

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

February 17, 2006

**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**

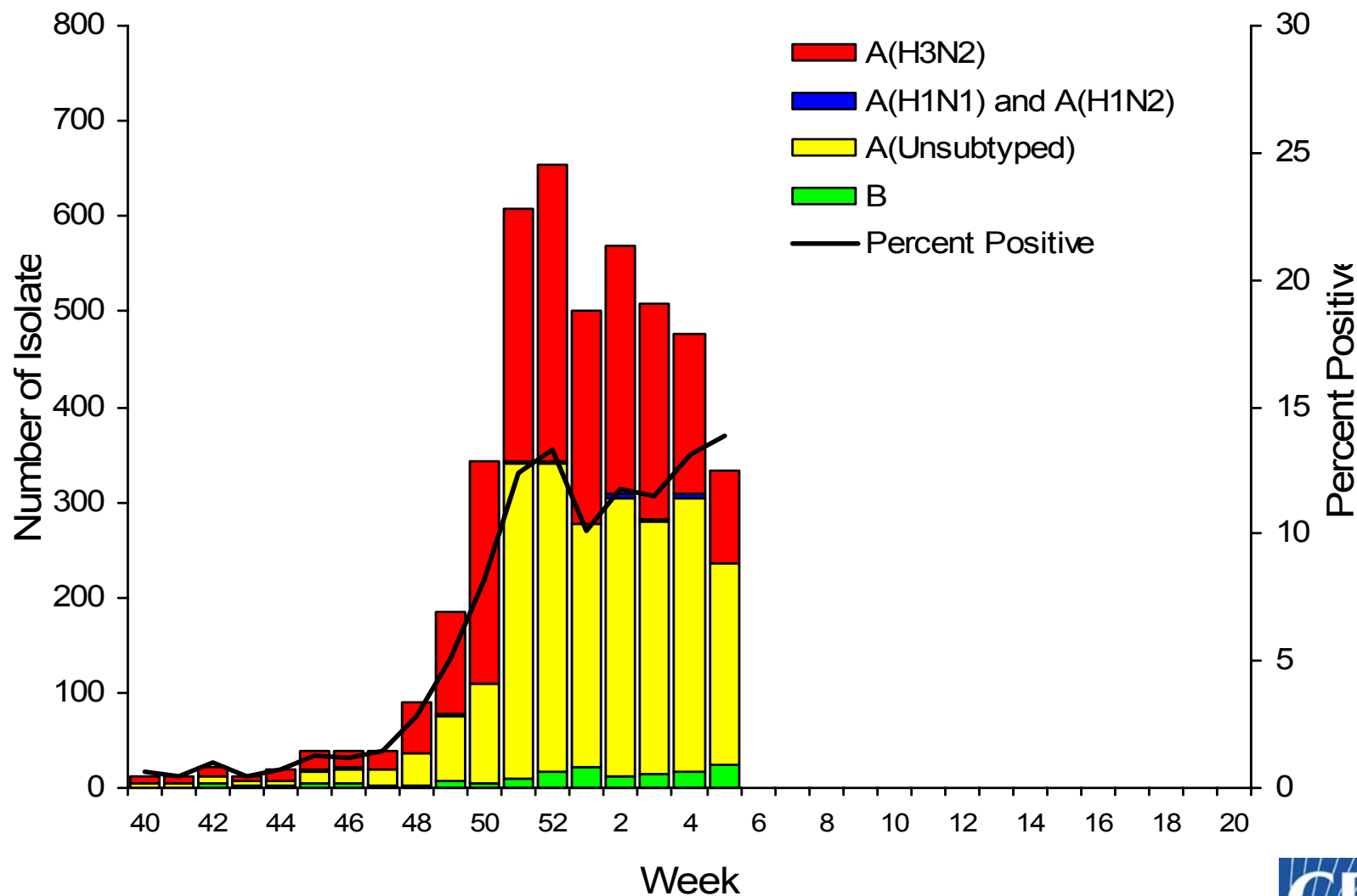


**WHO COLLABORATING CENTER FOR SURVEILLANCE,
EPIDEMIOLOGY AND CONTROL OF INFLUENZA**

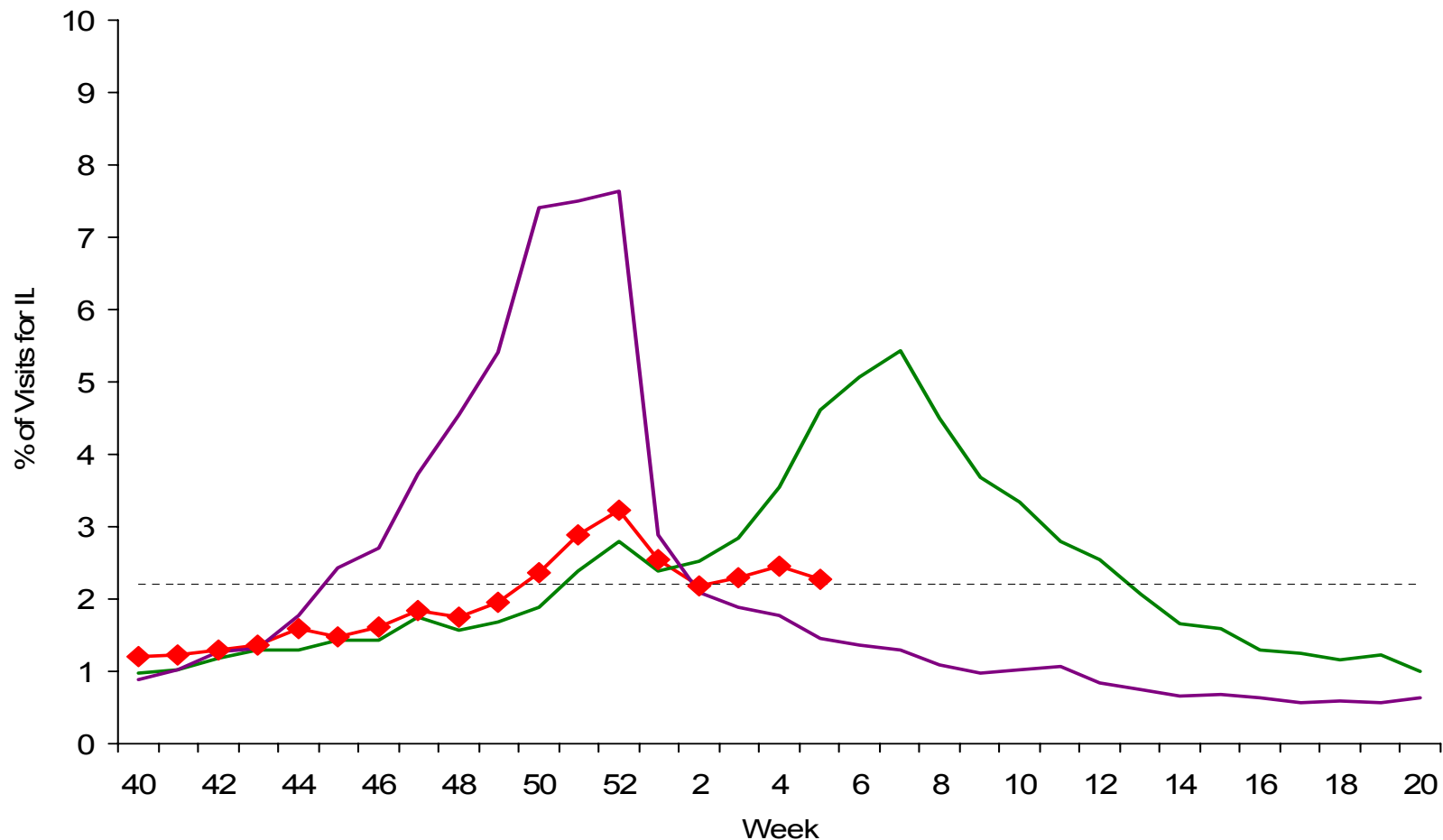
Nancy Cox, Ph.D. (Director)
Amanda Balish
LaShondra Berman
Lynnette Brammer
Joseph Bresee, MD
Rick Bright, Ph.D.
Ruben Donis, Ph.D.
Angie Foust
Henrietta Hall
Alexander Klimov, Ph.D.
Stephen Lindstrom, Ph.D.
Jan Mabry
Ann Moen
Gilda Perez-Oronoz
Zachary Reed
Robert Robinson
Michael Shaw, Ph.D.
Bo Shu, MD
Catherine Smith
Teresa Wallis
Stanley Wang
Xu Xiyan, M.D.

US Surveillance

U.S. WHO/NREVSS Collaborating Laboratories Summary, 2005-06

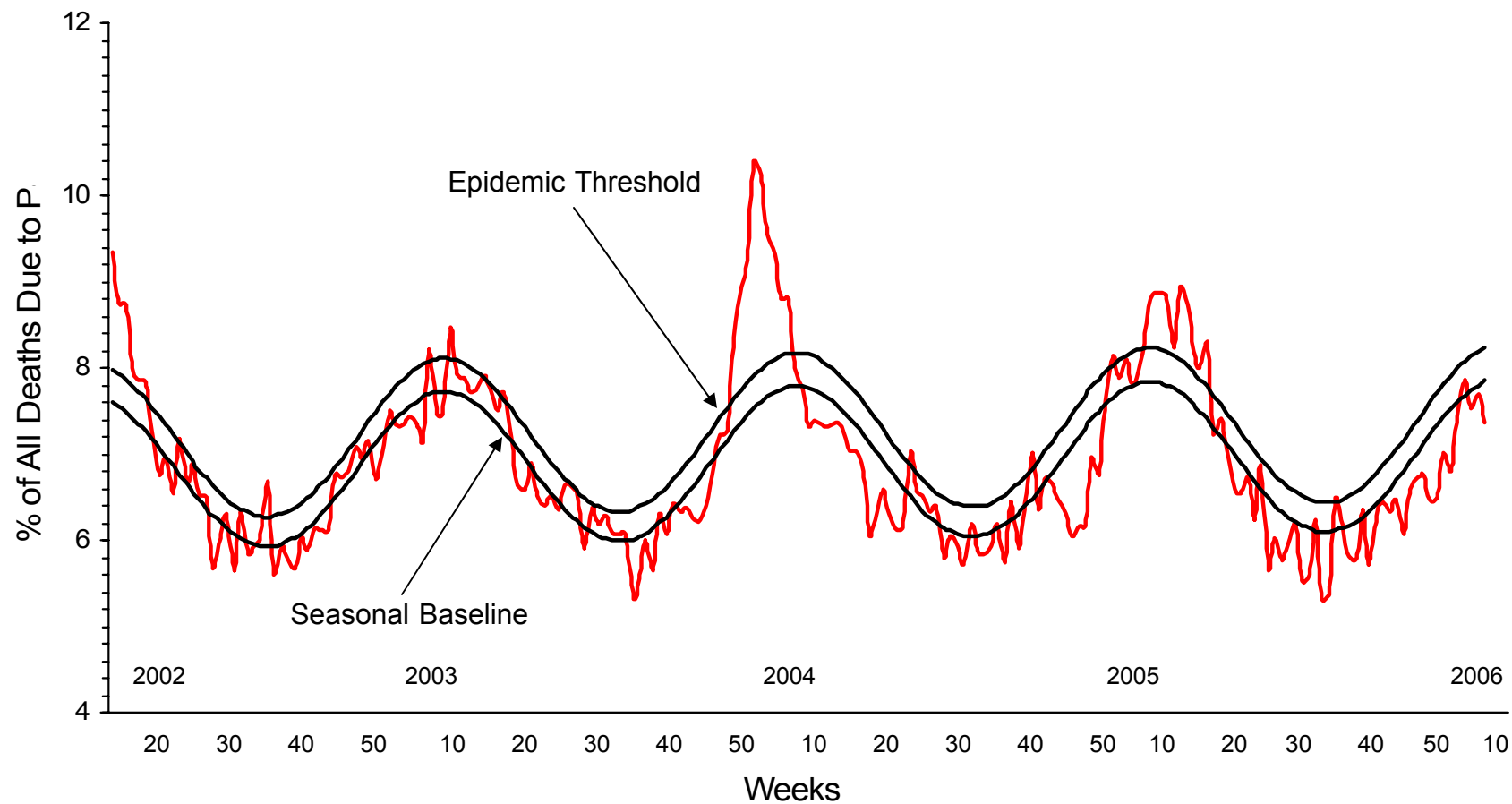


Percentage of Visits for Influenza-like Illness Reported by Sentinel Providers, National Summary 2005-06 and Previous 2 Seasons

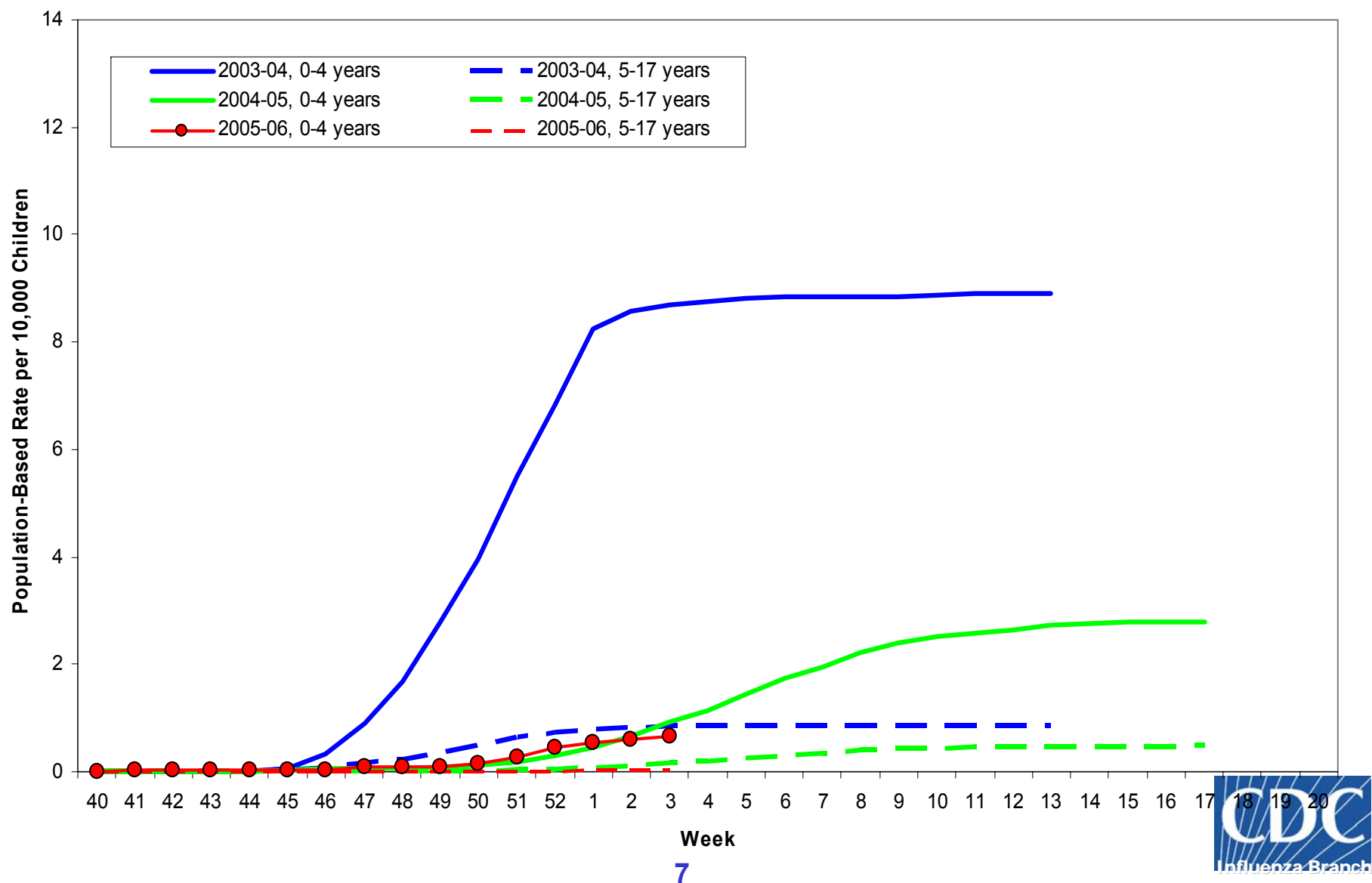


—◆— %ILI 2005-06 — %ILI 2004-05 — %ILI 2003-04 - - - - National baseline

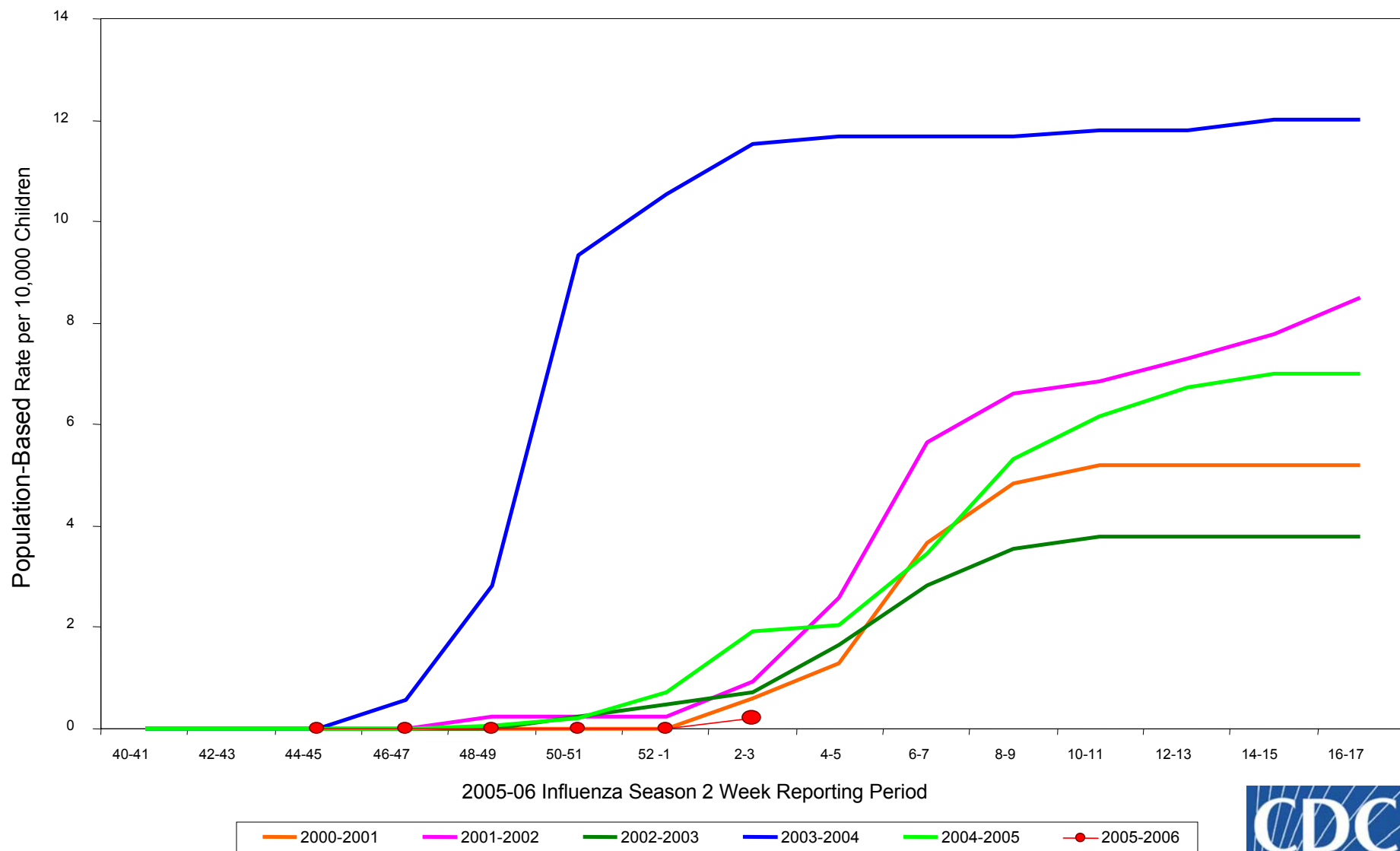
Pneumonia and Influenza Mortality for 122 U.S. Cities Week Ending 02/04/2006



EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates for Children Aged 0-4 and 5-17 years, 2005-06 and Previous 2 Seasons

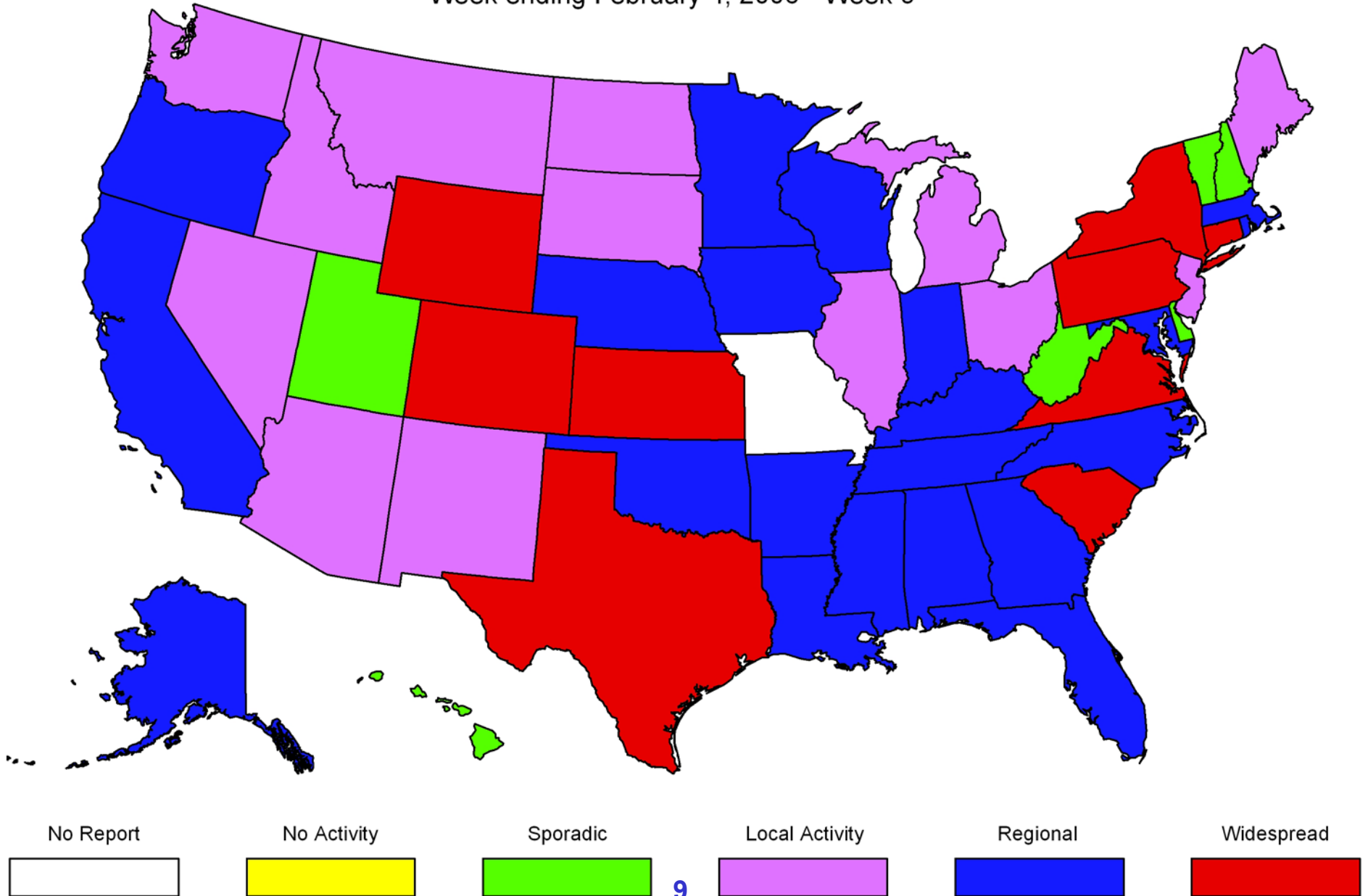


NVSN Influenza Laboratory-Confirmed Cumulative Hospitalization Rates for Children 0 - 4 Years, 2005-06 and Previous 5 Seasons



Weekly Influenza Activity Estimates Reported by State & Territorial Epidemiologists

Week ending February 4, 2006 - Week 5



Influenza A(H1N1) Viruses

HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H1 VIRUSES (02/08/06)

REFERENCE ANTIGENS		REFERENCE FERRET ANTISERA					Date	Passage	
		BJ/262	NC/20	NEI/52	KY/1	HI/15	JI/160		collected
1	A/BEIJING/262/1995	320	640	320	320	80	40	01/09/95	E3/E3
2	A/NEW CALEDONIA/20/99*	80	1280	640	640	160	160	06/09/99	E4/E2
3	A/NEIMENGGU/52/2002	80	640	640	640	160	80	01/25/02	E2/E4
4	A/KENTUCKY/01/2005*	160	640	640	1280	80	80	01/19/05	E4
5	A/HAWAII/15/2001	20	40	40	40	320	160	02/17/01	M2/C3
6	A/JIANGXI/160/2005*	<10	40	40	20	320	320	03/17/05	C2/C2
TEST ANTIGENS									
7	A/ARIZONA/01/2006	160	1280	640	640	160	40	01/05/06	E1
8	A/PENNSYLVANIA/01/2006	160	1280	1280	1280	160	80	01/17/06	C1/C1
9	A/HONG KONG/35/2006	160	1280	640	1280	160	80	01/07/06	C2/C1
10	A/HONG KONG/4921/2005	160	1280	1280	1280	160	160	12/21/05	C2/C1
11	A/SINGAPORE/104/2005	80	1280	640	640	80	80	11/16/05	C2/C1
12	A/CHEJU/903/2005	160	1280	640	640	160	80	12/14/05	C2/C1
13	A/KANGWON/848/2005	160	1280	1280	640	160	80	12/05/05	C2/C1
14	A/HONG KONG/34/2006	40	640	320	320	80	20	01/07/06	C2/C1
15	A/HONG KONG/31/2006	80	640	640	640	80	40	01/06/06	C2/C1
16	A/BEIJING/138/2005	80	640	320	160	80	40	11/17/05	C2/C1
17	A/GANSU/32/2005	80	640	640	320	80	80	11/11/05	C3/C1
18	A/TIANJIN/27/2005	80	640	320	320	80	40	11/01/05	C2/C1
19	A/WUHAN/392/2005	80	640	640	320	80	80	11/07/05	C3/C1
20	A/SINGAPORE/107/2005	40	640	320	320	80	80	11/29/05	C1/C1
21	A/DAEJEION/868/2005	40	640	320	160	80	80	12/08/05	C2/C1
22	A/KYONGGI/836/2005	40	640	320	320	80	40	12/07/05	C2/C2
23	A/INCHEON/831/2005	80	640	320	320	80	40	12/05/05	C2/C1
24	A/KANGWON/799/2005	40	640	320	320	160	80	12/01/05	C2/C1
25	A/BEIJING/117/2005	80	320	640	320	80	40	11/10/05	C3/C1
26	A/SINGAPORE/93/2005	40	320	320	160	80	40	10/04/05	C2/C1
27	A/CHEJU/959/2005	80	320	640	640	160	40	12/23/05	C2/C1
28	A/HONG KONG/32/2005	40	320	320	320	40	40	12/30/05	C2/C1
29	A/TIANJIN/16/2005	80	160	320	320	160	40	10/18/05	C2/C1
30	A/DAEJEION/1000/2005	10	40	40	20	320	320	12/21/05	C2/C1

* Serology antigens



Influenza A(H1N1) Isolates Characterized by CDC

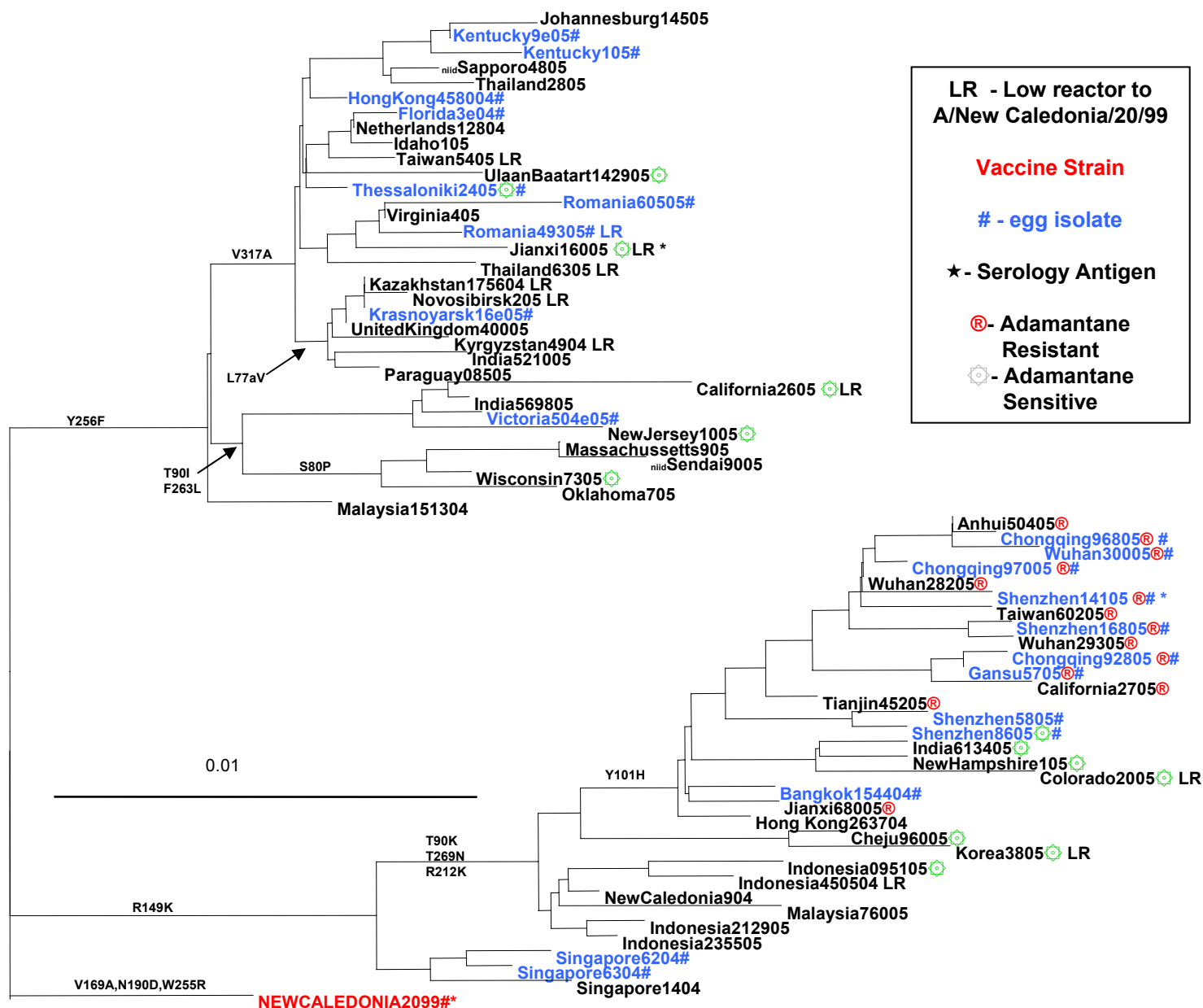
	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2005 – September 2005							
A/N.Caledonia/20/99-like	2		1	42	2	2	49 (100%)
A/N.Caledon./20/99 (low)							
						Total	49
October 2005 – January 2006							
A/N.Caledonia/20/99-like	7			58			65 (84%)
A/N.Caledon./20/99 (low)	2			10			12 (16%)
						Total	77
Total	23	1	44	216	2	4	290

Preliminary Data

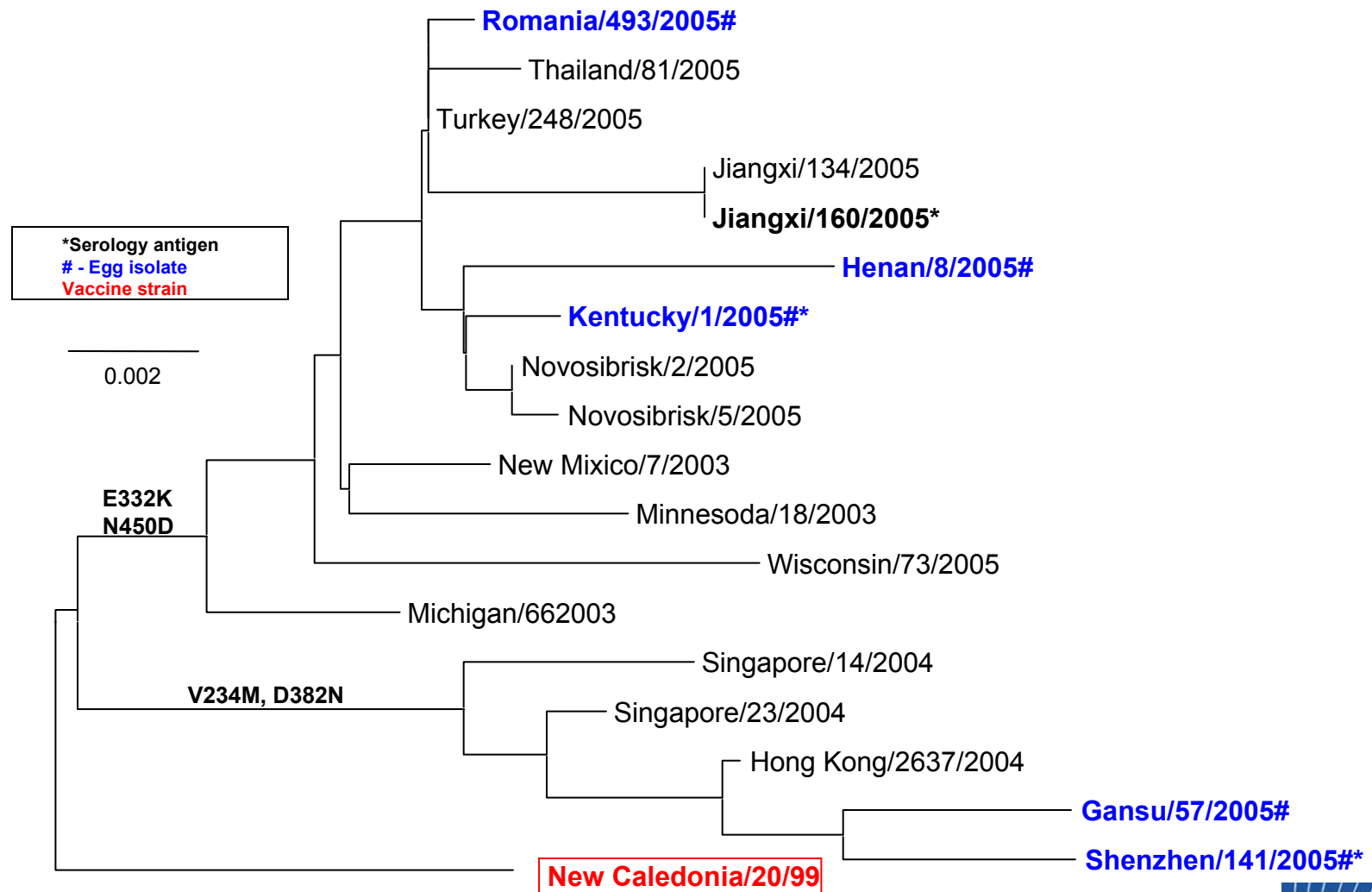
02/08/2006



Evolutionary Relationships Among Influenza A (H1N1) HA (HA1) Genes, 2005



Evolutionary Relationships Among Influenza A N1 Neuraminidase Genes, 2005



Influenza A(H3N2) Viruses

HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (1/25/06)

REFERENCE ANTIGENS	REFERENCE FERRET ANTISERA							Date collected	Passage
	CA/7	NY/55-R	BR/1742	HK/2831	AN/1239	HIR/52	WI/67		
1 A/CALIFORNIA/07/04	640	160	320	160	160	160	640	09/16/04	SpfCK3E4
2 A/NY/55/04 A/PR/8/34 X-157 *	320	1280	2560	640	160	320	1280	REASS	EX/E1
3 A/BRAZIL/1742/05 *	160	640	640	160	160	320	1280	07/07/05	E1/E3
4 A/HONG KONG/2831/05	320	320	160	640	160	320	640	05/25/05	C2/C3
5 A/ANHUI/1239/05 *	160	160	320	320	640	1280	2560	08/23/05	E2/E1
6 A/HIROSHIMA/52/05 *	160	160	320	320	640	1280	1280	11/25/05	E3/E1
7 A/WISCONSIN/67/05 *	160	160	320	640	160	320	1280	08/31/05	SpfCK3E3
TEST ANTIGENS									
8 A/GEORGIA/14/2005	640	320	640	1280	640	1280	2560	12/27/05	M1/C2
9 A/OREGON/20/2005	640	640	640	1280	640	1280	2560	12/15/05	R1/C2
10 A/OREGON//21/2005	320	320	160	320	320	160	640	12/08/05	R1/C1
11 A/CALIFORNIA/25/2005	320	320	320	640	160	320	640	11/22/05	M1/C2
12 A/WISCONSIN/86/2005	160	160	80	320	160	160	640	12/14/05	C2
13 A/ILLINOIS/16/2005	160	160	160	320	160	160	640	12/21/05	R1/C1
14 A/MEXICO/2322/2005	320	160	160	320	160	160	640	11/11/05	C2/C1
15 A/MEXICO/2081/2005	160	160	320	320	160	160	640	11/01/05	C3/C1
16 A/KOREA/7/2005	320	320	160	640	160	320	640	12/28/05	X/C2
17 A/TAIWAN/567/2005	320	160	320	320	160	320	1280	11/08/05	C2/C1
18 A/TAIWAN/584/2005	320	320	640	640	320	640	2560	09/19/05	C2/C1
19 A/TAIWAN/604/2005	320	320	640	320	160	320	1280	12/24/05	C2/C1
20 A/ULAANBAATAR/1575/2005	320	320	640	320	160	320	2560	11/28/05	C3/C1
21 A/SUKHBAATAR/1580/2005	320	640	640	1280	640	1280	5120	11/29/05	C3/C1
22 A/SUKHBAATAR/1587/2005	320	640	640	640	320	640	2560	12/07/05	C3/C1
23 A/SAINSHAND/1589/2005	320	160	160	320	160	160	640	11/28/05	C3/C1
24 A/ARVAIKHEER/2101/2005	320	320	640	320	160	640	2560	12/21/05	C2/C1
25 A/ULAANBAATAR/1806/2005	160	160	160	320	160	320	640	12/01/05	C2/C1
26 A/SUKHBAATAR/1991/2005	160	160	160	320	160	160	320	12/19/05	C2/C1
27 A/NAGASAKI/50/2005	160	160	80	320	80	80	320	09/13/05	C5/C2
28 A/ITALY/227/2005	160	80	80	80	40	80	160	11/30/05	X/C2

* Serology antigens



Influenza A(H3N2) Isolates Characterized by CDC

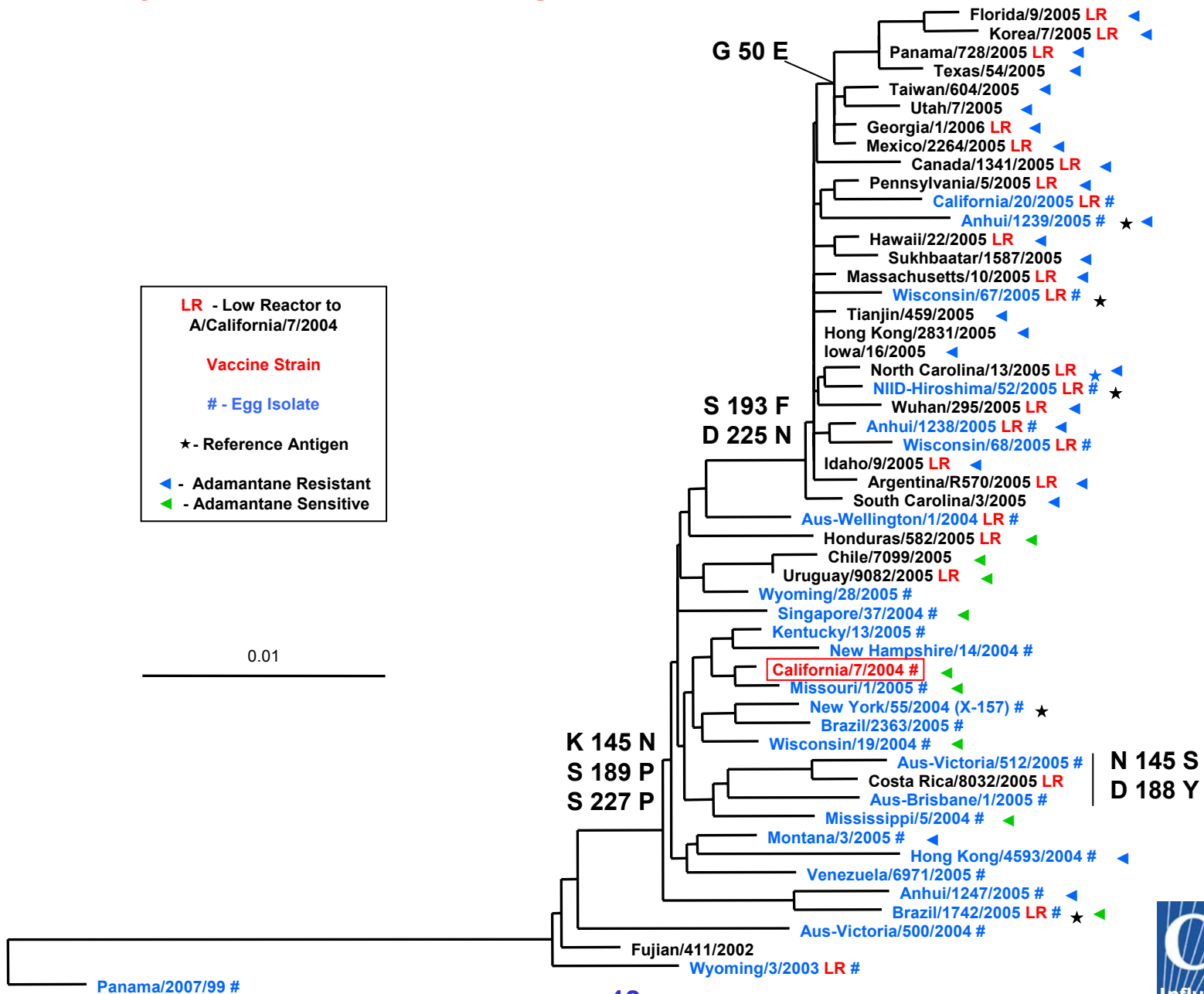
	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2005 – September 2005							
A/California/07/2004-like*	43	7	1	74	145	5	275 (80%)
A/California/07/2004-like (low)*	2	4	1	39	22	3	70 (20%)
						Total	346
October 2005 – December 2005							
A/California/07/2004-like*	123	11		10			144 (72%)
A/California/07/2004-like (low)*	42	6	1	7			56 (28%)
						Total	200
Total	992	64	72	586	377	25	2116

Preliminary data

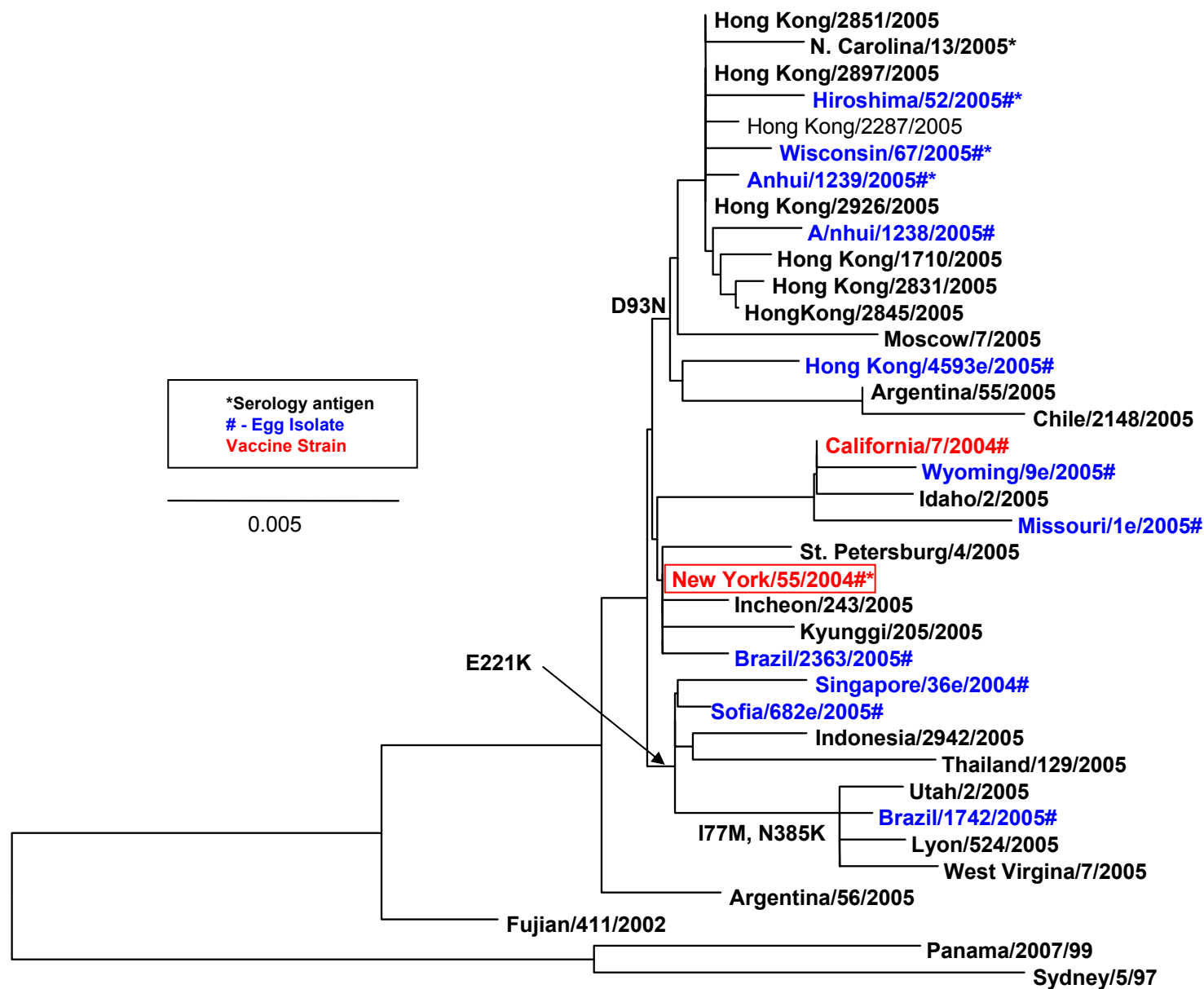
02/01/2005



Evolutionary Relationships Among Influenza A (H3N2) HA (HA1) Genes, 2005



Evolutionary Relationships Among Influenza A N2 Neuraminidase Genes, 2005



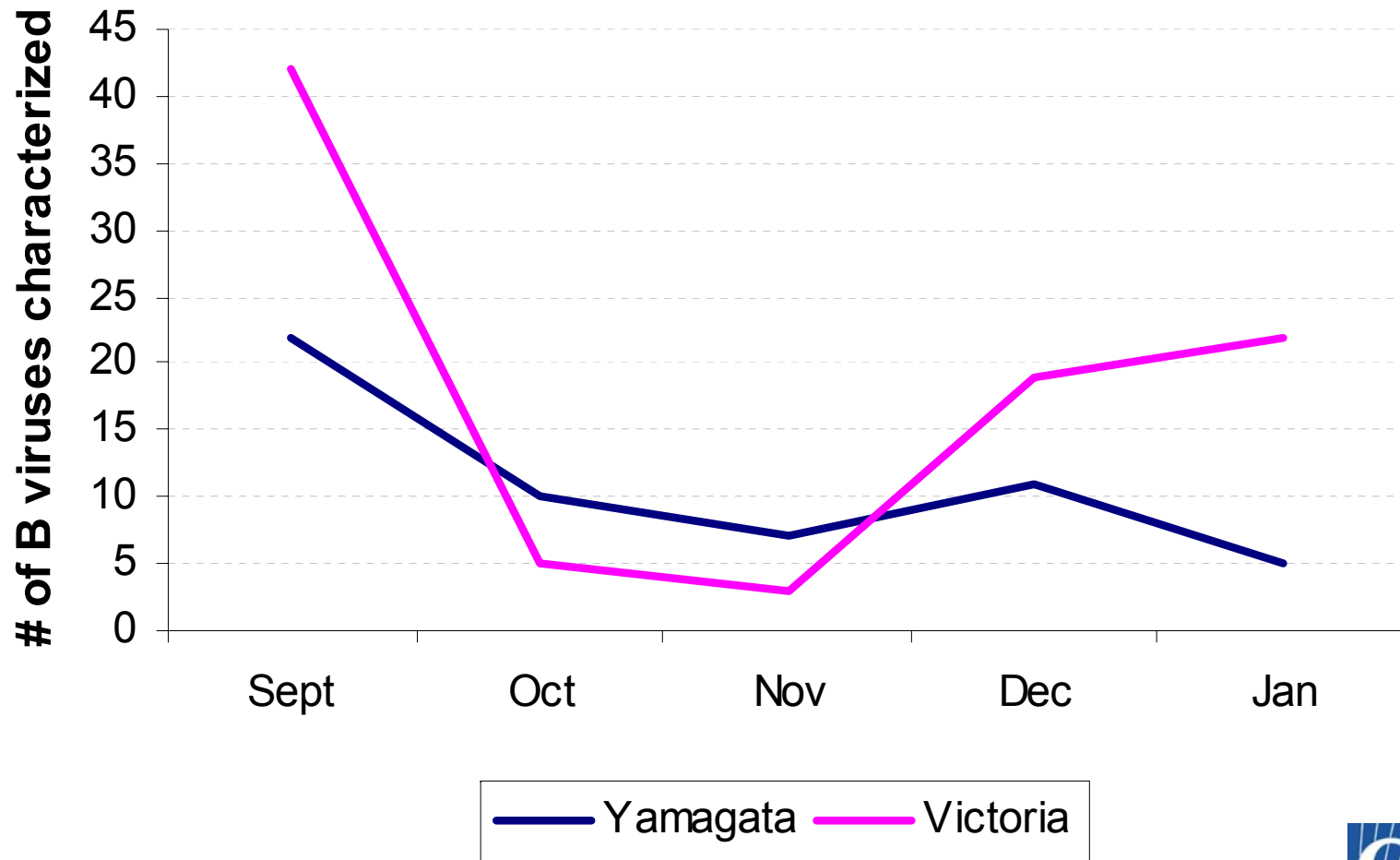
Influenza B Viruses

**Influenza Virus Isolates Characterized by CDC and Other WHO Collaborating Centers
and Laboratories ***
(October 2005 – February 2006)

	North America	Europe	Asia	Cent/So America	Africa, Oceania	Total (%)
A(H1N1)	11	36	127		58	232 (19%)
A(H3N2)	304	40	156		62	562 (45%)
B/Yamagata	12	33	29	1	39	114 (9%)
B/Victoria	88	83	53		115	339 (27%)
Total	415	192	365	1	274	1247

* Data based on cumulative influenza virus isolates antigenic characterization data provided by WHO Collaborating Centers in Atlanta, London, Melbourne, Tokyo, reports from European Influenza Surveillance Scheme and National Influenza Center, Canada

Number of Two Lineages of Influenza B Isolates Characterized by WHOCCs



HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA TYPE B VIRUSES (02/14/06)

REFERENCE ANTIGENS		REFERENCE FERRET ANTISERA						Date	Passage
		SH/361	FL/7	SH/7	HK/310	MY/2506	OH/1	collected	
1	CH B/SHANGHAI/361/2002	640	1280	5	40	80	80	06/12/02	E2/E2
2	FL B/FLORIDA/07/2004 *	320	640	5	20	80	40	10/01/04	E4
3	CH B/SHANDONG/07/1997	5	5	1280	320	640	1280	11/03/97	E4/E3
4	HK B/HONG KONG/310/2004	5	5	1280	1280	1280	1280	11/24/04	C2/C2
5	MY B/MALAYSIA/2506/2004 *	5	10	1280	640	1280	1280	UNKN	E3/E1
6	OH B/OHIO/01/2005 *	5	5	640	320	640	640	02/23/05	E4
TEST ANTIGENS									
7	PA B/PENNSYLVANIA/03/2005	160	640	5	5	20	40	12/22/05	C2/C1
8	PA B/PENNSYLVANIA/04/2005	160	640	5	5	20	40	12/29/05	X/C1
9	TX B/TEXAS/01/2006	80	640	10	10	40	80	01/19/06	M1/C1
10	WI B/WISCONSIN/01/2006	160	1280	5	5	20	40	01/25/06	C2/C2
11	VA B/VIRGINIA/01/2006	160	1280	5	10	40	80	02/01/06	M1/C1
12	KY B/KENTUCKY/01/2006	320	1280	5	10	40	80	01/11/06	C1/C1
13	HO B/HONDURAS/120/2005	160	1280	5	5	40	80	11/07/05	X/C1
14	HO B/HONDURAS/298/2006	160	1280	10	10	40	80	01/24/06	X/C1
15	PA B/PENNSYLVANIA/05/2005	5	5	640	320	1280	1280	12/25/05	C2/C1
16	AZ B/ARIZONA/01/2006	5	5	1280	320	1280	1280	01/04/06	CX/C1
17	NE B/NEBRASKA/01/2006	5	5	320	80	160	320	12/12/05	X1/C2
18	FL B/FLORIDA/01/2006	5	5	320	80	160	320	01/11/06	M1/C1
19	TX B/TEXAS/02/2006	5	5	320	80	160	320	01/17/06	M1/C1
20	HK B/HONG KONG/12/2006	5	5	640	640	1280	1280	12/30/05	C2/C1
21	HK B/HONG KONG/15/2006	5	5	640	640	1280	1280	12/30/05	C2/C1
22	KW B/KUWAIT/1510/2005	5	5	1280	640	1280	1280	12/20/05	X/C1
23	HK B/HONG KONG/01/2006	5	5	640	640	640	1280	12/28/05	C2/C1
24	CH B/CHONGQING/1400/2005	5	5	640	320	640	1280	10/27/05	E2/E2
25	SN B/SINGAPORE/20/2005	5	5	320	80	160	320	11/29/05	C2/C1
26	SN B/SINGAPORE/21/2005	5	5	320	80	160	320	12/23/05	C2/C1
27	HK B/HONG KONG/02/2006	5	5	160	80	160	320	12/28/05	C2/C1
28	HK B/HONG KONG/06/2006	5	5	160	40	160	160	12/28/05	C2/C1
29	TW B/TAIWAN/965/2005	5	5	160	40	80	160	11/19/05	C2/C1
30	UK B/UNITED KINGDOM/290/2006	5	5	320	80	160	320	01/21/06	X/C1
31	UK B/UNITED KINGDOM/310/2006	5	5	320	80	160	320	01/24/06	X/C1

* Serology antigens



HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA TYPE B VIRUSES (Australian WHOCC)

		A	B	C	D	E	F		
	ANTISERA NO.	F765	F835	F856	F806	F805	F843	Passage	Sample
	REF. Ag	BRIS/32	MAL	OHIO/1	SHAN361	JIAN	FLO/7	History	Date
A	B/BRISBANE/32/2002	640	640	1280	<20	<20	<20	E2	
B	B/MALAYSIA/2506/2004	320	320	640	<20	<20	<20	E4	
C	B/OHIO/1/2005	320	320	640	<20	<20	<20	E5	
D	B/SHANGHAI/361/2002	<20	40	20	1280	320	640	E9	
E	B/JIANGSU/10/2003	<20	<20	<20	160	640	80	E7	
F	B/FLORIDA/7/2004	40	20	20	640	160	640	E4	
	TEST ANTIGENS								
1	B/PERTH/111/2005	<20	<20	<20	320	160	640	MDCK1	27/10/2005
2	B/PERTH/110/2005	<20	<20	-	320	160	640	MDCK1	5/10/2005
3	B/VICTORIA/530/2005	<20	<20	-	640	160	640	MDCK1	16/10/2005
4	B/PHILIPPINES/275/2005	<20	<20	<20	160	80	80	MDCK3	19/09/2005
5	B/PHILIPPINES/457/2005	<20	<20	<20	320	80	320	MDCK3	17/10/2005
6	B/PHILIPPINES/419/2005	<20	<20	<20	160	40	320	MDCK3	10/10/2005
7	B/PHILIPPINES/1041/2005	<20	<20	<20	160	40	320	MDCK3	14/11/2005
8	B/CAMBODIA/3/2005	40	160	160	<20	<20	<20	X,MDCK1	5/10/05
9	B/SINGAPORE/20/2005	20	160	80	<20	<20	<20	MDCK3	29/11/05
10	B/SINGAPORE/21/2005	20	160	80	<20	<20	<20	MDCK3	23/12/05
11	B/BRISBANE/102/2005	320	640	1280	<20	<20	<20	MDCK1	11/10/2005
12	B/SYDNEY/505/2005	40	320	160	<20	<20	<20	MDCK1	12/10/2005
13	B/PERTH/112/2005	160	320	160	<20	<20	<20	MDCK1	26/11/2005
14	B/BRISBANE/99/2005	160	320	160	<20	<20	<20	MDCK1	5/10/2005
15	B/PHILIPPINES/500/2005	20	160	40	<20	<20	<20	MDCK3	25/10/2005

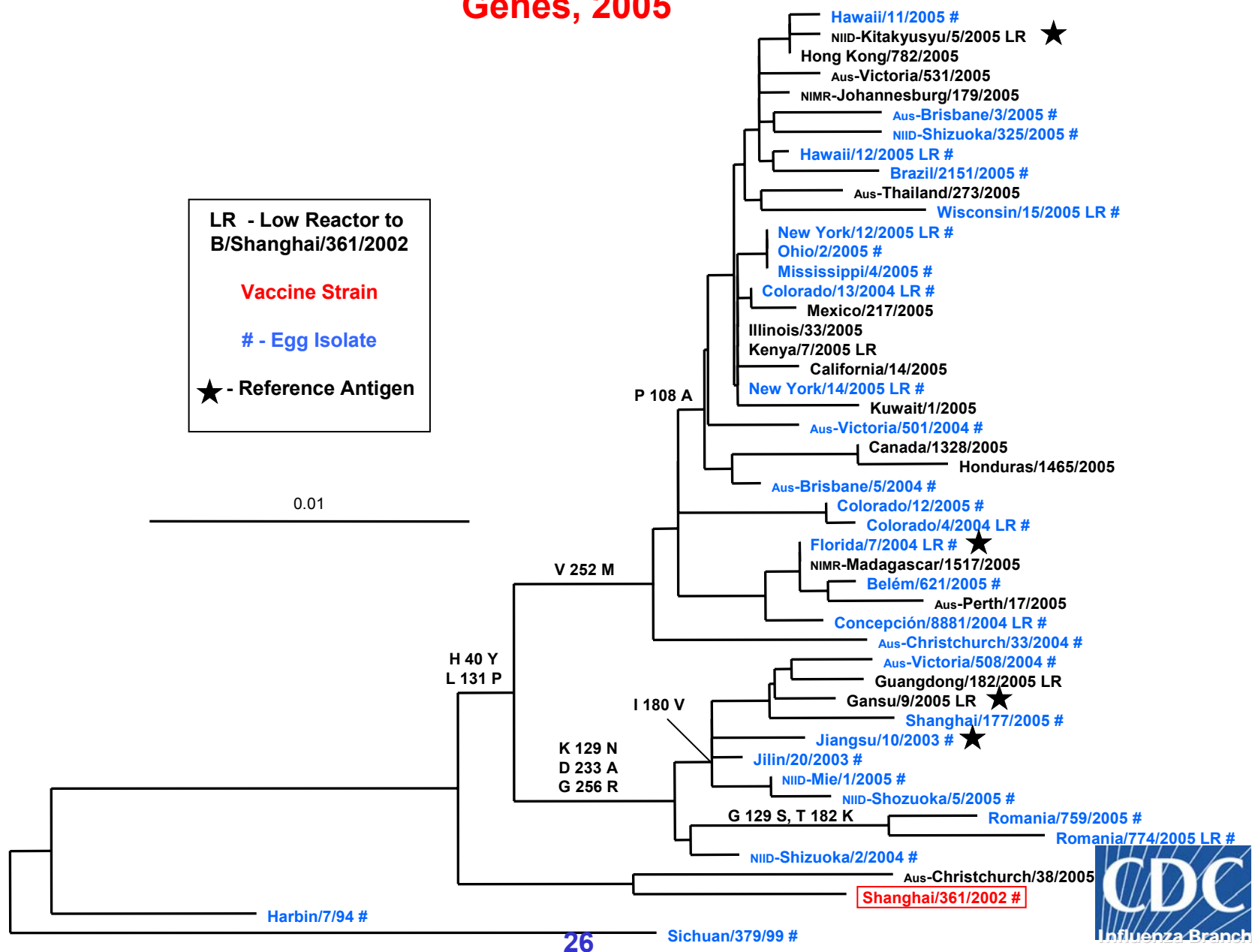
Influenza B Isolates Characterized by CDC

	U.S.A.	North America	Europe	Asia	Cent/So America	Africa, Australia, New Zealand	Total (%)
April 2005 – September 2005							
B/Hong Kong/330/2001-like	3			4	3		10 (5%)
B/HK/330/2001-like (low)	18	1		115	24	4	162 (60%)
B/Shanghai/361/2002-like	12	1		3	3	7	26 (13%)
B/Florida/07/2004-like*	15		1	12	4	11	43 (21%)
						Total	241
October 2005 – December 2005							
B/Hong Kong/330/2001-like							
B/HK/330/2001-like (low)	3	1	1				5 (31%)
B/Shanghai/361/2002-like	1						1 (6%)
B/Florida/07/2004-like*	7	1		1	1		10 (63%)
						Total	16
Total	467	41	36	446	117	49	1156

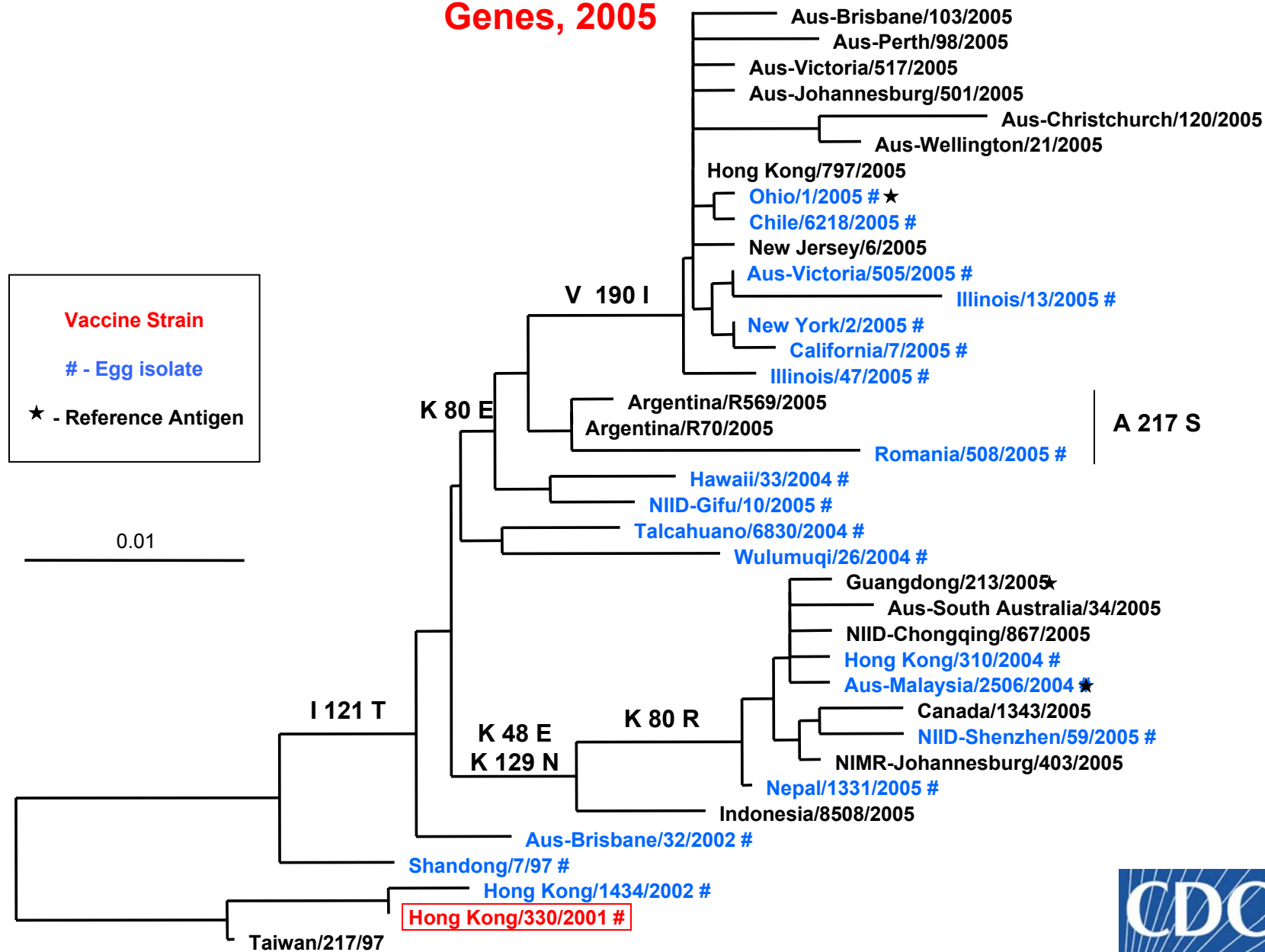
*B/Florida/07/2004 ferret antiserum was used from April 26, 2005.

Preliminary Data 02/10/2006

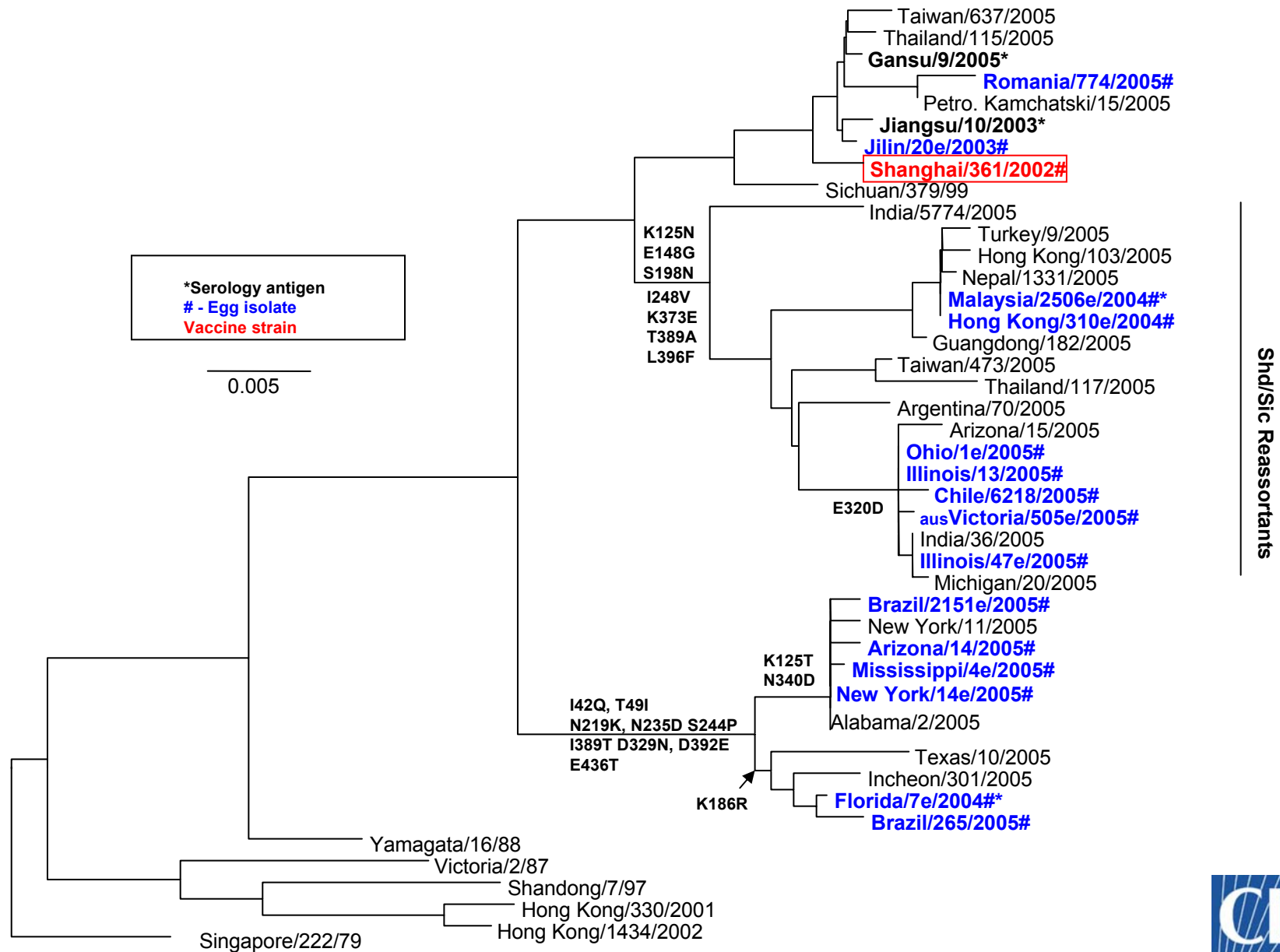
Evolutionary Relationships Among Influenza B (Yamagata lineage) HA (HA1) Genes, 2005



Evolutionary Relationships Among Influenza B (Victoria lineage) HA (HA1) Genes, 2005



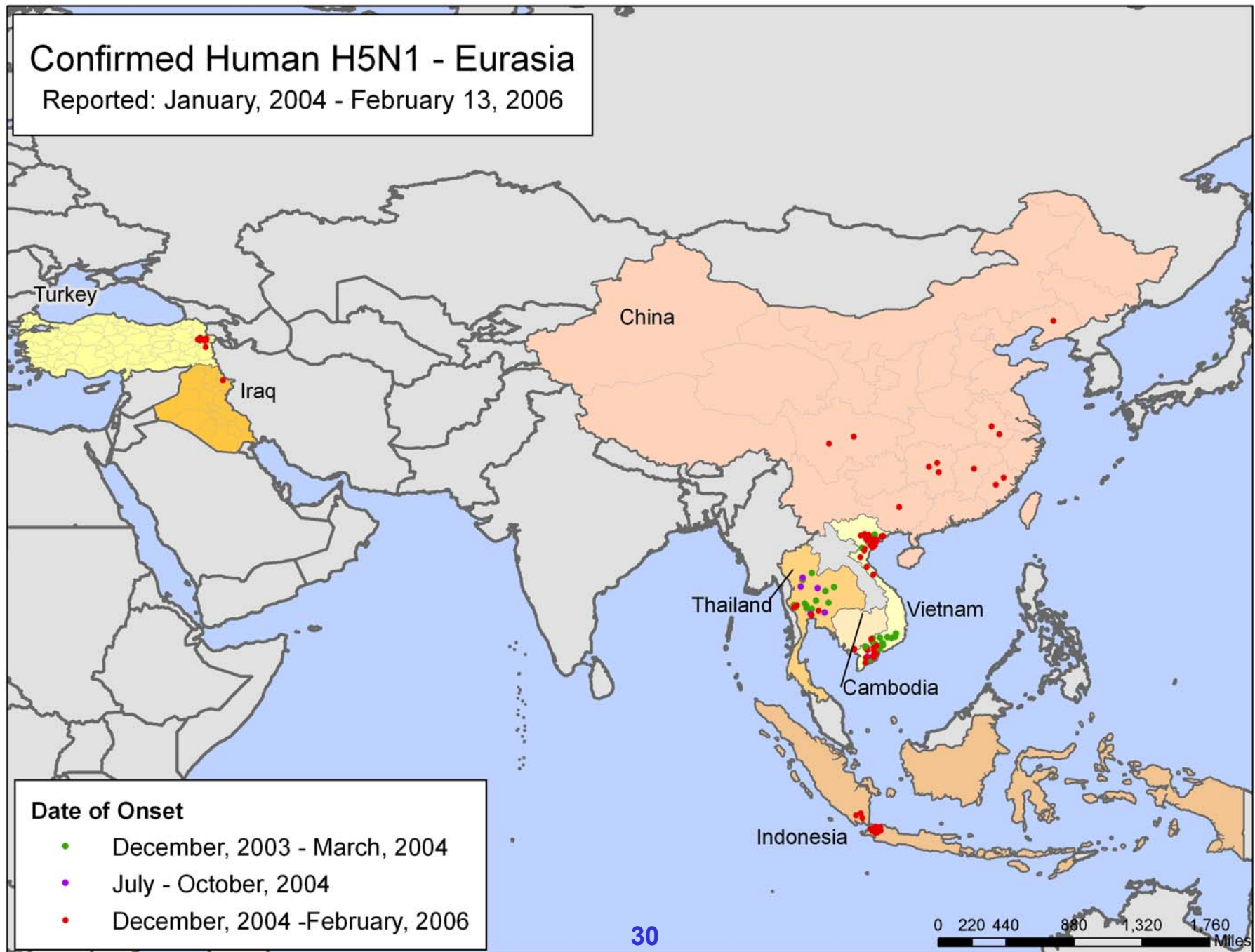
Evolutionary Relationships Among Influenza B Neuraminidase Genes, 2005



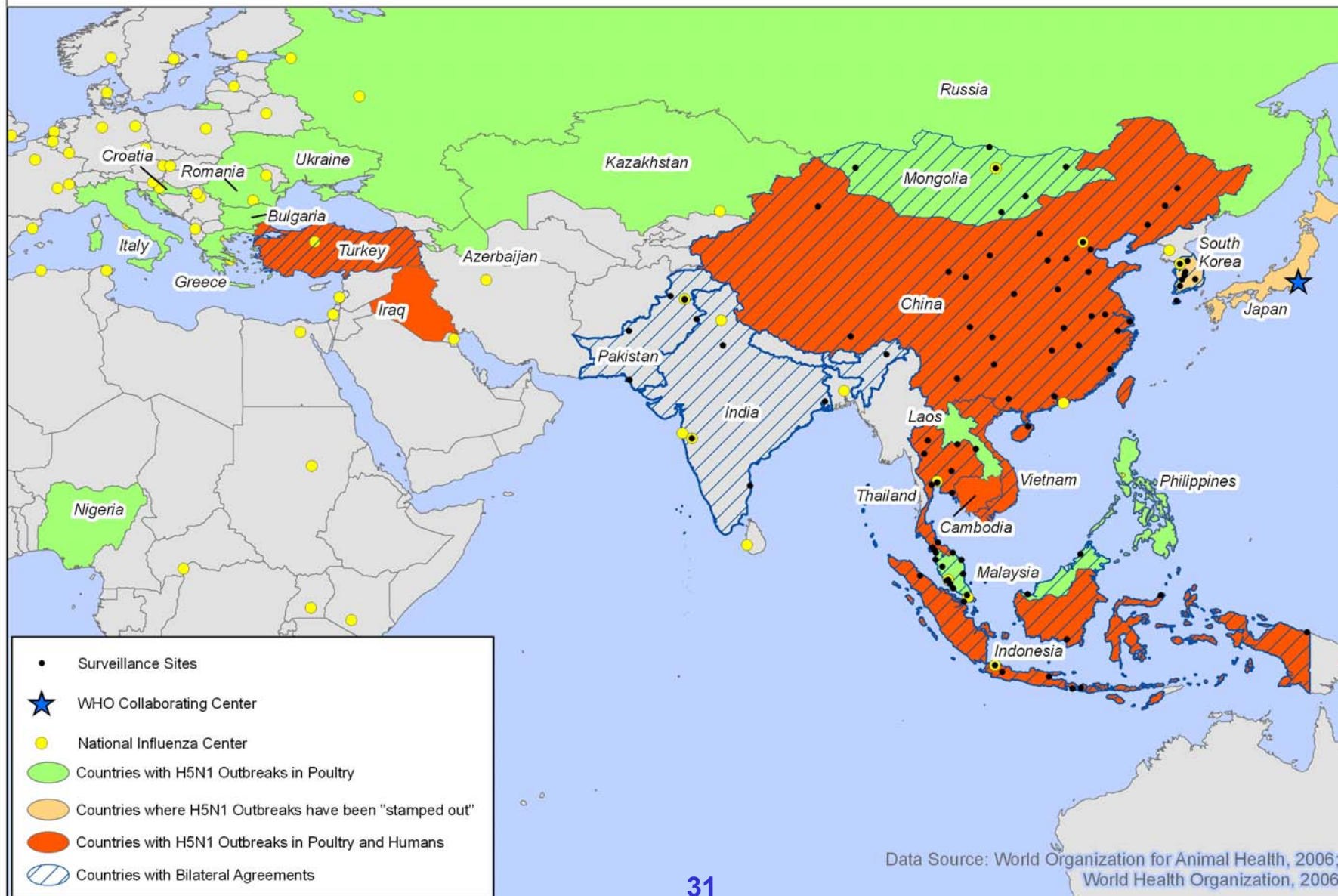
Influenza A(H5N1) Viruses

Confirmed Human H5N1 - Eurasia

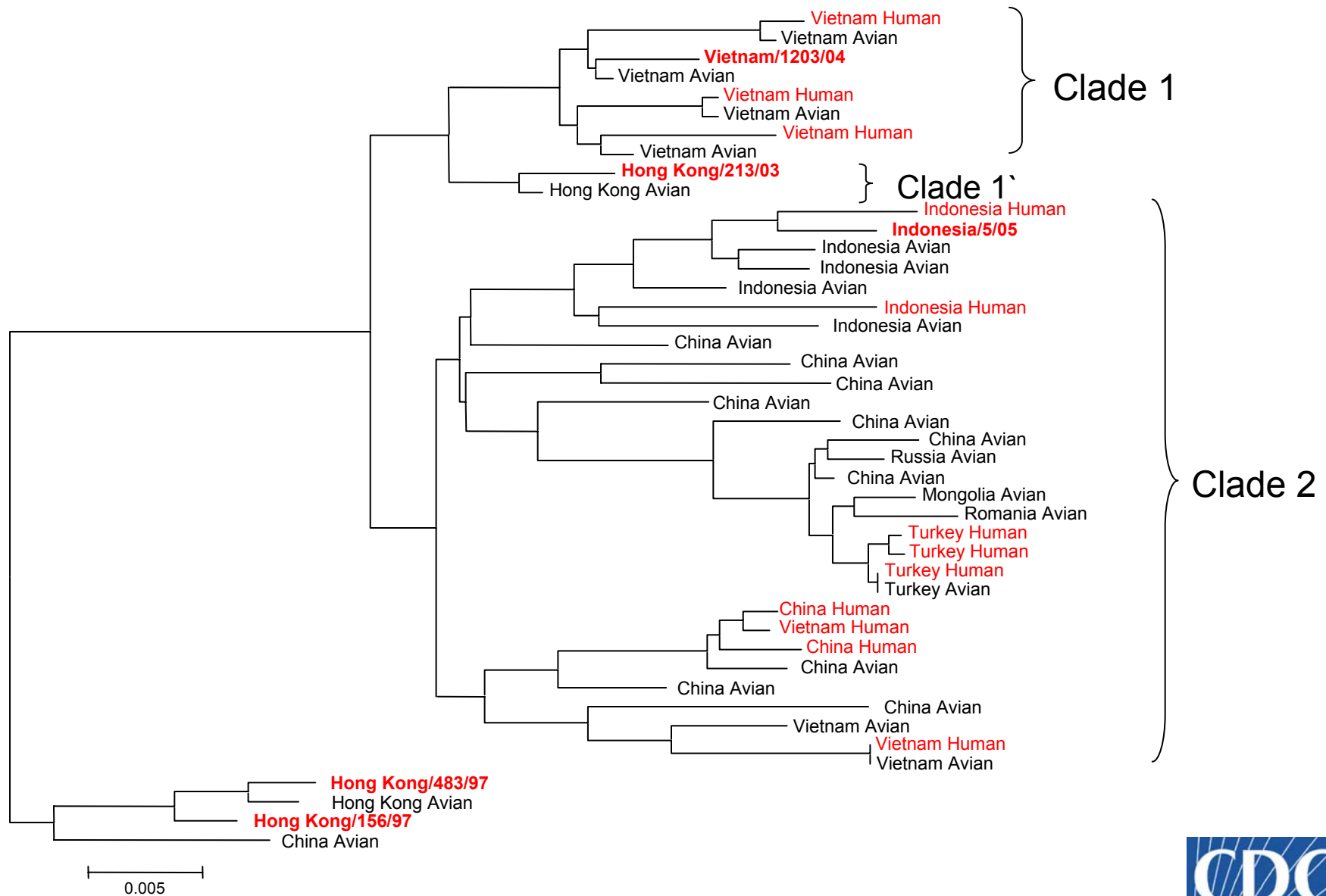
Reported: January, 2004 - February 13, 2006



National Influenza Centers, WHO Collaborating Centers, Surveillance Sites, Nations with Bilateral Agreements, Avian Outbreaks, and Human Cases



Evolutionary Relationships Among Influenza A (H5N1) Hemagglutinin (HA1) Genes



HEMAGGLUTINATION INHIBITION REACTIONS OF H5 INFLUENZA SPECIMENS

REFERENCE ANTIGENS		REFERENCE FERRET ANTISERA							Date	Passage	
		VN/1203	VN/30321	VN30408	DK/KP	IND/5	IND/6	DK/HU/15	IND/5-R		collected
1	A/VIETNAM/1203/2004	320	80	320	10	20	10	160	10	01/04/04	E1/E2
2	A/VIETNAM/JPHN30321/2005	80	320	80	160	160	20	40	10	UNKN	E2/E1
3	A/VIETNAM/HN30408/05	160	40	640	160	20	5	320	10	UNKN	X1/E1
4	A/DUCK KULON PROGO/BBVET/1X/04	20	40	20	2560	1280	320	80	640	UNKN	EX/E2
5	A/INDONESIA/5/2005	10	40	10	1280	1280	320	40	320	07/08/05	E2
6	A/INDONESIA/6/2005	10	20	20	1280	1280	640	40	320	UNKN	E2/E1
7	A/DUCK/HUNANWG/15/04	20	40	40	80	80	10	160	10	UNKN	XE1
8	A/INDONESIA/5/05 X PR/8-R (CDC)	10	40	20	2560	1280	1280	80	320	REASS	293TE1/E1
TEST ANTIGENS											
9	A/INDONESIA/CDC184/05	20	40	20	2560	1280	640	80	320	11/08/05	E1
10	A/INDONESIA/CDC194P/05	20	80	20	2560	1280	640	80	320	11/12/05	E1
11	A/INDONESIA/CDC287T/05	20	80	20	5120	2560	1280	80	640	12/13/05	E2
12	A/INDONESIA/CDC292N/05	10	20	10	1280	640	320	40	320	12/15/05	E2
13	A/INDONESIA/CDC292T/05	10	40	20	1280	1280	320	40	320	12/15/05	E2
14	A/INDONESIA/CDC326/06	10	40	20	2560	1280	640	40	320	01/15/06	E1
15	A/INDONESIA/CDC326T/06	10	20	20	1280	640	320	40	320	01/16/06	E1
16	A/INDONESIA/CDC326N/06	10	20	20	2560	1280	640	40	320	01/17/06	E1
17	A/INDONESIA/CDC329/06	20	40	20	2560	2560	640	80	640	01/14/06	E1
18	A/TURKEY/12/06	160	320	80	2560	1280	640	80	320	UNKN	XE1
19	A/TURKEY/15/06	40	80	40	640	320	320	40	80	UNKN	XE1
20	A/ANHUI/1/05	80	20	80	640	640	160	320	80	UNKN	E2/E1
21	A/ANHUI/2/05	20	10	40	320	320	40	160	40	UNKN	E2/E1

Clade 1

Clade 2

