



**INFORMATION FOR THE VACCINES AND RELATED BIOLOGICAL
PRODUCTS ADVISORY COMMITTEE, CBER, FDA**

February 20, 2003

Bethesda, MD

**WHO COLLABORATING CENTER FOR SURVEILLANCE,
EPIDEMIOLOGY AND CONTROL OF INFLUENZA**

**Influenza Branch
Division of Viral and Rickettsial Diseases
National Center for Infectious Diseases
Centers for Disease Control and Prevention
Atlanta, GA 30333**

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US Surveillance

Summary of Influenza Surveillance, United States

September 29, 2002 - January 25, 2003*

Influenza activity in the United States overall has been low to moderate but is increasing. The percentage of specimens testing positive for influenza increased from 0.7% at the end of November to 10.0% for the week ending January 25, 2003. Influenza A viruses have predominated (range 53% - 90%) in six surveillance regions (East North Central, Mid-Atlantic, Mountain, New England, Pacific, and South Atlantic), and influenza B viruses have predominated (range 75% - 92%) in three surveillance regions (East South Central, West North Central, and West South Central). The majority of the influenza A viruses that have been subtyped were influenza A (H1)[†] viruses. The percentage of deaths attributed to pneumonia and influenza (P&I) has not exceeded epidemic threshold levels this season. The percentage of visits to U.S. sentinel providers for influenza-like illness (ILI) has exceeded the national baseline of 1.9% for one week this season.

WHO and NREVSS collaborating laboratories

Since September 29, WHO and NREVSS laboratories have tested a total of 33,901 specimens for influenza viruses and 1,195 (3.5%) were positive. Of the 1,195 viruses identified, 375 (31%) were influenza A viruses and 820 (69%) were influenza B viruses. One hundred and thirty-six (36%) of the 375 influenza A viruses have been subtyped; 116 (85%) were influenza A (H1)[†] viruses and 20 (15%) were influenza A (H3N2) viruses. Five hundred and seventy-six (70%) of the 820 influenza B viruses were identified in Texas and Missouri. Forty-four states have reported laboratory-confirmed influenza. Influenza isolates have been identified each week since the week ending October 26, but the proportion of specimens testing positive for influenza has been increasing steadily since the end of November. During the week ending January 26, 10% of specimens tested were positive for influenza.

P&I deaths from 122 cities

The percentage of deaths attributed to pneumonia and influenza (P&I) has remained below the epidemic threshold for each week since September 29. During the week ending January 25, 7.3% of deaths were due to pneumonia or influenza. This was below the epidemic threshold of 8.2% for that week.

Sentinel providers network

Nationwide, the percentage of visits to U.S. sentinel providers for influenza-like illness (ILI) has exceeded the national baseline of 1.9% for one week this season: 2.6% for the week ending January 25, 2003.

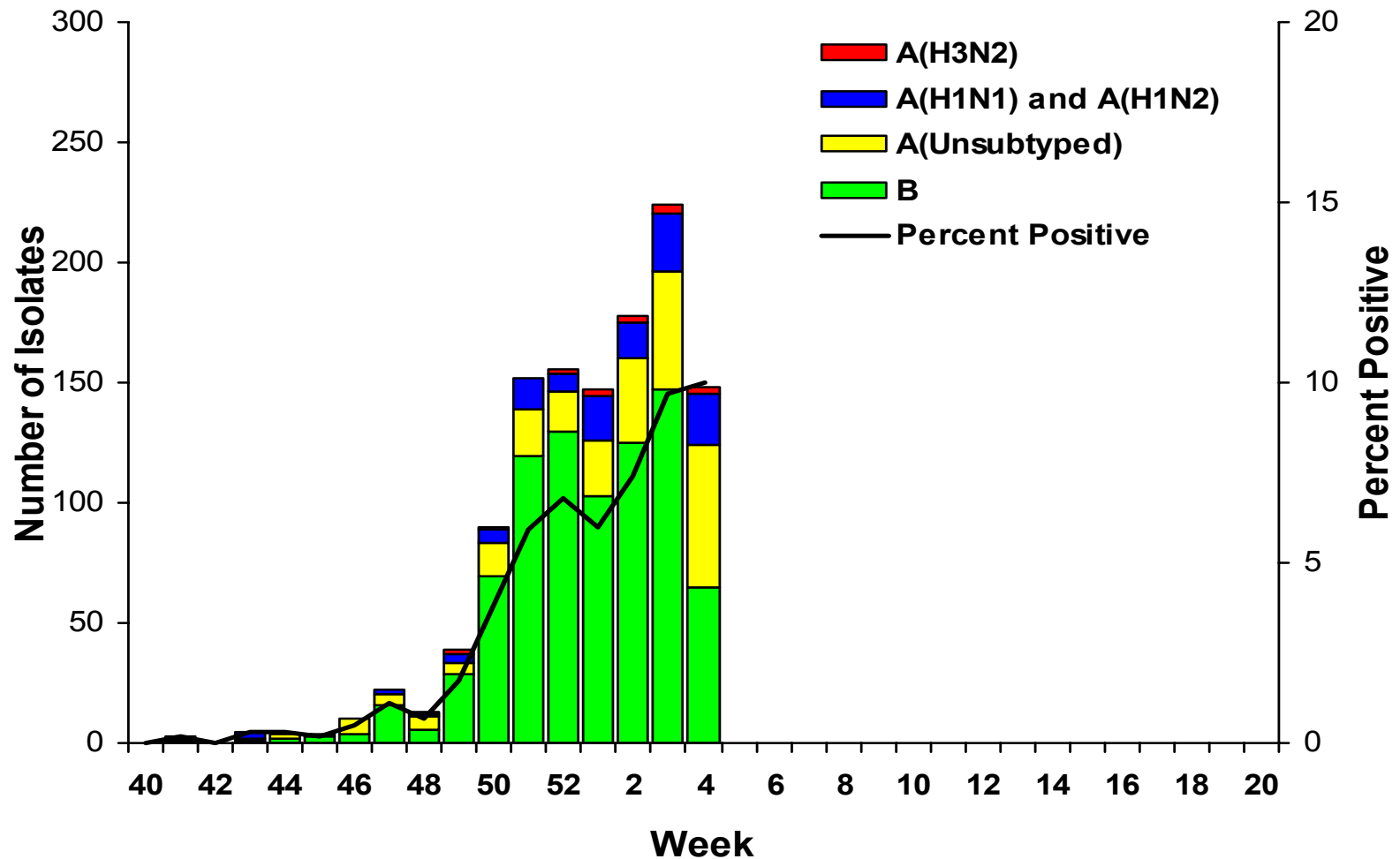
State and territorial epidemiologists

Regional or widespread influenza activity has been reported by at least one state each week since the week ending October 26, 2002. Widespread activity was first reported the week ending December 7, 2002. For the week ending January 25, 3 states reported widespread influenza activity, 14 states reported regional activity, 32 states reported sporadic activity, and 1 state reported no influenza activity.

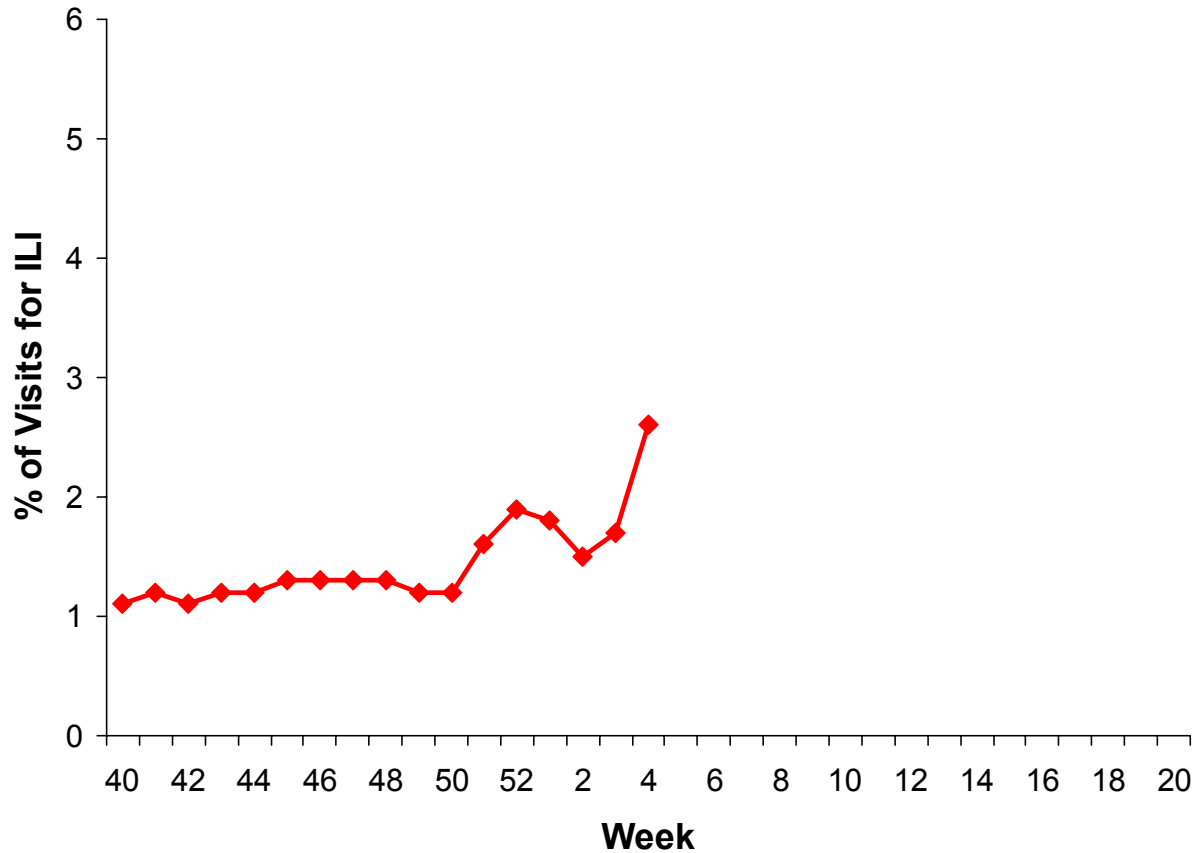
* Data reported as of January 30, 2003.

[†]Includes both the A (H1N1) and A (H1N2) influenza virus subtypes. The influenza A (H1N2) strain appears to have resulted from the reassortment of the genes of currently circulating influenza A (H1N1) and A (H3N2) subtypes. Because the hemagglutinin proteins of the A (H1N2) viruses are similar to those of the currently circulating A (H1N1) viruses and the neuraminidase proteins are similar to those of the currently circulating A (H3N2) viruses, the 2002-03 influenza vaccine should provide protection against A (H1N2) viruses.

WHO/NREVSS Collaborating Laboratories National Summary, 2002-03

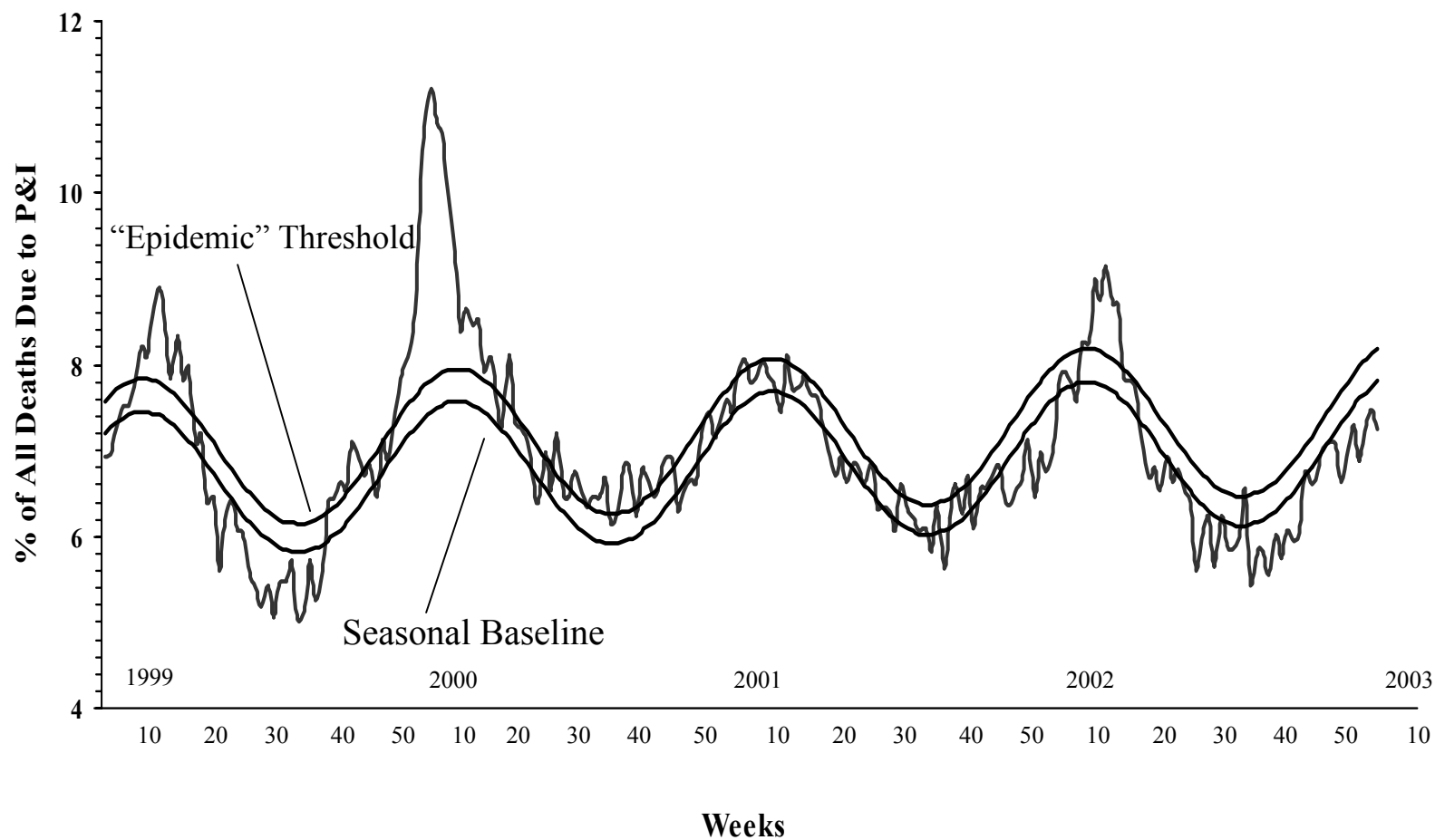


Percentage of Visits for Influenza-like Illness Reported by Sentinel Providers, National Summary, 2002-03



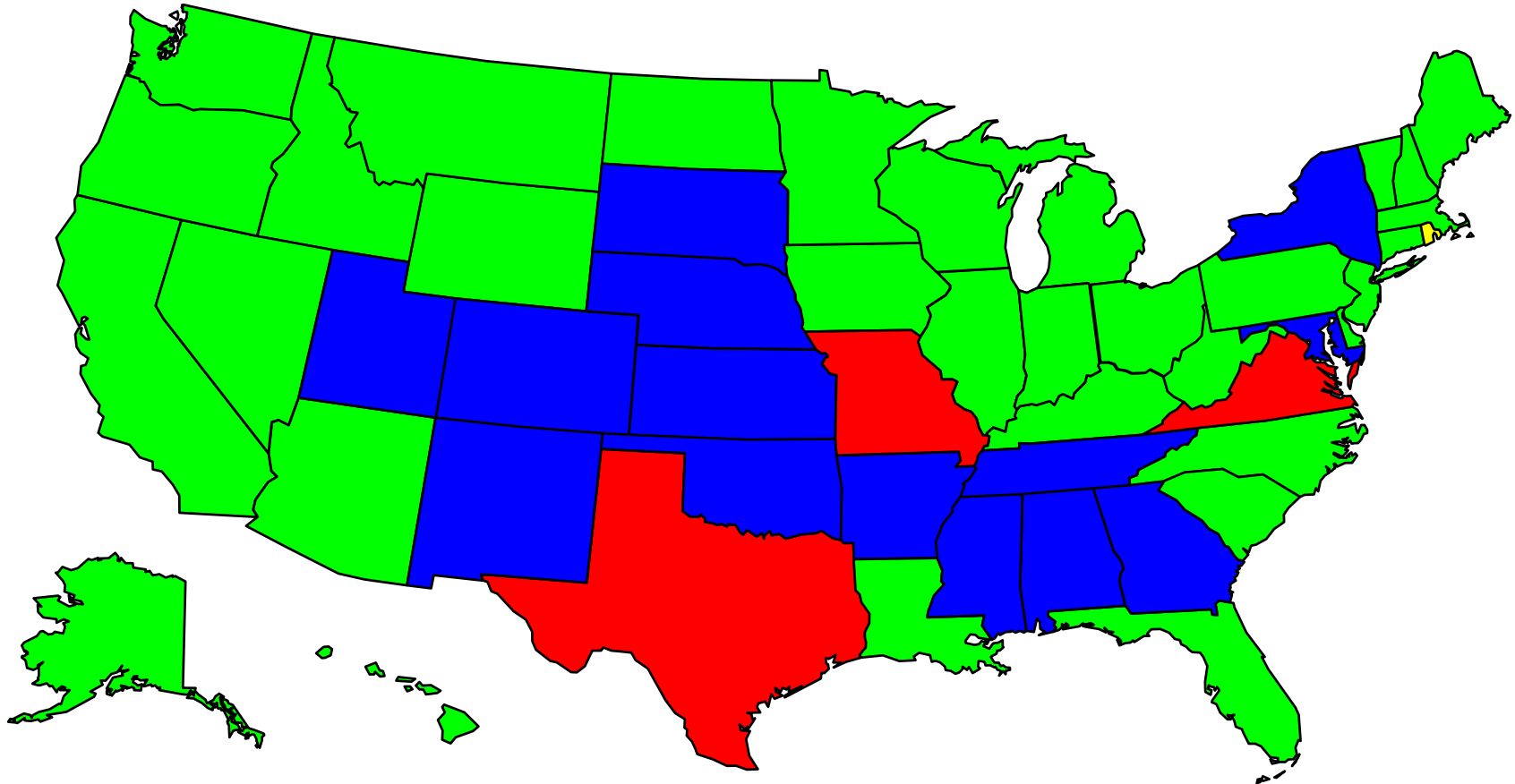
Pneumonia and Influenza Mortality for 122 U.S. Cities

Week Ending 1/25/03

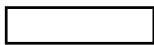


Weekly Influenza Activity Estimates Reported by State & Territorial Epidemiologists

Week ending January 25, 2003 - Week 4



No Report



No Activity



Sporadic



Regional



Widespread



Influenza A(H1) Viruses

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HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H1 VIRUSES (01/09/03)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA							Date	Passage	NA	
REFERENCE ANTIGENS		A BJ/262	B NC/20	C FUJ/156	D NEI/52	E CI/8885	F HI/10	G HI/15	H JOH/82			collected
1	A/BEIJING/262/95	640	320	320	320	640	320	40	80	01/09/95	E3/E3	N1
2	A/NEW CALEDONIA/20/99*	160	320	320	320	320	160	80	10	06/09/99	E4/E1	N1
3	A/FUJIAN/156/2000	80	320	640	640	320	160	80	20	08/25/00	E2/E2	N1
4	A/NEIMENGGU/52/2002	40	80	160	320	80	40	40	5	01/25/02	E2/E4	N1
5	A/CHILE/8885/02	40	80	160	160	320	80	40	10	07/03/02	E1/E4	N1
6	A/HAWAII/10/2002	80	160	80	320	160	320	40	10	03/22/02	E3	N2
7	A/HAWAII/15/2001	20	40	40	20	20	20	160	5	02/17/01	M2/C3	N1
8	A/JOHANNESBURG/82/96	40	80	20	20	40	20	40	2560	1996	E4/E3	N1
TEST ANTIGENS												
9	A/MASSACHUSETTS/5/2002*	160	320	640	1280	320	160	80	40	12/06/02	X/C1	N1
10	A/WISCONSIN/12/2002	160	640	1280	1280	640	320	160	40	12/03/02	C1/C1	N1
11	A/TEXAS/49/2002	160	320	640	1280	320	160	80	20	11/25/02	M1/C1	N1
12	A/TEXAS/50/2002	320	640	1280	1280	640	320	80	20	12/02/02	M1/C1	N1
13	A/TEXAS/51/2002	160	320	320	640	160	160	40	20	12/13/02	X/C1	N1
14	A/TEXAS/52/2002	160	320	640	1280	320	320	80	20	12/10/02	M1/C1	N1
15	A/NEW JERSEY/05/2002	160	320	320	640	160	160	40	10	UNKN	MX/C1	N1
16	A/CANADA/640/2002	160	320	160	320	320	320	40	10	11/19/02	X/C1	N2
17	A/CANADA/641/2002	320	320	160	640	640	640	40	10	11/20/02	X/C1	N2
18	A/CANADA/643/2002	160	320	160	320	640	640	40	10	11/25/02	X/C1	N2
19	A/CANADA/0644/2002	160	320	160	320	10	640	80	10	11/25/02	X/C1	N2
20	A/CANADA/645/2002	320	640	160	640	640	640	40	20	UNKN	X/C1	N2
21	A/CANADA/649/2002*	160	320	160	320	320	640	40	10	12/04/02	X/C1	N2
22	A/CANADA/638/2002	160	320	160	320	320	320	40	10	11/19/02	X/C1	N2
23	A/CANADA/639/2002	160	320	160	320	320	320	40	10	11/19/02	X/C1	N2
24	A/PERU/3064/2002	20	80	80	40	20	20	80	5	08/14/02	X/C1	N1
25	A/PERU/3086/2002	160	160	160	40	20	40	320	10	08/14/02	X/C1	N1
26	A/PERU/3090/2002*	160	80	20	20	10	20	160	5	09/08/02	X/C1	N1
27	A/GUIZHOU/198/2002	80	320	320	640	320	160	80	20	06/18/02	C2E1/E1	N1

* Serology antigens

HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H1 VIRUSES (02/04/03)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA								Date collected	Passage	NA
REFERENCE ANTIGENS		A BJ/262	B NC/20	C FUJ/156	D HI/15	E NEI/52	F CI/8885	G HI/10	H JOH/82			
1	A/BEIJING/262/95	640	320	160	40	320	320	320	80	01/09/95	E3/E3	N1
2	A/NEW CALEDON./20/99*	160	320	320	80	320	320	160	10	06/09/99	E4/E1	N1
3	A/FUJIAN/156/2000	80	320	320	80	640	320	160	20	08/25/00	E2/E2	N1
4	A/HAWAII/15/2001	20	40	40	160	20	20	10	5	02/17/01	M2/C3	N1
5	A/NEIMENGGU/52/2002	20	80	160	20	320	80	40	5	01/25/02	E2/E4	N1
6	A/CHILE/8885/02	40	80	80	20	160	160	40	5	07/03/02	E1/E4	N1
7	A/HAWAII/10/2002	40	80	40	10	80	80	160	5	03/22/02	E3	N2
8	A/CHILE/9848/02	20	40	40	20	80	160	20	5	07/17/02	E4/E2	N1
9	A/JOHANNESBURG/82/96	40	40	10	40	20	20	20	1280	1996	E4/E3	N1
TEST ANTIGENS												
10	A/DELAWARE/01/2002	320	640	320	40	640	640	640	10	12/29/02	M2/C1	N2
11	A/PENNSYLVANIA/01/2003	640	640	320	40	640	640	1280	80	01/16/03	X/C1	N2
12	A/NEW YORK/01/2003	320	640	640	80	1280	320	320	40	01/02/03	M1/C1	N1
13	A/NEW YORK/07/2003	320	640	160	40	640	640	640	40	01/07/03	X1/C1	N2
14	A/NEW YORK/02/2003	320	640	160	40	640	640	640	20	1/7/2003	X1/C1	N2
15	A/NEW YORK/34/2002	80	320	320	40	640	320	160	20	12/26/02	MX/C1	N1
16	A/NEW YORK/04/2003	160	320	160	40	320	320	640	20	01/07/03	X1/C1	N2
17	A/NEW YORK/05/2003	160	320	160	40	320	320	320	20	01/07/03	X1/C1	N2
18	A/NEW YORK/30/2002	80	160	160	40	160	160	80	10	11/27/02	MX/C1	N1
19	A/NEW YORK/03/2003	80	80	40	20	80	160	320	20	01/03/03	MX/C1	N2
20	A/TEXAS/02/2003	80	320	640	80	1280	320	160	20	01/05/03	M1/C1	N1
21	A/TEXAS/01/2003	80	320	640	80	1280	320	160	20	01/07/03	M1/C1	N1
22	A/TEXAS/58/2002	160	320	640	40	1280	320	160	20	12/30/02	M1/C1	N1
23	A/TEXAS/62/2002	80	320	640	80	1280	320	160	20	12/31/02	M1/C1	N1
24	A/TEXAS/61/2002	80	160	320	40	640	320	160	10	12/28/02	M1/C1	N1
25	A/WASHINGTON/08/2002	160	320	160	40	640	320	1280	20	12/31/02	M1/C1	N2
26	A/WASHINGTON/01/2003	160	320	160	40	320	320	640	20	01/11/03	X/C1	N2
27	A/WASHINGTON/02/2003	160	320	160	20	640	640	640	20	01/13/03	X/C1	N2
28	A/NORTH CAROLINA/09/2002	160	320	640	80	1280	320	320	20	12/23/02	M1C1/C1	N1
29	A/SOUTH DAKOTA/02/2002	160	320	160	40	320	320	640	10	12/20/02	X2/C1	N2
30	A/MASSACHUSETTS/06/2002	160	320	640	80	1280	320	320	40	02/28/02	X1/C1	N1
31	A/NEW JERSEY/01/2003	80	160	320	40	640	160	160	10	01/02/03	MX/C1	N1
32	A/OKLAHOMA/03/2002	80	160	320	40	320	160	80	10	02/30/02	X/C1	N1
33	A/MEXICO/935/2002	160	640	640	80	1280	640	320	40	10/12/02	C3/C1	N1
34	A/DAKAR/49/02	160	320	640	80	1280	320	160	20	11/05/02	X/C1	N1
35	A/YAMAGUCHI/12/02	20	40	80	20	80	160	40	5	01/15/02	C1/C1	N1

* Serology antigen

Influenza A(H1) Isolates Characterized by CDC

	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2001 - September 2001							
A/N.Caledonia/20/99-like	3	1	1	145	15	13	178 (94%)
A/N.Caledon./20/99-like (low)				9	2		11 (6%)
A/Johannesburg/82/96-like							
						Total	189
October 2001 - March 2002							
A/N.Caledonia/20/99-like	30	2	12	123		13	180 (92%)
A/N.Caledon./20/99-like (low)			1	13		2	16 (8%)
A/Johannesburg/82/96-like							
						Total	196
April 2002 - September 2002							
A/N.Caledonia/20/99-like	4	2		7	37	1	51 (75%)
A/N.Caledon./20/99-like (low)	2			1	14		17 (25%)
A/Johannesburg/82/96-like							
						Total	68
October 2002 - March 2003							
A/N.Caledonia/20/99-like	47	9				1	57 (97%)
A/N.Caledon./20/99-like (low)	1	1					2 (3%)
A/Johannesburg/82/96-like							
						Total	59
Total	87	15	14	298	68	30	512

Preliminary Data

02/05/2003

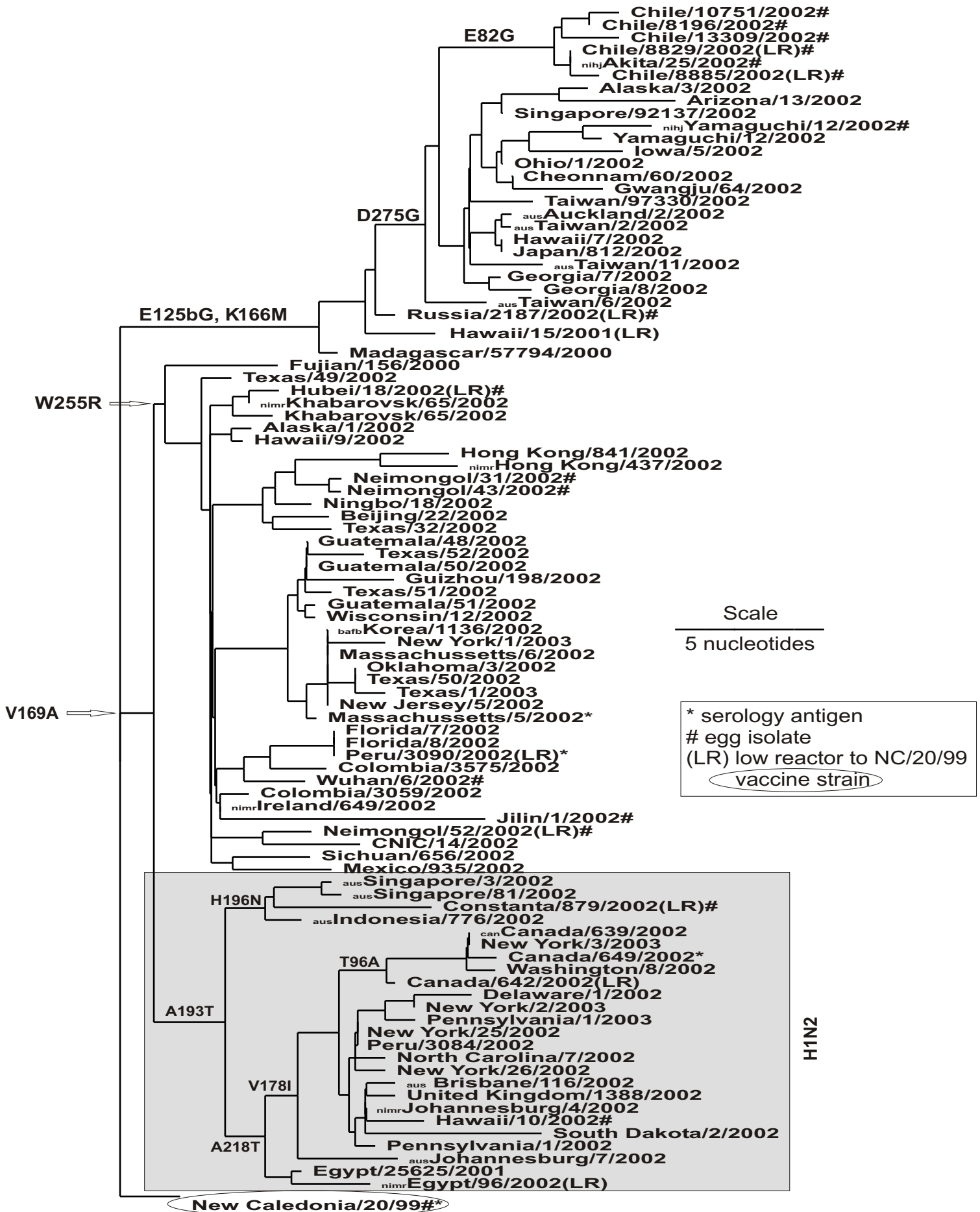
Influenza A(H1N1) & A(H1N2) Isolates Identified by CDC

	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
October 2001 - March 2002							
H1N1	13	1	4	124		4	146 (77%)
H1N2	16	1	9	6		11	43 (23%)
						Total	189
April 2002 - September 2002							
H1N1	5	2		7	50	1	65 (97%)
H1N2	1				1		2 (3%)
						Total	67
October 2002 - March 2003							
H1N1	34	1			3		38(61%)
H1N2	15	9					24(39%)
						Total	62
Total	84	14	13	137	54	16	318

Preliminary Data

02/05/2003

Evolutionary Relationships Among Influenza A (H1) Hemagglutinin (HA1) Genes



Number of Amino Acid Differences from A/New Caledonia/20/99-like Consensus HA1 Sequence

Isolate	Passage	Collection Date	No. of Differences	Position of Change
New Caledonia/20/99*	E4/E1	6/9/1999	3	V-5A, A169V, D190N
Russia/2187/2002	E1/E1	2/12/2002	5	V-5A, E125BG, K166M, A169V, D190N
Hawaii/10/2002* (H1N2)	E3	Unk	7	V-5A, V-1I, K157N, V178I, D190N, A193T, A218T
Neimongol/43/2002	E2/E2	1/23/2002	4	V-5A, P186S, D190N, W255R
Neimongol/31/2002	E2/E1	1/28/2002	3	P186S, D190N, W255R
Neimongol/52/2002	E2/E1	1/25/2002	3	E173K, D190N, W255R
Wuhan/6/2002	E1/E1	1/10/2002	3	D190G, R192K, W255R
Chile/8885/2002	E1/E1	7/3/2002	7	V-5A, E82G, E125bG, K166M, A169V, D190N, D275G
Chile/13309/2002	E2/E1	9/24/2002	7	V-5A, E82G, E125bG, K166M, A169V, Q226R, D275G
Chile/8196/2002	E1/E1	6/18/2002	7	V-5A, E82G, E125bG, K166M, A169V, G189R, D275G
Chile/8829/2002	E1/E1	6/26/2002	7	V-5A, E82G, E125bG, K166M, A169V, D190N, D275G
Chile/10751/2002	E2/E1	8/5/2001	7	V-5A, E82G, E125bG, K166M, A169V, G189R, D275G
Jilin/1/2002	E3/E2	1/11/2002	6	S46N, V132A, R149K, L154P, G189R, W255R,
nihjYamaguchi/12/2002	AM3+AL1	1/15/2002	7	I79T, E125bG, K145N, K166M, A169V, D190G, D275G

Influenza H1 Hemagglutinin Sequences Compared to the 2002 Consensus

	MKVKLLVLLCTFTATYADTICIGYHANNSTD ^{TV} DTVLEKNVT ^{VTHSVN} LLEDShngkLCL	
-7	-----+-----+-----+-----+-----+-----+	53
New Caledonia/20/99	A	
Russia/2187/2002	A	
nihjYamaguchi/12/2002		
Chile/8829/2002	A	
Chile/8885/2002	A	
Chile/8196/2002	A	
Chile/10751/2002	A	
Chile/13309/2002	A	
Hawaii/10/2002*	A I	
Neimongol/52/2002		
Jilin/1/2002		N
Wuhan/6/2002		
Neimongol/31/2002		
Neimongol/43/2002	A	

H1 Consensus

[illegible]

New Caledonia/20/99	
Russia/2187/2002	
^{nihj} Yamaguchi/12/2002	T
Chile/8829/2002	G
Chile/8885/2002	G
Chile/8196/2002	G
Chile/10751/2002	G
Chile/13309/2002	G
Hawaii/10/2002*	
Neimongol/52/2002	
Jilin/1/2002	
Wuhan/6/2002	
Neimongol/31/2002	
Neimongol/43/2002	

H1 Consensus

[illegible][illegible]

YANNKEKEVLVLWGVHHPPNIGDORALYHTENAYVSVVSSHYSRRFTPEIAKRPKVRDOE

168 -----+-----+-----+-----+-----+-----+-----+ 227

New Caledonia/20/99	V		N		
Russia/2187/2002	V		N		
nihYamaguchi/12/2002	V		G		
Chile/8829/2002	V		N		
Chile/8885/2002	V		N		
Chile/8196/2002	V		R		
Chile/10751/2002	V		R		
Chile/13309/2002	V				R
Hawaii/10/2002*		I	N	T	T
Neimongol/52/2002	K		N		
Jilin/1/2002			R		
Wuhan/6/2002			G	K	
Neimongol/31/2002		S	N		
Neimongol/43/2002		S	N		

GRINYYWTLLEPGDTIIFEANGNLIAPWYAFALS RGFSGSIITSNAPMDECDKACOTPOG

228 -----+-----+-----+-----*-----+-----+-----+----- 286

New Caledonia/20/99		
Russia/2187/2002		
^{nihj} Yamaguchi/12/2002		G
Chile/8829/2002		G
Chile/8885/2002		G
Chile/8196/2002		G
Chile/10751/2002		G
Chile/13309/2002		G
Hawaii/10/2002*		
Neimongol/52/2002	R	
Jilin/1/2002	R	
Wuhan/6/2002	R	
Neimongol/31/2002	R	
Neimongol/43/2002	R	

AINSSLPFQNVHPVTIGECPKYVRS AKLRMVTGLRNIPSIQSR

287 -----+-----+-----+-----+----- 329

New Caledonia/20/99
Russia/2187/2002
nihYamaguchi/12/2002
Chile/8829/2002
Chile/8885/2002
Chile/8196/2002
Chile/10751/2002
Chile/13309/2002
Hawaii/10/2002*
Neimongol/52/2002
Jilin/1/2002
Wuhan/6/2002
Neimongol/31/2002
Neimongol/43/2002

*H1N2 subtype

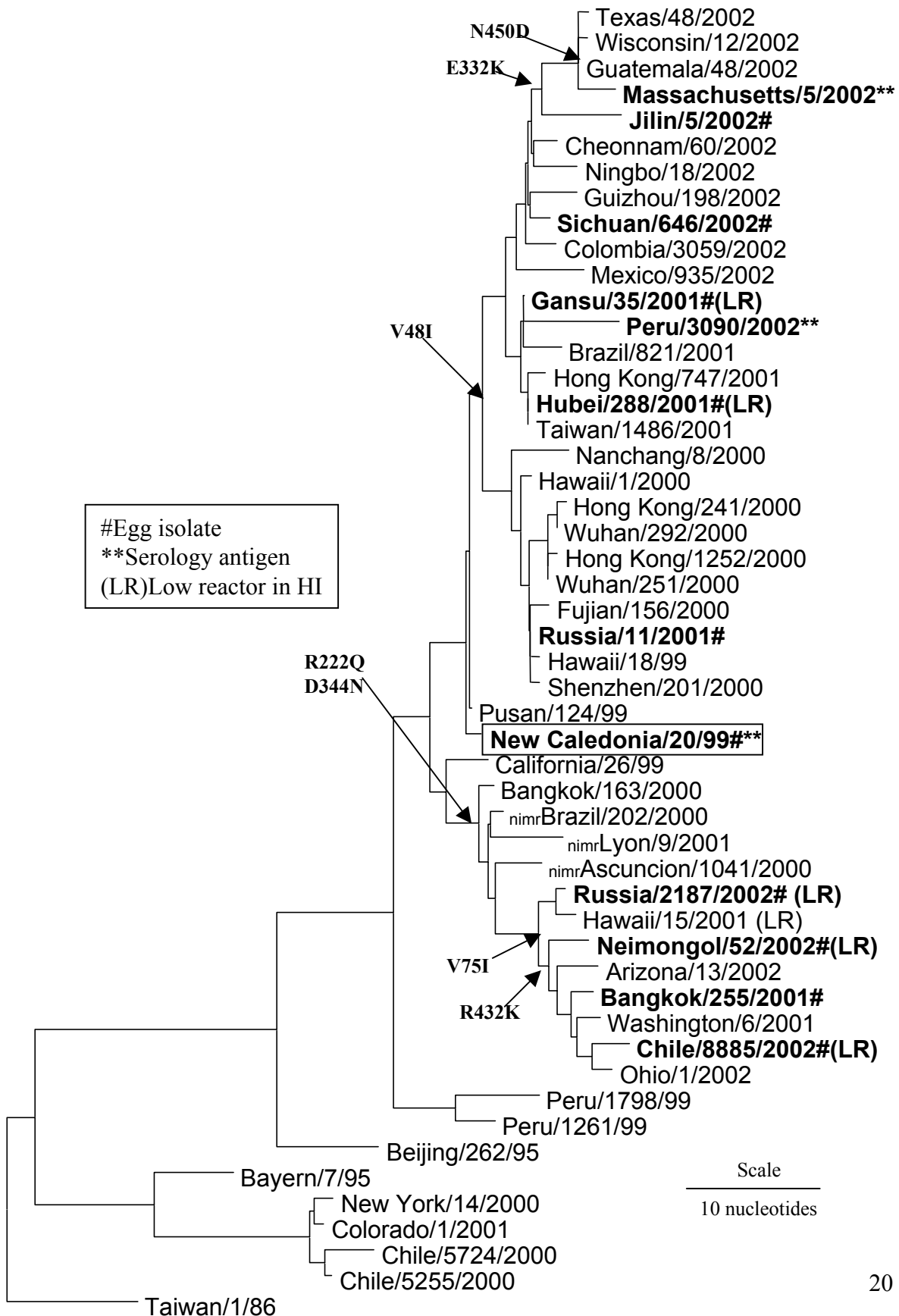
NEURAMINIDASE INHIBITION TEST OF INFLUENZA N1 VIRUSES (01/31/03)

STRAIN DESIGNATION		FERRET ANTISERA				Date collected
REFERENCE ANTIGENS		A New Cal/20/99	B Fuji/156/00	C Neim/52/02	D Joh/82/99	
1	A/New Caledonia/20/99	<u>1280</u>	1280	1280	320	06/09/99
2	A/Fujian/156/2000	1280	<u>2560</u>	1280	320	08/25/00
3	A/Neimonggu/52/2002	1280	2560	<u>1280</u>	320	01/25/02
4	A/Johannesburg/82/96	320	640	480	<u>1280</u>	1996
TEST ANTIGENS						
5	A/Colombia/3059/2002	1280	2560	2560	320	09/13/02
6	A/Guizhou/198/2002	2560	2560	1280	320	06/18/02
7	A/Wisconsin/12/2002	1280	1280	2560	160	12/03/02
8	A/Texas/48/2002	1280	1280	1280	80	11/14/02

NEURAMINIDASE INHIBITION TEST OF INFLUENZA N2 VIRUSES (01/10/03)

STRAIN DESIGNATION		FERRET ANTISERA					Date collected
REFERENCE ANIGENS		A PN/2007/99	B Chile/6416/01	C Shzh/499/00	D HI/10/02	E New Cal/20/99	
1 A/Panama/2007/99 (H3N2)		<u>320</u>	80	80	40	<10	07/12/99
2 A/Chile/6416/2001(H3N2)		160	<u>320</u>	160	80	<10	06/14/01
3 A/Shenzhen/499/2001(H3N2)		320	80	<u>320</u>	80	<10	05/22/00
4 A/Hawaii/10/2001(H1N2)		40	40	80	<u>320</u>	<10	03/22/02
5 A/New Caledonia/20/99 (H1N1)		<10	<10	<10	<10	<u>1280</u>	09/01/99
TEST ANIGENS							
6 A/New York/28/2002 (H3N2)		320	320	320	120	<10	10/12/02
7 A/Fujian/411/2002 (H3N2)		160	160	160	80	<10	08/11/02
8 A/Peru/3084/2002 (H1N2)		80	80	80	320	<10	08/13/02
9 A/Canada/638/2002 (H1N2)		80	80	80	320	<10	11/19/02

Evolutionary Relationships Among Influenza A N1 Neuraminidase Genes



Number of Amino Acid Differences from Consensus* N1 Neuraminidase Sequence

Isolate	Passage	AA Diff.	Position Different
A/ N. Caledonia/20/99	E4/E1	1	48
A/Sichuan/646/2002	E3	1	122
A/Hubei/288/2001	E2/E1	2	461, 466
A/Gansu/35/2001	E1/E1	2	461, 466
A/Jilin/5/2002	E3/E3	4	64, 217, 332, 336
A/Neimongol/52/2001	E2/E1	6	48, 75, 222, 344, 366, 432
A/Chile/8885/2002	E1/E1	7	48, 75, 222, 344, 432, 461, 466
A/Bangkok/255/2001	E3/E1	8	48, 75, 81, 222, 344, 432, 461, 466
A/Russia/2187/2002	E1/E1	8	48, 75, 222, 344, 393, 432, 461, 466

*Consensus sequence was generated from 17 viruses isolated from Jan. 2002-present.

COMPARISON OF EGG-GROWN A N1 NEURAMINIDASE GENES TO THE 2002-2003 AMINO ACID CONSENSUS SEQUENCE
(Consensus sequence was generated from 17 viruses isolated from Jan. 2002- present)

	10	30	50	70	90
Consensus	MNPNQKIITIGSISIAIGIISLMLQIGNIISIWASHSIQTGSQNHTGICNQRIITYENSTWVNHTYVNNINNTNVVAGKDKTSVTLAGNSSLC SISGWA IY				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/N. Caledonia/20/99			V		
A/Sichuan/646/2002					
A/Hubei/288/2001					
A/Gansu/35/2001					
A/Jilin/5/2002				Q	
A/Neimongol/52/2002			V		I
A/Chile/8885/2002			V		I
A/Bangkok/255/2001			V		I N
A/Russia/2187/2002			V		I
	110	130	150	170	190
Consensus	TKDNSIRIGSKGDV FVIREPFISCSHLECRTFFLTQGALLNDKHSNGTVKDRSPYRALMSCPLGEAPSPYNSKFESVAWSASACHDGMGWLTI GISGPDN				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/N. Caledonia/20/99					
A/Sichuan/646/2002		V			
A/Hubei/288/2001					
A/Gansu/35/2001					
A/Jilin/5/2002					
A/Neimongol/52/2002					
A/Chile/8885/2002					
A/Bangkok/255/2001					
A/Russia/2187/2002					
	210	230	250	270	290
Consensus	GAVAVLKYNGIITETIKSWKKRILRTQESECVCVNGSCFTIMTDGPSNGAASYKIFKIEKGKVTKSIELNAPNFHYEECSYCPDTGTVMCVCRDNWHG SN				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/N. Caledonia/20/99					
A/Sichuan/646/2002					
A/Hubei/288/2001					
A/Gansu/35/2001					
A/Jilin/5/2002		R			
A/Neimongol/52/2002			Q		
A/Chile/8885/2002			Q		I
A/Bangkok/255/2001			Q		
A/Russia/2187/2002			Q		

	310	330	350	370	390
Consensus	RPWVSFNQLDYQIGYICSGVFGDNPRPKDGEGSCNPVTVDGADGVKGF SYKYGNVWIGRTKSNRLRKGFEMIWDPNGWTDSDFSVKQDVVAITDWS				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/N. Caledonia/20/99					
A/Sichuan/646/2002					
A/Hubei/288/2001					
A/Gansu/35/2001					
A/Jilin/5/2002		K S			
A/Neimongol/52/2002			N	K	
A/Chile/8885/2002			N		
A/Bangkok/255/2001			N		
A/Russia/2187/2002			N		I
	410	430	450	470	
Consensus	GYSGSFVQHPELTGLDCIRPCFWVELVRGLPRENTTIWTSGSSISFCGVNSDTANWSWPDDAELPLTIDK				
	-----+-----+-----+-----+-----+-----+-----+				
A/N. Caledonia/20/99					
A/Sichuan/646/2002					
A/Hubei/288/2001				G F	
A/Gansu/35/2001				G F	
A/Jilin/5/2002					
A/Neimongol/52/2002		K			
A/Chile/8885/2002		K		G F	
A/Bangkok/255/2001		K		G F	
A/Russia/2187/2002		K		G F	

**Hemagglutination Inhibition Antibody Responses to the H1* Component
of the 2002 -2003 Influenza Vaccine
ADULT POPULATIONS**

Population	N	Antigen	% Rise	Pre GMT	Post GMT	% with HI titer > 40	
						Pre Vaccine	Post Vaccine
Australia¹							
	24	A/New Caled./20/99 IVR-116*	92	8	90	8	92
	24	A/Massachusetts/05/2002	88	12	155	25	96
	24	A/Canada/649/2002**	71	8	38	13	63
	24	A/Peru/3090/2002	79	7	46	4	71
Japan²							
	14	A/New Caled./20/99 IVR-116*	43	10	30	14	43
	14	A/Massachusetts/05/2002	57	13	51	21	57
	14	A/Canada/649/2002**	36	7	17	7	21
	14	A/Peru/3090/2002	29	9	19	14	36

Preliminary Data 01/25/2003

1. Sera were kindly provided by Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like hemagglutinin.
2. Sera were kindly provided by Dr. Takato Odigari, WHO Collaborating Center, Tokyo, Japan. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

* A/New Caledonia/20/99 is the H1N1 component of the vaccine.

** H1N2

**Hemagglutination Inhibition Antibody Responses to the H1* Component
of the 2002 -2003 Influenza Vaccine
ELDERLY POPULATIONS**

						% with HI titer \geq 40	
Population	N	Antigen	% Rise	Pre GMT	Post GMT	Pre Vaccine	Post Vaccine
Australia¹							
	24	A/New Caled./20/99 IVR-116*	52	8	37	9	58
	24	A/Massachusetts/05/2002	52	11	52	13	63
	24	A/Canada/649/2002**	48	8	31	9	42
	24	A/Peru/3090/2002	39	6	14	4	25
Japan²							
	26	A/New Caled./20/99 IVR-116*	42	6	23	4	42
	26	A/Massachusetts/05/2002	42	9	32	8	54
	26	A/Canada/649/2002**	35	7	16	4	38
	26	A/Peru/3090/2002	35	7	17	4	35

Preliminary Data 01/25/2003

1. Sera were kindly provided by Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like hemagglutinin.
2. Sera were kindly provided by Dr. Takato Odigari, WHO Collaborating Center, Tokyo, Japan. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

* A/New Caledonia/20/99 is the H1N1 component of the vaccine.

** H1N2

Influenza A(H3N2) Viruses

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HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (01/23/033)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA								Date collected	Passage
REFERENCE ANTIGENS		A SYD/5	B MOS/10	C PN/2007	D FUJ/140	E CI/6416	F HK/1550	G NY/55	H GUA/405		
1	A/SYDNEY/05/97	640	10	320	160	320	320	640	10	06/23/97	CK2E2/E2 E2/E2 E5 E2/E4 E7 E5 E4 C2/C4
2	A/MOSCOW/10/99	320	640	320	80	640	320	640	320	01/15/99	
3	A/PANAMA/2007/99*	160	160	640	320	640	320	640	320	07/12/99	
4	A/FUJIAN/140/2000	40	20	160	640	160	160	80	320	7/30/00	
5	A/CHILE/6416/2001	160	160	320	160	640	160	640	320	6/14/01	
6	A/HONG KONG/1550/2002	640	320	640	640	640	640	1280	1280	01/19/02	
7	A/NEW YORK/55/2001	320	320	640	320	1280	320	1280	640	11/22/01	
8	A/GUANGZHOU/405/2002	40	40	160	80	160	160	160	320	05/21/02	
TEST ANTIGENS											
9	A/WASHINGTON/07/2002	160	160	640	640	640	320	640	1280	12/23/02	M1/C1
10	A/WISCONSIN/16/2002	320	640	640	320	2560	640	1280	1280	12/20/02	C1/C1
11	A/WISCONSIN/13/2002	80	320	320	320	320	320	320	640	11/27/02	C1/C1
12	A/NEW JERSEY/4/2002*	160	320	320	640	640	640	640	1280	11/04/02	X/C4
13	A/TEXAS/53/2002	80	80	160	160	640	320	320	640	12/18/02	M1/C1
14	A/HAWAII/16/2002	160	320	640	640	640	640	640	1280	12/23/02	M2/C1
15	A/HAWAII/12/2002	160	160	320	320	640	320	320	1280	12/17/02	M3/C1
16	A/HAWAII/13/2002	160	320	320	320	1280	1280	640	1280	12/22/02	M2/C1
17	A/HAWAII/14/2002	80	160	320	320	320	320	320	640	12/24/02	M2/C1
18	A/HAWAII/17/2002	160	160	320	320	640	320	320	1280	12/26/02	M2/C1
19	A/HAWAII/15/2002	80	80	320	640	160	640	320	2560	12/24/02	M3/C1
20	A/HAWAII/19/2002	80	80	160	80	320	80	80	320	12/30/02	M2/C1
21	A/GUAM/228/2002*	80	320	160	640	320	640	320	640	10/26/02	X/C2
22	A/ENGLAND/01/2003	640	640	1280	320	2560	1280	2560	1280	01/08/03	C1/C1
23	A/ENGLAND/449/2002	320	640	640	320	1280	1280	2560	1280	12/18/02	C1/C1
24	A/TURKEY/1035/2002	640	640	640	640	1280	1280	2560	1280	12/13/02	X/C1
25	A/HUNAN/352/2002	320	640	640	640	640	1280	640	1280	07/29/02	C2/C2
26	A/FUJIAN/312/2002	160	320	320	640	640	1280	640	1280	07/14/02	C1/C2
27	A/TAIWAN/1520/2002	640	640	1280	1280	1280	1280	1280	2560	11/29/02	C2/C1
28	A/TAIWAN/1521/2002	80	160	160	80	80	80	160	1280	12/09/02	C2/C1
29	A/TAIWAN/1522/2002	160	320	320	640	640	640	640	1280	12/15/02	C2/C1
30	A/KOREA/770/2002*	40	80	80	320	80	160	80	320	12/02/02	X/C3
31	A/KOREA/930/2002	20	40	80	80	80	80	40	160	12/04/02	X/C2
32	A/KOREA/935/2002	40	80	160	320	160	320	160	320	12/09/02	X/C2
33	A/KOREA/931/2002	80	160	320	320	320	320	320	640	12/05/02	X/C1
34	A/KOREA/1010/2002	80	160	160	320	160	320	160	320	12/11/02	X/C1
35	A/JAPAN/1067/2002	160	320	320	640	640	640	640	1280	12/17/02	X/C1
36	A/JAPAN/910/2002	40	80	160	320	160	320	160	320	12/09/02	X/C2
37	A/PHILLIPINES/1159050/2002	80	40	160	80	160	80	80	80	11/21/02	XC

* Serology antigens

HEMAGGLUTINATION INHIBITION TEST OF INFLUENZA H3 VIRUSES (01/31/03)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA								Date collected	Passage
REFERENCE ANTIGENS	A SYD/5	B MOS/10	C PN/2007	D FUJ/140	E CI/6416	F HK/1550	G NY/55	H GUA/405	I FUJ/411		
1 A/SYDNEY/05/97	<u>320</u>	80	80	80	160	160	320	160	20	06/23/97	CK2E2/E2
2 A/MOSCOW/10/99	320	<u>320</u>	160	40	320	160	320	160	20	01/15/99	E2/E2
3 A/PANAMA/2007/99*	160	160	<u>320</u>	320	320	320	640	320	40	07/12/99	E5
4 A/FUJIAN/140/2000	40	20	160	<u>640</u>	160	320	160	320	20	7/30/00	E2/E4
5 A/CHILE/6416/2001	80	40	80	80	<u>320</u>	80	320	160	20	6/14/01	E7
6 A/HONG KONG/1550/2002	640	320	320	320	640	<u>640</u>	1280	640	160	01/19/02	E5
7 A/NEW YORK/55/2001	320	160	320	160	640	320	<u>1280</u>	320	40	11/22/01	E4
8 A/GUANGZHOU/405/2002	40	40	160	80	160	160	80	<u>320</u>	20	21/2002	C2/C4
9 A/FUJIAN/411/2002	80	80	160	320	320	320	160	640	<u>1280</u>	08/11/02	X/C2
TEST ANTIGENS											
10 A/EGYPT/919441/2002	320	640	640	320	1280	640	1280	640	80	11/07/02	C2/C1
11 A/ALASKA/4/2002	160	160	320	640	320	320	320	640	1280	12/02/02	X/C1
12 A/TEXAS/53/2002	160	160	320	640	640	320	320	1280	2560	12/18/02	M1/C1
13 A/ENGLAND/455/2002	320	160	320	160	640	320	640	320	320	12/30/02	C1/C2
14 A/EGYPT/914454/2002	320	320	320	320	1280	640	1280	640	80	09/04/02	C2/C1
15 A/EGYPT/915167/2002	320	160	320	160	1280	320	1280	640	40	10/02/02	C2/C1
16 A/EGYPT/919475/2002	320	320	320	320	1280	640	1280	640	80	11/11/02	C2/C1
17 A/EGYPT/921138/2002	160	160	320	320	1280	640	1280	640	80	10/22/02	C2/C2
18 A/HAWAII/19/2002	160	160	160	320	320	320	320	640	1280	2/30/02	M2/C1
19 A/HAWAII/20/2002	80	160	160	320	160	320	160	640	640	12/04/02	M2/C2
20 A/BEIJING/253/2002	160	320	160	20	640	160	320	640	2560	12/12/02	C1/C1
21 A/PHILIPPINES/160105/2002	160	320	160	320	640	640	640	640	320	07/17/02	X/C1
22 A/ISHIKAWA/102/2002	80	160	160	320	160	640	320	640	640	11/26/02	C1/C1
23 A/HAWAII/21/2002	80	40	80	160	160	160	80	320	1280	12/18/02	M3/C2
24 A/MASSACHUSETTS/01/2003	80	80	80	160	320	320	160	320	1280	01/05/03	X1/C1
25 A/GUAM/228/2002	80	160	80	320	320	320	640	640	160	10/26/02	X/C1
26 A/EGYPT/919505/2002	40	80	80	160	160	320	160	320	80	11/16/02	C2/C1
27 A/KOREA/770/2002	40	80	80	320	160	160	160	320	640	12/02/02	X/C1
28 A/KOREA/1010/2002	80	80	80	320	160	320	320	320	640	12/11/02	X/C1
29 A/BEIJING/51/2002	80	80	80	320	160	320	160	320	640	12/20/02	C1/C2
30 A/BEIJING/301/2002*	40	160	80	20	320	80	160	320	640	12/20/02	C1/C1
31 A/BEIJING/178/2002	40	80	80	160	160	160	160	320	640	11/21/02	C2/C2
32 A/ANHUI/550/2002	40	80	80	320	80	160	80	320	320	12/01/02	C2/C2
33 A/OSAKA/c70/2002	40	80	80	320	160	320	160	320	640	11/15/02	C2/C1
34 A/KOREA/930/2002	20	20	40	80	40	40	40	80	320	12/04/02	X/C2
35 A/KOREA/935/2002	40	40	40	160	80	160	80	160	320	12/09/02	X/C2
36 A/TAIWAN/1521/2002	40	80	40	160	80	160	80	160	80	12/09/02	C2/C1
37 A/BEIJING/290/2002	40	80	40	20	160	80	80	160	320	12/19/02	C1/C1
38 A/SHIGA/41/2002	40	80	40	160	160	160	160	320	80	11/25/02	C1/C1
39 A/JAPAN/910/2002	40	80	40	320	160	320	160	160	320	12/09/02	X/C2

* Serology antigens

HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (02/06/03)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA									Date collected	Passage
REFERENCE ANTIGENS	A SYD/5	B MOS/10	C PN/2007 lot 2002-7	D PN/2007 lot 2003-21	E FUJ/140	F CI/6416	G HK/1550	H NY/55	I GUA/405	J FUJ/411		
1 A/SYDNEY/05/97	320	320	160	160	80	160	160	320	160	40	06/23/97	CK2E2/E2
2 A/MOSCOW/10/99	640	640	320	320	80	320	320	320	320	40	01/15/99	E2/E2
3 A/PANAMA/2007/99*	160	160	320	640	160	320	320	320	320	80	07/12/99	E5
4 A/FUJIAN/140/2000	40	80	160	160	320	160	160	160	320	20	07/30/00	E2/E4
5 A/CHILE/6416/2001	80	160	160	320	80	320	160	320	160	20	06/14/01	E7
6 A/HONG KONG/1550/2002	640	640	640	640	320	640	640	640	640	80	01/19/02	E5
7 A/NEW YORK/55/2001	320	640	320	320	160	6470	320	1280	320	80	11/22/01	E4
8 A/GUANGZHOU/405/2002	40	80	160	80	80	160	160	80	160	20	05/21/02	C2/C4
9 A/FUJIAN/411/2002	80	160	160	160	320	320	160	160	640	1280	08/11/02	X/C2
TEST ANTIGENS												
10 A/NEW JERSEY/04/2002	640	1280	640	640	640	1280	1280	1280	1280	160	11/04/02	E2
11 A/THAILAND/1170/02	320	320	640	1280	640	1280	640	1280	2560	160	10/21/02	X/C1
12 A/EGYPT/919441/2002	320	1280	640	1280	320	1280	640	1280	640	80	11/07/02	C2/C1
13 A/DAKAR/50/02	320	320	640	1280	160	1280	320	1280	640	80	10/30/02	CXC1/C1
14 A/THAILAND/1169/2002	160	640	320	1280	160	640	320	640	1280	160	10/17/02	X/C1
15 A/CALIFORNIA/09/2002**	80	160	160	160	320	320	320	160	320	1280	12/03/02	M2/C1
16 A/BEIJING/178/2002**	80	160	160	160	320	320	320	160	320	1280	11/21/02	C2/C2
17 A/BEIJING/51/2002	80	160	160	80	320	160	320	160	320	640	12/20/02	C1/C2
18 A/PARIS/0207/02	80	320	160	640	160	320	320	640	320	80	12/01/02	C1C1/C1
19 A/KOREA/23/1002	80	160	160	320	320	320	320	160	320	640	12/12/02	X/C1
20 A/KOREA/27/2002	40	160	80	160	160	80	160	80	160	160	12/10/02	X/C1
21 A/HAWAII/21/2002	80	160	80	160	160	160	160	80	320	1280	12/18/02	M3/C2
22 A/BEIJING/301/2002*	40	160	80	80	10	160	80	160	160	640	12/20/02	C1/C1
23 A/ANHUI/550/2002	40	80	80	80	320	80	160	80	320	320	12/01/02	C2/C2
24 A/EGYPT/919505/2002	40	160	80	160	160	160	320	160	320	80	11/16/02	C2/C1
25 A/ISHIKAWA/102/02**	40	320	80	160	320	160	320	160	320	320	11/26/02	C1/C1
26 A/OSAKA-C/70/02**	40	160	80	160	320	160	320	160	320	640	11/15/02	C2/C1
27 A/SHIGA/41/02	20	80	40	160	160	80	160	80	80	80	11/25/02	C1/C1
28 A/HAWAII/14/2002**	20	40	40	40	80	40	40	40	80	640	12/24/02	M2/C1
29 A/BEIJING/290/2002	20	160	40	40	10	160	80	80	160	320	12/19/02	C1/C1

* Serology antigens

** Strains that have aa changes at positions 155+156

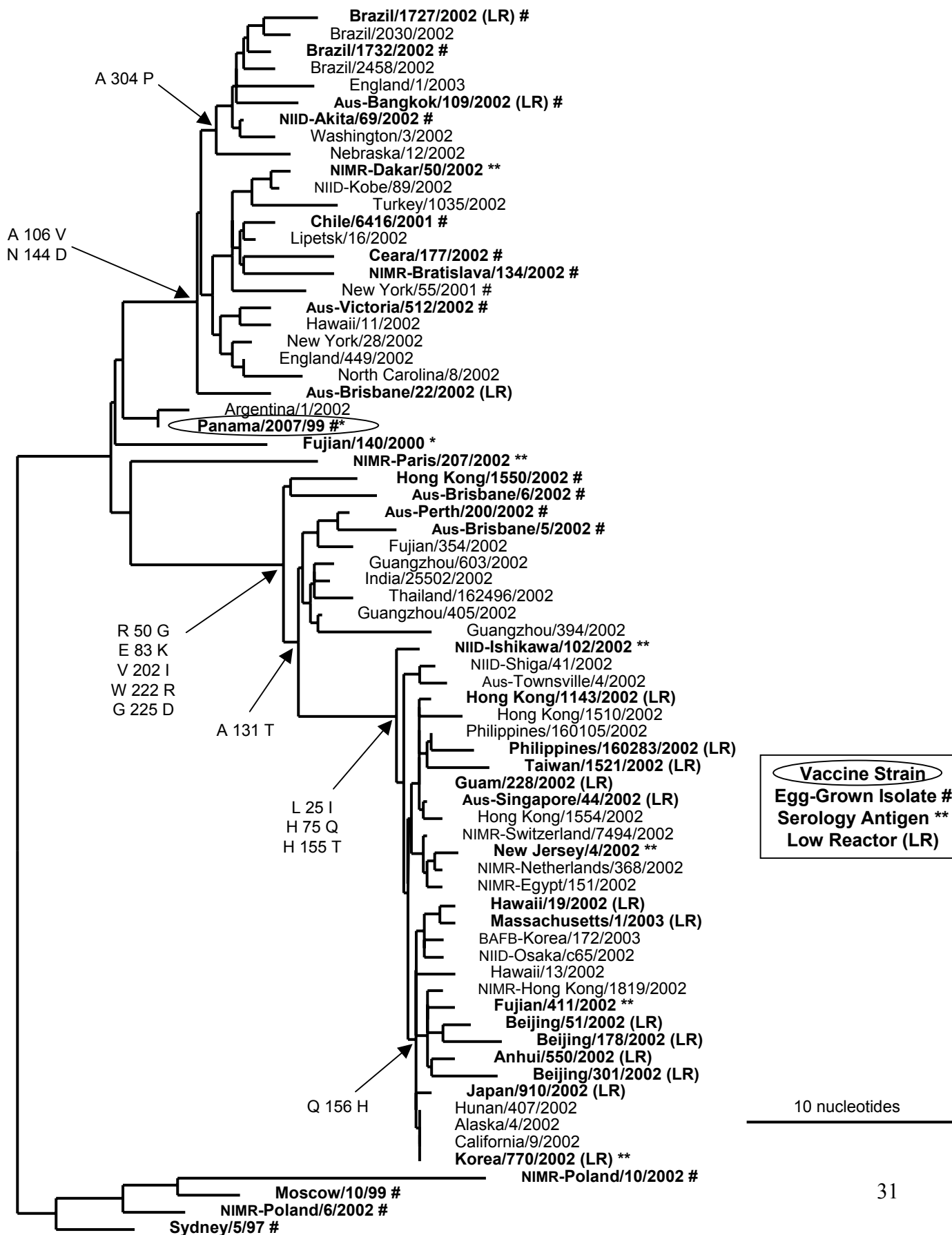
Influenza A(H3N2) Isolates Characterized by CDC

	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2001 - September 2001							
A/Panama/2007/99-like	8	1		44	90	6	149 (95%)
A/Panama/2007/99-like (low)				2	6		8 (5%)
						Total	157
October 2001 - March 2002							
A/Panama/2007/99-like	408	12	14	98	11	8	551 (96%)
A/Panama/2007/99-like (low)	2		2	13	2	1	20 (4%)
						Total	571
April 2002 - September 2002							
A/Panama/2007/99-like	15	1	3	108	27	6	160 (89%)
A/Panama/2007/99-like (low)				8	3	9	20 (11%)
						Total	180
October 2002 - March 2003							
A/Panama/2007/99-like	21	4	4	22		5	56 (64%)
A/Panama/2007/99-like (low)	2			16		1	18 (24%)
						Total	74
Total	456	18	23	310	139	36	982

Preliminary Data

02/06/2003

EVOLUTIONARY RELATIONSHIPS AMONG INFLUENZA A (H3) HA1 GENES



Number of Amino Acid Differences from Type A (H3) Consensus HA1 Sequence

Isolate	Passage	Date Isolated	No. of Differences	Positions Different
Panama/2007/99*	e3	07/12/99	5	21, 106, 144, 183, 186
Aus-Victoria/512/2002	e2/e1	06/27/02	1	183
NIID-Akita/69/2002	e1/e1	02/12/02	1	304
Brazil/1732/2002	e2/e1	06/27/02	2	194, 304
Chile/6416/2001	e2/e2	06/14/01	2	221, 246
Aus-Bangkok/109/2002	e5	03/25/02	3	10, 183, 304
New York/55/2001	e4	11/22/01	3	49, 194, 229
Ceara/177/2002	e2/e2	04/04/02	3	21, 183, 291
Brazil/1727/2002	e3/e3	05/23/02	4	88, 183, 226, 304
NIMR-Bratislava/143/2002	e3	04/18/02	4	155, 190, 220, 291
Aus-Brisbane/6/2002	e4	06/13/02	7	50, 83, 106, 144, 202, 222, 225
Moscow/10/99	e2/e1	01/15/99	8	106, 144, 160, 172, 186, 192, 196, 226
Aus-Perth/200/2002	e5	01/22/02	9	50, 83, 106, 131, 144, 194, 202, 222, 225
Hong Kong/1550/2002	e3	01/19/02	10	50, 83, 96, 106, 144, 186, 194, 202, 222, 225
Fujian/140/2000*	e2/e2	07/30/00	10	14, 43, 106, 144, 186, 194, 199, 226, 247, 273
Sydney/5/97	ck2e/e1	06/23/97	12	3, 57, 106, 137, 142, 144, 172, 186, 192, 194, 226, 233
NIMR-Poland/6/2002	e4	02/17/02	13	106, 144, 145, 160, 172, 186, 192, 196, 197, 198, 205, 226, 308

* Serology Antigens

COMPARISON OF EGG-GROWN TYPE A HA1 GENES (H3) TO THE 2002 CONSENSUS AMINO ACID SEQUENCE

	1				50
Consensus	QKLPGNDNST	ATLCLGHHAV	PNGTLVKTIT	NDQIEVTNAT	ELVQSSSTGR
Aus-Brisbane/5/2002	-----	-----	-----	-----	-----G
Aus-Perth/200/2002	-----	-----	-----	-----	-----G
Aus-Brisbane/6/2002	-----	-----	-----	-----	-----G
Hong Kong/1550/2002	-----	-----	-----	-----	-----G
Chile/6416/2001	-----	-----	-----	-----	-----
New York/55/2001	-----	-----	-----	-----	-----S-
Brazil/1732/2002	-----	-----	-----	-----	-----
NIID-Akita/69/2002	-----	-----	-----	-----	-----
Aus-Victoria/512/2002	-----	-----	-----	-----	-----
Brazil/1727/2002	-----	-----	-----	-----	-----
Aus-Bangkok/109/2002	-----M	-----	-----	-----	-----
Ceara/177/2002	-----	-----	S-----	-----	-----
NIMR-Bratislava/134/2002	-----	-----	-----	-----	-----
Panama/2007/99	-----	-----	S-----	-----	-----
Moscow/10/99	-----	-----	-----	-----	-----
Sydney/5/97	--I-----	-----	-----	-----	-----
NIMR-Poland/6/2002	-----	-----	-----	-----	-----
Fujian/140/2000	-----	--G-----	-----	-----	--A-----
NIMR-Poland/10/2002	-----	-----	-----	-----	-----
	51				100
Consensus	ICDSPHQILD	GENCTLIDAL	LGDPHCDGFQ	NKEWDLFVER	SKAYSNCYPY
Aus-Brisbane/5/2002	-----	-----	-----	--K-----	-----
Aus-Perth/200/2002	-----	-----	-----	--K-----	-----
Aus-Brisbane/6/2002	-----	-----	-----	--K-----	-----
Hong Kong/1550/2002	-----	-----	-----	--K-----	-----S----
Chile/6416/2001	-----	-----	-----	-----	-----
New York/55/2001	-----	-----	-----	-----	-----
Brazil/1732/2002	-----	-----	-----	-----	-----
NIID-Akita/69/2002	-----	-----	-----	-----	-----
Aus-Victoria/512/2002	-----	-----	-----	-----	-----
Brazil/1727/2002	-----	-----	-----	-----I--	-----
Aus-Bangkok/109/2002	-----	-----	-----	-----	-----
Ceara/177/2002	-----	-----	-----	-----	-----
NIMR-Bratislava/134/2002	-----	-----	-----	-----	-----
Panama/2007/99	-----	-----	-----	-----	-----
Moscow/10/99	-----	-----	-----	-----	-----
Sydney/5/97	-----R--	-----	-----	-----	-----
NIMR-Poland/6/2002	-----	-----	-----	-----	-----
Fujian/140/2000	-----	-----	-----	-----	-----
NIMR-Poland/10/2002	-----	-----	-----	-----	-----
	101				150
Consensus	DVPDYVSLRS	LVASSGTLEF	NNESFNWTGV	AQNGTSSACK	RRSDKSFFSR
Aus-Brisbane/5/2002	-----A----	-----	-----	T-----	-----N-----
Aus-Perth/200/2002	-----A----	-----	-----	T-----	-----N-----
Aus-Brisbane/6/2002	-----A----	-----	-----	-----	-----N-----
Hong Kong/1550/2002	-----A----	-----	-----	-----	-----N-----
Chile/6416/2001	-----	-----	-----	-----	-----
New York/55/2001	-----	-----	-----	-----	-----
Brazil/1732/2002	-----	-----	-----	-----	-----
NIID-Akita/69/2002	-----	-----	-----	-----	-----
Aus-Victoria/512/2002	-----	-----	-----	-----	-----
Brazil/1727/2002	-----	-----	-----	-----	-----
Aus-Bangkok/109/2002	-----	-----	-----	-----	-----
Ceara/177/2002	-----	-----	-----	-----	-----
NIMR-Bratislava/134/2002	-----	-----	-----	-----	-----
Panama/2007/99	-----A----	-----	-----	-----	-----N-----
Moscow/10/99	-----A----	-----	-----	-----	-----I-----
Sydney/5/97	-----A----	-----	-----	-----Y----	-S-I-----
NIMR-Poland/6/2002	-----A----	-----	-----	-----	-----IN-----
Fujian/140/2000	-----A----	-----	-----	-----	-----N-----
NIMR-Poland/10/2002	-----A----	-----	-----	-----K-----	-----IN-----

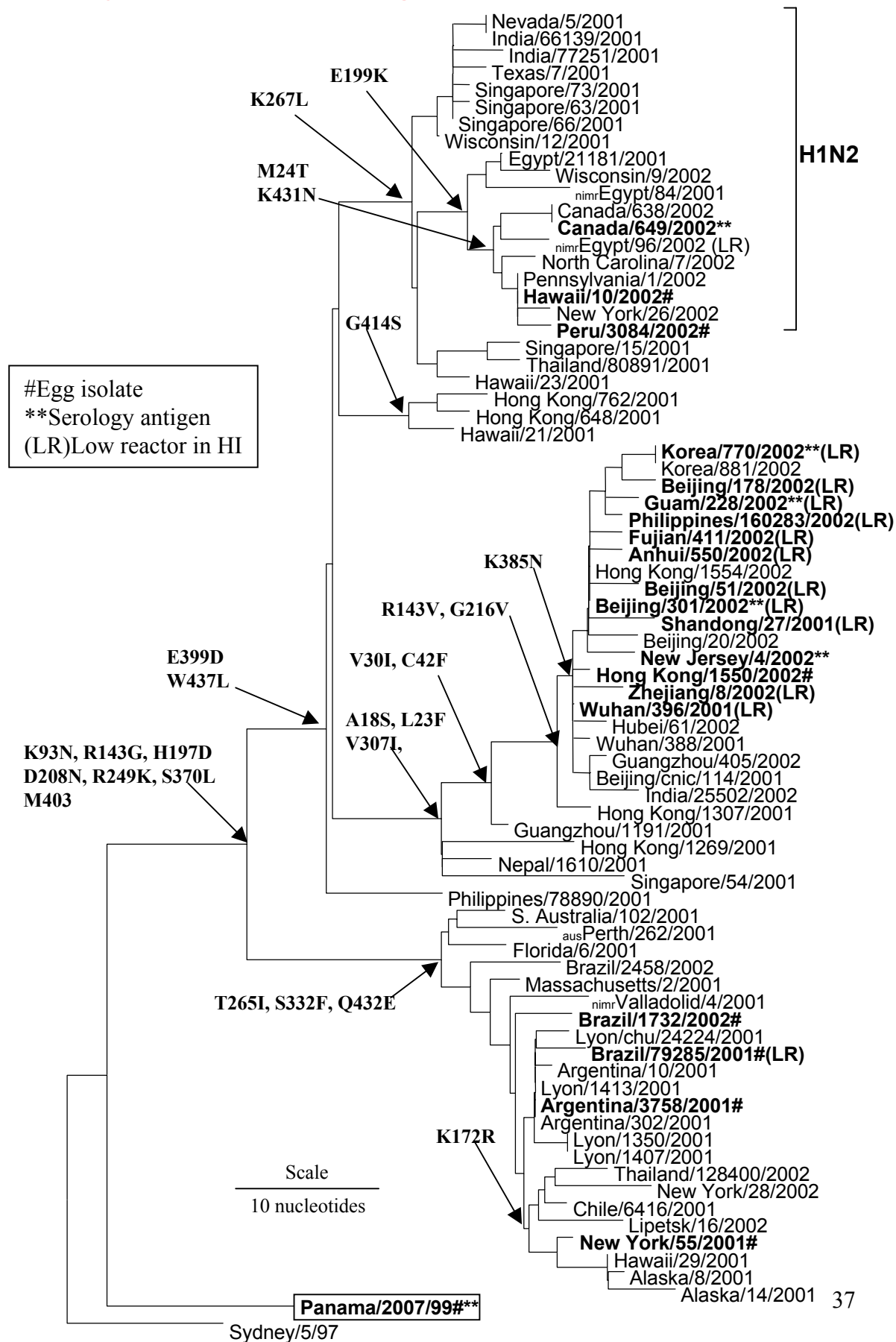
	151			200
Consensus	LNWLHQLKYK	YPALNVTMPN	NEKFDKLYIW	GVHHPGTDSD QISLYAQASG
Aus-Brisbane/5/2002	-----	-----	-----	-----
Aus-Perth/200/2002	-----	-----	-----	---V-----
Aus-Brisbane/6/2002	-----	-----	-----	-----
Hong Kong/1550/2002	-----	-----	-----	---V---I-----
Chile/6416/2001	-----	-----	-----	-----
New York/55/2001	-----	-----	-----	---I-----
Brazil/1732/2002	-----	-----	-----	---I-----
NIID-Akita/69/2002	-----	-----	-----	-----
Aus-Victoria/512/2002	-----	-----	--L-----	-----
Brazil/1727/2002	-----	-----	--L-----	-----
Aus-Bangkok/109/2002	-----	-----	--L-----	-----
Ceara/177/2002	-----	-----	--L-----	-----
NIMR-Bratislava/134/2002	---Y-----	-----	-----	-----T-----
Panama/2007/99	-----	-----	--L--S---	-----
Moscow/10/99	-----R	-----D-----	-----S---	-T---T-----
Sydney/5/97	-----	-----D-----	-----S---	-T-I-----
NIMR-Poland/6/2002	-----R	-----D-----	-----S---	-T---T.P--
Fujian/140/2000	-----	-----	-----S---	---V---P-
NIMR-Poland/10/2002	-----R	-----D-----	-----S---	-T---I.P--
	201			250
Consensus	RVTVSTKRSQ	QTVIPNIGSR	PWVRGVSSRI	SIYWTIVKPG DILLINSTGN
Aus-Brisbane/5/2002	-I-----	-----	-R--D----	-----
Aus-Perth/200/2002	-I-----	-----	-R--D----	-----
Aus-Brisbane/6/2002	-I-----	-----	-R--D----	-----
Hong Kong/1550/2002	-I-----	-----	-R--D----	-----
Chile/6416/2001	-----	-----	H-----	-----K----
New York/55/2001	-----	-----	-----G-	-----
Brazil/1732/2002	-----	-----	-----	-----
NIID-Akita/69/2002	-----	-----	-----	-----
Aus-Victoria/512/2002	-----	-----	-----	-----
Brazil/1727/2002	-----	-----	---I----	-----
Aus-Bangkok/109/2002	-----	-----	-----	-----
Ceara/177/2002	-----	-----	-----	-----
NIMR-Bratislava/134/2002	-----	-----G	-----	-----
Panama/2007/99	-----	-----	-----	-----
Moscow/10/99	-----	-----	---I----	-----
Sydney/5/97	-----	-----	---I----	---H-----
NIMR-Poland/6/2002	---P-----	-----	---I----	-----
Fujian/140/2000	-----	-----	---I----	-----C---
NIMR-Poland/10/2002	-----	-----	---I----	-----
	251			300
Consensus	LIAPRGYFKI	RSGKSSIMRS	DAPIGKCNSE	CITPNGSIPN DKPFQNVNRI
Aus-Brisbane/5/2002	-----	-----	-----	-----
Aus-Perth/200/2002	-----	-----	-----	-----
Aus-Brisbane/6/2002	-----	-----	-----	-----
Hong Kong/1550/2002	-----	-----	H-----	-----
Chile/6416/2001	-----	-----	-----	-----
New York/55/2001	-----	-----	-----	-----
Brazil/1732/2002	-----	-----	-----	-----
NIID-Akita/69/2002	-----	-----	-----	-----
Aus-Victoria/512/2002	-----	-----	-----	-----
Brazil/1727/2002	-----	-----	-----	-----
Aus-Bangkok/109/2002	-----	-----	-----	-----
Ceara/177/2002	-----	-----	-----	G-----
NIMR-Bratislava/134/2002	-----	-----	-----	G-----
Panama/2007/99	-----	-----	-----	-----
Moscow/10/99	-----	-----	-----	-----
Sydney/5/97	-----	-----	-----	-----
NIMR-Poland/6/2002	-----	-----	-----	-----
Fujian/140/2000	-----	-----	-S-----	-----
NIMR-Poland/10/2002	-----	-----	-----	-----

	301	320
Consensus	TYGACPRYVK	QNTLKLATGM
Aus-Brisbane/5/2002	-----	-----
Aus-Perth/200/2002	-----	-----
Aus-Brisbane/6/2002	-----	-----
Hong Kong/1550/2002	-----	-----
Chile/6416/2001	-----	-----
New York/55/2001	-----	-----
Brazil/1732/2002	---P-----	-----
NIID-Akita/69/2002	---P-----	-----
Aus-Victoria/512/2002	-----	-----
Brazil/1727/2002	---P-----	-----
Aus-Bangkok/109/2002	---P-----	-----
Ceara/177/2002	-----	-----
NIMR-Bratislava/134/2002	-----	-----
Panama/2007/99	-----	-----
Moscow/10/99	-----	-----
Sydney/5/97	-----	-----
NIMR-Poland/6/2002	-----N--	-----
Fujian/140/2000	-----	-----
NIMR-Poland/10/2002	-----N----	-----

NEURAMINIDASE INHIBITION TEST OF INFLUENZA N2 VIRUSES (01/10/03)

STRAIN DESIGNATION		FERRET ANTISERA					Date collected
REFERENCE ANIGENS		A PN/2007/99	B Chile/6416/01	C Shzh/499/00	D HI/10/02	E New Cal/20/99	
1 A/Panama/2007/99 (H3N2)		<u>320</u>	80	80	40	<10	07/12/99
2 A/Chile/6416/2001(H3N2)		160	<u>320</u>	160	80	<10	06/14/01
3 A/Shenzhen/499/2001(H3N2)		320	80	<u>320</u>	80	<10	05/22/00
4 A/Hawaii/10/2001(H1N2)		40	40	80	<u>320</u>	<10	03/22/02
5 A/New Caledonia/20/99 (H1N1)		<10	<10	<10	<10	<u>1280</u>	09/01/99
TEST ANIGENS							
6 A/New York/28/2002 (H3N2)		320	320	320	120	<10	10/12/02
7 A/Fujian/411/2002 (H3N2)		160	160	160	80	<10	08/11/02
8 A/Peru/3084/2002 (H1N2)		80	80	80	320	<10	08/13/02
9 A/Canada/638/2002 (H1N2)		80	80	80	320	<10	11/19/02

Evolutionary Relationships Among Influenza A N2 Neuraminidase Genes



Number of Amino Acid Differences from Consensus* N2 Neuraminidase Sequence

Isolate	Passage	AA Diff.	Position Different
A/Hong Kong/1550/2002	E2	1	258
A/Hawaii/10/2002**	E2	12	18, 23, 24, 30, 42, 143, 197, 216, 267, 307, 358, 431
A/Brazil/1732/2002	E2	14	18, 23, 30, 42, 143, 172, 216, 265, 307, 332, 342, 385, 399, 432
A/Panama/2007/99	E3	17	18, 23, 30, 42, 93, 143, 197, 208, 216, 249, 267, 307, 370, 385, 399, 403, 437

*Consensus sequence was generated from 32 viruses isolated from Jan. 2002-present.

**H1N2 virus

COMPARISON OF EGG-GROWN A N2 NEURAMINIDASE GENES TO THE 2002-2003 AMINO ACID CONSENSUS SEQUENCE
(Consensus sequence was generated from 32 viruses isolated from Jan. 2002- present)

	10	30	50	70	90
Consensus	MNPNQKIITIGSVSLTISTICFFMQIAILITTVTLHFKQYEFNSPPNNQVMLCEPTIIERNITEIVYLTNTTIEKEICPKLAEYRNWSKPQCNIITGFAPF				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/Hong Kong/1550/2002					
A/Hawaii/10/2002		A	LT	V	C
A/Brazil/1732/2002		A	L	V	C
A/Panama/2007/99		A	L	V	C
					K
	110	130	150	170	190
Consensus	SKDNSIRLSAGGDIWVTREPYVSCDPKCYQFALGQGTTLNNVHSNDTVHDRTTPYRTLLMNELGVPFHLGTKQVCIAWSSSSCHDGKAWLHVCVTGDDEN				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/Hong Kong/1550/2002					
A/Hawaii/10/2002			G		K
A/Brazil/1732/2002			G	R	
A/Panama/2007/99			R		H
	210	230	250	270	290
Consensus	ATASFIYNGRLVDSIVSWSKKILRTQESECVCINGTCTVMTDGSASGKADTKILFIEEGKIVHTSTLSGSAQHVEECSCYPRYPGVRCVCRDNWKGSNR				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/Hong Kong/1550/2002				K	
A/Hawaii/10/2002		G			L
A/Brazil/1732/2002		G		I	
A/Panama/2007/99	D	G		K	
	310	330	350	370	390
Consensus	PIVDINIKDYSIVSSYVCSGLVGDTPRKNDSSSSSHCLDPNNEEGHGVKGWAFDDGNDVWMGRTISEKLRSQYETFKVIEGWSNPNSKLQINRQVIVDR				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/Hong Kong/1550/2002					
A/Hawaii/10/2002	V				K
A/Brazil/1732/2002	V	F	K		K
A/Panama/2007/99	V			S	K
					E
	410	430	450		
Consensus	GNRSGYSGIFSGVEGKSCINRCFYVELIRGRKQETEVLTWSNSIVVFCGTSQTYGTGSGWPDGADINLMPI				
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+				
A/Hong Kong/1550/2002					
A/Hawaii/10/2002			N		
A/Brazil/1732/2002			E		
A/Panama/2007/99	M		W		

**Hemagglutination Inhibition Antibody Responses to the H3* Component
of the 2002-2003 Influenza Vaccine
ADULT POPULATIONS**

Population	N	Antigen	% Rise	Pre GMT	Post GMT	% with HI titer \geq 40	
						Pre Vaccine	Post Vaccine
USA¹							
	18	A/Panama/2007/99 Resvir-17*	50	14	60	28	88
	18	A/New Jersey/04/2002	50	13	65	22	82
	18	A/Korea/770/2002	50	9	29	17	65
	18	A/Guam/228/2002	50	9	29	17	65
	18	A/Beijing/301/2002	39	7	15	0	29
Australia²							
	24	A/Panama/2007/99 Resvir-17*	75	10	67	8	88
	24	A/New Jersey/04/2002	79	10	90	17	92
	24	A/Korea/770/2002	88	6	38	0	67
	24	A/Guam/228/2002	88	6	39	0	63
	24	A/Beijing/301/2002	54	6	18	0	25
Japan³							
	14	A/Panama/2007/99 Resvir-17*	50	9	24	7	21
	14	A/New Jersey/04/2002	29	11	28	7	50
	14	A/Korea/770/2002	21	6	13	0	14
	14	A/Guam/228/2002	21	7	15	7	21
	14	A/Beijing/301/2002	14	5	8	0	7
UK⁴							
	24	A/Panama/2007/99 Resvir-17*	83	7	87	4	83
	24	A/New Jersey/04/2002	88	8	69	8	79
	24	A/Korea/770/2002	71	6	39	4	63
	24	A/Guam/228/2002	71	6	34	0	58
	24	A/Beijing/301/2002	46	6	16	0	21

Preliminary Data 01/30/2003

*A/Panama/2007/99 is the H3 vaccine component.

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Sichuan/379/99-like hemagglutinin.

2. Sera were kindly provided by Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Sichuan/379/99-like hemagglutinin.

3. Sera were kindly provided by Dr. Takato Odigari, WHO Collaborating Center, Tokyo, Japan. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

4. Sera were kindly provided by Dr. John Wood, NIBSC, Herfordshire, UK. The populations were vaccinated with the 2002-20003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Shangdong/07/97-like hemagglutinin.

**Hemagglutination Inhibition Antibody Responses to the H3* Component
of the 2002-2003 Influenza Vaccine
ELDERLY POPULATIONS**

Population	N	Antigen	% Rise	Pre GMT	Post GMT	% with HI titer \geq 40	
						Pre Vaccine	Post Vaccine
USA¹							
	24	A/Panama/2007/99 Resvir-17*	29	21	38	38	50
	24	A/New Jersey/04/2002	13	22	41	46	67
	24	A/Korea/770/2002	13	12	19	13	22
	24	A/Guam/228/2002	8	13	18	13	26
	24	A/Beijing/301/2002	0	8	9	4	6
Australia²							
	24	A/Panama/2007/99 Resvir-17*	70	13	87	26	83
	24	A/New Jersey/04/2002	65	14	123	30	92
	24	A/Korea/770/2002	70	9	49	9	79
	24	A/Guam/228/2002	61	10	55	13	79
	24	A/Beijing/301/2002	52	7	21	4	29
Japan³							
	26	A/Panama/2007/99 Resvir-17*	54	11	63	19	73
	26	A/New Jersey/04/2002	50	11	46	23	65
	26	A/Korea/770/2002	38	7	22	0	42
	26	A/Guam/228/2002	46	8	25	0	38
	26	A/Beijing/301/2002	31	6	14	0	23
UK⁴							
	24	A/Panama/2007/99 Resvir-17*	79	14	132	29	86
	24	A/New Jersey/04/2002	76	10	166	19	89
	24	A/Korea/770/2002	83	8	66	4	73
	24	A/Guam/228/2002	79	8	62	0	68
	24	A/Beijing/301/2002	75	5	30	0	61

Preliminary Data 01/30/2003

*A/Panama/2007/99 is the H3 vaccine component.

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Sichuan/379/99-like hemagglutinin.

2. Sera were kindly provided by Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Sichuan/379/99-like hemagglutinin.

3. Sera were kindly provided by Dr. Takato Odigari, WHO Collaborating Center, Tokyo, Japan. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

4. Sera were kindly provided by Dr. John Wood, NIBSC, Herfordshire, UK. The populations were vaccinated with the 2002-20003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Shangdong/07/97-like hemagglutinin.

Influenza B Viruses

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HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA TYPE B VIRUSES (01/16/03)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA								Date collected	Passage	HA-NA
REFERENCE ANTIGENS		A SIC/379	B SHI/15	C MOS/16	D SEN/1754	E SHA/07	F HK/330	G HK/1434	H BRI/32	I PER/25		
1. B/SICHUAN/379/99	640	640	1280	320	20	5	20	40	10	12/02/99	E2/E4	Sic-Sic
2. B/SHIZUOKA/15/2001	320	320	320	160	10	5	5	10	5	01/17/01	E3/E2	Sic-Sic
3. B/MOSCOW/16/2002	640	640	1280	320	40	10	20	10	5	02/22/02	E1/E2	Har-Har
4. B/SENDAI/1754/2001	160	320	160	640	20	10	20	10	5	12/01/01	E2/E1	Sic-Sic
5. B/SHANDONG/7/97*	10	5	10	5	640	320	320	640	320	11/03/97	E4/E3	SH-SH
6. B/HONG KONG/330/2001*	10	5	10	5	320	320	640	640	320	04/09/01	E3	HK-HK
7. B/HONG KONG/1434/2002*	10	5	20	5	640	640	640	1280	320	01/15/02	E4	HK-HK
8. B/BRISBANE/32/2002*	10	5	10	5	320	160	320	640	160	07/02/02	E2/E4	SH-Sic
9. B/PERTH/25/2002	5	5	5	5	160	80	80	320	320	07/09/02	XC1/C2	SH-Sic
10 B/SHANGHAI/361/2002*	640	640	1280	n.d.	20	20	20	20	5	06/12/02	E2/E1	Sic-Sic
11 B/MISSOURI/11/2002	5	5	10	5	640	640	640	1280	640	12/12/02	X/C1	SH-Sic
12 B/MISSOURI/12/2002	10	5	10	5	640	640	640	2560	640	12/16/02	X/C1	SH-Sic
13 B/NEVADA/05/2002	10	5	5	5	320	320	320	640	320	12/17/02	X/C2	SH-Sic
14 B/LOUISIANA/07/2002	5	5	5	5	160	160	160	640	640	12/16/02	X/C2	SH-Sic
15 B/LOUISIANA/05/2002	5	5	5	5	80	80	80	160	160	12/14/02	X/C2	SH-Sic
16 B/LOUISIANA/06/2002	5	5	5	5	80	80	40	160	160	12/14/02	X/C2	SH-Sic
17 B/TEXAS/57/2002*	5	5	5	5	160	80	160	320	320	12/04/02	M1/C1	SH-Sic
18 B/TEXAS/67/2002	5	5	5	5	160	320	160	320	160	UNKN	M1/C1	SH-Sic
19 B/TEXAS/65/2002	5	5	5	5	160	160	80	320	320	12/12/02	M1/C1	SH-Sic
20 B/TEXAS/64/2002	5	5	5	5	80	80	80	160	160	12/10/02	M1/C1	SH-Sic
21 B/TEXAS/66/2002	5	5	5	5	80	80	80	160	160	12/18/02	M1/C1	SH-Sic
22 B/TEXAS/68/2002	5	5	5	5	80	40	40	160	160	12/26/02	M1/C1	SH-Sic
23 B/TEXAS/69/2002	5	5	5	5	80	40	40	160	160	12/05/02	X1/C1	SH-Sic
24 B/TEXAS/70/2002	5	5	5	5	80	40	40	160	160	12/19/02	X1/C1	SH-Sic
25 B/ARKANSAS/01/2002	5	5	5	5	80	80	80	160	160	12/11/02	X1/C1	SH-Sic
26 B/JAPAN/843/2002	5	5	5	5	80	160	160	160	160	12/05/02	X/C1	HK-Sic
27 B/JAPAN/9332002	5	5	5	5	160	80	80	320	320	12/08/02	X/C1	SH-Sic

* Serology antigens

HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA TYPE B VIRUSES (01/29/03)

STRAIN DESIGNATION		REFERENCE FERRET ANTISERA									Date	Passage	HA-NA
REFERENCE ANTIGENS		A SIC/379	B SHI/15	C MOS/16	D SEN/1754	E SHA/07	F HK/330	G HK/1434	H BRI/32	I PER/25	collected		
1	C B/SICHUAN/379/99	1280	640	1280	640	20	5	40	40	5	12/02/99	E2/E4	Sic-Sic
2	J B/SHIZUOKA/15/2001	160	320	320	160	10	5	10	10	5	01/17/01	E3/E2	Sic-Sic
3	U B/MOSCOW/16/2002	320	320	640	160	10	5	20	10	5	02/22/02	E1/E2	Har-Har
4	J B/SENDAI/1754/2001	160	320	160	640	20	5	20	10	5	12/01/01	E2/E1	Sic-Sic
5	C B/SHANDONG/7/97*	10	5	10	5	320	320	320	640	160	11/03/97	E4/E3	SH-SH
6	H B/HONG KONG/330/2001*	5	5	5	5	320	640	320	640	160	04/09/01	E3	HK-HK
7	H B/HONG KONG/1434/2002*	10	5	10	5	640	640	640	1280	320	01/15/02	E4	HK-HK
8	A B/BRISBANE/32/2002*	5	5	10	5	320	160	160	640	160	07/02/02	E2/E4	SH-Sic
9	A B/PERTH/25/2002	5	5	5	5	160	160	80	320	320	07/09/02	XC1/C2	SH-Sic

TEST ANTIGENS

10	B/TEXAS/71/2002	5	5	5	5	160	160	80	320	320	12/20/02	M1/C1	SH-Sic
11	B/TEXAS/68/2002	5	5	5	5	160	80	80	320	320	12/26/02	M1/C1	SH-Sic
12	B/TEXAS/70/2002	5	5	5	5	80	80	80	160	160	12/19/02	X1/C1	SH-Sic
13	B/N. CAROLINA/07/2002	5	5	5	5	160	80	80	320	320	12/02/02	M1/C1	SH-Sic
14	B/N. CAROLINA/08/2002	5	5	5	5	160	160	80	320	320	12/02/02	M1/C1	SH-Sic
15	B/ARKANSAS/01/2002	5	5	5	5	160	160	80	320	320	12/11/02	X1/C1	SH-Sic
16	B/WISCONSIN/01/2003	10	5	5	5	160	160	160	640	320	01/01/03	C1/C1	SH-Sic
17	B/LOUISIANA/08/2002	10	5	5	5	320	320	160	640	640	12/26/02	X/C1	SH-Sic
18	B/LOUISIANA/09/2002	5	5	5	5	160	80	80	320	320	12/30/02	X/C2	SH-Sic
19	B/MEXICO/963/2002	5	5	5	5	160	80	80	320	320	12/12/02	C3/C1	SH-Sic
20	B/ENGLAND/450/2002	5	5	5	5	320	160	160	640	640	12/20/02	C1/C1	SH-Sic
21	B/EGYPT/914609/2002	5	5	5	5	160	160	160	320	320	08/19/02	C2/C1	SH-Sic
22	B/EGYPT/914642/2002	5	5	5	5	160	160	160	320	320	08/22/02	C2/C1	SH-Sic
23	B/PHILIPPINES/199562/2002	5	5	5	5	80	160	160	320	160	11/20/02	XC	SH-Sic
24	B/PHILIPPINES/198424/2002	10	5	5	10	160	160	160	640	320	11/20/02	XC	SH-Sic
25	B/PHILIPPINES/1159027/2002	5	5	5	5	80	160	160	320	160	12/09/02	XC	SH-Sic
26	B/PHILIPPINES/199104/2002	5	5	5	5	80	80	80	160	160	11/26/02	XC	SH-Sic
27	B/JAPAN/1097/2002	10	5	20	5	1280	1280	1280	2560	640	12/18/02	X/C1	SH-Sic
28	B/JAPAN/980/2002	5	5	5	5	80	160	160	160	160	12/16/02	X/C1	SH-Sic
29	B/JAPAN/995/2002	5	5	5	5	160	80	80	320	320	12/14/02	X/C1	SH-Sic
30	B/TAIWAN/1517/2002	10	5	10	5	1280	1280	1280	2560	640	11/09/02	C2/C1	SH-Sic
31	B/TAIWAN/1519/2002	5	5	5	5	160	80	80	320	320	12/20/02	C2/C1	SH-Sic
32	B/SHENZHEN/658/2002	5	5	5	5	640	1280	640	2560	640	11/04/02	E2C1/C1	SH-Sic
33	B/SHENZHEN/669/2002	10	5	10	5	640	1280	1280	2560	640	11/04/02	E2C1/C1	SH-Sic
34	B/SHENZHEN/656/2002	5	5	10	5	640	1280	640	2560	640	11/05/02	E2C1/C1	SH-Sic
35	B/SHENZHEN/689/2002	10	5	10	5	320	1280	640	1280	640	11/05/02	E2C3/C1	SH-Sic
36	B/SHENZHEN/646/2002	10	5	10	5	320	1280	640	1280	640	11/04/02	E2C3/C1	SH-Sic
37	B/ANHUI/562/2002	5	5	5	5	40	160	160	160	80	12/08/02	C2/C1	SH-Sic
38	B/FUJIAN/712/2002	5	5	5	5	40	160	160	160	80	12/02/02	C1/C1	SH-Sic
39	B/TIANJIN/130/2002	5	5	5	5	160	160	160	640	160	12/18/02	C1/C1	SH-Sic
40	B/TIANJIN/192/2002	10	5	5	5	160	160	160	640	320	12/16/02	C1/C1	SH-Sic
41	B/TIANJIN/189/2002	5	5	5	5	160	160	160	640	320	12/17/02	C1/C1	SH-Sic
42	B/BEIJING/171/2002	5	5	5	5	80	160	160	320	80	11/22/02	C1/C1	SH-Sic
43	B/GUANGZHOU/895/2002	10	10	5	5	640	1280	640	1280	320	10/25/02	C2/C1	HK-Sic
44	B/HUBEI/447/2002	5	5	5	5	80	640	320	320	160	12/01/02	C1/C1	HK-Sic
45	B/BEIJING/169/2002	5	5	5	5	80	320	320	320	80	11/22/02	C1/C1	HK-Sic
46	B/TIANJIN/170/2002	5	5	5	5	80	160	160	320	160	12/14/02	C2/C1	HK-Sic
47	B/TIANJIN/176/2002	5	5	5	5	80	160	80	320	160	12/16/02	C2/C1	HK-Sic
48	B/GUANGZHOU/958/2002	5	5	5	5	40	160	160	160	80	11/11/02	C2/C1	HK-HK

* Serology antigens

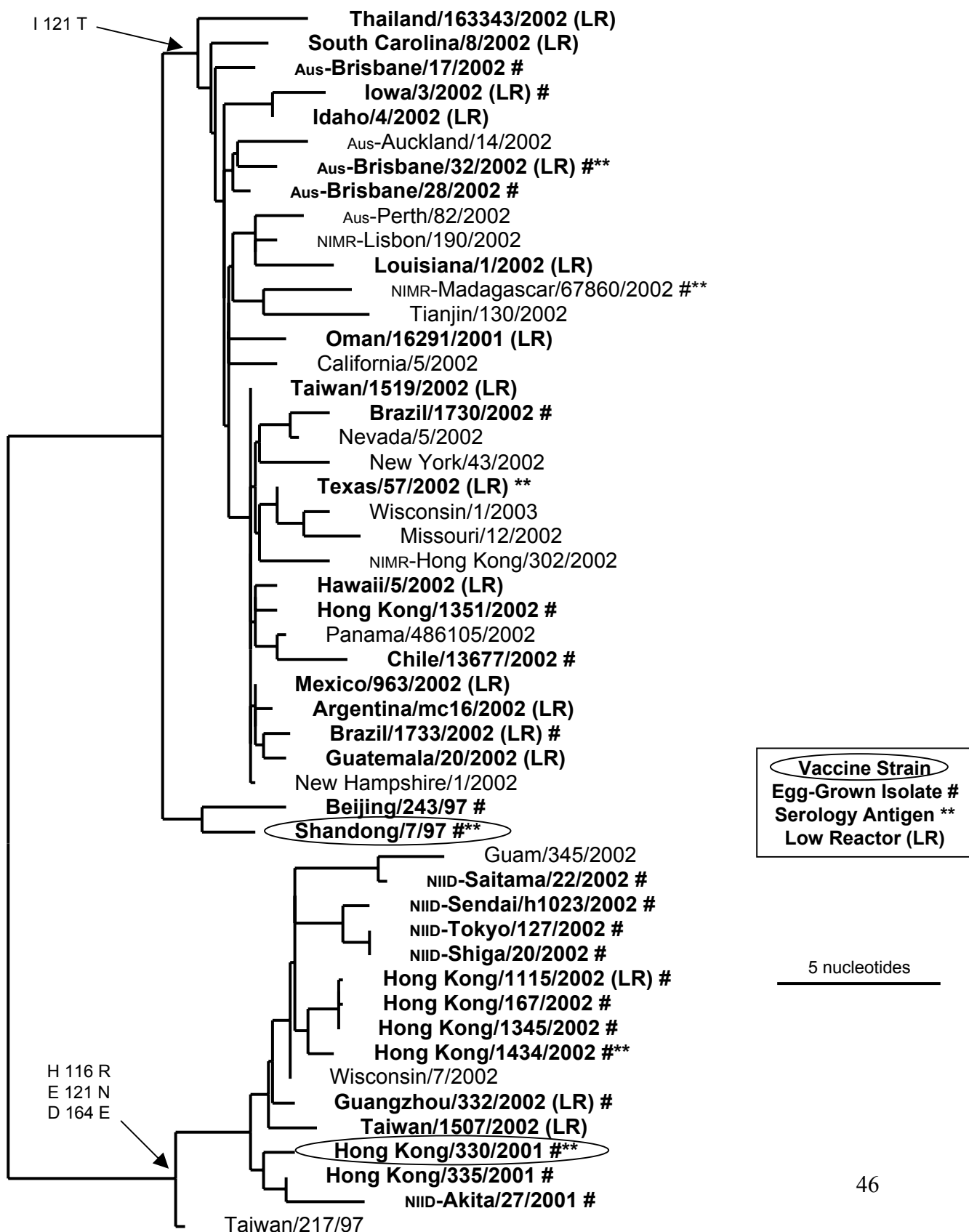
Influenza B Isolates Characterized by CDC

	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2001 - September 2001							
B/Beijing/243/97-like	5			2			7 (3.5%)
B/Hong Kong/22/2001-like	21			18			39 (19.5%)
B/Sichuan/379/99-like	9		7	41	39	7	103 (51.5%)
B/Sichuan/379/99 (low)	2	1	5	22	20	1	51 (25.5%)
						Total	200
October 2001 - March 2002							
B/Hong Kong/330/2001-like	86	3		41			130 (33%)
B/HK/330/2001-like (low)	71	2		17			90 (22%)
B/Sichuan/379/99-like	14		26	27	6	2	75 (19%)
B/Sichuan/379/99 (low)	50	1	8	44		2	105 (26%)
						Total	400
April 2002 - September 2002							
B/Hong Kong/330/2001-like	56			22	57	17	152 (43%)
B/Brisbane/32/2002-like (low)	41			68	48	15	172 (49%)
B/Sichuan/379/99-like	2			10	2		14 (4%)
B/Sichuan/379/99 (low)	1			6	8		15 (4%)
						Total	353
October 2002 - March 2003							
B/Hong Kong/330/2001-like	13		1	35			49 (43%)
B/Brisbane/32/2002-like	34	1		21			56 (50%)
B/Sichuan/379/99-like				2	4		6 (5%)
B/Sichuan/379/99 (low)					2		2 (2%)
						Total	113
Total	405	8	47	376	186	44	1066

Preliminary Data

02/04/2003

EVOLUTIONARY RELATIONSHIPS AMONG INFLUENZA B HA1 GENES (VICTORIA LINEAGE)



**Number of Amino Acid Differences from
B/Victoria/2/87-like Consensus HA1 Sequence**

Isolate	Passage	Date Isolated	No. of Differences	Positions Different
Shandong/7/97*	e4/e2	11/03/97	2	121, 199
Aus-Brisbane/32/2002*	e2	07/02/02	1	74
Brazil/1730/2002*	e2/e1	06/05/02	1	199
Brazil/1733/2002	e1/e1	06/25/02	1	199
Chile/13677/2002	e2/e1	09/30/02	1	197
Hong Kong/1351/2002*	e1	01/17/02	1	197
Aus-Brisbane/28/2002*	e2	06/27/02	1	197
Iowa/3/2002	e2	03/19/02	2	188, 199
NIMR-Madagascar/67860/2002*	ex	11/12/02	2	146, 199
Hong Kong/330/2001*	e2	04/09/01	4	116, 121, 164, 197
Hong Kong/1115/2002	e2	01/15/02	4	116, 121, 129, 164
Hong Kong/1115/2002*	e5	01/15/02	5	116, 121, 129, 164, 199
Hong Kong/167/2002	e3	01/03/02	5	116, 121, 129, 164, 199
Hong Kong/1345/2002	e3	01/17/02	5	116, 121, 129, 164, 199
Hong Kong/1434/2002*	e3	01/15/02	5	116, 121, 129, 164, 197
NIID-Akita/27/2001	e3/e1	Unk.	5	116, 121, 129, 164, 199

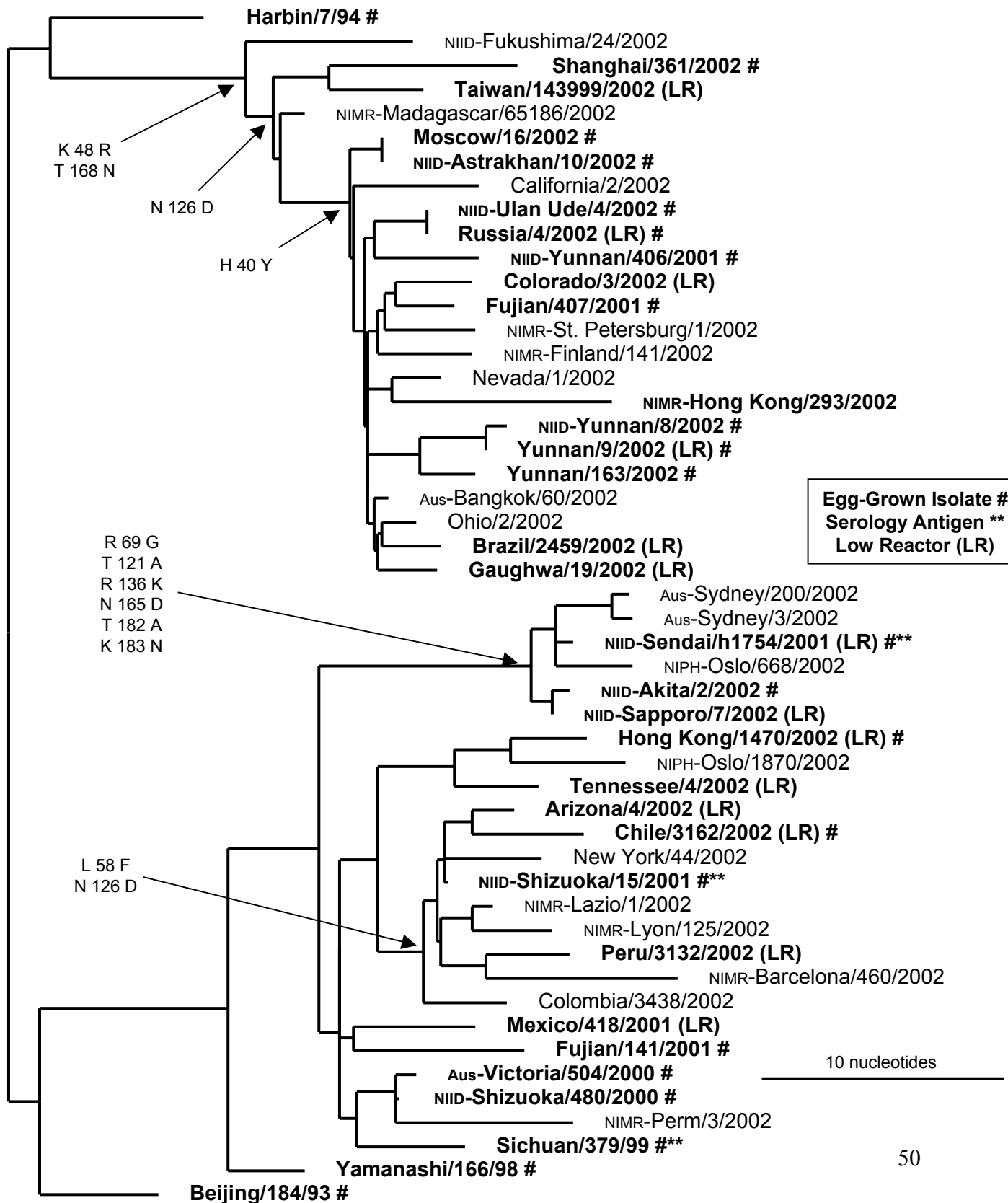
*** Serology Antigens**

COMPARISON OF EGG-GROWN TYPE B HA1 GENES (VICTORIA LINEAGE) TO THE 2002 CONSENSUS AMINO ACID SEQUENCE

	1				50
Consensus	DRICTGITSS	NSPHVVKTAT	QGEVNVTVGI	PLTTPTPKSH	FANLKGTKTR
Hong Kong/115/2002	-----	-----	-----	-----	-----
Hong Kong/1345/2002	-----	-----	-----	-----	-----
Hong Kong/167/2002	-----	-----	-----	-----	-----
NIID-Tokyo/127/2002	-----	-----	-----	-----	-----
Guangzhou/332/2002	-----	-----	-----	-----	-----
NIID-Akita/27/2001	-----	-----	-----	-----	-----
NIID-Shiga/20/2002	-----	-----	-----	-----	-----
Hong Kong/335/2001	-----	-----	-----	-----	-----
Hong Kong/330/2001	-----	-----	-----	-----	-----
Brazil/1733/2002	-----	-----	-----	-----	-----
Iowa/3/2002	-----	-----	-----	-----	-----
Shandong/7/97	-----	-----	-----	-----	-----
Aus-Brisbane/28/2002	-----	-----	-----	-----	-----
Chile/13677/2002	-----	-----	-----	-----	-----
Hong Kong/1351/2002	-----	-----	-----	-----	-----
Brazil/1730/2002	-----	-----	-----	-----	-----
NIMR-Madagascar/67860/2002	-----	-----	-----	-----	-----
Aus-Brisbane/32/2002	-----	-----	-----	-----	-----
Aus-Brisbane/17/2002	-----	-----	-----	-----	-----
	51				100
Consensus	GKLCPKCLNC	TDLDVALGRP	KCTGNIPSAK	VSILHEVRPV	TSGCFPI MHD
Hong Kong/115/2002	-----	-----	-----	-----	-----
Hong Kong/1345/2002	-----	-----	-----	-----	-----
Hong Kong/167/2002	-----	-----	-----	-----	-----
NIID-Tokyo/127/2002	-----	-----	-----	-----	-----
Guangzhou/332/2002	-----	-----	-----	-----	-----
NIID-Akita/27/2001	-----	-----	-----	-----	-----
NIID-Shiga/20/2002	-----	-----	-----	-----	-----
Hong Kong/335/2001	-----	-----	-----	-----	-----
Hong Kong/330/2001	-----	-----	-----	-----	-----
Brazil/1733/2002	-----	-----	-----	-----	-----
Iowa/3/2002	-----	-----	-----	-----	-----
Shandong/7/97	-----	-----	-----	-----	-----
Aus-Brisbane/28/2002	-----	-----	-----	-----	-----
Chile/13677/2002	-----	-----	-----	-----	-----
Hong Kong/1351/2002	-----	-----	-----	-----	-----
Brazil/1730/2002	-----	-----	-----	-----	-----
NIMR-Madagascar/67860/2002	-----	-----	-----	-----	-----
Aus-Brisbane/32/2002	-----	-----	-E-	-----	-----
Aus-Brisbane/17/2002	-----	-----	-----	-----	-----
	101				150
Consensus	RTKIRQLPNL	LRGYEHIRLS	THNVINA EKA	PGGPYKIGTS	GSCPNTVNGN
Hong Kong/115/2002	-----	-----R-----	N-----E-	-----	-----
Hong Kong/1345/2002	-----	-----R-----	N-----E-	-----	-----
Hong Kong/167/2002	-----	-----R-----	N-----E-	-----	-----
NIID-Tokyo/127/2002	-----	-----R-----	N-----	-----	-----
Guangzhou/332/2002	-----	-----R-----	N-----E-	-----	-----
NIID-Akita/27/2001	-----	-----R-----	N-----E-	-----	-----
NIID-Shiga/20/2002	-----	-----R-----	N-----	-----	-----
Hong Kong/335/2001	-----	-----R-----	N-----	-----	-----
Hong Kong/330/2001	-----	-----R-----	N-----	-----	-----
Brazil/1733/2002	-----	-----	-----	-----	-----
Iowa/3/2002	-----	-----	-----	-----	-----
Shandong/7/97	-----	-----	I-----	-----	-----
Aus-Brisbane/28/2002	-----	-----	-----	-----	-----
Chile/13677/2002	-----	-----	-----	-----	-----
Hong Kong/1351/2002	-----	-----	-----	-----	-----
Brazil/1730/2002	-----	-----	-----	-----	-----
NIMR-Madagascar/67860/2002	-----	-----	-----	-----	I-----
Aus-Brisbane/32/2002	-----	-----	-----	-----	-----
egg.msf{a-bb172002}	-----	-----N-----	-----	-----	-----

	151		200
Consensus	GFFATMAWAV	PKNDNNKTAT	NSLTIEVPYI CTEGEDQITV WGFHSDNETQ
Hong Kong/115/2002	-----E-----	-----	-----I-
Hong Kong/1345/2002	-----E-----	-----	-----I-
Hong Kong/167/2002	-----E-----	-----	-----I-
NIID-Tokyo/127/2002	-----E-----	-----	-----I-
Guangzhou/332/2002	-----E-----	-----	-----
NIID-Akita/27/2001	-----E-----	-----	-----A-
NIID-Shiga/20/2002	-----E-----	-----	-----I-
Hong Kong/335/2001	-----E-----	-----	-----A-
Hong Kong/330/2001	-----E-----	-----	-----S---
Brazil/1733/2002	-----	-----	-----N-
Iowa/3/2002	-----	-----	-----1--N-
Shandong/7/97	-----	-----	-----N-
Aus-Brisbane/28/2002	-----	-----	-----S---
Chile/13677/2002	-----	-----	-----S---
Hong Kong/1351/2002	-----	-----	-----K---
Brazil/1730/2002	-----	-----	-----A-
NIMR-Madagascar/67860/2002	-----	-----	-----A-
Aus-Brisbane/32/2002	-----	-----	-----
Aus-Brisbane/17/2002	-----	-----	-----I-
	201		250
Consensus	MAKLYGDSKP	QKFTSSANGV	TTHYVSQIGG FPNQTEDGGL PQSGRIVVDY
Hong Kong/115/2002	-----	-----	-----
Hong Kong/1345/2002	-----	-----	-----
Hong Kong/167/2002	-----	-----	-----
NIID-Tokyo/127/2002	-----	-----	-----
Guangzhou/332/2002	-----	-----	-----
NIID-Akita/27/2001	-----	-----	-----
NIID-Shiga/20/2002	-----	-----	-----
Hong Kong/335/2001	-----	-----	-----
Hong Kong/330/2001	-----	-----	-----
Brazil/1733/2002	-----	-----	-----
Iowa/3/2002	-----	-----	-----
Shandong/7/97	-----	-----	-----
Aus-Brisbane/28/2002	-----	-----	-----
Chile/13677/2002	-----	-----	-----
Hong Kong/1351/2002	-----	-----	-----
Brazil/1730/2002	-----	-----	-----
NIMR-Madagascar/67860/2002	-----	-----	-----
Aus-Brisbane/32/2002	-----	-----	-----
Aus-Brisbane/17/2002	-----	-----	-----
	251		300
Consensus	MVQKSGKTGT	ITYQRGILLP	QKVWCASGRS KVIKGSLLPI GEADCLHEKY
Hong Kong/115/2002	-----	-----	-----
Hong Kong/1345/2002	-----	-----	-----
Hong Kong/167/2002	-----	-----	-----
NIID-Tokyo/127/2002	-----	-----	-----
Guangzhou/332/2002	-----	-----	-----
NIID-Akita/27/2001	-----	-----	-----
NIID-Shiga/20/2002	-----	-----	-----
Hong Kong/335/2001	-----	-----	-----
Hong Kong/330/2001	-----	-----	-----
Brazil/1733/2002	-----	-----	-----
Iowa/3/2002	-----	-----	-----
Shandong/7/97	-----	-----	-----
Aus-Brisbane/28/2002	-----	-----	-----
Chile/13677/2002	-----	-----	-----
Hong Kong/1351/2002	-----	-----	-----
Brazil/1730/2002	-----	-----	-----
NIMR-Madagascar/67860/2002	-----	-----	-----
Aus-Brisbane/32/2002	-----	-----	-----
Aus-Brisbane/17/2002	-----	-----	-----

EVOLUTIONARY RELATIONSHIPS AMONG INFLUENZA B HA1 GENES (YAMAGATA LINEAGE)



Number of Amino Acid Differences from B/Sichuan/379/99-like Consensus HA1 Sequence

Isolate	Passage	Date Isolated	No. of aa diff	Positions Different
Shanghai/361/2002	e2/e1	06/12/02	3	37, 131, 197
Moscow/16/2002	e1/e1	02/22/02	3	40, 180, 197
Russia/4/2002	e2/e1	03/04/02	4	40, 69, 180, 199
Yunnan/9/2002	e2/e1	01/07/02	5	40, 128, 173, 180, 199
Yamanashi/166/98	e2/e7	02/21/98	11	48, 56, 75, 116, 126, 149, 168, 179, 183, 184, 267
Chile/3162/2002	e2/e2	03/14/02	12	29, 48, 56, 58, 75, 116, 162, 164, 183, 184, 220, 267
NIID-Shizuoka/15/2001*	e3/e2	01/17/01	13	29, 48, 56, 58, 75, 116, 162, 164, 168, 179, 183, 184, 220, 267
Fujian/407/2001	e1	07/30/01	14	29, 48, 56, 75, 116, 162, 164, 168, 179, 183, 184, 199, 220, 267
Fujian/141/2001	e2/e2	04/24/01	14	29, 48, 56, 75, 116, 162, 164, 168, 179, 183, 184, 199, 220, 267
Sichuan/379/99*	e2	12/02/99	15	29, 48, 56, 75, 87, 88, 116, 126, 162, 168, 179, 183, 184, 220, 267
Aus-Victoria/504/2000*	cek1e12/e1	Unk.	15	29, 48, 56, 75, 88, 116, 126, 162, 168, 179, 183, 184, 220, 233, 267
NIID-Shizuoka/480/2000	e1/e5	Unk.	15	29, 48, 56, 75, 88, 116, 126, 162, 168, 179, 183, 184, 220, 233, 267
Hong Kong/1470/2002	e2	01/18/02	16	29, 48, 56, 75, 116, 126, 129, 162, 164, 168, 175, 179, 183, 184, 220, 267
NIID-Sendai/h1754/2001*	e1/e1	12/01/01	19	29, 48, 56, 69, 75, 116, 121, 126, 136, 162, 165, 168, 179, 182, 183, 184, 200, 220, 267
Aus-Sydney/200/2002	e4	11/02/02	19	29, 48, 56, 69, 75, 116, 121, 126, 136, 162, 165, 168, 179, 182, 183, 184, 199, 220, 267

*** Serology Antigens**

COMPARISON OF EGG-GROWN TYPE B HA1 GENES (YAMAGATA LINEAGE) TO THE 2002 CONSENSUS AMINO ACID SEQUENCE

	1				50
Consensus	DRICTGITSS	NSPHVVKTAT	QGEVNVTVGI	PLTTTPTKSH	FANLKGTRTR
Aus-Sydney/200/2002	-----	-----	-----A-	-----	-----K--
NIID-Sendai/H1754/2001	-----	-----	-----A-	-----	-----K--
Aus-Victoria/504/2000	-----	-----	-----A-	-----	-----K--
NIID-Shizuoka/480/2000	-----	-----	-----A-	-----	-----K--
Sichuan/379/99	-----	-----	-----A-	-----	-----K--
Hong Kong/1470/2002	-----	-----	-----A-	-----	-----K--
Chile/3162/2002	-----	-----	-----A-	-----	-----K--
NIID-Shizuoka/15/2001	-----	-----	-----A-	-----	-----K--
Fujian/141/2001	-----	-----	-----A-	-----	-----K--
Yamanashi/166/98	-----	-----	-----	-----	-----K--
NIID-Yunnan/8/2002	-----	-----	-----	-----Y	-----
Yunnan/9/2002	-----	-----	-----	-----Y	-----
Yunnan/163/2002	-----	-----	-----	-----Y	-----
Moscow/16/2002	-----	-----	-----	-----Y	-----
NIID-Astrakhan/10/2002	-----	-----	-----	-----Y	-----
Fujian/407/2001	-----	-----	-----	-----Y	-----
NIID-Ulan Ude/4/2002	-----	-----	-----	-----Y	-----
Russia/4/2002	-----	-----	-----	-----Y	-----
NIID-Yunnan/406/2001	-----	-----	-----	-----Y	-----
Shanghai/361/2002	-----	-----	-----	I--	-----
Harbin/7/94	-----	-----	-----	-----	-----K--
	51				100
Consensus	GKLCPDCLNC	TDL DVALGRP	MCVGTTPSAK	ASILHEVRPV	TSGCFPIIMHD
Aus-Sydney/200/2002	----T----	-----G-	----I----	-----	-----
NIID-Sendai/H1754/2001	----T----	-----G-	----I----	-----	-----
Aus-Victoria/504/2000	----T----	-----	----I----	-----K--	-----
NIID-Shizuoka/480/2000	----T----	-----	----I----	-----K--	-----
Sichuan/379/99	----T----	-----	----I----	-----IK--	-----
Hong Kong/1470/2002	----T----	-----	----I----	-----	-----
Chile/3162/2002	----T-F--	-----	----I----	-----	-----
NIID-Shizuoka/15/2001	----T-F--	-----	----I----	-----	-----
Fujian/141/2001	----T----	-----	----I----	-----	-----
Yamanashi/166/98	----T----	-----	----V----	-----	-----
NIID-Yunnan/8/2002	-----	-----	-----	-----	-----
Yunnan/9/2002	-----	-----	-----	-----	-----
Yunnan/163/2002	-----	-----	-----	-----	-----
Moscow/16/2002	-----	-----	-----	-----	-----
NIID-Astrakhan/10/2002	-----	-----	-----	-----	-----
Fujian/407/2001	-N-----	-----	-----	-----	-----
NIID-Ulan Ude/4/2002	-----	-----I-	-----	-----	-----
Russia/4/2002	-----	-----I-	-----	-----	-----
NIID-Yunnan/406/2001	-----	-----	-----	-----	-----
Shanghai/361/2002	-----	-----	-----	-----	-----
Harbin/7/94	-----N----	-----	-----V-	-----	-----
	101				150
Consensus	RTKIRQLPNL	LRGYENIRLS	TQNVIDAEKA	PGGPYRLGTS	GSCPNATSKS
Aus-Sydney/200/2002	-----	-----K----	A----N----	-----K----	-----
NIID-Sendai/H1754/2001	-----	-----K----	A----N----	-----K----	-----
Aus-Victoria/504/2000	-----	-----K----	-----N----	-----	-----
NIID-Shizuoka/480/2000	-----	-----K----	-----N----	-----	-----
Sichuan/379/99	-----	-----K----	-----N----	-----	-----
Hong Kong/1470/2002	-----	-----K----	-----N-E-	-----	-----
Chile/3162/2002	-----	-----K----	-----	-----	-----
NIID-Shizuoka/15/2001	-----	-----K----	-----	-----	-----
Fujian/141/2001	-----	-----K----	-----	-----	-----
Yamanashi/166/98	-----	-----K----	-----N----	-----	-----R-
NIID-Yunnan/8/2002	-----	-----	-----G--	-----	-----T----
Yunnan/9/2002	-----	-----	-----G--	-----	-----
Yunnan/163/2002	-----	-----	-----G--	-----	-----
Moscow/16/2002	-----	-----	-----	-----	-----
NIID-Astrakhan/10/2002	-----	-----	-----	-----	-----
Fujian/407/2001	-----	-----	-----	-----	-----
NIID-Ulan Ude/4/2002	-----	-----	-----	-----	-----
Russia/4/2002	-----	-----	-----	-----	-----
NIID-Yunnan/406/2001	-----	-----	-----	-----	-----
Shanghai/361/2002	-----	-----	-----	L--	-----
Harbin/7/94	-----	-----	-----N----	-----	-----R-

	151		200
Consensus	GFFATMAWAV	PK-DNNKNAT	NPLTVEVPYI CTEGEDQITV WGFHSDNKTQ
Aus-Sydney/200/2002	-----	-R.-D--T--	-----H- -ANE-----I-
NIID-Sendai/H1754/2001	-----	-R.-D--T--	-----H- -ANE-----P
Aus-Victoria/504/2000	-----	-R.---T--	-----H- --KE-----
NIID-Shizuoka/480/2000	-----	-R.---T--	-----H- --KE-----
Sichuan/379/99	-----	-R.---T--	-----H- --KE-----
Hong Kong/1470/2002	-----	-R.E---T--	-----I--H- --KE-----
Chile/3162/2002	-----	-R.Q---T--	-----H- --KE-----
NIID-Shizuoka/15/2001	-----	-R.---T--	-----H- --KE-----
Fujian/141/2001	-----	-R.E---T--	-----H- --KE-----A-
Yamanashi/166/98	-----	--.---T--	-----H- --KE-----
NIID-Yunnan/8/2002	-----	--.-----	--Q-----V -----I-
Yunnan/9/2002	-----	--.-----	--Q-----V -----I-
Yunnan/163/2002	-----	--.-----	--Q-----V -----D--
Moscow/16/2002	-----	--.-----	-----V -----D--
NIID-Astrakhan/10/2002	-----	--.-----	-----V -----D-x-
Fujian/407/2001	-----	--.-----	-----I--V -----
NIID-Ulan Ude/4/2002	-----	--.-----	-----V -----I-
Russia/4/2002	-----	--.-----	-----V -----I-
NIID-Yunnan/406/2001	-----	--.-----	-----I--V -----I-
Shanghai/361/2002	-----	--.-----	-----V -----D--
Harbin/7/94	-----	-R.-D--T--	-----V -----A-
	201		250
Consensus	MKNLYGDSNP	QKFTSSANGV	TTHYVSQIGG FPDQTEDGGL PQSGRIVVDY
Aus-Sydney/200/2002	-----	-----	-----I -----
NIID-Sendai/H1754/2001	-----	-----	-----I -----
Aus-Victoria/504/2000	-----	-----	-----I -----E-----
NIID-Shizuoka/480/2000	-----	-----	-----I -----E-----
Sichuan/379/99	-----	-----	-----I -----
Hong Kong/1470/2002	-----	-----	-----I -----
Chile/3162/2002	-----	-----	-----I -----
NIID-Shizuoka/15/2001	-----	-----	-----I -----
Fujian/141/2001	-----	-----	-----I -----
Yamanashi/166/98	-----	-----	-----I -----
NIID-Yunnan/8/2002	-----	-----	-----I -----
Yunnan/9/2002	-----	-----	-----I -----
Yunnan/163/2002	-----	-----	-----I -----
Moscow/16/2002	-----	-----	-----I -----
NIID-Astrakhan/10/2002	-----	-----	-----I -----
Fujian/407/2001	-----	-----	-----I -----
NIID-Ulan Ude/4/2002	-----	-----	-----I -----
Russia/4/2002	-----	-----	-----I -----
NIID-Yunnan/406/2001	-----	-----	-----I -----
Shanghai/361/2002	-----	-----	-----I -----
Harbin/7/94	-----	-----	-----I -----
	251		300
Consensus	MVQKPGKTGT	IVYQRGVLLP	QKVWCASGRS KVIKGSPLPI GEADCLHEKY
Aus-Sydney/200/2002	-----	-----I---	-----I-----
NIID-Sendai/H1754/2001	-----	-----I---	-----I-----
Aus-Victoria/504/2000	-----	-----I---	-----I-----
NIID-Shizuoka/480/2000	-----	-----I---	-----I-----
Sichuan/379/99	-----	-----I---	-----I-----
Hong Kong/1470/2002	-----	-----I---	-----I-----
Chile/3162/2002	-----	-----I---	-----I-----
NIID-Shizuoka/15/2001	-----	-----I---	-----I-----
Fujian/141/2001	-----	-----I---	-----I-----
Yamanashi/166/98	-----	-----I---	-----I-----
NIID-Yunnan/8/2002	-----	-----I---	-----I-----
Yunnan/9/2002	-----	-----I---	-----I-----
Yunnan/163/2002	-----	-----I---	-----I-----
Moscow/16/2002	-----	-----I---	-----I-----
NIID-Astrakhan/10/2002	-----	-----I---	-----I-----
Fujian/407/2001	-----	-----I---	-----I-----
NIID-Ulan Ude/4/2002	-----	-----I---	-----I-----
Russia/4/2002	-----	-----I---	-----I-----
NIID-Yunnan/406/2001	-----	-----I---	-----I-----
Shanghai/361/2002	-----	-----I---	-----I-----
Harbin/7/94	-----	-----I---	-----I-----

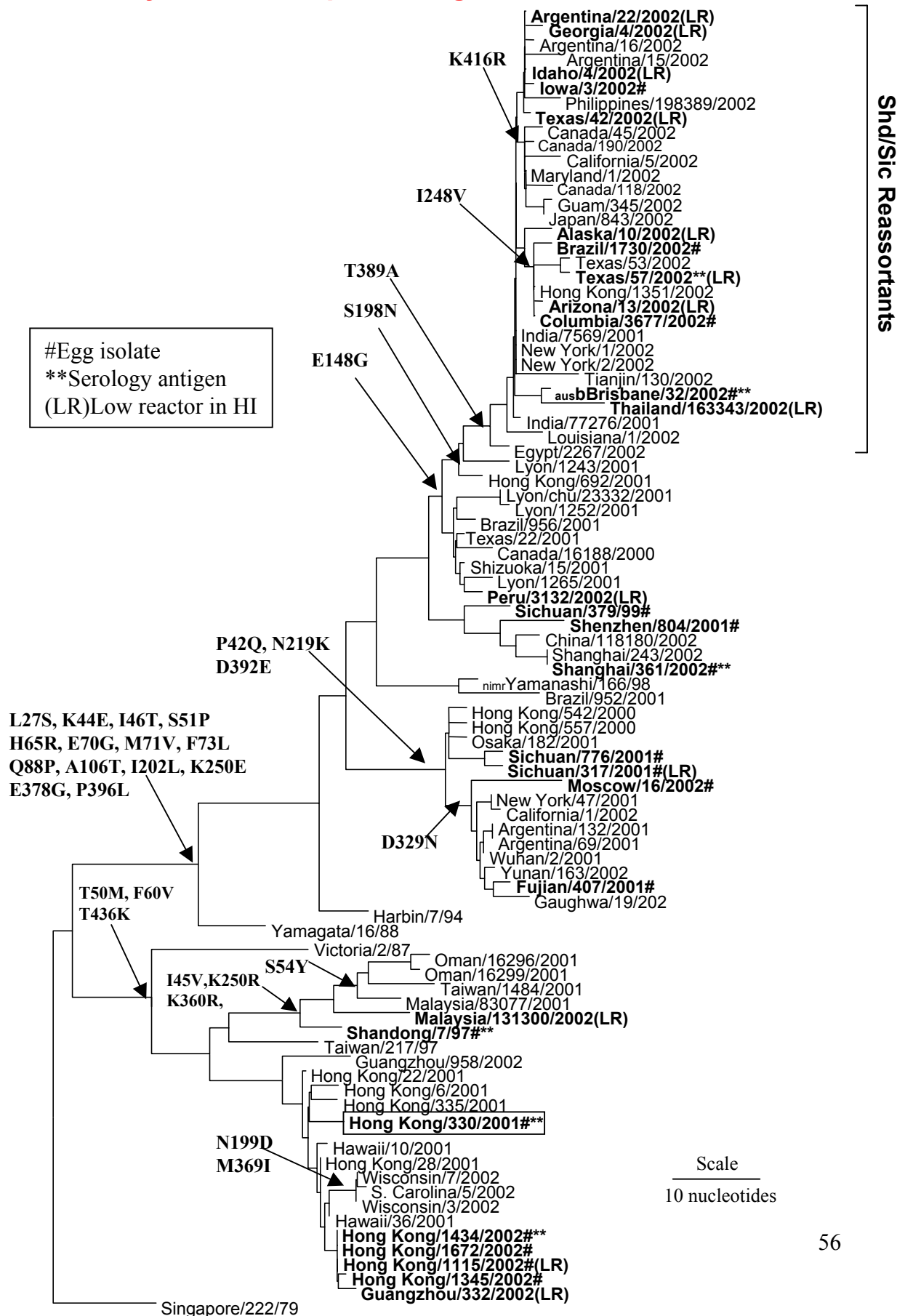
Restriction Analysis of Influenza B Isolates

	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2001 - September 2001							
B/Victoria/02/87 lineage	29			21			50 (21%)
B/Sichuan/379/99 lineage	9	1	2	57	77		146 (62%)
B/Harbin/07/94 lineage			2	24	14	1	41 (17%)
						Total	237
October 2001 - March 2002							
B/Victoria/02/87 lineage	4	2		40			46 (11%)
B/Sichuan/379/99 lineage	46	1	16	39	6	2	110 (26%)
B/Harbin/07/94 lineage	16		20	40		2	78 (19%)
B/Hong Kong/330/2001	18			20			38 (9%)
B/Shandong/7/97 lineage	133	1	1	12			147 (35%)
						Total	419
April 2002 - September 2002							
B/Sichuan/379/99 lineage	3			8	6		17 (4%)
B/Harbin/07/94 lineage	2			14	5		21 (5%)
B/Hong Kong/330/2001	1			14			15 (4%)
B/Shandong/7/97 lineage	103			85	119	27	334 (87%)
						Total	387
October 2003 - March 2003							
B/Sichuan/379/99 lineage				1			1 (0.5%)
B/Harbin/07/94 lineage	1			6			7 (4%)
B/Hong Kong/330/2001	2			46			48 (26.5%)
B/Shandong/7/97 lineage	57	1	3	59	4	1	125 (69%)
						Total	181
Total	424	6	44	486	231	33	1224

Neuraminidase Inhibition Test of Influenza B viruses (02/05/03)

STRAIN DESIGNATION		FERRET ANTISERA				Date collected
REFERENCE ANTIGENS		A Sich/379/99	C Brisb/32/02	B SH/7/97	D HK/330/01	
1	B/Sichuan/379/99 (Sic-Sic)	640	480	20	80	12/02/99
2	B/Brisbane/32/2002 (SH-Sic)	320	1280	40	320	07/02/02
3	B/Shandong/7/97 (SH-SH)	160	160	1280	2560	11/03/97
4	B/Hong Kong/330/02 (HK-HK)	80	320	640	1280	04/09/01
TEST ANTIGENS						
5	B/Texas/53/2002 (SH-Sic)	240	480	120	80	11/19/02
6	B/Philippines/198389/2002 (SH-Sic)	640	480	20	160	11/07/02
7	B/Guangzhou/332/2002 (HK-HK)	80	160	320	640	08/29/02

Evolutionary Relationships Among Influenza B Neuraminidase Genes



Number of Amino Acid Differences from Consensus* B Neuraminidase Sequence

Isolate	Passage	AA diff	Position Different
B/Brisbane/32/2002	E2	0	
B/Iowa/3/2002	E2	0	
B/Brazil/1730/2002	E2	1	248
B/Columbia/3677/2002	E2/E1	1	248
B/Hong Kong/1351/2002	E1	1	248
B/Shanghai/361/2002	E2/E1	5	42, 148, 199, 342, 389
B/Moscow/16/2002	E1	15	42, 44, 148, 186, 198, 219, 235, 329, 340, 343, 358, 359, 392, 436, 444
B/Hong Kong/1434/2002	E3	26	28, 44, 46, 50, 51, 54, 60, 65, 70, 71, 73, 88, 106, 148, 160, 186, 198, 202, 235, 250, 272, 378, 389, 396, 403, 436
B/Hong Kong/1345/2002	E3	26	28, 44, 46, 50, 51, 54, 60, 65, 70, 71, 73, 88, 106, 148, 160, 186, 198, 202, 235, 250, 272, 378, 389, 396, 403, 436
B/Hong Kong/1672/2002	E3	26	28, 44, 46, 50, 51, 54, 60, 65, 70, 71, 73, 88, 106, 148, 160, 186, 198, 202, 235, 250, 272, 378, 389, 396, 403, 436
B/Hong Kong/1115/2002	E2	26	28, 44, 46, 50, 51, 54, 60, 65, 70, 71, 73, 88, 106, 148, 160, 186, 198, 202, 235, 250, 272, 378, 389, 396, 403, 436
B/Hong Kong/330/2001	E2	29	28, 44, 46, 50, 51, 54, 60, 65, 70, 71, 73, 88, 106, 148, 160, 161, 186, 198, 202, 235, 250, 262, 272, 378, 389, 396, 403, 436, 459

*Consensus sequence was generated from 46 viruses isolated from Jan. 2002-present.

COMPARISON OF EGG-GROWN B NEURAMINIDASE GENES TO THE 2002-2003 AMINO ACID CONSENSUS SEQUENCE
(Consensus sequence was generated from 46 viruses isolated from Jan. 2002- present)

	10	30	50	70	90
Consensus	MLPSTIQTLTLFLTSGGVLLSLYVSASLSYLLYSDDLKFSPTETAPTMLDLCANASNVQAVNRSATKGVTLLLPPEWTPRLSCPGSTFQKALLISP				
B/Brisbane/32/2002					
B/Brazil/1730/2002					
B/Moscow/16/2002			Q K		
B/Iowa/3/2002					
B/Columbia/3677/2002					
B/Shanghai/361/2002			T		
B/Hong Kong/1351/2002					
B/Shandong/7/97		L	KVI S	H EEM F	Q
B/Hong Kong/330/2001		L	K I TS S	F H EM F	Q
B/Hong Kong/1434/2002		L	K I TS S	F H EM F	Q
B/Hong Kong/1345/2002		L	K I TS S	F H EM F	Q
B/Hong Kong/1672/2002		L	K I TS S	F H EM F	Q
B/Hong Kong/1115/2002		L	K I TS S	F H EM F	Q

	110	130	150	170	190									
Consensus	HRFGETKGN	SAPLIIREPF	FIACGPK	ECKHFAL	THYAAQPGGY	NGTRGDRN	KLRHLISV	KLGKIP	TVENSIF	HMAAWS	GSACHD	GKEWTY	IGVDGP	DNNAA
	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+	-----+
B/Brisbane/32/2002														
B/Brazil/1730/2002														
B/Moscow/16/2002						E						R		S
B/Iowa/3/2002														
B/Columbia/3677/2002														
B/Shanghai/361/2002						E								S
B/Hong Kong/1351/2002														
B/Shandong/7/97	A					E		N				R		S
B/Hong Kong/330/2001	A					E		NF				R		S
B/Hong Kong/1434/2002	A					E		N				R		S
B/Hong Kong/1345/2002	A					E		N				R		S
B/Hong Kong/1672/2002	A					E		N				R		S
B/Hong Kong/1115/2002	A					E		N				R		S

	210	230	250	270	290
Consensus	LLKIKYGEAYTDTYHSYANNILRTQESACNCIGGNCYLMITDGSASGISSECRFLKIREGRIIKEIFPTGRVKHTEECTCGFASNKTIETACACRDNSTAKR				
B/Brisbane/32/2002					
B/Brazil/1730/2002			V		
B/Moscow/16/2002	K	D			
B/Iowa/3/2002					
B/Columbia/3677/2002			V		
B/Shanghai/361/2002					
B/Hong Kong/1351/2002			V		
B/Shandong/7/97	I	D	R	E	
B/Hong Kong/330/2001	I	D	K	V	E
B/Hong Kong/1434/2002	I	D	K		E
B/Hong Kong/1345/2002	I	D	K		E
B/Hong Kong/1672/2002	I	D	K		E
B/Hong Kong/1115/2002	I	D	K		E

	310	330	350	370	390	
Consensus	PFVKLN	VETDTAEIRLMCTET	YLDTPRPDDGSITGPCES	NGDKGSGGIKGGFVHQ	RMASKIGRWYSRTMSKTKRMGMGLYVKYD	GD
	-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+					
B/Brisbane/32/2002						
B/Brazil/1730/2002						
B/Moscow/16/2002		N	D R	E		T E
B/Iowa/3/2002						
B/Columbia/3677/2002						
B/Shanghai/361/2002			N			I
B/Hong Kong/1351/2002						
B/Shandong/7/97			N	R	E	T P
B/Hong Kong/330/2001					E	T P
B/Hong Kong/1434/2002					E	T P
B/Hong Kong/1345/2002					E	T P
B/Hong Kong/1672/2002					E	T P
B/Hong Kong/1115/2002					E	T P

	410	430	450
Consensus	VSMEEPGWYSFGFEIKDKKCDVPCIGIEMVHDGGKETW	WSAATAIYCLMGSGQLLWDTVTG	VDMAL
	-----+-----+-----+-----+-----+-----+-----+		
B/Brisbane/32/2002			
B/Brazil/1730/2002			
B/Moscow/16/2002		T	T
B/Iowa/3/2002			
B/Columbia/3677/2002			
B/Shanghai/361/2002			
B/Hong Kong/1351/2002			
B/Shandong/7/97	I	K	
B/Hong Kong/330/2001	I	T	I
B/Hong Kong/1434/2002	I	T	
B/Hong Kong/1345/2002	I	T	
B/Hong Kong/1672/2002	I	T	
B/Hong Kong/1115/2002	I	T	

**Hemagglutination Inhibition Antibody Responses to the B* Component
of the 2002-2003 Influenza Vaccine
ADULT POPULATIONS**

						% with HI titer ≥ 40	
Population	N	Antigen	% Rise	Pre GMT	Post GMT	Pre Vaccine	Post Vaccine
USA ¹							
	24	B/Shandong/07/97	50	15	64	29	83
	24	B/Hong Kong/330/2001	58	15	76	33	88
	24	B/Hong Kong/1434/2002*	58	10	44	21	71
	24	B/Brisbane/32/2002	50	19	87	38	88
	24	B/Shanghai/361/2002**	29	19	42	33	54
	24	B/Texas/57/2002	54	16	85	33	88
Australia ²							
	24	B/Shandong/07/97	50	8	24	4	38
	24	B/Hong Kong/330/2001	46	8	27	13	38
	24	B/Hong Kong/1434/2002	54	7	20	4	33
	24	B/Brisbane/32/2002	54	9	31	13	46
	24	B/Shanghai/361/2002**	83	10	104	17	88
	24	B/Texas/57/2002	50	9	33	13	50
Japan ³							
	14	B/Shandong/07/97*	7	13	20	14	36
	14	B/Hong Kong/330/2001	21	19	33	29	57
	14	B/Hong Kong/1434/2002	14	12	20	14	36
	14	B/Brisbane/32/2002	29	17	31	21	50
	14	B/Shanghai/361/2002**	14	17	26	29	50
	14	B/Texas/57/2002	21	18	34	29	57
UK ⁴							
	24	B/Shandong/07/97*	100	6	174	0	100
	24	B/Hong Kong/330/2001	100	8	261	13	100
	24	B/Hong Kong/1434/2002	100	6	143	0	96
	24	B/Brisbane/32/2002	100	9	320	8	100
	24	B/Shanghai/361/2002**	79	7	53	4	67
	24	B/Texas/57/2002	100	8	261	8	100

Preliminary Data 01/28/2003

*Vaccine component

**B/Shanghai/361/2002 is a B/Sichuan/379/99-like virus.

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

2. Sera were kindly provided by Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Sichuan/379/99-like hemagglutinin.

3. Sera were kindly provided by Dr. Takato Odagiri, WHO Collaborating Center, Tokyo, Japan. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

4. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Shandong/07/97-like hemagglutinin.

**Hemagglutination Inhibition Antibody Responses to the B* Component
of the 2002-2003 Influenza Vaccine
ELDERLY POPULATIONS**

Population	N	Antigen	% Rise	Pre GMT	Post GMT	% with HI titer ≥ 40	
						Pre Vaccine	Post Vaccine
USA¹							
	24	B/Shandong/07/97	54	17	50	21	75
	24	B/Hong Kong/330/2001	54	16	57	21	75
	24	B/Hong Kong/1434/2002*	54	11	33	8	54
	24	B/Brisbane/32/2002	54	21	62	38	83
	24	B/Shanghai/361/2002**	25	24	49	42	63
	24	B/Texas/57/2002	54	19	60	33	83
Australia²							
	24	B/Shandong/07/97	25	7	15	8	25
	24	B/Hong Kong/330/2001	21	8	15	8	25
	24	B/Hong Kong/1434/2002	13	7	12	8	17
	24	B/Brisbane/32/2002	26	9	19	9	38
	24	B/Shanghai/361/2002**	48	11	34	13	54
	24	B/Texas/57/2002	26	9	18	9	29
Japan³							
	26	B/Shandong/07/97*	46	12	32	15	42
	26	B/Hong Kong/330/2001	58	15	46	23	65
	26	B/Hong Kong/1434/2002	38	11	28	15	35
	26	B/Brisbane/32/2002	54	14	43	23	58
	26	B/Shanghai/361/2002**	15	12	17	13	27
	26	B/Texas/57/2002	46	13	41	15	58
UK⁴							
	24	B/Shandong/07/97*	88	11	142	8	96
	24	B/Hong Kong/330/2001	83	12	165	17	96
	24	B/Hong Kong/1434/2002	83	9	102	8	96
	24	B/Brisbane/32/2002	88	15	204	25	100
	24	B/Shanghai/361/2002**	42	10	34	13	57
	24	B/Texas/57/2002	83	11	146	8	96

Preliminary Data 01/28/2003

*Vaccine component

**B/Shanghai/361/2002 is a B/Sichuan/379/99-like virus.

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

2. Sera were kindly provided by Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2002 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Sichuan/379/99-like hemagglutinin.

3. Sera were kindly provided by Dr. Takato Odagiri, WHO Collaborating Center, Tokyo, Japan. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Hong Kong/330/2001-like hemagglutinin.

4. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2002-2003 trivalent influenza vaccine containing 15: g each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Shandong/07/97-like hemagglutinin.

Appendix

Countries of Origin of Isolates Received by CDC

<u>Month of Collection Date</u>	<u>B's</u>	<u>H1N1's</u>	<u>H1N2's</u>	<u>H3's</u>
July, 2002	Argentina Australia Brazil Chile Egypt Hong Kong Panama Peru Taiwan Thailand United States Uruguay	Chile		Australia Brazil China Hong Kong New Zealand Philippines Taiwan Thailand United States
August, 2002	Argentina Brazil Chile Egypt Guatemala Hong Kong Thailand	Chile Guatemala Peru Philippines*	Peru	Brazil Canada China Hong Kong India Taiwan Thailand
September, 2002	Brazil Chile China Hong Kong Thailand United States	Chile Peru Mexico		Brazil Canada Egypt Thailand

<u>Month of Collection Date</u>	<u>B's</u>	<u>H1's</u>	<u>H1N2's</u>	<u>H3's</u>
October, 2002	Brazil Chile China India Philippines Thailand United States	China United States Mexico	United States	Canada Egypt Guam Korea Senegal Taiwan Thailand United States
November, 2002	China Guam Japan Madagascar Philippines Portugal Taiwan United States	Senegal United States	Canada	China Egypt Japan Korea Philippines Taiwan United States
December, 2002	China Japan Mexico Philippines Taiwan United Kingdom United States	United States	Canada United States	China France Japan Korea Taiwan Turkey United Kingdom United States
January, 2003	United States	United States	United States	United Kingdom

02/06/2003

* Neuraminidase subtype unknown