

**Peptide Arrays, Influenza Virus B Hemagglutinin (HA) Diverse Peptides**

**Catalog No. NR-2610**

This reagent is the tangible property of the U.S. Government.

**Product Description:** NR-2610 contains nine peptide arrays that represent regions of amino acid sequence diversity in the hemagglutinin (HA) protein of the B/Shanghai/361/2002 (NRC-226, NRC-228, NRC-230, and NRC-234) and B/Malaysia/2506/2004 (NRC-227, NRC-229, NRC-231, NRC-232, and NRC-233) strains of influenza virus. The HA proteins in these two strains of influenza B virus correspond to and have diverged from the pre-hemagglutinin protein in the B/Nanchang/12/1998 strain of influenza virus (GenPept: AAU94712). Peptides are 17- to 18-mers, with 11 to 12 amino acid overlaps.

**Lot: 334207-334252-X**

The following information applies to all peptides:

- Appearance White lyophilized powder
- Mass spectral analysis Correct MW by Electrospray
- Counter Ion Trifluoroacetate

Peptide-specific information is shown in the two tables below.

Table 1						
Peptide	Date of Mfg.	Length	Sequence	Molecular Weight (amu)	Purity by HPLC <sup>a</sup>	Peptide Content <sup>b</sup>
<b>NRC-226: Influenza Virus B/Shanghai/361/2002 HA Protein</b>						
1 of 3	05/08/06	17	24 GEVNVTVGIPLTTTPIK 40	1739.1	98.32%	71.56%
2 of 3	05/06/06	17	30 GVIPLTTTPIKSHFANL 46	1809.2	97.09%	75.32%
3 of 3	05/06/06	17	36 TPIKSHFANLKGTRTR 52	1928.2	87.45%	65.56%
<b>NRC-227: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>						
1 of 8	05/04/06	17	45 TTPTKSHFANLKGTETR 61	1889.1	90.18%	67.08%
2 of 8	05/06/06	17	51 HFANLKGTETRGKLCPK 67	1900.2	97.90%	71.65%
3 of 8	05/06/06	17	57 GTETRGKLCPKCLNCTD 73	1839.1	83.52%	71.55%
4 of 8	05/06/06	17	63 KLCPKCLNCTDLVALG 79	1806.2	85.98%	84.85%
5 of 8	05/06/06	17	69 LNCTDLVALGRPCKTG 85	1776.1	90.19%	74.77%
6 of 8	04/28/06	17	75 DVALGRPCKTGNIPSAR 91	1755.0	95.63%	69.03%
7 of 8	05/06/06	17	81 PKCTGNIPSARVSILHE 97	1822.1	97.76%	71.04%
8 of 8	05/08/06	17	87 IPSARVSILHEVRPVTS 103	1861.2	97.73%	74.53%
<b>NRC-228: Influenza Virus B/Shanghai/361/2002 HA Protein</b>						
1 of 4	05/08/06	17	113 LRGYENIRLSTQNVIDA 129	1962.2	80.11%	75.94%
2 of 4	05/06/06	17	119 IRLSTQNVIDAEKALGG 135	1785.0	97.21%	80.30%
3 of 4	05/08/06	17	125 NVIDAEKALGGPYRLGT 141	1774.0	96.65%	78.64%
4 of 4	05/06/06	17	131 KALGGPYRLGTSGSPN 147	1677.9	89.20%	70.94%

Table 1						
Peptide	Date of Mfg.	Length	Sequence	Molecular Weight (amu)	Purity by HPLC <sup>a</sup>	Peptide Content <sup>b</sup>
<b>NRC-229: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>						
1 of 14	04/27/06	17	111 DRTKIRQLPNLLRGYEH 127	2109.4	97.73%	75.98%
2 of 14	05/08/06	17	116 RQLPNLLRGYEHIRLST 132	2066.4	91.24%	69.29%
3 of 14	05/08/06	17	122 LRGYEHIRLSTHNVINA 138	1993.3	94.08%	73.17%
4 of 14	05/06/06	17	128 IRLSTHNVINAENAPGG 144	1763.0	88.16%	75.77%
5 of 14	05/08/06	17	134 NVINAENAPGGSYKIGT 150	1704.9	87.01%	79.17%
6 of 14	05/06/06	17	140 NAPGGSYKIGTSGSPN 156	1609.7	88.85%	69.19%
7 of 14	04/29/06	17	146 YKIGTSGSPNVTNGNG 162	1668.8	93.85%	77.37%
8 of 14	04/27/06	17	152 GSPNVTNGNGFFATMA 168	1687.9	91.81%	82.17%
9 of 14	05/06/06	17	158 TNGNGFFATMAWAVPKN 174	1826.1	91.47%	81.29%
10 of 14	05/06/06	18	164 FATMAWAVPKNDNNKTAT 181	1980.2	98.97%	79.76%
11 of 14	05/10/06	18	170 AVPKNDNNKTATNSLTIE 187	1930.1	100.00%	70.03%
12 of 14	05/06/06	17	177 NKTATNSLTIEVPYICT 193	1868.1	91.96%	76.60%
13 of 14	05/06/06	17	183 SLTIEVPYICTEGEDQI 199	1910.1	90.92%	78.01%
14 of 14	05/10/06	17	189 PYICTEGEDQITVWGFH 205	1995.2	75.16%	78.87%
<b>NRC-230: Influenza Virus B/Shanghai/361/2002 HA Protein</b>						
1 of 3	05/06/06	17	167 NKNATNPLTVEVPYICT 183	1877.2	93.94%	80.97%
2 of 3	05/06/06	17	173 PLTVEVPYICTEGEDQI 189	1906.2	84.63%	87.59%
3 of 3	05/06/06	17	179 PYICTEGEDQITVWGFH 195	1995.2	95.42%	83.76%
<b>NRC-231: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>						
1 of 5	05/06/06	17	195 GEDQITVWGFHSDNEAQ 211	1933.0	85.55%	88.59%
2 of 5	05/08/06	17	201 VWGFHSDNEAQMAYLYG 217	1953.2	97.15%	85.34%
3 of 5	04/28/06	17	207 DNEAQMAYLYGDSKPQK 223	1923.2	100.00%	76.60%
4 of 5	05/06/06	17	213 AKLYGDSKPQKFTSSAN 229	1842.0	85.70%	67.97%
5 of 5	05/08/06	17	219 SKPQKFTSSANGVTTHY 235	1853.0	94.31%	70.79%
<b>NRC-232: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>						
1 of 3	04/27/06	17	231 VTTHYVSIQIGGFNPQTE 247	1878.0	100.00%	84.58%
2 of 3	05/06/06	17	237 SIQIGGFNPQTEGGGLPQ 253	1744.8	80.96%	76.88%
3 of 3	05/06/06	17	243 PNQTEGGGLPQSGRIVV 259	1766.9	91.03%	78.28%
<b>NRC-233: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>						
1 of 4	05/08/06	17	255 GRIVVDYMQSGKTGT 271	1839.2	98.10%	67.49%
2 of 4	05/08/06	17	261 YMVQSGKTGTITYQRG 277	1918.2	90.10%	68.55%
3 of 4	05/08/06	17	267 GKTGTITYQRGILLPQK 283	1874.2	98.97%	80.84%
4 of 4	05/06/06	17	273 TYQRGILLPQKVCASG 289	1920.3	85.79%	80.00%
<b>NRC-234: Influenza Virus B/Shanghai/361/2002 HA Protein</b>						
1 of 2	05/06/06	17	311 YTGEHAKAIGHCPIWVK 327	1910.2	98.98%	80.04%
2 of 2	05/06/06	17	317 KAIGHCPIWVKTPLKLA 333	1875.4	98.69%	68.01%

<sup>a</sup>% full-length

<sup>b</sup>Remainder is salt and water

Table 2 - Amino Acid Analysis

Peptide		Ala (A)	Arg (R)	Asx (N,D)	Cys (C)	Glx (Q,E)	Gly (G)	His (H)	Ile (I)	Leu (L)	Lys (K)	Met (M)	Phe (F)	Pro (P)	Ser (S)	Thr (T)	Trp (W)	Tyr (Y)	Val (V)
<b>NRC-226: Influenza Virus B/Shanghai/361/2002 HA Protein</b>																			
1 of 3	Expected			1.00		1.00	2.00		2.00	1.00	1.00			2.00		4.00			3.00
	Actual			1.00		1.04	2.03		1.62 <sup>a</sup>	1.07	0.96			2.24		3.67			2.56 <sup>a</sup>
2 of 3	Expected	1.00		1.00			1.00	1.00	2.00	2.00	1.00		1.00	2.00	1.00	3.00			1.00
	Actual	1.04		1.07			1.00	1.05	1.61 <sup>a</sup>	2.19	0.99		1.02	2.31	0.83	2.75			0.66 <sup>a</sup>
3 of 3	Expected	1.00	2.00	1.00			1.00	1.00	1.00	1.00	2.00		1.00	1.00	1.00	4.00			
	Actual	1.00	2.03	1.02			1.03	1.00	0.95	1.10	1.96		0.98	1.08	0.81	3.73			
<b>NRC-227: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>																			
1 of 8	Expected	1.00	1.00	1.00		1.00	1.00	1.00		1.00	2.00		1.00	1.00	1.00	5.00			
	Actual	1.00	0.95	1.01		0.90	1.02	1.00		1.09	1.95		0.97	0.99	0.75 <sup>b</sup>	4.47			
2 of 8	Expected	1.00	1.00	1.00	1.00	1.00	2.00	1.00		2.00	3.00		1.00	1.00		2.00			
	Actual	0.99	1.02	1.00	0.03 <sup>c</sup>	1.08	2.03	0.92		2.16	2.97		0.98	0.91		1.96			
3 of 8	Expected		1.00	2.00	3.00	1.00	2.00			2.00	2.00				1.00				3.00
	Actual		0.98	1.94	0.04 <sup>c</sup>	1.00	2.00			2.12	1.92				0.79 <sup>d</sup>				2.75
4 of 8	Expected	1.00		3.00	3.00		1.00			4.00	2.00				1.00				1.00
	Actual	1.03		3.00	0.02 <sup>c</sup>		1.04			4.20	1.87				0.85				1.02
5 of 8	Expected	1.00	1.00	3.00	2.00		2.00			3.00	1.00				1.00				2.00
	Actual	1.00	0.99	2.91	0.02 <sup>c</sup>		2.01			3.14	0.97				0.87				1.94
6 of 8	Expected	2.00	2.00	2.00	1.00		2.00		1.00	1.00	1.00				2.00	1.00	1.00		1.00
	Actual	2.03	2.01	1.99	0.01 <sup>c</sup>		1.97		1.00	1.04	0.96				2.02	0.85	0.95		0.93
7 of 8	Expected	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00				2.00	2.00	1.00		1.00
	Actual	1.05	1.07	1.08	0.05 <sup>c</sup>	1.08	1.03	1.09	2.09	1.16	1.00				2.00	1.68	0.97		1.04
8 of 8	Expected	1.00	2.00			1.00		1.00	2.00	1.00					2.00	3.00	1.00		3.00
	Actual	0.94	1.90			1.07		1.00	1.92	1.05					2.06	2.39 <sup>b</sup>	0.93		2.79
<b>NRC-228: Influenza Virus B/Shanghai/361/2002 HA Protein</b>																			
1 of 4	Expected	1.00	2.00	3.00		2.00	1.00		2.00	2.00					1.00	1.00		1.00	1.00
	Actual	0.97	1.95	3.10		2.15	1.00		1.76 <sup>a</sup>	2.08					0.77 <sup>b</sup>	0.96		1.02	0.80 <sup>a</sup>
2 of 4	Expected	2.00	1.00	2.00		2.00	2.00		2.00	2.00	1.00				1.00	1.00			1.00
	Actual	2.04	0.92	2.09		2.13	1.99		1.68 <sup>a</sup>	2.17	1.00				0.78 <sup>b</sup>	0.94			0.75 <sup>a</sup>
3 of 4	Expected	2.00	1.00	2.00		1.00	3.00		1.00	2.00	1.00				1.00			1.00	1.00
	Actual	1.91	1.01	1.86		1.01	3.04		0.63 <sup>a</sup>	2.05	0.91				1.15			1.03	0.66 <sup>a</sup>
4 of 4	Expected	1.00	1.00	1.00	1.00		4.00			2.00	1.00				2.00	2.00	1.00		1.00
	Actual	0.94	0.99	1.07	0.03 <sup>c</sup>		4.05			2.03	0.89				2.11	1.11 <sup>b</sup>	1.00		1.00
<b>NRC-229: Influenza Virus B/Malaysia/2506/2004</b>																			
1 of 14	Expected		3.00	2.00		2.00	1.00	1.00	1.00	3.00	1.00				1.00			1.00	
	Actual		2.95	2.02		2.14	1.03	1.00	0.89	3.11	0.96				1.13			0.95	1.02
2 of 14	Expected		3.00	1.00		2.00	1.00	1.00	1.00	4.00					1.00	1.00		1.00	1.00
	Actual		2.89	1.00		2.02	1.00	1.00	0.89	4.09					0.96	0.80	0.92		0.99
3 of 14	Expected	1.00	2.00	2.00		1.00	1.00	2.00	2.00	2.00					1.00	1.00		1.00	1.00
	Actual	1.00	1.94	2.04		1.08	1.00	1.96	1.74 <sup>a</sup>	2.03					0.85	0.99		1.02	0.83 <sup>a</sup>
4 of 14	Expected	2.00	1.00	3.00		1.00	2.00	1.00	2.00	1.00					1.00	1.00	1.00		1.00
	Actual	2.03	0.98	3.08		1.03	1.93	1.00	1.80 <sup>a</sup>	1.09					0.98	0.83	0.95		0.81 <sup>a</sup>
5 of 14	Expected	2.00		3.00		1.00	3.00		2.00		1.00				1.00	1.00	1.00		1.00
	Actual	1.77		2.64		0.89	2.94		1.74 <sup>a</sup>		1.01				0.92	0.84	1.00		1.11
6 of 14	Expected	1.00		2.00	1.00		4.00		1.00		1.00				2.00	3.00	1.00		1.00
	Actual	0.94		2.10	0.03 <sup>c</sup>		4.02		1.00		0.94				2.14	1.94 <sup>b</sup>	1.04		0.97
7 of 14	Expected			3.00	1.00		4.00		1.00		1.00				1.00	2.00	2.00		1.00
	Actual			3.11	0.02 <sup>c</sup>		4.12		1.00		1.00				1.00	1.16 <sup>b</sup>	1.98		1.06

Table 2 - Amino Acid Analysis

Peptide		Ala (A)	Arg (R)	Asx (N,D)	Cys (C)	Glx (Q,E)	Gly (G)	His (H)	Ile (I)	Leu (L)	Lys (K)	Met (M)	Phe (F)	Pro (P)	Ser (S)	Thr (T)	Trp (W)	Tyr (Y)	Val (V)
8 of 14	Expected	2.00		3.00	1.00		3.00					1.00	2.00	1.00	1.00	2.00			1.00
	Actual	2.05		3.07	0.02 <sup>c</sup>		3.05					0.97	1.98	1.00	0.34 <sup>b</sup>	1.92			0.97
9 of 14	Expected	3.00		3.00			2.00				1.00	1.00	2.00	1.00		2.00	1.00		1.00
	Actual	3.15		2.99			1.93				1.02	0.99	1.91	1.17		1.96	0.00 <sup>e</sup>		1.00
10 of 14	Expected	4.00		4.00							2.00	1.00	1.00	1.00		3.00	1.00		1.00
	Actual	4.15		4.15							2.02	1.00	1.00	1.16		2.95	0.00 <sup>e</sup>		0.98
11 of 14	Expected	2.00		5.00		1.00			1.00	1.00	2.00			1.00	1.00	3.00			1.00
	Actual	2.03		4.94		1.03			1.00	1.08	1.95			1.01	0.84	2.90			0.96
12 of 14	Expected	1.00		2.00	1.00	1.00			2.00	1.00	1.00			1.00	1.00	4.00		1.00	1.00
	Actual	0.93		1.98	0.05 <sup>c</sup>	1.00			1.61	1.03	1.01			0.94	0.79 <sup>b</sup>	3.79		1.06	1.00
13 of 14	Expected			1.00	1.00	4.00	1.00		3.00	1.00				1.00	1.00	2.00		1.00	1.00
	Actual			1.08	0.04 <sup>c</sup>	4.44	1.08		2.61	1.00				0.92	0.82	1.98		0.67 <sup>f</sup>	1.04
14 of 14	Expected			1.00	1.00	3.00	2.00	1.00	2.00				1.00	1.00		2.00	1.00	1.00	1.00
	Actual			1.05	0.03 <sup>c</sup>	3.08	2.09	1.00	1.57 <sup>g</sup>				0.99	0.68 <sup>d</sup>		1.82	0.00 <sup>e</sup>	0.49 <sup>f</sup>	1.03
<b>NRC-230: Influenza Virus B/Shanghai/361/2002 HA Protein</b>																			
1 of 3	Expected	1.00		3.00	1.00	1.00			1.00	1.00	1.00			2.00		3.00		1.00	2.00
	Actual	1.02		3.03	0.02 <sup>c</sup>	1.08			0.58 <sup>g</sup>	1.00	0.97			1.99		2.97		1.09	1.99
2 of 3	Expected			1.00	1.00	4.00	1.00		2.00	1.00				2.00		2.00		1.00	2.00
	Actual			1.04	0.02 <sup>c</sup>	4.17	1.05		1.50 <sup>g</sup>	1.00				1.96		1.88		0.60 <sup>f</sup>	1.94
3 of 3	Expected			1.00	1.00	3.00	2.00	1.00	2.00				1.00	1.00		2.00	1.00	1.00	1.00
	Actual			1.00	0.01 <sup>c</sup>	3.07	2.03	0.94	1.44 <sup>g</sup>				0.95	0.84		1.76	0.00 <sup>e</sup>	1.00	0.89
<b>NRC-231: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>																			
1 of 5	Expected	1.00		3.00		4.00	2.00	1.00	1.00				1.00		1.00	1.00	1.00		1.00
	Actual	0.88		3.04		4.06	1.99	0.95	1.00				0.99		0.79 <sup>b</sup>	0.94	0.00 <sup>e</sup>		0.94
2 of 5	Expected	2.00		2.00		2.00	2.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
	Actual	1.97		2.01		2.07	1.96	0.94		1.00	0.97	0.97	0.95		0.70 <sup>b</sup>		0.00 <sup>e</sup>	1.00	0.85
3 of 5	Expected	2.00		3.00		3.00	1.00			1.00	3.00	1.00		1.00	1.00				1.00
	Actual	1.94		2.96		3.09	0.96			1.00	2.83	0.94		1.14	0.69 <sup>b</sup>				1.00
4 of 5	Expected	2.00		2.00		1.00	1.00			1.00	3.00		1.00	1.00	3.00	1.00			1.00
	Actual	1.94		2.00		1.17	0.99			1.03	3.00		1.04	1.22	2.33 <sup>b</sup>	1.03			1.00
5 of 5	Expected	1.00		1.00		1.00	1.00	1.00			2.00		1.00	1.00	3.00	3.00		1.00	1.00
	Actual	1.00		1.04		0.93	1.00	1.01			1.86		0.96	0.95	2.35 <sup>b</sup>	2.84		1.06	0.98
<b>NRC-232: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>																			
1 of 3	Expected			1.00		3.00	2.00	1.00	1.00				1.00	1.00	1.00	3.00		1.00	2.00
	Actual			1.00		2.97	1.96	0.95	0.96				0.94	1.07	0.75 <sup>b</sup>	2.66		1.02	1.86
2 of 3	Expected			2.00		4.00	4.00		1.00	1.00			1.00	2.00	1.00	1.00			
	Actual			2.05		4.06	4.13		0.97	1.13			1.00	2.35	0.60 <sup>b</sup>	0.88			
3 of 3	Expected		1.00	2.00		3.00	3.00		1.00	1.00				2.00	1.00	1.00			2.00
	Actual		1.00	2.00		3.04	3.07		0.83	1.08				2.24	0.75 <sup>b</sup>	0.90			1.75
<b>NRC-233: Influenza Virus B/Malaysia/2506/2004 HA Protein</b>																			
1 of 4	Expected		1.00	1.00		1.00	3.00		1.00		2.00	1.00			1.00	2.00		1.00	3.00
	Actual		0.96	1.00		1.03	2.98		0.61 <sup>a</sup>		1.99	0.97			0.80	1.83		1.04	2.28 <sup>a</sup>
2 of 4	Expected		1.00			2.00	3.00		1.00		2.00	1.00			1.00	3.00		2.00	1.00
	Actual		1.03			2.08	3.06		1.00		1.98	0.95			0.79 <sup>b</sup>	2.85		2.14	0.95
3 of 4	Expected		1.00			2.00	3.00		2.00	2.00	2.00			1.00		3.00		1.00	
	Actual		1.00			2.11	2.95		1.91	2.09	1.93			1.17		2.83		1.01	
4 of 4	Expected	1.00	1.00		1.00	2.00	2.00		1.00	2.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
	Actual	0.94	1.00		0.05 <sup>c</sup>	2.08	1.94		0.94	2.06	1.01			0.88	0.74 <sup>b</sup>	0.92	0.00 <sup>e</sup>	1.01	0.92

Table 2 - Amino Acid Analysis

Peptide		Ala (A)	Arg (R)	Asx (N,D)	Cys (C)	Glx (Q,E)	Gly (G)	His (H)	Ile (I)	Leu (L)	Lys (K)	Met (M)	Phe (F)	Pro (P)	Ser (S)	Thr (T)	Trp (W)	Tyr (Y)	Val (V)
<b>NRC-234: Influenza Virus B/Shanghai/361/2002 HA Protein</b>																			
1 of 2	Expected	2.00			1.00	1.00	2.00	2.00	2.00		2.00			1.00		1.00	1.00	1.00	1.00
	Actual	1.92			0.02 <sup>c</sup>	1.01	1.91	1.90	1.82		1.85			0.85		0.89	0.00 <sup>e</sup>	1.00	0.86
2 of 2	Expected	2.00			1.00		1.00	1.00	2.00	2.00	3.00			2.00		1.00	1.00		1.00
	Actual	2.53			0.08 <sup>c</sup>		1.49	1.00	1.89	2.14	2.94			2.11		0.96	0.00 <sup>e</sup>		0.81
<sup>a</sup> Ile-Val, Val-Ile and/or Val-Val bonds were partially destroyed during hydrolysis <sup>b</sup> Ser was partially destroyed during hydrolysis <sup>c</sup> Cys was completely destroyed during hydrolysis <sup>d</sup> Pro was partially destroyed during hydrolysis <sup>e</sup> Trp was completely destroyed during hydrolysis <sup>f</sup> Tyr was partially destroyed during hydrolysis <sup>g</sup> Ile was partially destroyed during hydrolysis																			

Date: 09 JUN 2014

Signature: *Dorothy C. Young*

Title: Technical Manager, BEI Authentication or designee

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