	His	Cys	Thr	Glu	Leu	Lys
7b	His	Cys	Glu	Lys	Leu	Thr
8a	Phe	Ile	Thr	Ile	Arg	Lys
8b	Trp	Ser	His	Ile	Leu	Thr
9a	His	Ser	Leu	Ile	Trp	Thr
9b	His	Ile	His	Arg	Leu	Phe
10a	Trp	Cys	Thr	Glu	Arg	Phe
10b	Phe	Cys	Glu	Arg	Trp	Thr
11a	Trp	Ile	His	Val	Ala	Cys
11b	Val	Cys	His	Ile	Trp	Ala
12	His	Asp	His	Arg	Leu	Lys
13	Val	Asp	Thr	Arg	Leu	Thr
14	His	Ile	Glu	Ile	Ala	Phe
15	Trp	Ile	His	Arg	Arg	Thr
16	Val	Tyr	Thr	Glu	Arg	Phe
17	Phe	Tyr	Glu	Val	Arg	Thr
18a	Val	Tyr	His	Ile	Arg	Thr
18b	His	Ile	Tyr	Val	Arg	Thr
19	Trp	Tyr	Thr	Ile	Arg	Cys
20	Trp	Cys	Tyr	Ile	Arg	Thr
21	Val	Tyr	Leu	Lys	Asp	Lys
22	Ser	Asp	Tyr	Ile	Trp	Lys
23	Trp	Ser	Tyr	Ile	Asp	Lys
24a	Trp	Tyr	Leu	Val	Asp	Lys
24b	Trp	Asp	Tyr	Val	Leu	Lys
25a	Trp	Ile	Tyr	Val	Leu	Ala
25b	Val	Tyr	Leu	Ile	Trp	Ala
26	Phe	Ser	Tyr	Ile	Leu	Thr
27	Ser	Tyr	Thr	Ile	Leu	Phe
28	Val	Tyr	Tyr	Glu	Leu	Ala

7. Analytical HPLC profiles and mass spectra (+ESI-MS) data

Peptide 3a: c(HDEPGIATPq)

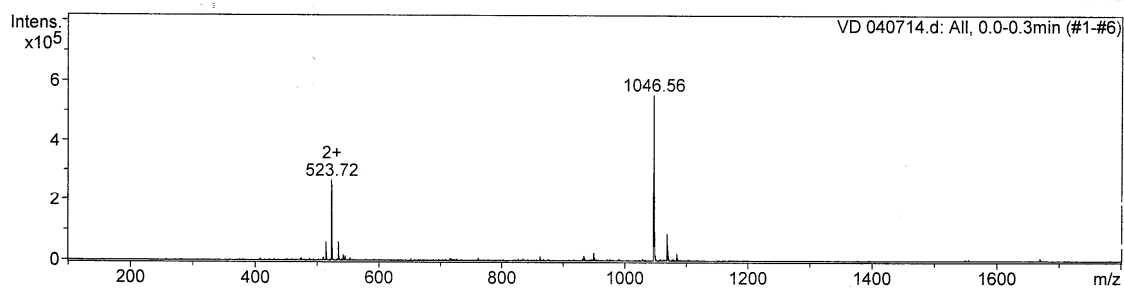
Analytical RP-HPLC: $t_R = 5.6$ min (5-100% B in 15 min)



+ESI-MS calcd for $C_{45}H_{68}N_{13}O_{16} [M+H]^+$: 1046.5, found: 1046.6.

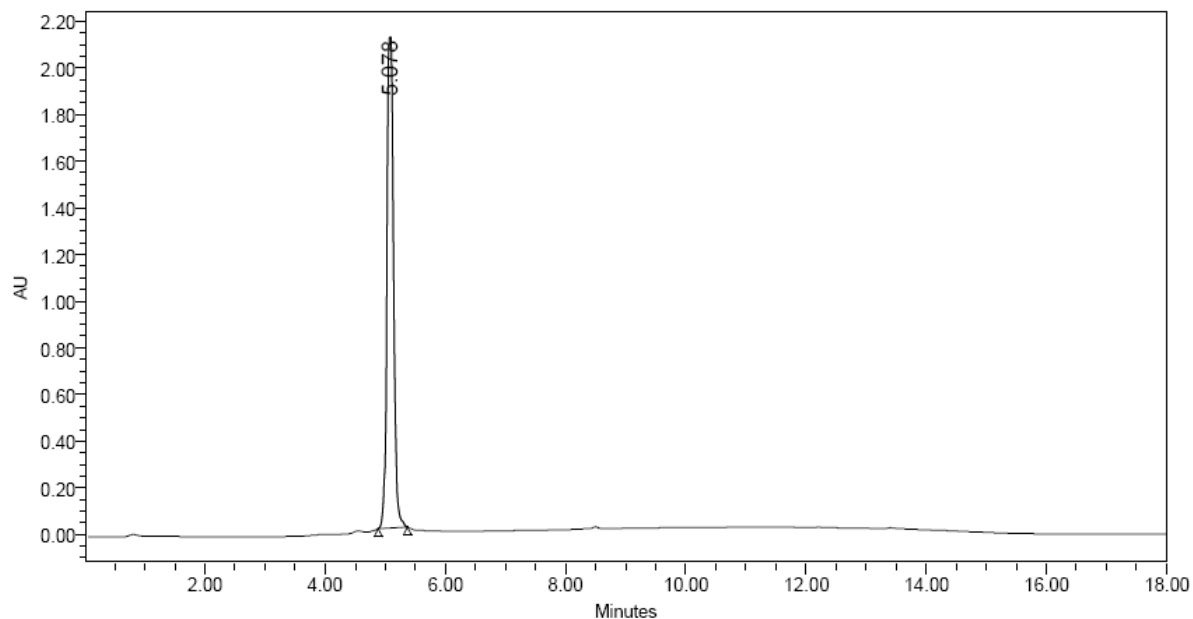
Acquisition Parameter

Ion Source Type	ESI	Ion Polarity	Positive	Alternating Ion Polarity	off
Mass Range Mode	Std/Normal	Scan Begin	100 m/z	Scan End	1800 m/z
Capillary Exit	169.4 Volt	Skim 1	40.0 Volt	Trap Drive	94.4
Accumulation Time	689 μ s	Averages	20 Spectra	Auto MS/MS	off



Peptide 3b: c(HITPGEDAPq)

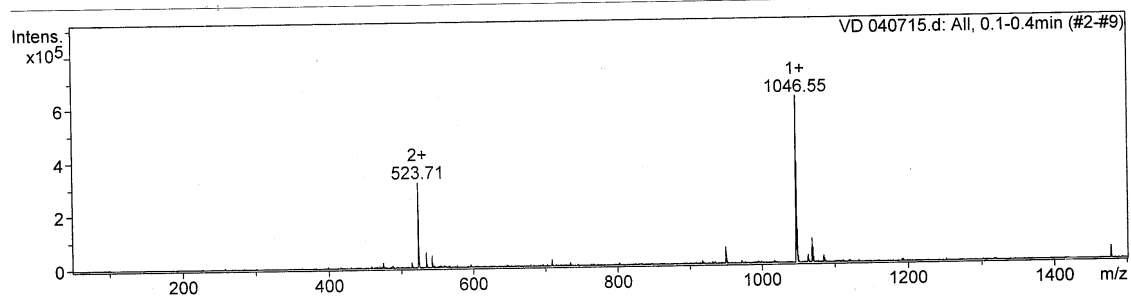
Analytical RP-HPLC: $t_R = 5.1$ min (5-100% B in 15 min)



+ESI-MS calcd for $C_{45}H_{68}N_{13}O_{16}$ $[M+H]^+$: 1046.5, found: 1046.6.

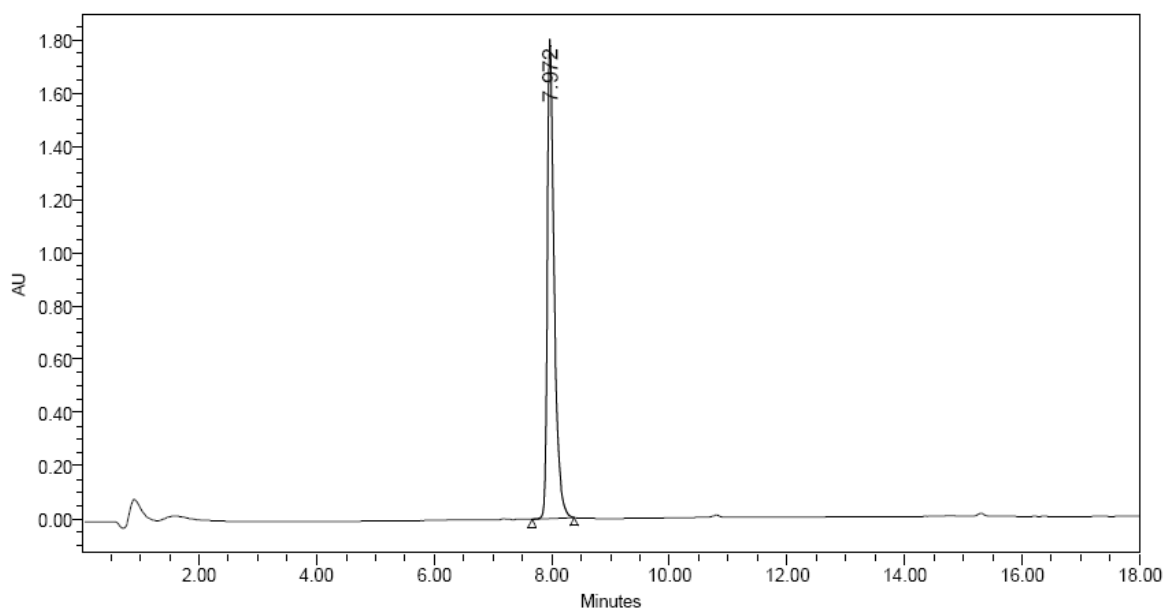
Acquisition Parameter

Ion Source Type	ESI	Ion Polarity	Positive	Alternating Ion Polarity	off
Mass Range Mode	Std/Normal	Scan Begin	50 m/z	Scan End	1500 m/z
Capillary Exit	169.4 Volt	Skim 1	40.0 Volt	Trap Drive	94.4
Accumulation Time	259 μ s	Averages	20 Spectra	Auto MS/MS	off

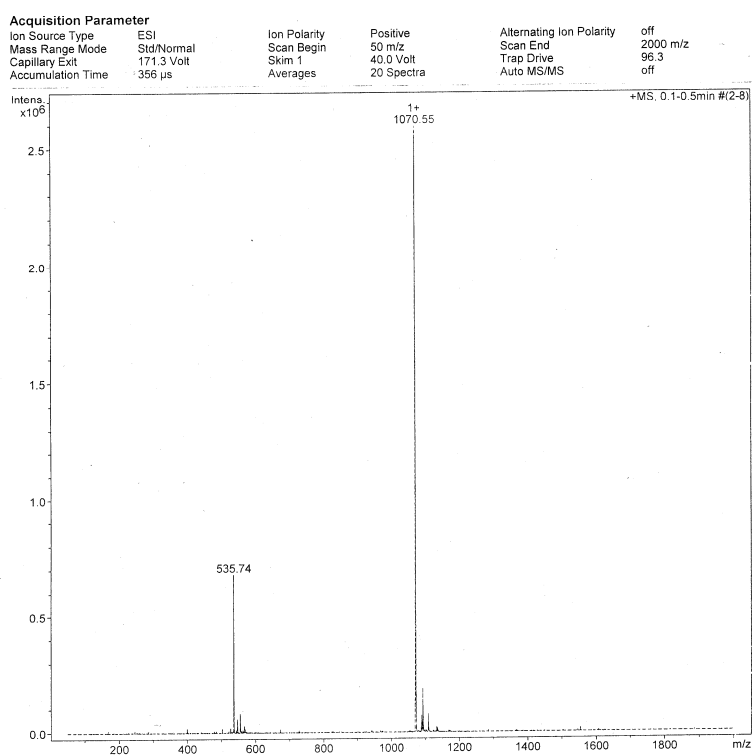


Peptide 4: c(VDEPGEDCPq)

Analytical RP-HPLC: $t_R = 7.9$ min (5-40% B in 15 min)

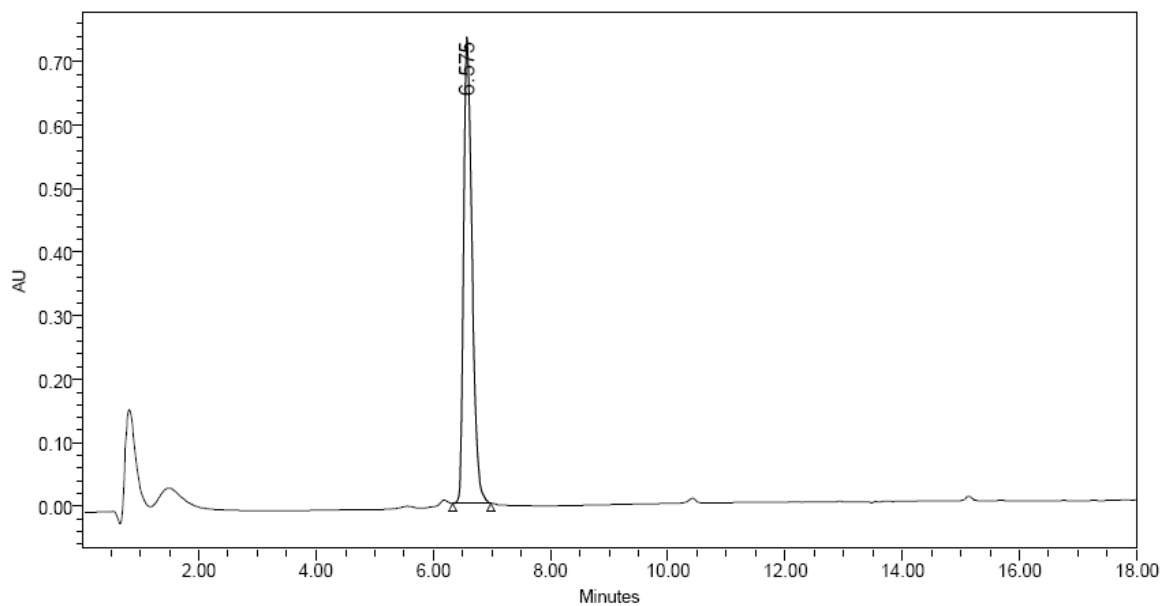


+ESI-MS calcd for $C_{43}H_{64}N_{11}O_{19}S$ $[M+H]^+$: 1070.4, found: 1070.6.

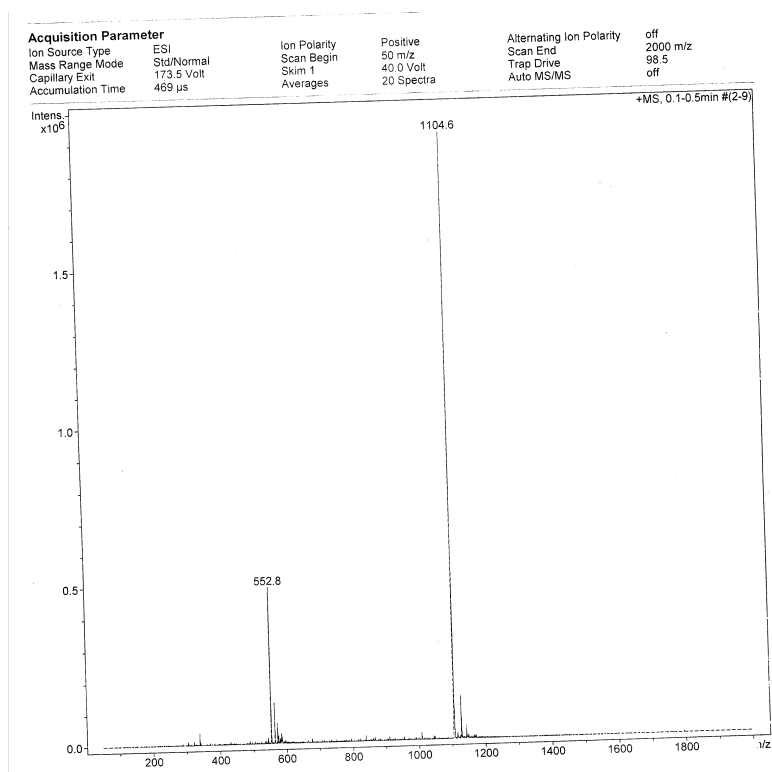


Peptide 4His: c(VDEPGEDHPq)

Analytical RP-HPLC: $t_R = 6.5$ min (5-40% B in 15 min)

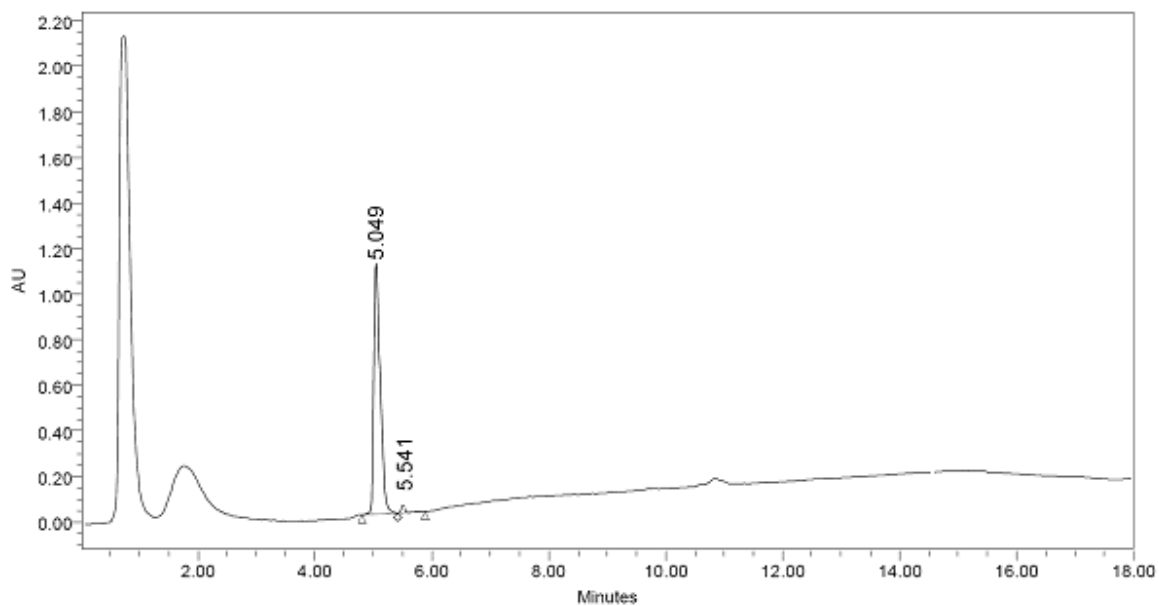


+ESI-MS calcd for $C_{46}H_{66}N_{13}O_{19} [M+H]^+$: 1104.5, found: 1104.6.



Peptide 4': VDEPGEDCPG-NH₂

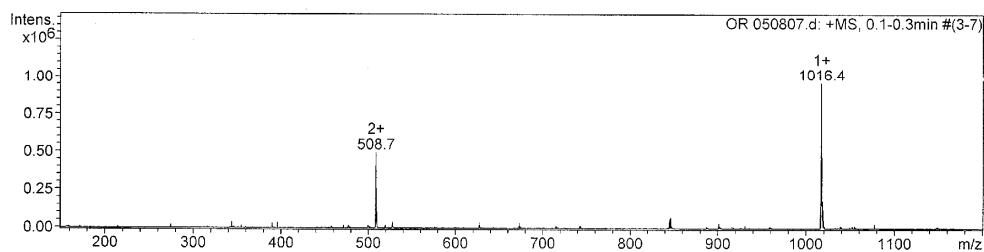
Analytical RP-HPLC: $t_R = 5.0$ min (5-100% B in 15 min)



+ESI-MS calcd for C₄₀H₆₂N₁₁O₁₈S [M+H]⁺: 1016.4, found: 1016.4.

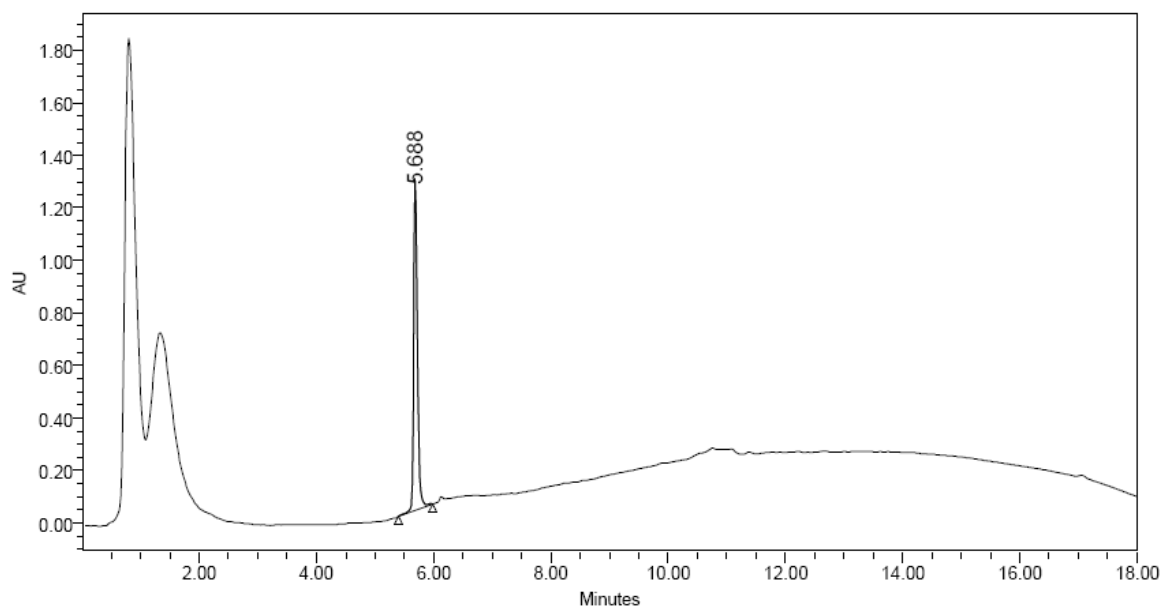
Acquisition Parameter

Ion Source Type	ESI	Ion Polarity	Positive	Alternating Ion Polarity	off
Mass Range Mode	Std/Normal	Scan Begin	150 m/z	Scan End	1200 m/z
Capillary Exit	158.5 Volt	Skim 1	40.0 Volt	Trap Drive	63.6
Accumulation Time	534 μ s	Averages	20 Spectra	Auto MS/MS	off



Peptide 4'Ac: Ac-VDEPGEDCPG-NH₂

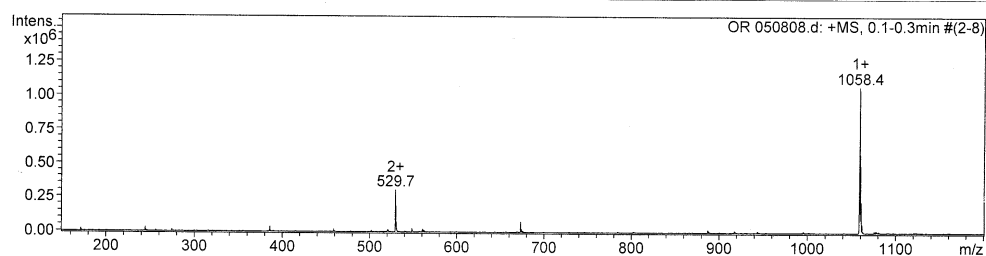
Analytical RP-HPLC: $t_R = 5.6$ min (5-100% B in 15 min)



+ESI-MS calcd for C₄₂H₆₄N₁₁O₁₉S [M+H]⁺: 1058.4, found: 1058.4.

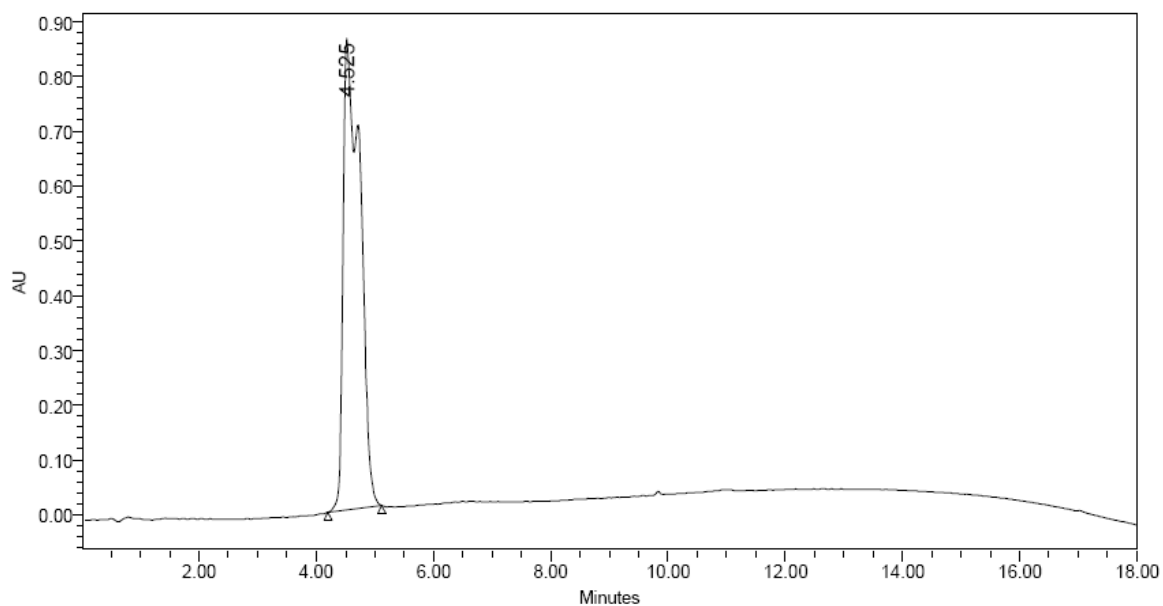
Acquisition Parameter

Ion Source Type	ESI	Ion Polarity	Positive	Alternating Ion Polarity	off
Mass Range Mode	Std/Normal	Scan Begin	150 m/z	Scan End	1200 m/z
Capillary Exit	158.5 Volt	Skim 1	40.0 Volt	Trap Drive	83.6
Accumulation Time	570 μ s	Averages	20 Spectra	Auto MS/MS	off



Peptide 4His' : VDEPGEDHPG-NH₂

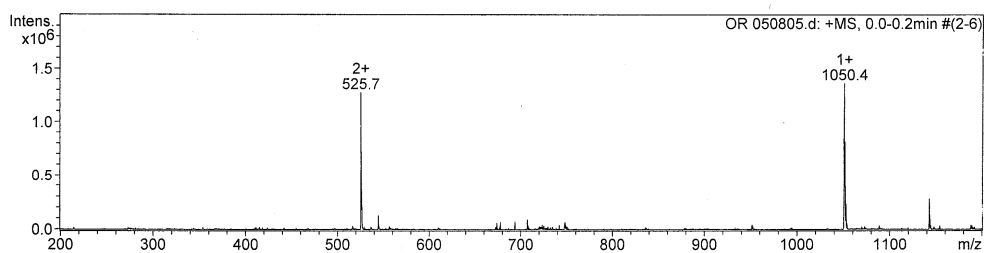
Analytical RP-HPLC: $t_R = 4.5$ min (5-100% B in 15 min)



+ESI-MS calcd for C₄₄H₆₆N₁₂O₁₈ [M+H]⁺: 1050.5, found: 1050.4.

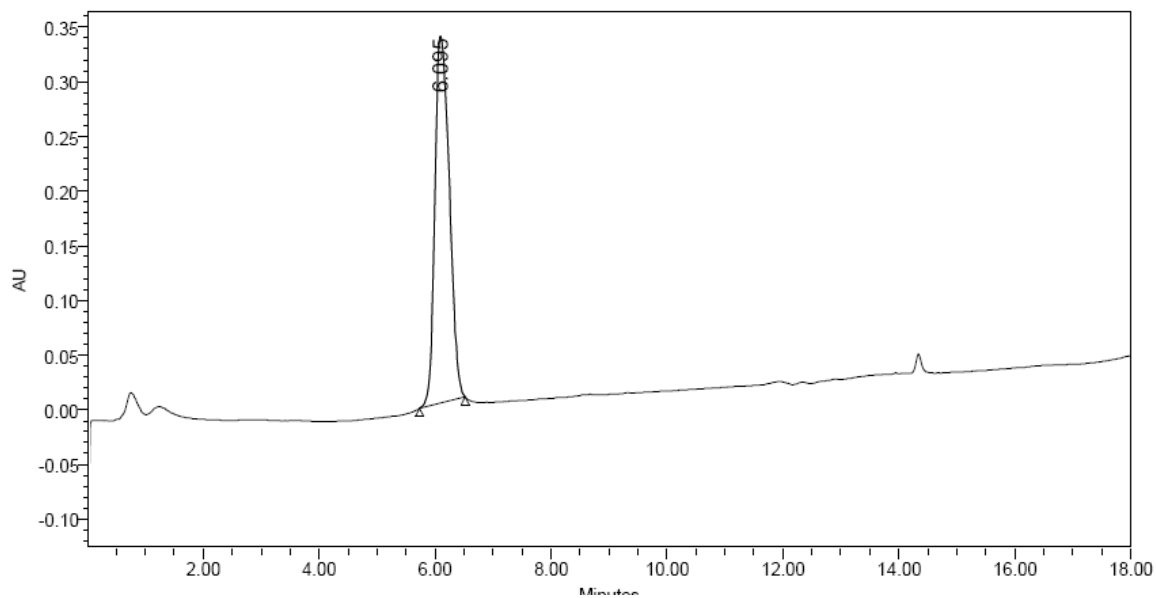
Acquisition Parameter

Ion Source Type	ESI	Ion Polarity	Positive	Alternating Ion Polarity	off
Mass Range Mode	Std/Normal	Scan Begin	200 m/z	Scan End	1200 m/z
Capillary Exit	173.5 Volt	Skim 1	40.0 Volt	Trap Drive	98.5
Accumulation Time	81 μ s	Averages	20 Spectra	Auto MS/MS	off

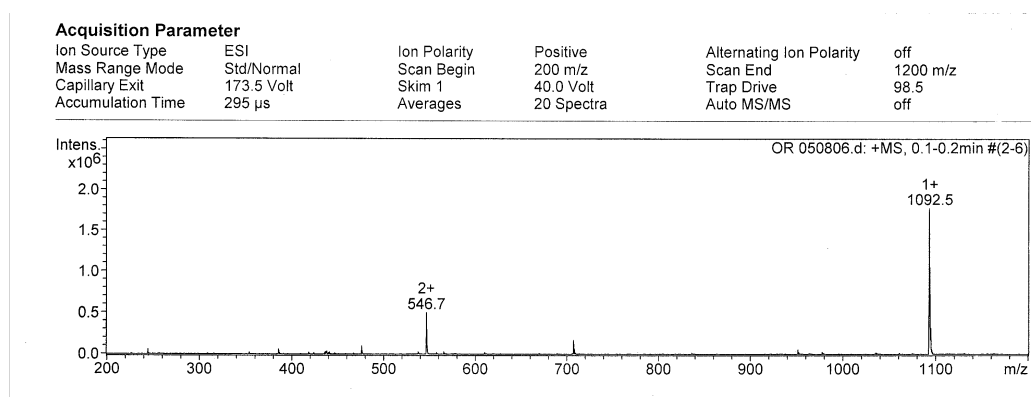


Peptide 4His'Ac: Ac-VDEPGEDHPG-NH₂

Analytical RP-HPLC: $t_R = 6.0$ min (5-100% B in 15 min)

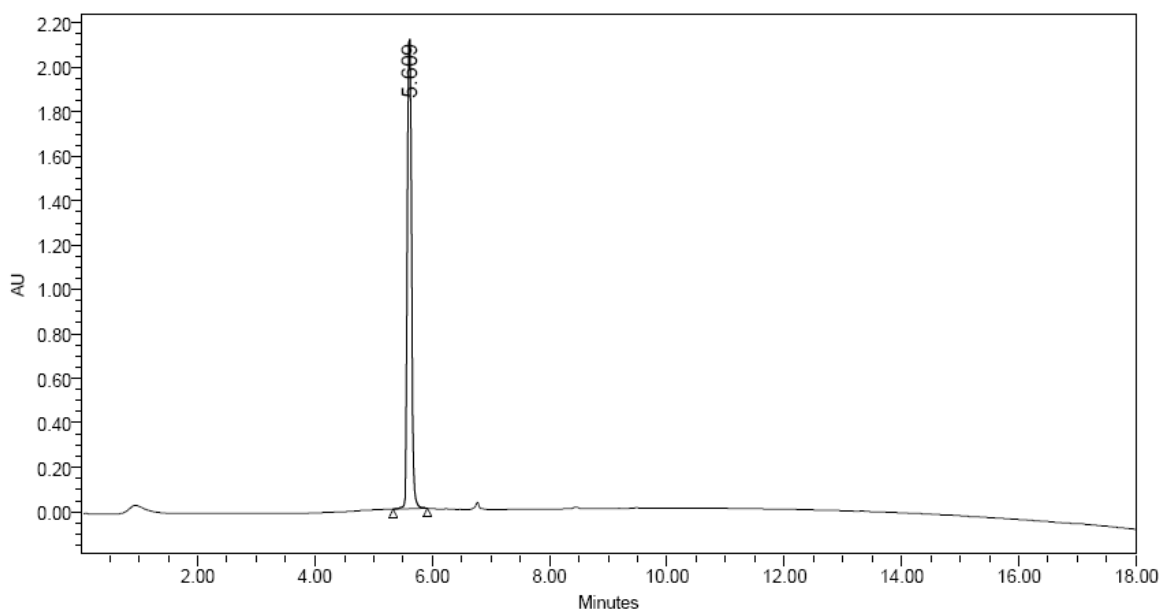


+ESI-MS calcd for C₄₅H₆₆N₁₃O₁₉ [M+H]⁺: 1092.5, found: 1092.5.

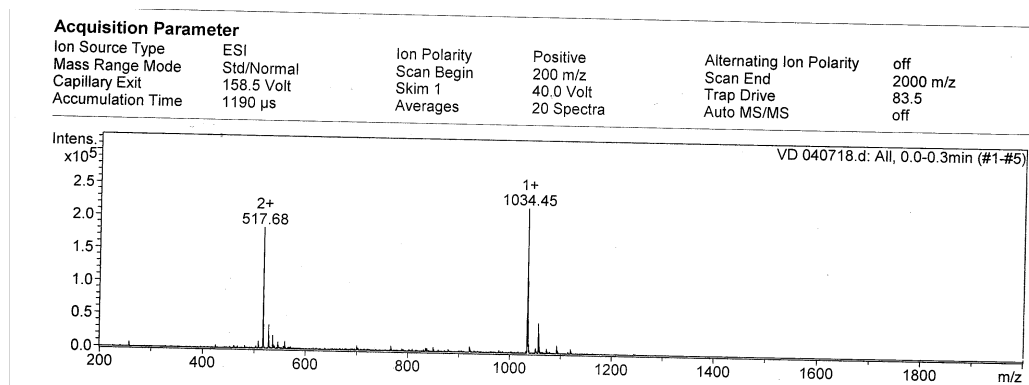


Peptide 9: c(HCTPGELAPq)

Analytical RP-HPLC: $t_R = 5.6$ min (5-100% B in 15 min)

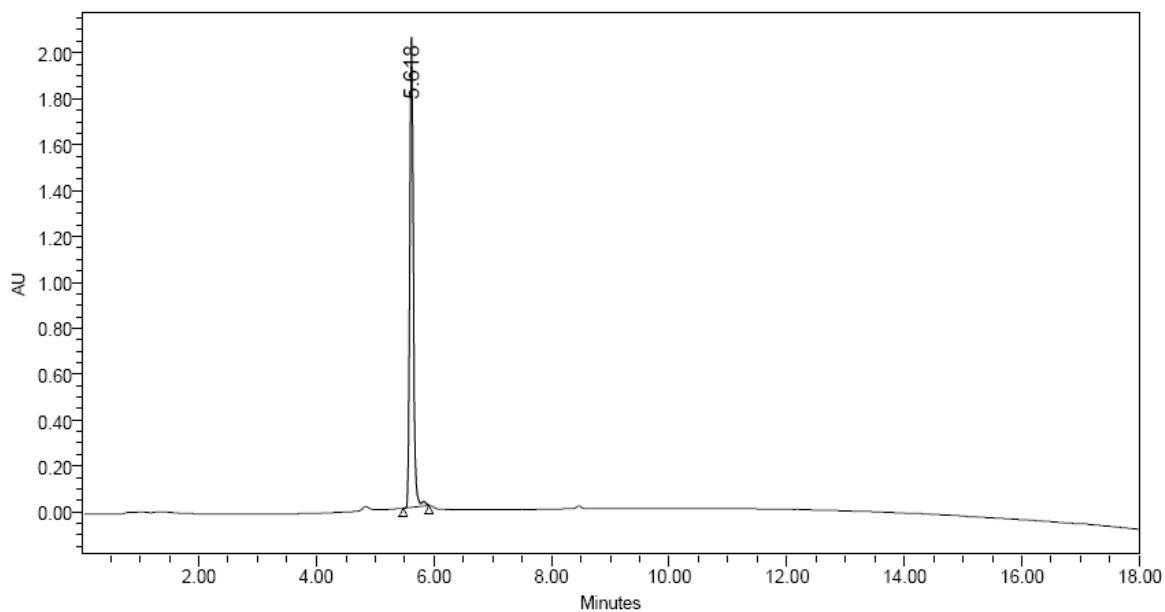


+ESI-MS calcd for $C_{44}H_{68}N_{13}O_{14}S$ $[M+H]^+$: 1034.2, found: 1034.5.



Peptide 11: c(VIEPGEDCPq)

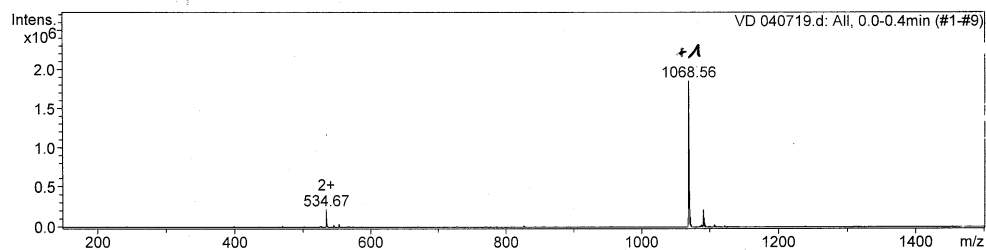
Analytical RP-HPLC: $t_R = 5.6$ min (5-100% B in 15 min)



+ESI-MS calcd for $C_{45}H_{69}N_{11}O_{17}S$ $[M+H]^+$: 1068.2, found: 1068.6.

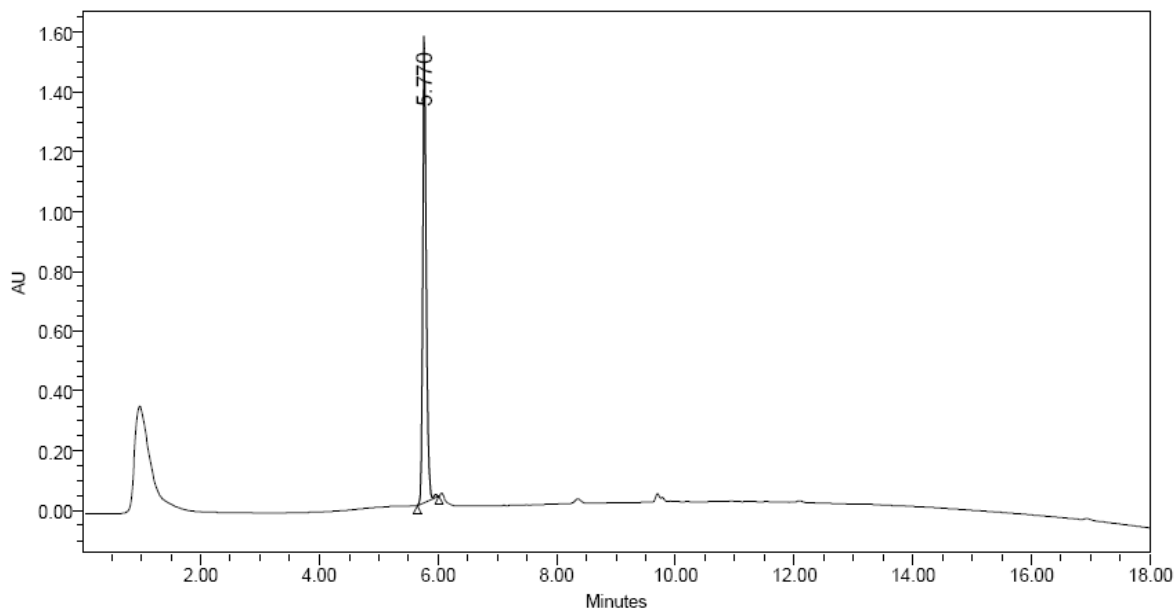
Acquisition Parameter

Ion Source Type	ESI	Ion Polarity	Positive	Alternating Ion Polarity	off
Mass Range Mode	Std/Normal	Scan Begin	150 m/z	Scan End	1500 m/z
Capillary Exit	171.0 Volt	Skim 1	40.0 Volt	Trap Drive	96.1
Accumulation Time	212 μ s	Averages	20 Spectra	Auto MS/MS	off



Peptide 12: c(VIEPGEDAPq)

Analytical RP-HPLC: $t_R = 5.7$ min (5-100% B in 15 min)



+ESI-MS calcd for $C_{45}H_{69}N_{11}O_{17}S$ $[M+H]^+$: 1036.2, found: 1036.6.

