



INFORMATION FOR THE VACCINES AND RELATED BIOLOGICAL  
PRODUCTS ADVISORY COMMITTEE

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Bethesda, Maryland

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

## **Methods Used in United States Influenza Surveillance**

### **World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories**

Approximately 120 WHO and NREVSS collaborating laboratories in the United States report the total number of specimens received for respiratory virus testing and the number testing positive for influenza A(H1N1), A(H3N2), A(not subtyped), or influenza B. Participating laboratories are in state or local health departments, universities, or hospitals. A subset of the isolates from these laboratories are submitted for complete antigenic characterization and antiviral resistance testing to the WHO Collaborating Center for Reference and Research on Influenza, CDC.

### **Pneumonia and influenza (P&I) deaths from 122 cities**

Each week throughout the year, the vital statistics offices of 122 cities report the total number of death certificates filed each week and the number of death certificates in which pneumonia or influenza is listed in any position on the certificate. A periodic regression model that incorporates a robust regression procedure is applied to produce a seasonal baseline of P&I deaths since 1983 and to calculate "excess" deaths above the baseline. An increase of 1.645 standard deviations above the seasonal baseline of P&I deaths is considered the "epidemic threshold", i.e., the point at which the observed proportion of deaths attributed to pneumonia or influenza is significantly higher than the expected.

Prior to the 1999-2000 season, a new case definition for a P&I death was introduced in the 122 Cities Mortality Reporting System. During the summer of 2000, the baseline and epidemic thresholds were adjusted manually to account for these changes in case definition. For the 2001-02 season, sufficient data have been collected using the new case definition to allow projection of the baseline using the regression procedure employed before the 2000-01 season.

### **Sentinel physician surveillance network**

Approximately 650 regularly reporting volunteer physicians throughout the United States provide the total number of patient visits per week and the number of those patients seen for ILI by age group. A subset of the physicians submit nasal and throat swabs to either a contract laboratory or to their state public health laboratory for virus isolation.

### **State and territorial epidemiologists**

State or territory-wide influenza activity, as assessed by the state or territorial epidemiologist, is reported weekly. Levels of influenza activity are classified as:

*No activity;*

*Sporadic* - sporadically occurring influenza-like illness (ILI) or culture-confirmed influenza, with no outbreaks detected;

*Regional*- outbreaks of ILI or culture-confirmed influenza in a county or counties having a combined population <50% of the state's total population;

*Widespread*- outbreaks of ILI or culture-confirmed influenza in a county or counties having a combined population  $\geq$ 50% of the state's total population.

## **Summary of Influenza Surveillance, United States September 30, 2001 - January 19, 2002\***

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 4% at the end of November to 14% for the week ending January 19, 2002. The predominant viruses isolated this season have been influenza type A (H3N2) viruses. The percentage of deaths attributed to pneumonia and influenza (P&I) has not exceeded baseline levels this season. The percentage of visits to U.S. sentinel physicians for influenza-like illness (ILI) has exceeded the national baseline of 1.9% twice this season (2.1% for the week ending December 29 and 2.2% for the week ending January 19).

### **WHO and NREVSS collaborating laboratories**

Since September 30, WHO and NREVSS laboratories have tested a total of 25,779 specimens for influenza viruses and 1,299 (5.0%) were positive. Of the 1,299 isolates identified, 1,278 (98%) were influenza A viruses and 21 (2%) were influenza B viruses. Four hundred and seventy-seven (37%) of the 1,278 influenza A viruses identified have been subtyped; 469 (98%) were influenza A (H3N2) viruses and 8 (2%) were influenza A (H1N1) viruses. Forty-five states have reported laboratory-confirmed influenza. Influenza isolates have been identified each week of this season but the proportion of specimens testing positive for influenza has been increasing steadily since the end of November. During the week ending January 19, 14% 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 30. During the week ending January 19, 7.7% of deaths were due to pneumonia or influenza. This was below the epidemic threshold of 8.1% for that week.

### **Sentinel physicians network**

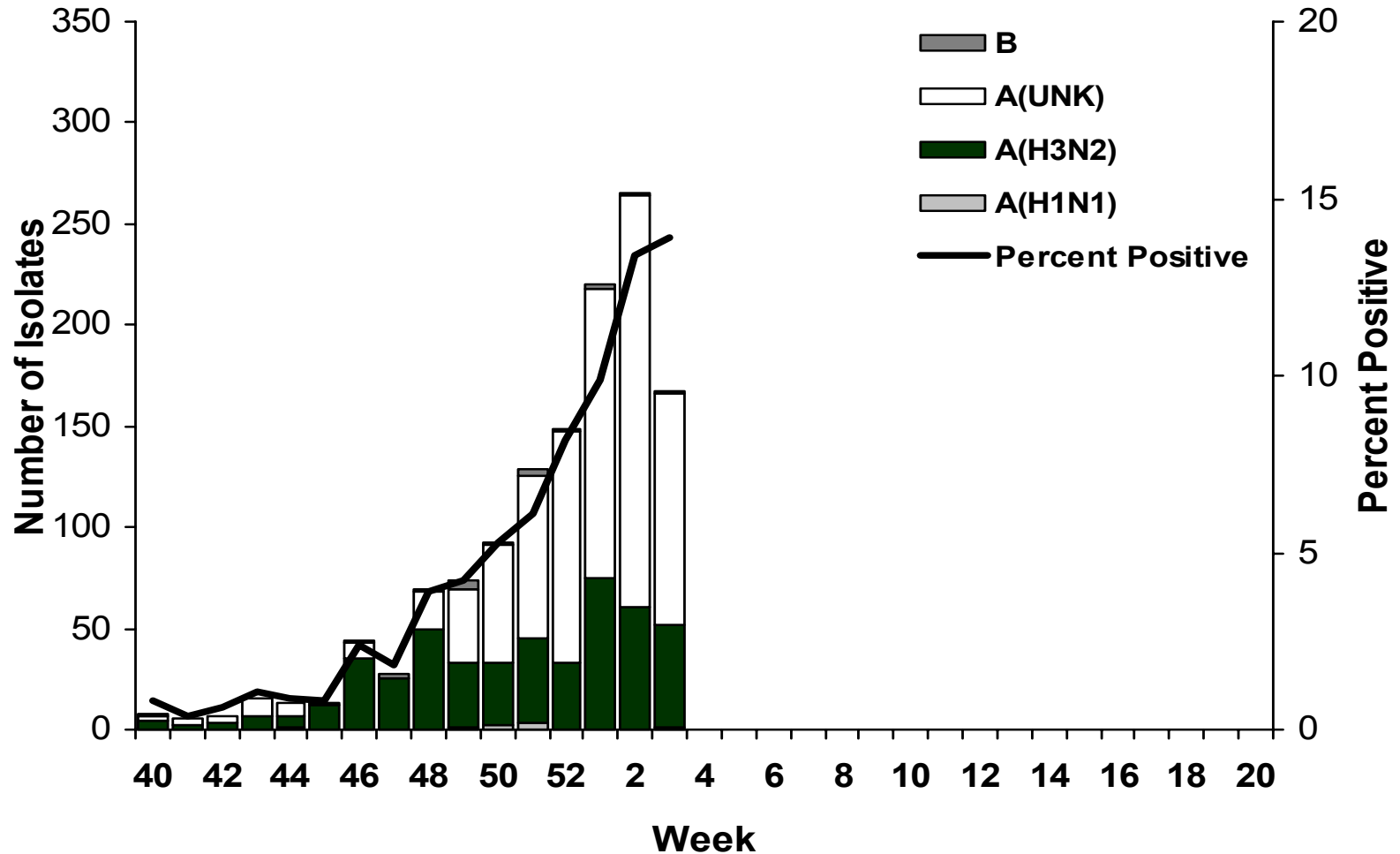
Nationwide, the percentage of visits to U.S. sentinel physicians for influenza-like illness (ILI) has exceeded the national baseline of 1.9% for 2 weeks this season (2.1% for the week ending December 29 and 2.2% for the week ending January 19).

### **State and territorial epidemiologists**

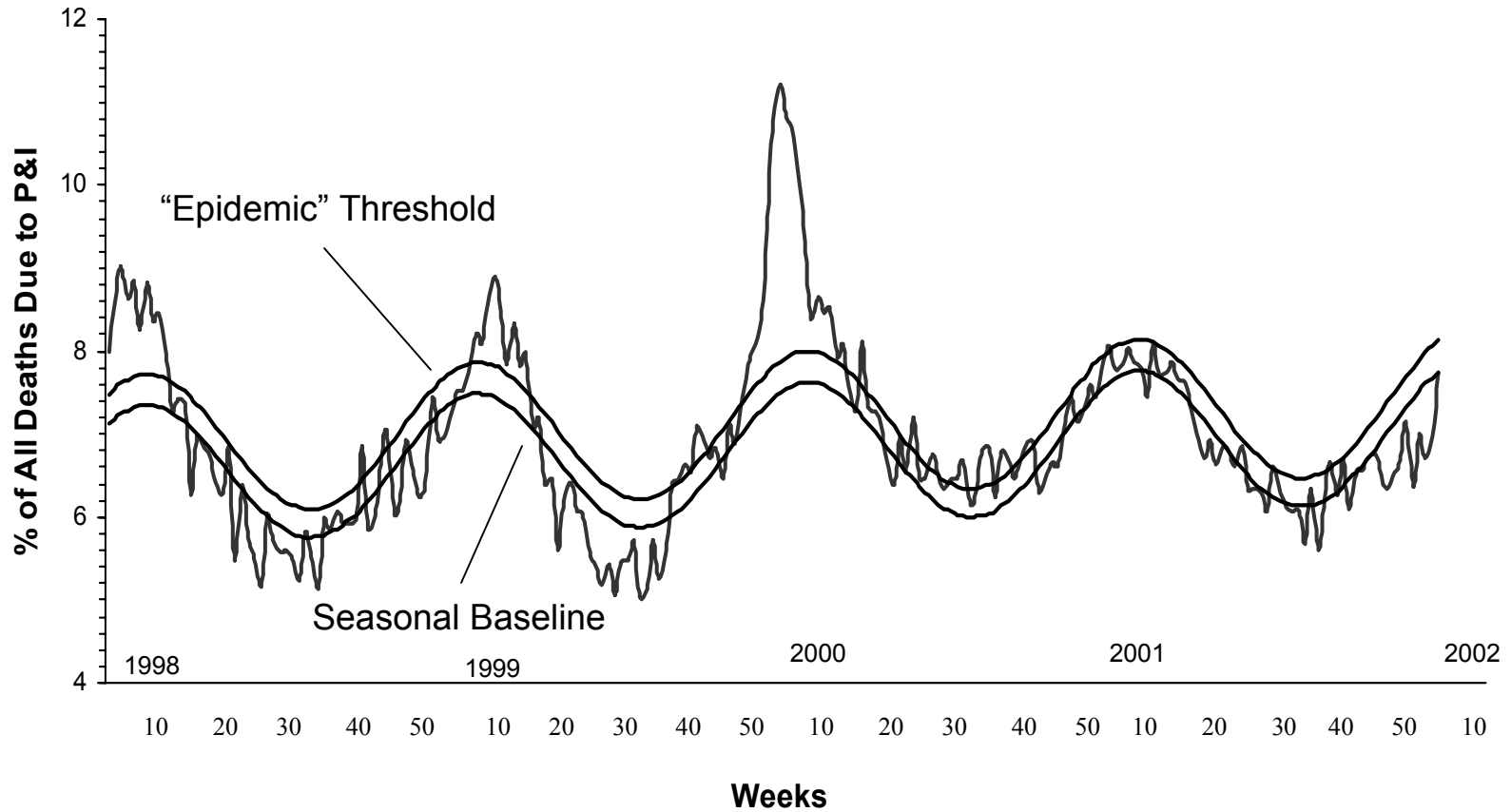
Regional or widespread influenza activity has been reported by at least one state each week since the week ending November 17, 2001. Widespread activity was first reported the week ending December 1, 2001. For the week ending January 19, with 47 states reporting, 4 states reported widespread activity, 11 states reported regional activity, 31 states reported sporadic activity, and one state reported no influenza activity.

\* Data reported as of January 24, 2002.

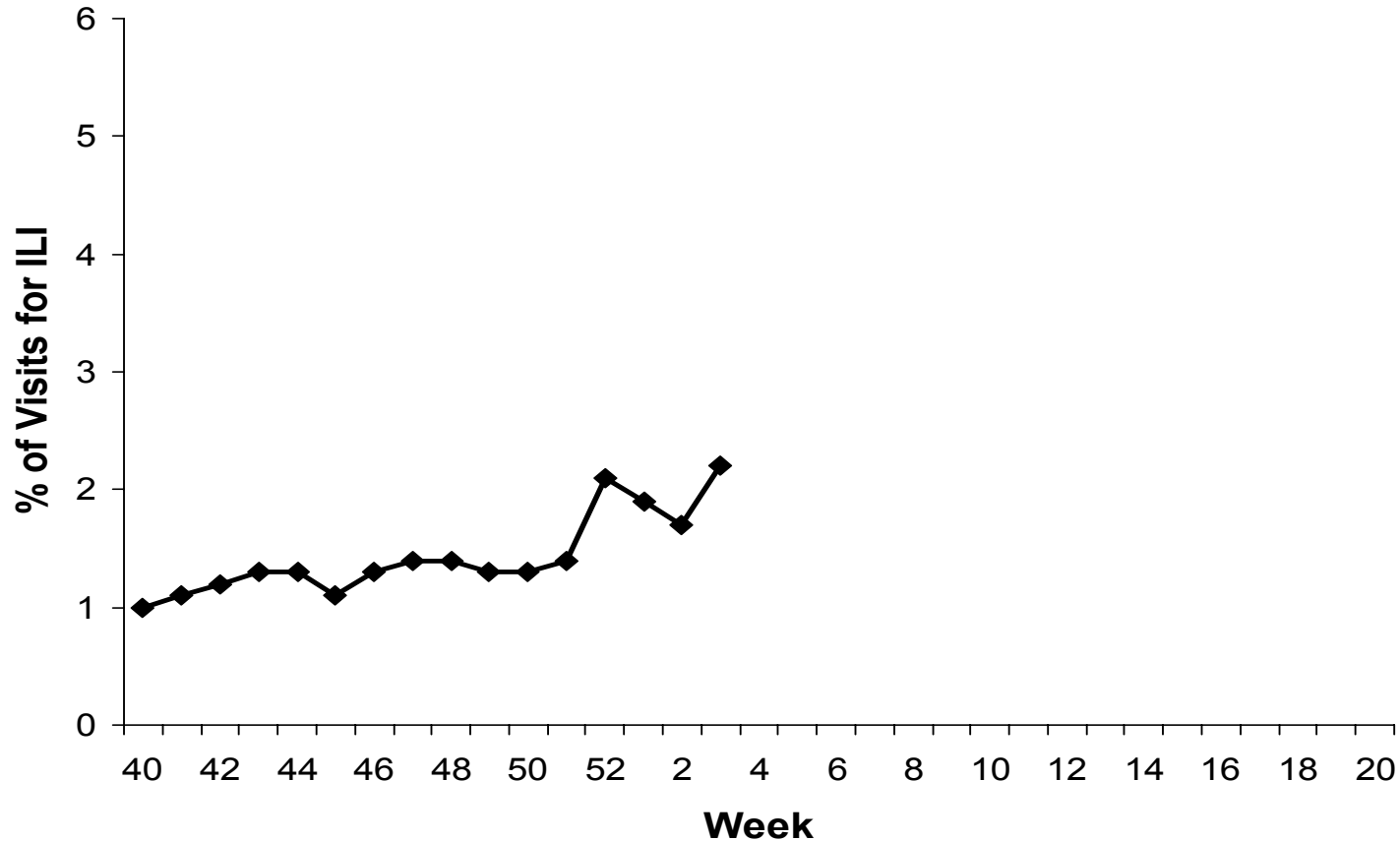
# WHO/NREVSS Collaborating Laboratories National Summary, 2001-2002



# Pneumonia and Influenza Mortality for 122 U.S. Cities Week Ending 1/19/02

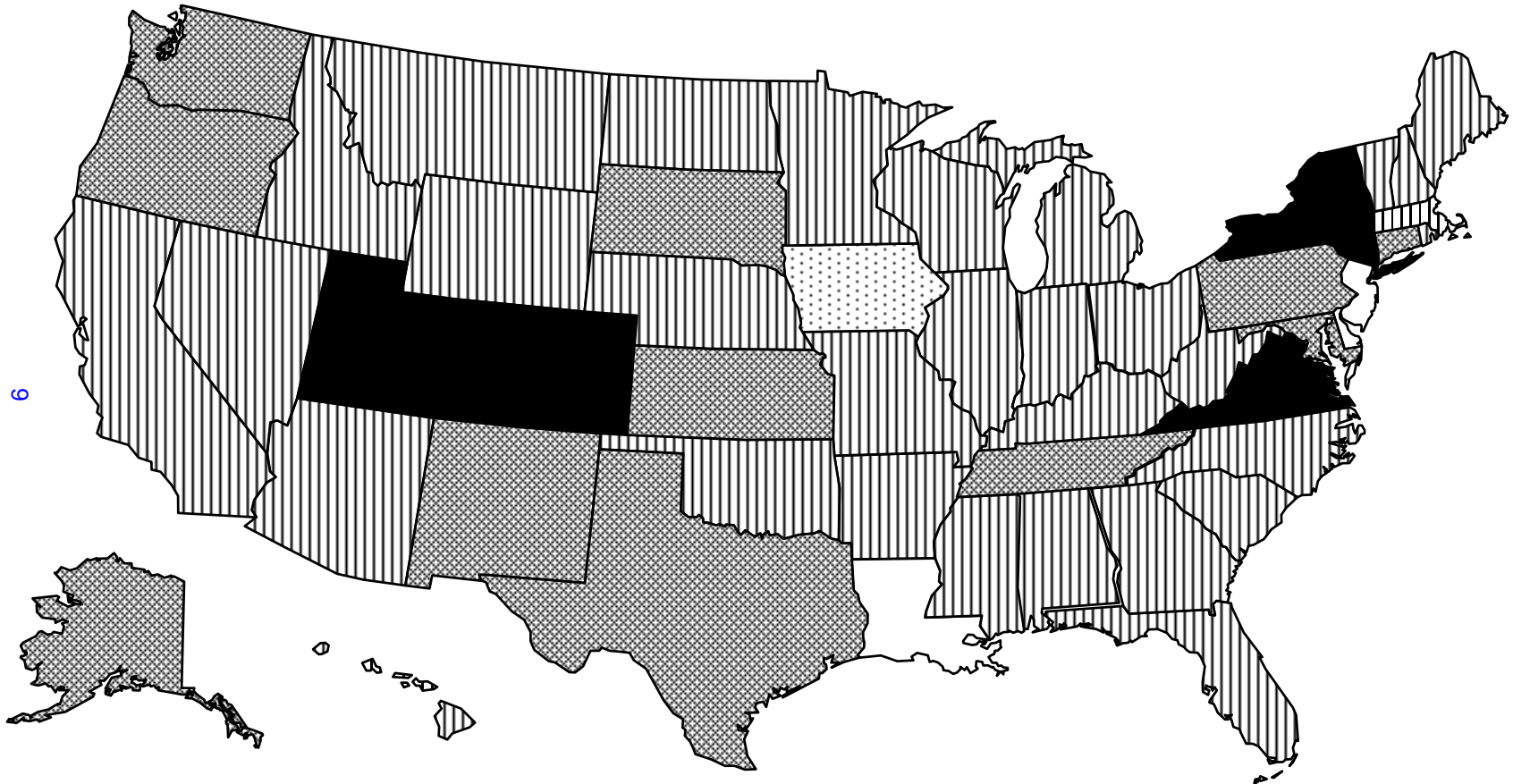


# Percentage of Visits for Influenza-like Illness Reported by Sentinel Physicians National Summary, 2001-2002



# Weekly Influenza Activity Estimates Reported by State & Territorial Epidemiologists

Week ending January 19, 2002 - Week 3

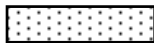


6

No Report



No Activity



Sporadic



Regional



Widespread



# **Influenza A(H1N1) Viruses**

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# INFLUENZA A(H1N1) WORLDWIDE ACTIVITY<sup>1</sup>

| <b>Geographical Region</b> | <b>October 2000 - March 2001</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|----------------------------------|--------|--------|--------|--------|--------|--|
|                            | Oct-00                           | Nov-00 | Dec-00 | Jan-01 | Feb-01 | Mar-01 |  |
| United States              | [                                | [ [    | [ [    | [ [    | [ [    | [      | A/New Caledonia/20/99<br>A/Johannesburg/82/96      |
| Canada                     | [                                | [      | [      | [ [    | [ [    | [ [    | A/New Caledonia/20/99                              |
| Europe                     | [                                | [ [    | [ [    | [ [ [  | [ [ [  | [ [    | A/New Caledonia/20/99                              |
| Aus/NZ                     |                                  |        |        | [      |        |        |  |
| Cen/So America             | [                                |        | [      |        |        |        | A/New Caledonia/20/99<br>A/Johannesburg/82/96      |
| Asia                       | [                                | [      | [ [    | [      | [ [    | [ [    | A/New Caledonia/20/99                              |
| N Africa/E Med             |                                  |        | [      | [ [    | [      | [      | A/New Caledonia/20/99                              |
| Southern Africa            |                                  |        |        |        |        |        |  |

| <b>Geographical Region</b> | <b>April 2001 - September 2001</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|------------------------------------|--------|--------|--------|--------|--------|--|
|                            | Apr-01                             | May-01 | Jun-01 | Jul-01 | Aug-01 | Sep-01 |  |
| United States              | [                                  |        |        | [      |        | [      | A/New Caledonia/20/99                              |
| Canada                     | [                                  | A      | A      | A      | A      |        |  |
| Europe                     | [                                  |        | [      |        |        | [      | A/New Caledonia/20/99                              |
| Aus/NZ                     |                                    | [      | [ [    | [ [    | [ [    | [      |  |
| Cen/So America             | [                                  | [      | [      | [      | [      | [      | A/New Caledonia/20/99                              |
| Asia                       | [ [                                | [      | [      | [      | [ [    | [      | A/New Caledonia/20/99                              |
| N Africa/E Med             |                                    |        |        |        | [      | [ [    |  |
| Southern Africa            |                                    |        |        |        |        |        |  |

| <b>Geographical Region</b> | <b>October 2001 - January 2002</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|------------------------------------|--------|--------|--------|--------|--------|--|
|                            | Oct-01                             | Nov-01 | Dec-01 | Jan-02 | Feb-02 | Mar-02 |  |
| United States              | [                                  |        | [      | [      |        |        | A/New Caledonia/20/99                              |
| Canada                     |                                    |        | [      | [      |        |        |  |
| Europe                     | [                                  | [      | [      | [      |        |        |  |
| Aus/NZ                     | [                                  |        |        |        |        |        |  |
| Cen/So America             |                                    |        |        |        |        |        |  |
| Asia                       | [                                  | [      | [      | [      |        |        | A/New Caledonia/20/99                              |
| N Africa/E Med             |                                    | [      | [      | [      |        |        |  |
| Southern Africa            |                                    |        |        |        |        |        |  |

<sup>1</sup> Activity level. + = Sporadic, ++ = Outbreak, +++ = Epidemic

<sup>2</sup> Strain data based on characterization tests performed at CDC and other WHO Collaborating Centers.

# HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H1 VIRUSES (12/05/01)

## REFERENCE ANTIGENS

## REFERENCE FERRET ANTISERA

| STRAIN DESIGNATION        | A<br>BJ/262 | B<br>NC/20 | C<br>FU/156 | D<br>HK/1252 | E<br>HI/15 | F<br>JOH/82 | Date<br>collected | Passage |
|---------------------------|-------------|------------|-------------|--------------|------------|-------------|-------------------|---------|
| 1. A/BEIJING/262/95       | <b>640</b>  | 320        | 320         | 80           | 40         | 40          | 01/09/95          | E3/E3   |
| 2. A/NEW CALEDONIA/20/99* | 160         | <b>640</b> | 640         | 160          | 160        | 20          | 06/09/99          | E4/E1   |
| 3. A/FUJIAN/156/2000      | 80          | 160        | <b>320</b>  | 40           | 40         | 10          | 08/25/00          | E2/E1   |
| 4. A/HONG KONG/1252/2000  | 80          | 40         | 40          | <b>320</b>   | 320        | 10          | 02/21/00          | C2/C2   |
| 5. A/HAWAII/15/2001*      | 80          | 40         | 20          | 320          | <b>640</b> | 5           | 02/17/01          | M2/C1   |
| 6. A/JOHANNESBURG/82/96   | 40          | 40         | 5           | 20           | 10         | <b>1280</b> | 2000              | E4/E3   |

## TEST ANTIGENS

|                           |     |      |      |     |     |    |          |         |
|---------------------------|-----|------|------|-----|-----|----|----------|---------|
| 7. A/GUIZHOU/241/2001     | 320 | 1280 | 640  | 320 | 160 | 80 | 08/20/01 | E3/E1   |
| 8. A/SHENZHEN/505/2001    | 640 | 1280 | 1280 | 320 | 160 | 80 | 09/05/01 | E3/E1   |
| 9. A/WUHAN/282/2001       | 640 | 1280 | 2560 | 640 | 320 | 80 | 08/30/01 | C1/C1   |
| 10. A/YUNNAN/350/2001     | 160 | 640  | 640  | 80  | 80  | 10 | 09/10/01 | E2/E1   |
| 11. A/FUJIAN/529/2001     | 320 | 640  | 1280 | 320 | 160 | 40 | 09/05/01 | E2/E1   |
| 12. A/WUHAN/285/2001      | 160 | 640  | 1280 | 80  | 80  | 20 | 09/06/01 | C1/C1   |
| 13. A/FUJIAN/478/2001     | 320 | 640  | 1280 | 160 | 160 | 40 | 08/16/01 | E2/E1   |
| 14. A/WUHAN/293/2001      | 320 | 640  | 1280 | 160 | 160 | 40 | 09/06/01 | C1/C1   |
| 15. A/GUANGER/347/2001    | 320 | 640  | 1280 | 320 | 160 | 40 | 08/01/01 | C2E1/E1 |
| 16. A/LONGYAN/163/2001    | 160 | 640  | 1280 | 160 | 160 | 40 | 08/12/01 | E3/E1   |
| 17. A/WUHAN/295/2001      | 320 | 320  | 640  | 320 | 160 | 20 | 09/06/01 | C1/C1   |
| 18. A/HUBEI/336/2001      | 160 | 320  | 1280 | 80  | 160 | 20 | 09/14/01 | E3/E1   |
| 19. A/WUHAN/297/2001      | 160 | 320  | 640  | 80  | 80  | 20 | 09/06/01 | C1/C1   |
| 20. A/LONGYAN/167/2001    | 160 | 320  | 320  | 160 | 80  | 20 | 08/12/01 | E3/E1   |
| 21. A/WUHAN/270/2001      | 80  | 320  | 640  | 80  | 80  | 20 | 08/23/01 | E1/E1   |
| 22. A/HUBEI/338/2001      | 80  | 320  | 640  | 80  | 80  | 10 | 09/14/01 | E3/E1   |
| 23. A/YUNNAN/307/2001     | 80  | 320  | 640  | 80  | 80  | 10 | 08/20/01 | E1/E1   |
| 24. A/HUBEI/278/2001      | 80  | 320  | 640  | 80  | 80  | 10 | 08/23/01 | E2/E1   |
| 25. A/HUBEI/316/2001      | 160 | 320  | 1280 | 160 | 160 | 20 | 09/12/01 | E3/E1   |
| 26. A/FUJIAN/479/2001     | 80  | 320  | 640  | 80  | 80  | 10 | 08/16/01 | E2/E1   |
| 27. A/WUHAN/298/2001      | 160 | 320  | 640  | 40  | 40  | 10 | 09/13/01 | E2/E1   |
| 28. A/SICHUAN/626/2001    | 80  | 320  | 640  | 40  | 40  | 10 | 08/06/01 | E3/E1   |
| 29. A/GUANGZHOU/1135/2001 | 80  | 320  | 640  | 80  | 80  | 10 | 08/30/01 | C2E1/E1 |
| 30. A/HUBEI/339/2001      | 40  | 160  | 640  | 40  | 40  | 5  | 09/14/01 | E2/E2   |
| 31. A/HUBEI/333/2001      | 80  | 160  | 320  | 40  | 40  | 10 | 09/12/01 | E3/E2   |
| 32. A/HUBEI/288/2001*     | 80  | 160  | 320  | 40  | 40  | 10 | 08/29/01 | E2/E1   |

\* Serology antigen

## HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H1 VIRUSES (01/11/02)

### REFERENCE ANTIGENS

### REFERENCE FERRET ANTISERA

| STRAIN DESIGNATION        | A          | B          | C          | D          | E           | Date      | Passage |
|---------------------------|------------|------------|------------|------------|-------------|-----------|---------|
|                           | BJ/262     | NC/20      | FUJ/156    | HI/15      | JOH/82      | collected |         |
| 1. A/BEIJING/262/95       | <b>640</b> | 320        | 320        | 40         | 40          | 01/09/95  | E3/E3   |
| 2. A/NEW CALEDONIA/20/99* | 160        | <b>640</b> | 640        | 160        | 20          | 06/09/99  | E4/E1   |
| 3. A/FUJIAN/156/2000      | 80         | 320        | <b>640</b> | 80         | 20          | 08/25/00  | E2/E1   |
| 4. A/HAWAII/15/2001*      | 20         | 20         | 20         | <b>160</b> | 5           | 02/17/01  | M2/C1   |
| 5. A/JOHANNESBURG/82/96   | 40         | 40         | 20         | 20         | <b>1280</b> | 1996      | E4/E3   |

### TEST ANTIGENS

|                                |     |     |      |     |    |          |         |
|--------------------------------|-----|-----|------|-----|----|----------|---------|
| 6. A/WISCONSIN/12/2001*        | 160 | 320 | 320  | 20  | 5  | 12/07/01 | C2/C1   |
| 7. A/WASHINGTON/6/2001         | 160 | 320 | 160  | 80  | 10 | 10/29/01 | M5/C3   |
| 8. A/CHRISTCHURCH/181/2001     | 80  | 320 | 320  | 40  | 10 | 09/05/01 | C4/C1   |
| 9. A/NEW CALEDONIA/10/2001     | 160 | 320 | 160  | 80  | 10 | 09/04/01 | CXC3/C1 |
| 10. A/SOUTH AUSTRALIA/103/2001 | 160 | 640 | 320  | 80  | 20 | 10/30/01 | CXC2/C1 |
| 11. A/DARWIN/18/2001           | 80  | 320 | 640  | 80  | 10 | 10/11/01 | C2/C1   |
| 12. A/BRISBANE/166/2001        | 40  | 160 | 160  | 40  | 10 | 10/04/01 | CXC2/C1 |
| 13. A/HONG KONG/1272/2001      | 160 | 640 | 1280 | 80  | 20 | 08/28/01 | C2/C1   |
| 14. A/HONG KONG/1273/2001      | 320 | 640 | 1280 | 160 | 40 | 08/29/01 | C2/C1   |
| 15. A/HONG KONG/1303/2001      | 160 | 640 | 1280 | 80  | 20 | 10/31/01 | C2/C1   |
| 16. A/PHILIPPINES/637/2001     | 160 | 640 | 1280 | 80  | 20 | 08/10/01 | C2/C1   |
| 17. A/BANGKOK/544/2001         | 320 | 640 | 640  | 80  | 20 | 10/09/01 | C4/C1   |
| 18. A/BANGKOK/255/2001*        | 80  | 160 | 320  | 40  | 10 | 06/25/01 | E3/E2   |

\* Serology antigen

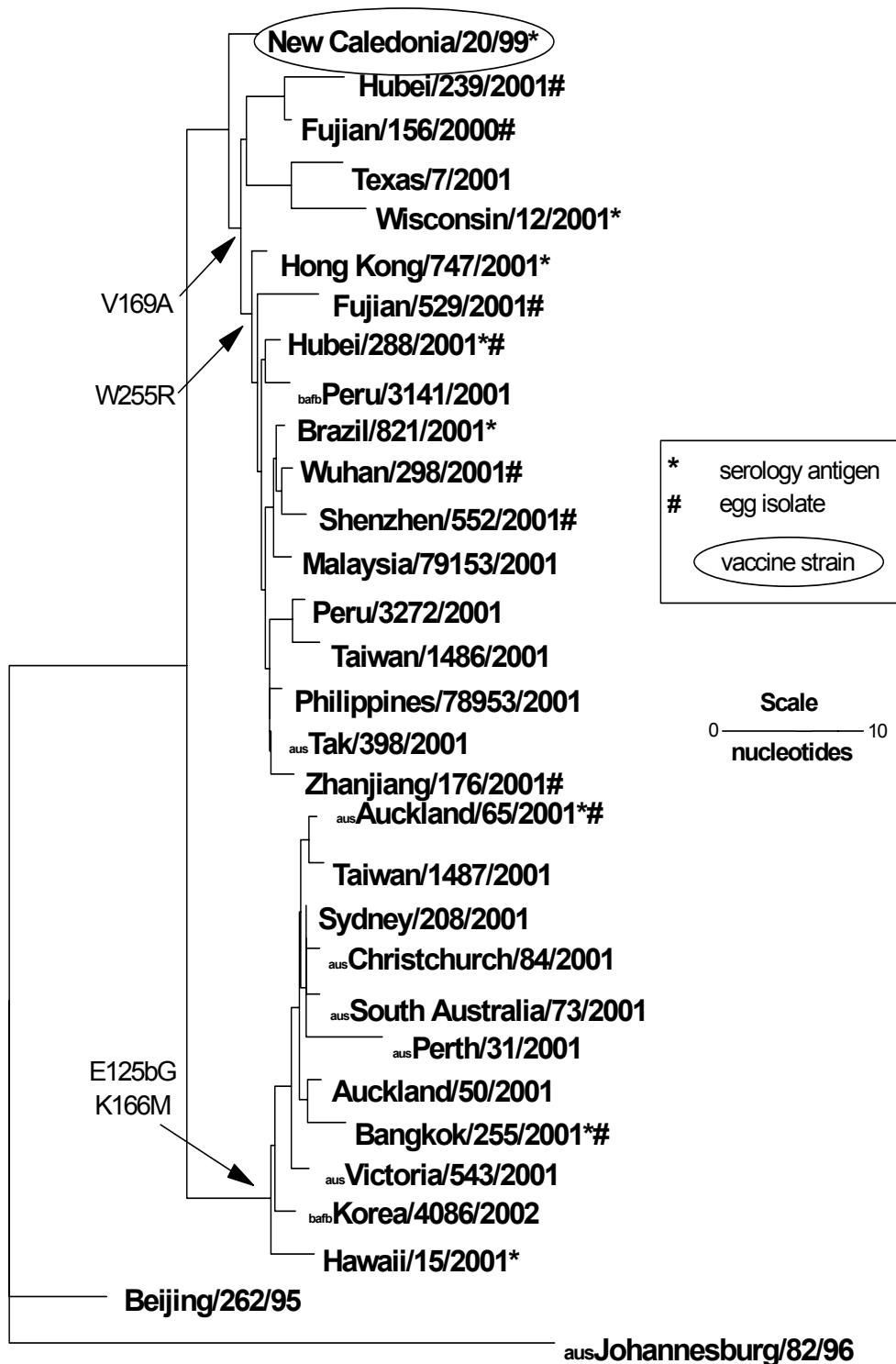
## Influenza A(H1N1) Isolates Characterized by CDC

|                                    | U.S.A.     | North America | Europe    | Asia       | Cent/So America | Africa, Australia, New Zealand | Total (%)  |
|------------------------------------|------------|---------------|-----------|------------|-----------------|--------------------------------|------------|
| <b>October 2000 - March 2001</b>   |            |               |           |            |                 |                                |            |
| A/N.Caledonia/20/99-like           | 342        | 5             | 83        | 91         | 1               | 8                              | 530 (95%)  |
| A/N.Caledon./20/99-like (low)      | 5          |               |           | 4          |                 |                                | 9 (1%)     |
| A/Johannesburg/82/96-like          | 18         | 1             | 1         |            | 1               |                                | 21 (4%)    |
|                                    |            |               |           |            |                 | <b>Total</b>                   | <b>560</b> |
| <b>April 2001 - September 2001</b> |            |               |           |            |                 |                                |            |
| A/N.Caledonia/20/99-like           | 3          | 1             | 1         | 109        | 13              | 13                             | 140 (95%)  |
| A/N.Caledon./20/99-like (low)      |            |               |           | 6          | 1               |                                | 7 (5%)     |
| A/Johannesburg/82/96-like          |            |               |           |            |                 |                                |            |
|                                    |            |               |           |            |                 | <b>Total</b>                   | <b>147</b> |
| <b>October 2001 - January 2001</b> |            |               |           |            |                 |                                |            |
| A/N.Caledonia/20/99-like           | 2          |               |           | 2          |                 | 2                              | 6 (86%)    |
| A/N.Caledon./20/99-like (low)      |            |               |           |            |                 | 1                              | 1 (14%)    |
| A/Johannesburg/82/96-like          |            |               |           |            |                 |                                |            |
|                                    |            |               |           |            |                 | <b>Total</b>                   | <b>7</b>   |
| <b>Total</b>                       | <b>370</b> | <b>7</b>      | <b>85</b> | <b>212</b> | <b>16</b>       | <b>24</b>                      | <b>714</b> |

Preliminary Data

01/26/02

# Evolutionary Relationships Among Influenza H1 Hemagglutinin (HA1) Genes

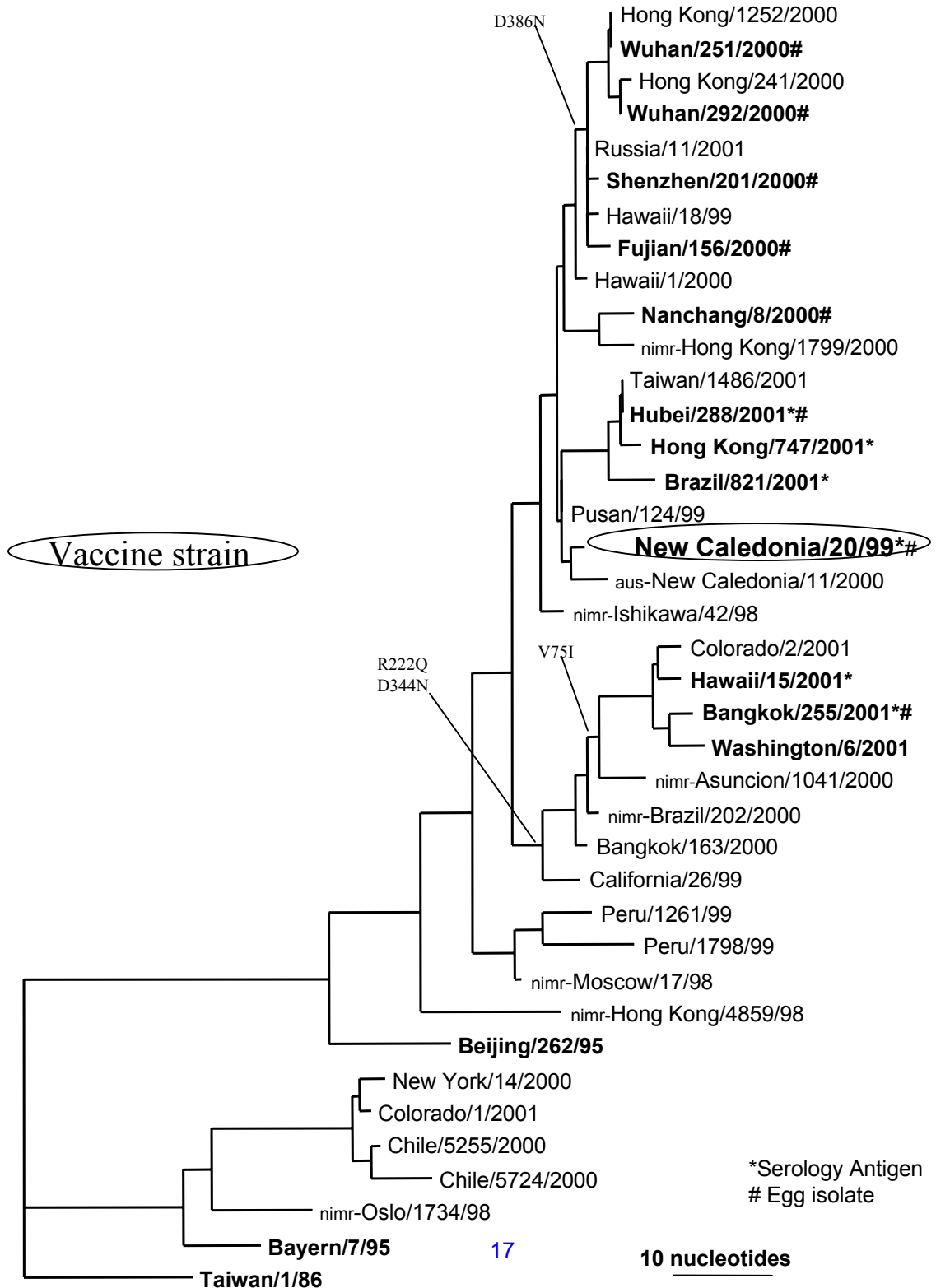


## Number of Amino Acid Differences from A/New Caledonia/20/99-like Consensus HA1 Sequence

| Isolate             | Passage | Collection Date | No. of Differences | Position of change                               |
|---------------------|---------|-----------------|--------------------|--|
| Fujian/478/2001     | E2/E1   | 8/16/2001       | 0                  |  |
| Guangdong/285/2001  | E2/E1   | 7/27/2001       | 1                  | N129H  |
| Longyan/173/2001    | E2/E1   | 8/15/2001       | 1                  | D190N  |
| Hubei/288/2001*     | E2/E1   | 8/29/2001       | 1                  | D190N  |
| Fujian/529/2001     | E2/E1   | 9/5/2001        | 1                  | D190N  |
| Hubei/350/2001      | E2/E1   | 9/19/2001       | 1                  | D190N  |
| Hubei/339/2001      | E2/E2   | 9/14/2001       | 1                  | D190N  |
| Hubei/316/2001      | E3/E1   | 9/12/2001       | 1                  | Q226E  |
| Zhanjiang/176/2001  | EX/E1   | 7/23/2001       | 2                  | D190G, R310K                                     |
| Guizhou/241/2001    | E3/E1   | 8/20/2001       | 2                  | E125bG, G189R                                    |
| Yunnan/350/2001     | E2/E1   | 9/10/2001       | 2                  | D190N, R255W                                     |
| Wuhan/298/2001      | E2/E1   | 9/13/2001       | 2                  | T12P, D190N                                      |
| NewCaledonia/20/99* | E4/E1   | 6/9/1999        | 3                  | A169V, D190N, R255W                              |
| Guangdong/313/2001  | E2/E2   | 8/3/2001        | 3                  | T12P, G156E, D190N                               |
| Shenzhen/505/2001   | E3/E1   | 9/5/2001        | 3                  | T12P, V132P, D225N                               |
| Shenzhen/301/2001   | E2/E1   | Unknown         | 4                  | T12P, V26G, R149K, D190N                         |
| Auckland/65/2001*   | E2      | Unknown         | 4                  | E125bG, K166M, A169V, D275G                      |
| Hubei/239/2001      | E2/E1   | 8/21/2001       | 5                  | T12P, K144E, E173K, D190N, R192K                 |
| Bangkok/263/2001    | E3/E1   | 6/25/2001       | 6                  | E125bG, A169V, D190N, R255W, F263V, D275G        |
| Bangkok/255/2001*   | E3/E1   | 6/25/2001       | 7                  | E125bG, K166M, A169V, D190N, R255W, E263V, D275G |

\* Serology antigen

# Evolutionary Relationships Among Influenza A N1 Neuraminidase Genes



## Number of Amino Acid Differences from Consensus\* N1 Neuraminidase Sequence

| Isolate               | Passage | AA<br>Diff. | Position          |
|-----------------------|---------|-------------|-------------------|
| A/Hubei/288/2001      | E2/E1   | 0           |                   |
| A/Russia/11/2001      | E1/E1   | 1           | 386               |
| A/New Caledonia/20/99 | E4/E1   | 2           | 461, 466          |
| A/Bangkok/255/2001    | E3/E1   | 4           | 81, 222, 344, 432 |

\*Consensus sequence was generated from 10 viruses isolated in 2001.

**Hemagglutination Inhibition Antibody Responses to the H1\* Component  
of the 2001-2002 Influenza Vaccine  
ADULT POPULATIONS**

|                              |    |                             |        |         |          | % with HI titer $\geq$ 40 |              |
|------------------------------|----|-----------------------------|--------|---------|----------|---------------------------|--------------|
| Population                   | N  | Antigen                     | % Rise | Pre GMT | Post GMT | Pre Vaccine               | Post Vaccine |
| <b>USA<sup>1</sup></b>       |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 42     | 21      | 92       | 33                        | 88           |
|                              | 24 | A/Brazil/821/2001           | 42     | 29      | 127      | 54                        | 96           |
|                              | 24 | A/Hong Kong/747/2001        | 42     | 31      | 120      | 54                        | 96           |
|                              | 24 | A/Auckland/65/2001 (egg)    | 42     | 14      | 46       | 29                        | 71           |
| <b>UK<sup>2</sup></b>        |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 96     | 6       | 143      | 0                         | 88           |
|                              | 24 | A/Brazil/821/2001           | 96     | 7       | 196      | 13                        | 100          |
|                              | 24 | A/Hong Kong/747/2001        | 96     | 8       | 174      | 13                        | 100          |
|                              | 24 | A/Auckland/65/2001 (egg)    | 75     | 5       | 50       | 0                         | 63           |
|                              |    |                             |        |         |          |                           |              |
| <b>Australia<sup>3</sup></b> | 24 | A/N.Caledon./20/99 IVR-116* | 100    | 6       | 240      | 0                         | 100          |
|                              | 24 | A/Brazil/821/2001           | 100    | 7       | 293      | 0                         | 100          |
|                              | 24 | A/Hong Kong/747/2001        | 100    | 7       | 293      | 0                         | 100          |
|                              | 24 | A/Auckland/65/2001 (egg)    | 100    | 5       | 101      | 0                         | 92           |

Preliminary Data 08/30/01

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Yamanashi/166/98 hemagglutinin.

2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

3. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

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

**Hemagglutination Inhibition Antibody Responses to the H1\* Component  
of the 2001-2002 Influenza Vaccine  
ELDERLY POPULATIONS**

|                              |    |                             |        |         |          | % with HI titer $\geq$ 40 |              |
|------------------------------|----|-----------------------------|--------|---------|----------|---------------------------|--------------|
| Population                   | N  | Antigen                     | % Rise | Pre GMT | Post GMT | Pre Vaccine               | Post Vaccine |
| <b>USA<sup>1</sup></b>       |    |                             |        |         |          |                           |              |
|                              | 23 | A/N.Caledon./20/99 IVR-116* | 30     | 14      | 34       | 22                        | 57           |
|                              | 23 | A/Brazil/821/2001           | 30     | 23      | 56       | 30                        | 74           |
|                              | 23 | A/Hong Kong/747/2001        | 26     | 25      | 57       | 39                        | 78           |
|                              | 23 | A/Auckland/65/2001 (egg)    | 30     | 9       | 18       | 13                        | 30           |
| <b>UK<sup>2</sup></b>        |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 71     | 8       | 65       | 13                        | 79           |
|                              | 24 | A/Brazil/821/2001           | 83     | 9       | 90       | 13                        | 83           |
|                              | 24 | A/Hong Kong/747/2001        | 79     | 9       | 76       | 13                        | 75           |
|                              | 24 | A/Auckland/65/2001 (egg)    | 58     | 7       | 30       | 13                        | 54           |
|                              |    |                             |        |         |          |                           |              |
| <b>Australia<sup>3</sup></b> | 24 | A/N.Caledon./20/99 IVR-116* | 67     | 8       | 32       | 8                         | 54           |
|                              | 24 | A/Brazil/821/2001           | 75     | 11      | 60       | 25                        | 79           |
|                              | 24 | A/Hong Kong/747/2001        | 75     | 11      | 53       | 25                        | 75           |
|                              | 24 | A/Auckland/65/2001 (egg)    | 58     | 7       | 22       | 4                         | 33           |

Preliminary Data 08/30/01

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Yamanashi/166/98 hemagglutinin.

2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

3. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

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

**Hemagglutination Inhibition Antibody Responses to the H1\* Component  
of the 2001-2002 Influenza Vaccine  
ADULT POPULATIONS**

| Population                   | N  | Antigen                     | % Rise | Pre GMT | Post GMT | % with HI titer $\geq$ 40 |              |
|------------------------------|----|-----------------------------|--------|---------|----------|---------------------------|--------------|
|                              |    |                             |        |         |          | Pre Vaccine               | Post Vaccine |
| <b>UK<sup>1</sup></b>        |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 71     | 10      | 73       | 0                         | 71           |
|                              | 24 | A/Hubei/288/2001            | 71     | 10      | 76       | 0                         | 71           |
|                              | 24 | A/Bangkok/255/2001          | 58     | 10      | 41       | 0                         | 58           |
|                              | 24 | A/Wisconsin/12/2001         | 71     | 10      | 55       | 0                         | 71           |
|                              | 24 | A/Hawaii/15/2001            | 58     | 10      | 34       | 0                         | 58           |
| <b>Australia<sup>2</sup></b> |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 92     | 6       | 200      | 4                         | 92           |
|                              | 24 | A/Hubei/288/2001            | 96     | 7       | 202      | 4                         | 96           |
|                              | 24 | A/Bangkok/255/2001          | 96     | 6       | 110      | 4                         | 96           |
|                              | 24 | A/Wisconsin/12/2001         | 88     | 6       | 105      | 4                         | 91           |
|                              | 24 | A/Hawaii/15/2001            | 83     | 6       | 52       | 4                         | 67           |

Preliminary Data 01/10/02

1. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

2. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

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

**Hemagglutination Inhibition Antibody Responses to the H1\* Component  
of the 2001-2002 Influenza Vaccine  
ELDERLY POPULATIONS**

| Population                   | N  | Antigen                     | % Rise | Pre GMT | Post GMT | % with HI titer $\geq$ 40 |              |
|------------------------------|----|-----------------------------|--------|---------|----------|---------------------------|--------------|
|                              |    |                             |        |         |          | Pre Vaccine               | Post Vaccine |
| <b>UK<sup>1</sup></b>        |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 39     | 14      | 31       | 13                        | 57           |
|                              | 24 | A/Hubei/288/2001            | 38     | 14      | 35       | 17                        | 54           |
|                              | 24 | A/Bangkok/255/2001          | 25     | 12      | 20       | 8                         | 33           |
|                              | 24 | A/Wisconsin/12/2001         | 42     | 14      | 35       | 17                        | 58           |
|                              | 24 | A/Hawaii/15/2001            | 29     | 10      | 18       | 0                         | 29           |
| <b>Australia<sup>2</sup></b> |    |                             |        |         |          |                           |              |
|                              | 24 | A/N.Caledon./20/99 IVR-116* | 63     | 8       | 44       | 8                         | 70           |
|                              | 24 | A/Hubei/288/2001            | 71     | 9       | 41       | 8                         | 65           |
|                              | 24 | A/Bangkok/255/2001          | 63     | 7       | 26       | 4                         | 43           |
|                              | 24 | A/Wisconsin/12/2001         | 71     | 9       | 40       | 13                        | 61           |
|                              | 24 | A/Hawaii/15/2001            | 50     | 7       | 23       | 4                         | 48           |

Preliminary Data 01/10/02

1. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

2. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

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

# **Influenza A(H3N2) Viruses**

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# INFLUENZA A(H3N2) WORLDWIDE ACTIVITY<sup>1</sup>

| <b>Geographical Region</b> | <b>October 2000 - March 2001</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|----------------------------------|--------|--------|--------|--------|--------|--|
|                            | Oct-00                           | Nov-00 | Dec-00 | Jan-01 | Feb-01 | Mar-01 |  |
| United States              | [                                | [      | [      | [      | [      | [      | A/Panama/2007/99                                   |
| Canada                     | [                                |        |        |        |        |        | A/Panama/2007/99                                   |
| Europe                     | [                                | [      | [      | [      | [      | [      | A/Panama/2007/99                                   |
| Aus/NZ                     |                                  |        |        |        |        | [      | A/Panama/2007/99                                   |
| Cen/So America             | [                                | [      | [      | [      | [      |        | A/Panama/2007/99                                   |
| Asia                       | [                                | [      | [      | [      | [ [    | [ [    | A/Panama/2007/99                                   |
| N Africa/E Med             |                                  |        |        |        |        |        |  |
| Southern Africa            | [                                |        |        |        |        |        |  |

| <b>Geographical Region</b> | <b>April 2001 - September 2001</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|------------------------------------|--------|--------|--------|--------|--------|--|
|                            | Apr-01                             | May-01 | Jun-01 | Jul-01 | Aug-01 | Sep-01 |  |
| United States              | [                                  |        | [      |        |        | [      | A/Panama/2007/99                                   |
| Canada                     |                                    | A      | A      | A      | A      | [      | A/Panama/2007/99                                   |
| Europe                     |                                    |        |        |        |        |        |  |
| Aus/NZ                     | [                                  | [      | [      | [      | [      | [      | A/Panama/2007/99                                   |
| Cen/So America             | [                                  | [      | [ [ [  | [ [ [  | [ [    | [ [    | A/Panama/2007/99                                   |
| Asia                       | [ [                                | [      | [      | [      | [      | [      | A/Panama/2007/99                                   |
| N Africa/E Med             | [                                  | [      | [      | [      |        | [      | A/Panama/2007/99                                   |
| Southern Africa            |                                    |        | [      | [      |        |        | A/Panama/2007/99                                   |

| <b>Geographical Region</b> | <b>October 2001 - January 2002</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|------------------------------------|--------|--------|--------|--------|--------|--|
|                            | Oct-01                             | Nov-01 | Dec-01 | Jan-02 | Feb-02 | Mar-02 |  |
| United States              | [                                  | [ [    | [ [    | [ [    |        |        | A/Panama/2007/99                                   |
| Canada                     | [                                  | [      | [      | [      |        |        | A/Panama/2007/99                                   |
| Europe                     | [                                  | [      | [ [    | [ [    |        |        | A/Panama/2007/99                                   |
| Aus/NZ                     | [                                  | [      |        | [ [    |        |        | A/Panama/2007/99                                   |
| Cen/So America             | [                                  | [      |        |        |        |        |  |
| Asia                       | [                                  | [      | [ [    | [ [    |        |        | A/Panama/2007/99                                   |
| N Africa/E Med             | [                                  | [      | [      | [      |        |        |  |
| Southern Africa            |                                    |        |        |        |        |        |  |

<sup>1</sup> Activity level. + = Sporadic, ++ = Outbreak, +++ = Epidemic

<sup>2</sup> Strain data based on characterization tests performed at CDC and other WHO Collaborating Centers.

## HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (01/12/02)

| STRAIN DESIGNATION |                           | REFERENCE FERRET ANTISERA |                    |                   |                   |                    |                   | Date collected | Passage  |
|--------------------|---------------------------|---------------------------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|----------|
| REFERENCE ANTIGENS |                           | A<br>SYD/5                | B<br>MOS/10        | C<br>PN/2007      | D<br>FUJ/140      | E<br>CHI/6416      | F<br>DAR/3        |                |          |
| 1.                 | A/SYDNEY/05/97            | <b><u>1280</u></b>        | 1280               | 320               | 320               | 320                | 160               | 06/23/97       | CK2E2/E2 |
| 2.                 | A/MOSCOW/10/99            | 640                       | <b><u>2560</u></b> | 320               | 160               | 640                | 80                | 01/15/99       | E2/E2    |
| 3.                 | A/PANAMA/2007/99*         | 320                       | 640                | <b><u>640</u></b> | 320               | 160                | 80                | 07/12/99       | E4       |
| 4.                 | A/FUJIAN/140/2000         | 320                       | 160                | 320               | <b><u>640</u></b> | 160                | 320               | 07/30/00       | E2/E4    |
| 5.                 | A/CHILE/6416/2001*        | 640                       | 1280               | 640               | 640               | <b><u>1280</u></b> | 320               | 06/14/01       | E3       |
| 6.                 | A/DARWIN/03/2000          | 160                       | 80                 | 80                | 640               | 80                 | <b><u>640</u></b> | 09/07/00       | E8/E3    |
| TEST ANTIGENS      |                           |                           |                    |                   |                   |                    |                   |                |          |
| 7.                 | A/VIRGINIA/07/2001        | 1280                      | 2560               | 1280              | 640               | 1280               | 320               | 11/26/01       | M2/C1    |
| 8.                 | A/NEW YORK/47/2001        | 1280                      | 2560               | 1280              | 640               | 1280               | 320               | 12/11/01       | M1/C1    |
| 9.                 | A/WASHINGTON/07/2001      | 1280                      | 2560               | 1280              | 640               | 2560               | 640               | 12/11/01       | M1/C1    |
| 10.                | A/WASHINGTON/08/2001      | 1280                      | 2560               | 1280              | 1280              | 1280               | 320               | 12/04/01       | MX/C1    |
| 11.                | A/WISCONSIN/16/2001       | 1280                      | 2560               | 1280              | 640               | 1280               | 320               | 11/30/01       | X/C2     |
| 12.                | A/WISCONSIN/15/2001       | 1280                      | 2560               | 640               | 1280              | 1280               | 320               | 12/01/01       | C1/C1    |
| 13.                | A/WISCONSIN/14/2001       | 640                       | 640                | 320               | 640               | 320                | 160               | 11/23/01       | C1/C1    |
| 14.                | A/WISCONSIN/13/2001       | 320                       | 640                | 320               | 320               | 640                | 80                | 11/13/01       | M1C1     |
| 15.                | A/TEXAS/16/2001           | 1280                      | 2560               | 640               | 640               | 1280               | 160               | 10/23/01       | X/C2     |
| 16.                | A/SOUTH DAKOTA/01/2001    | 640                       | 1280               | 640               | 640               | 1280               | 320               | 12/11/01       | X/C1     |
| 17.                | A/NEW JERSEY/04/2001      | 640                       | 1280               | 640               | 640               | 1280               | 160               | 12/12/01       | MX/C1    |
| 18.                | A/ALASKA/14/2001*         | 320                       | 1280               | 320               | 320               | 640                | 160               | 12/02/01       | M1/C2    |
| 19.                | A/ARGENTINA/3759/2001*    | 640                       | 2560               | 640               | 640               | 1280               | 160               | 08/29/01       | E2/E2    |
| 20.                | A/HONG KONG/1307/2001     | 1280                      | 1280               | 640               | 640               | 640                | 320               | 11/21/01       | C2/C1    |
| 21.                | A/HONG KONG/1269/2001*    | 640                       | 1280               | 640               | 1280              | 640                | 320               | 08/29/01       | C2/C2    |
| 22.                | A/PHILIPPINES/78890/2001* | 1280                      | 2560               | 640               | 1280              | 640                | 320               | 09/12/01       | X/C3     |
| 23.                | A/S. AUSTRALIA/98/2001    | 640                       | 1280               | 320               | 640               | 320                | 160               | 10/04/01       | CXC2/C1  |
| 24.                | A/S. AUSTRALIA/102/2001*  | 640                       | 1280               | 160               | 640               | 320                | 160               | 10/29/01       | CXC2/C1  |

\* Serology antigens

# HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (01/18/02)

| STRAIN DESIGNATION |                         | REFERENCE FERRET ANTISERA |             |              |              |               |            | Date collected | Passage  |
|--------------------|-------------------------|---------------------------|-------------|--------------|--------------|---------------|------------|----------------|----------|
| REFERENCE ANTIGENS |                         | A<br>SYD/5                | B<br>MOS/10 | C<br>PN/2007 | D<br>FUJ/140 | E<br>CHI/6416 | F<br>DAR/3 |                |          |
| 1.                 | A/SYDNEY/05/97          | <b>640</b>                | 1280        | 320          | 320          | 320           | 160        | 06/23/97       | CK2E2/E2 |
| 2.                 | A/MOSCOW/10/99          | 640                       | <b>2560</b> | 320          | 160          | 320           | 80         | 01/15/99       | E2/E2    |
| 3.                 | A/PANAMA/2007/99*       | 160                       | 640         | <b>320</b>   | 160          | 160           | 80         | 07/12/99       | E4       |
| 4.                 | A/FUJIAN/140/2000       | 160                       | 320         | 320          | <b>1280</b>  | 160           | 320        | 7/30/00        | E2/E4    |
| 5.                 | A/CHILE/6416/2001*      | 320                       | 1280        | 320          | 320          | <b>320</b>    | 160        | 06/14/01       | E3       |
| 6.                 | A/DARWIN/03/2000        | 40                        | 40          | 40           | 320          | 40            | <b>320</b> | 09/07/00       | E8/E3    |
| TEST ANTIGENS      |                         |                           |             |              |              |               |            |                |          |
| 7.                 | A/NEW YORK/49/2001      | 640                       | 2560        | 1280         | 640          | 1280          | 320        | 12/28/01       | M1/C1    |
| 8.                 | A/NEW YORK/01/2002      | 1280                      | 2560        | 1280         | 1280         | 1280          | 640        | 01/02/02       | M1/C1    |
| 9.                 | A/NEW YORK/51/2001      | 640                       | 2560        | 640          | 1280         | 1280          | 320        | 12/26/01       | M1/C1    |
| 10.                | A/NEW YORK/52/2001      | 640                       | 2560        | 640          | 1280         | 1280          | 320        | 12/31/01       | M1/C2    |
| 11.                | A/MICHIGAN/14/2001      | 640                       | 2560        | 1280         | 640          | 1280          | 320        | 11/15/01       | X2/C1    |
| 12.                | A/MICHIGAN/15/2001      | 640                       | 1280        | 640          | 640          | 1280          | 320        | 11/21/01       | X2/C1    |
| 13.                | A/MASSACHUSETTS/05/2001 | 640                       | 2560        | 640          | 640          | 1280          | 320        | 12/11/01       | X1/C1    |
| 14.                | A/MARYLAND/05/2001      | 640                       | 1280        | 640          | 640          | 1280          | 320        | 12/18/01       | M1/C1    |
| 15.                | A/HAWAII/35/2001        | 640                       | 2560        | 1280         | 640          | 1280          | 320        | 12/08/01       | M2/C1    |
| 16.                | A/HAWAII/38/2001        | 640                       | 2560        | 1280         | 640          | 1280          | 320        | 12/10/01       | M2/C1    |
| 17.                | A/HAWAII/36/2001        | 640                       | 2560        | 640          | 640          | 1280          | 320        | 12/07/01       | M2/C1    |
| 18.                | A/WISCONSIN/17/2001     | 320                       | 1280        | 320          | 640          | 320           | 320        | 12/02/01       | C1/C1    |
| 19.                | A/URUGUAY/331/2001      | 320                       | 1280        | 1280         | 640          | 1280          | 320        | 09/03/01       | C2/C1    |
| 20.                | A/PERTH/270/2001        | 640                       | 2560        | 1280         | 1280         | 1280          | 320        | 11/13/01       | C4/C2    |
| 21.                | A/DARWIN/17/2001        | 640                       | 1280        | 640          | 640          | 640           | 320        | 09/26/01       | C3/C2    |
| 22.                | A/BRISBANE/167/2001     | 640                       | 1280        | 640          | 640          | 1280          | 320        | 10/13/01       | CXC2/C2  |
| 23.                | A/AUCKLAND/142/2001     | 640                       | 1280        | 640          | 640          | 640           | 320        | 10/02/01       | CXC2/C2  |
| 24.                | A/VIETNAM/32/2001       | 640                       | 1280        | 640          | 640          | 640           | 320        | 12/12/01       | X/C1     |
| 25.                | A/THAILAND/78668/2001   | 320                       | 640         | 320          | 640          | 320           | 320        | 08/24/01       | XC       |
| 26.                | A/BANGKOK/504/2001      | 320                       | 640         | 160          | 640          | 160           | 320        | 09/18/01       | C4/C2    |

\* Serology antigen

# HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (01/24/02)

## REFERENCE ANTIGENS

## REFERENCE FERRET ANTISERA

| STRAIN DESIGNATION   | A          | B           | C          | D           | E          | F          | Date      | Passage  |
|----------------------|------------|-------------|------------|-------------|------------|------------|-----------|----------|
|                      | SYD/5      | MOS/10      | PN/2007    | FUJ/140     | CHI/6416   | DAR/3      | collected |          |
| 1. A/SYDNEY/05/97    | <b>640</b> | 1280        | 320        | 320         | 320        | 160        | 06/23/97  | CK2E2/E2 |
| 2. A/MOSCOW/10/99    | 640        | <b>2560</b> | 320        | 160         | 640        | 80         | 01/15/99  | E2/E2    |
| 3. A/PANAMA/2007/99  | 320        | 640         | <b>640</b> | 320         | 320        | 160        | 07/12/99  | E4       |
| 4. A/FUJIAN/140/2000 | 160        | 320         | 320        | <b>1280</b> | 160        | 320        | 07/30/00  | E2/E4    |
| 5. A/CHILE/6416/2001 | 320        | 1280        | 320        | 320         | <b>640</b> | 160        | 06/14/01  | E3       |
| 6. A/DARWIN/03/2001  | 40         | 40          | 80         | 320         | 40         | <b>640</b> | 09/07/00  | E8/E3    |

## TEST ANTIGENS

|                          |      |      |      |      |      |      |          |       |
|--------------------------|------|------|------|------|------|------|----------|-------|
| 7. A/CONNECTICUT/07/2001 | 1280 | 2560 | 1280 | 1280 | 2560 | 320  | 12/31/01 | X2/C1 |
| 8. A/CONNECTICUT/05/2001 | 640  | 1280 | 640  | 640  | 1280 | 320  | 12/11/01 | X2/C1 |
| 9. A/COLORADO/09/2001    | 640  | 2560 | 640  | 640  | 640  | 160  | 12/29/01 | X1/C1 |
| 10. A/NEW YORK/55/2001   | 1280 | 5120 | 1280 | 1280 | 2560 | 640  | 11/22/01 | M1/C1 |
| 11. A/NEW YORK/56/2001   | 640  | 2560 | 1280 | 640  | 2560 | 320  | 12/17/01 | M1/C1 |
| 12. A/NEW YORK/57/2001   | 1280 | 2560 | 1280 | 1280 | 2560 | 640  | 12/26/01 | M1/C1 |
| 13. A/MONTANA/10/2001    | 1280 | 2560 | 1280 | 640  | 1280 | 320  | 12/29/01 | M2/C1 |
| 14. A/MONTANA/01/2002    | 1280 | 2560 | 1280 | 1280 | 2560 | 320  | 01/02/02 | M2/C1 |
| 15. A/MONTANA/02/2002    | 1280 | 5120 | 1280 | 1280 | 2560 | 640  | 01/04/02 | M2/C1 |
| 16. A/MONTANA/08/2001    | 320  | 640  | 320  | 160  | 320  | 40   | 12/15/01 | M2/C1 |
| 17. A/MONTANA/04/2001    | 320  | 640  | 320  | 160  | 320  | 40   | 12/11/01 | M2/C1 |
| 18. A/UTAH/02/2002       | 1280 | 2560 | 1280 | 1280 | 2560 | 1280 | 01/06/02 | X/C1  |
| 19. A/UTAH/03/2002       | 1280 | 2560 | 1280 | 1280 | 2560 | 320  | 01/08/02 | X/C1  |
| 20. A/UTAH/04/2002       | 640  | 2560 | 1280 | 1280 | 2560 | 640  | 01/07/02 | X/C1  |
| 21. A/UTAH/05/2002       | 1280 | 2560 | 1280 | 640  | 2560 | 320  | 01/09/02 | X/C1  |
| 22. A/CANADA/612/2001    | 640  | 2560 | 1280 | 640  | 1280 | 320  | 12/08/01 | X1/C1 |
| 23. A/CANADA/7/2002      | 640  | 2560 | 1280 | 640  | 1280 | 320  | 12/13/01 | X2/C1 |
| 24. A/CANADA/6/2002      | 640  | 2560 | 640  | 640  | 1280 | 320  | 11/20/01 | X4/C1 |
| 25. A/CANADA/606/2001    | 640  | 1280 | 320  | 640  | 640  | 320  | 09/24/01 | X1/C1 |
| 26. A/URUGUAY/333/2001   | 640  | 1280 | 640  | 640  | 640  | 160  | 09/04/01 | C2/C2 |
| 27. A/SINGAPORE/54/2001  | 640  | 1280 | 640  | 640  | 640  | 320  | 09/26/01 | X/C1  |
| 28. A/SINGAPORE/41/2001  | 320  | 640  | 160  | 640  | 160  | 160  | 07/03/01 | X/C1  |
| 29. A/SINGAPORE/45/2001  | 320  | 1280 | 160  | 640  | 160  | 160  | 07/19/01 | X/C1  |
| 30. A/SINGAPORE/69/2001  | 160  | 320  | 160  | 640  | 160  | 160  | 09/11/01 | X/C1  |

\* Serology antigen

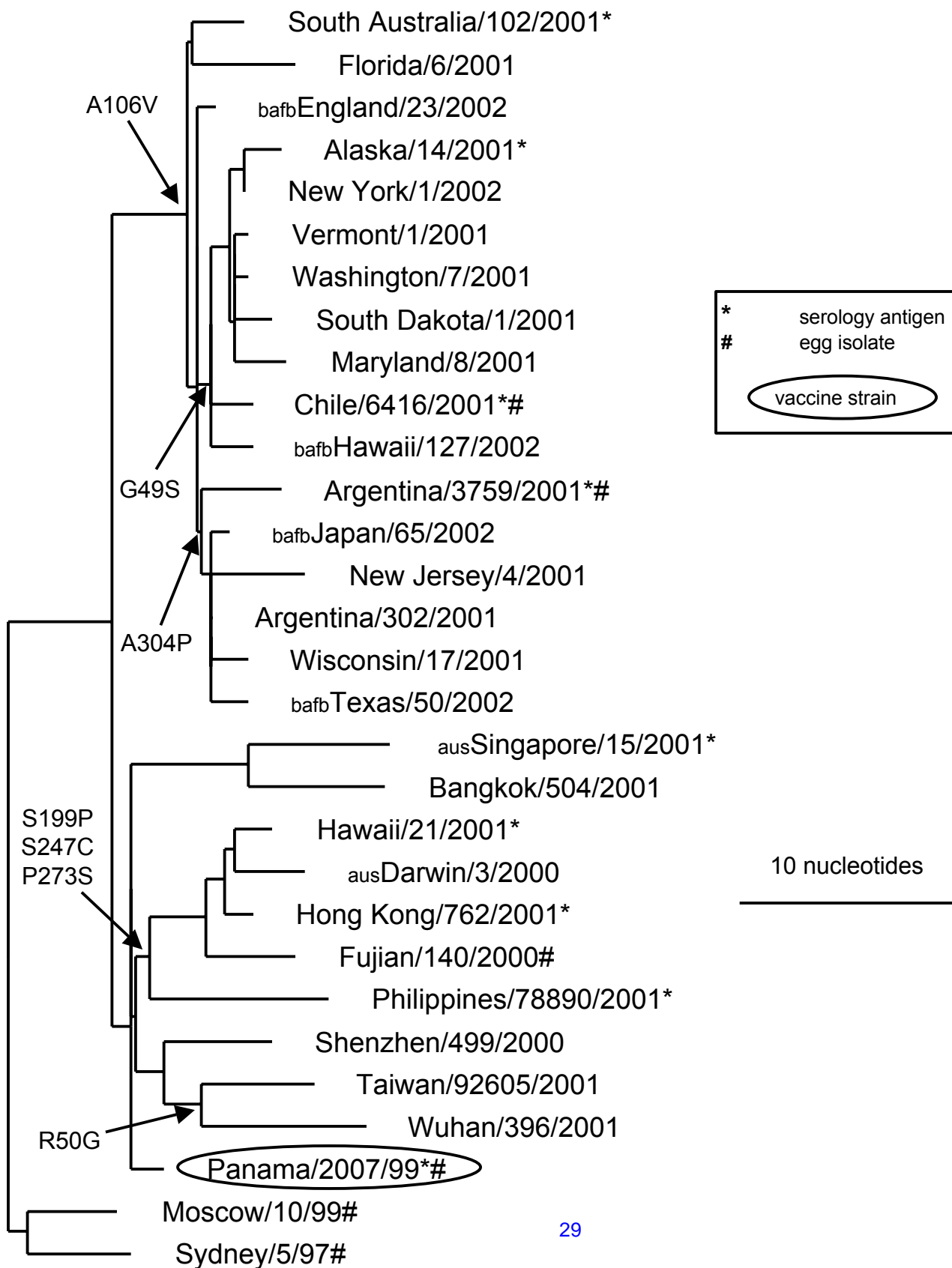
### Influenza A(H3N2) Isolates Characterized by CDC

|                                    | U.S.A.     | North America | Europe   | Asia      | Cent/So America | Africa, Australia, New Zealand | Total (%)  |
|------------------------------------|------------|---------------|----------|-----------|-----------------|--------------------------------|------------|
| <b>October 2000 - March 2001</b>   |            |               |          |           |                 |                                |            |
| A/Panama/2007/99-like              | 24         | 2             | 4        | 52        | 16              | 2                              | 100 (97%)  |
| A/Panama/2007/99-like (low)        |            |               |          | 3         |                 |                                | 3 (3%)     |
|                                    |            |               |          |           |                 | <b>Total</b>                   | <b>103</b> |
| <b>April 2001 - September 2001</b> |            |               |          |           |                 |                                |            |
| A/Panama/2007/99-like              | 8          | 1             |          | 27        | 78              | 6                              | 120 (94%)  |
| A/Panama/2007/99-like (low)        |            |               |          | 2         | 6               |                                | 8 (6%)     |
|                                    |            |               |          |           |                 | <b>Total</b>                   | <b>128</b> |
| <b>October 2001 - January 2002</b> |            |               |          |           |                 |                                |            |
| A/Panama/2007/99-like              | 108        | 8             |          | 3         |                 | 4                              | 123 (98%)  |
| A/Panama/2007/99-like (low)        |            |               |          | 1         |                 | 1                              | 2 (2%)     |
|                                    |            |               |          |           |                 | <b>Total</b>                   | <b>125</b> |
| <b>Total</b>                       | <b>140</b> | <b>11</b>     | <b>4</b> | <b>88</b> | <b>100</b>      | <b>13</b>                      | <b>356</b> |

Preliminary Data

01/26/02

# Evolutionary Relationships Among Influenza A (H3N2) Hemagglutinin (HA1) Genes



**Number of Amino Acid Differences from  
A/Panama/2007/99-like Consensus HA1 Sequence**

| Isolate              | Passage | AA<br>Diff. | Positions<br>Different                             |
|----------------------|---------|-------------|--|
| Panama/2007/99*      | e3      | 3           | 21, 144, 183                                       |
| Chile/5109/2001      | e1/e1   | 3           | 106, 144, 183                                      |
| Chile/5823/2001      | e2/e1   | 3           | 106, 144, 183                                      |
| Chile/6416/2001*     | e2/e2   | 4           | 106, 144, 221, 246                                 |
| Argentina/3758/2001  | e2/e1   | 5           | 43, 106, 144, 146, 304                             |
| Argentina/3759/2001* | e2/e1   | 6           | 43, 106, 144, 146, 183,<br>304                     |
| Bangkok/86/2001      | e2/e1   | 7           | 5, 33, 92, 144, 186, 194,<br>271                   |
| Singapore/23/2001    | e2      | 8           | 5, 33, 92, 131, 194, 220,<br>271, 279              |
| Fujian/140/2000*     | e2/e2   | 8           | 14, 43, 186, 194, 199,<br>226, 247, 273            |
| Bulgaria/28/2001     | e1/e1   | 9           | 144, 158, 159, 160, 186,<br>190, 192, 194, 196     |
| Darwin/3/2000*       | e8/e3   | 10          | 50, 158, 159, 167, 186,<br>194, 199, 220, 247, 273 |

\* Serology Antigens

## NEURAMINIDASE INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (12/12/01)

| STRAIN DESIGNATION |                        | REFERENCE RABBIT ANTISERA** |                   |                   |                   | Date collected | Passage |
|--------------------|------------------------|-----------------------------|-------------------|-------------------|-------------------|----------------|---------|
| REFERENCE ANTIGENS |                        | A<br>PR/8-SYD/5             | B<br>EQ-PAN/2007  | C<br>EQ-FUJ/140   | D<br>EQ-SHE/499   |                |         |
| 1.                 | A/SYDNEY/05/97         | <b><u>640</u></b>           | 640               | 640               | 320               | 06/23/97       | X2E2/E3 |
| 2.                 | A/PANAMA/2007/99*      | 80                          | <b><u>320</u></b> | 120               | 120               | 07/12/99       | E4      |
| 3.                 | A/FUJIAN/140/2000      | 320                         | 1280              | <b><u>640</u></b> | 320               | 07/30/00       | E2/E3   |
| 4.                 | A/SHENZHEN/499/2000    | 320                         | 640               | 320               | <b><u>320</u></b> | 05/22/00       | E2/E2   |
| TEST ANTIGENS      |                        |                             |                   |                   |                   |                |         |
| 5.                 | A/CHILE/6416/2001*     | 320                         | 640               | 640               | 640               | 06/14/01       | E2/E3   |
| 6.                 | A/ARGENTINA/3759/2001* | 640                         | 320               | 320               | 320               | 08/29/01       | E2/E2   |
| 7.                 | A/ALASKA/7/2001        | 320                         | 640               | 640               | 320               | 10/16/01       | M1/C1   |
| 8.                 | A/HAWAII/23/2001       | 160                         | 320               | 320               | 160               | 09/17/01       | M2/C1   |
| 9.                 | A/HONG KONG/648/2001   | 320                         | 640               | 320               | 320               | 05/25/01       | C2/C2   |
| 10.                | A/FLORIDA/5/2001       | 320                         | 640               | 1280              | 640               | 10/16/01       | CX/C1   |

\* Serology antigen

\*\* Rabbit antisera prepared against reassortant viruses bearing N2 neuraminidase

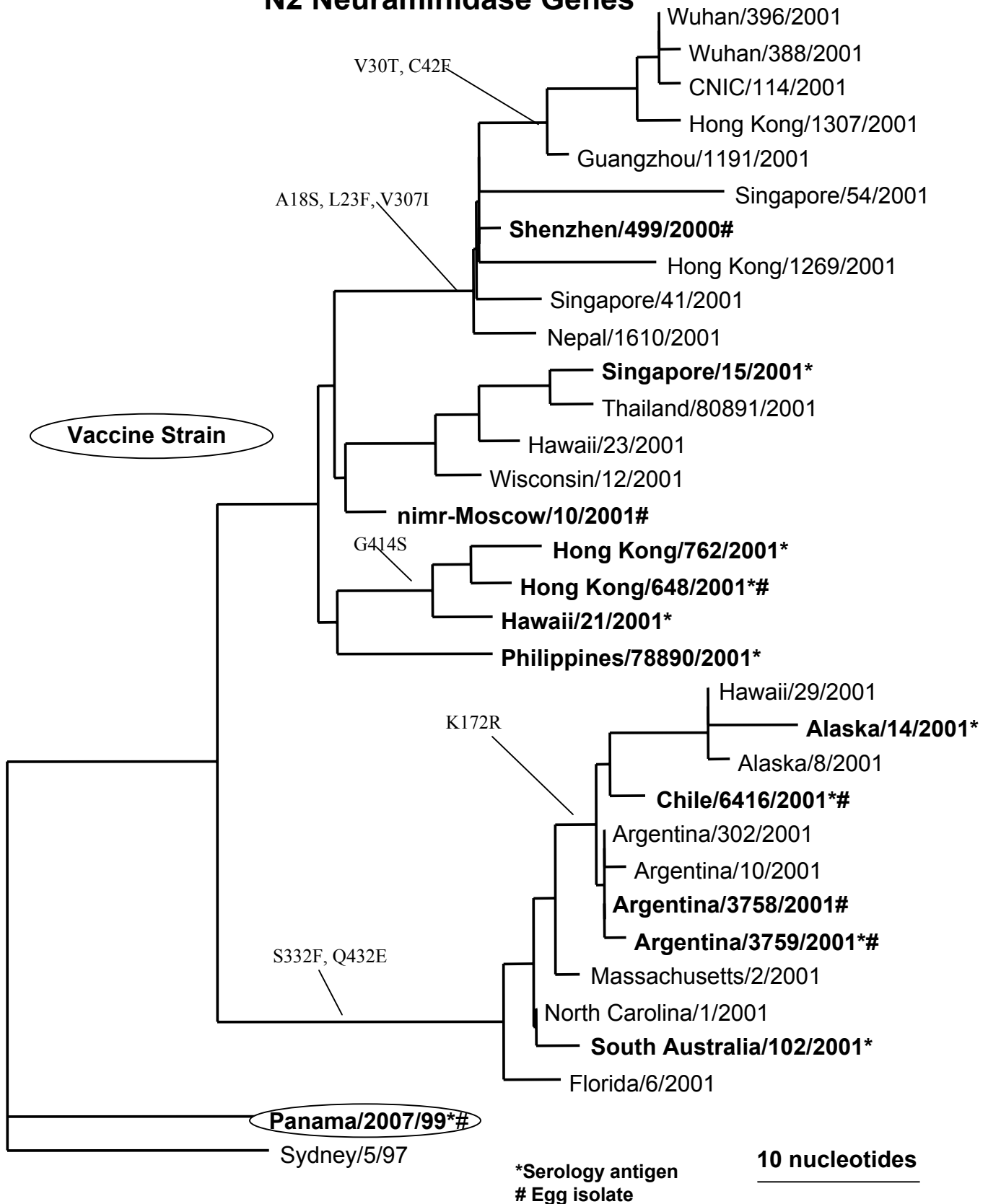
## NEURAMINIDASE INHIBITION REACTIONS OF INFLUENZA H3 VIRUSES (12/17/01)

| STRAIN DESIGNATION |                        | REFERENCE FERRET ANTISERA** |                   |                   |                   |                   | Date collected | Passage |
|--------------------|------------------------|-----------------------------|-------------------|-------------------|-------------------|-------------------|----------------|---------|
| REFERENCE ANTIGENS |                        | A<br>SYD/5                  | B<br>PAN/2007     | C<br>FUJ/140      | D<br>SHE/499      | E<br>CHI/6416     |                |         |
| 1.                 | A/SYDNEY/05/97         | <b><u>1280</u></b>          | 320               | 320               | 320               | 320               | 06/23/97       | X2E2/E3 |
| 2.                 | A/PANAMA/2007/99*      | 320                         | <b><u>160</u></b> | 320               | 160               | 160               | 07/12/99       | E4      |
| 3.                 | A/FUJIAN/140/2000      | 320                         | 160               | <b><u>640</u></b> | 320               | 320               | 07/30/00       | E2/E3   |
| 4.                 | A/SHENZHEN/499/2000    | 320                         | 160               | 320               | <b><u>160</u></b> | 160               | 05/22/00       | E2/E2   |
| 5.                 | A/CHILE/6416/2001      | 320                         | 160               | 320               | 320               | <b><u>320</u></b> | 06/14/01       | E2/E3   |
| TEST ANTIGENS      |                        |                             |                   |                   |                   |                   |                |         |
| 6.                 | A/ARGENTINA/3759/2001* | 640                         | 160               | 640               | 320               | 320               | 08/29/01       | E2/E2   |
| 7.                 | A/HAWAII/23/2001       | 320                         | 120               | 640               | 320               | 160               | 09/17/01       | M2/C1   |
| 8.                 | A/HONG KONG/648/2001   | 160                         | 120               | 320               | 160               | 160               | 05/25/01       | C2/C2   |
| 9.                 | A/FLORIDA/5/2001       | 320                         | 160               | 640               | 320               | 320               | 10/16/01       | CX/C1   |

\* Serology antigen

\*\* Ferret antisera prepared against non-reassortant H3N2 viruses

# Evolutionary Relationships Among Influenza A N2 Neuraminidase Genes



## Number of Amino Acid Differences from Consensus\* N2 Neuraminidase Sequence

| Isolate               | Passage | AA<br>Diff. | Position different                                    |
|-----------------------|---------|-------------|---|
| A/Chile/6416/2001     | E2/E1   | 6           | 172, 265, 332,<br>399, 432, 437                       |
| A/Argentina/3758/2001 | E2/E1   | 6           | 172, 265, 332,<br>399, 432, 437                       |
| A/Argentina/3759/2001 | E2/E1   | 7           | 172, 224, 265, 332,<br>399, 432, 437                  |
| A/Panama/2007/99      | E3      | 10          | 93, 143, 197, 208,<br>249, 277, 370, 399,<br>403, 437 |

\*Consensus sequence was generated from 29 viruses isolated in 2001.

**Hemagglutination Inhibition Antibody Responses to the H3\* Component  
of the 2001-2002 Influenza Vaccine  
ADULT POPULATIONS**

| Population                   | N  | Antigen                     | % Rise | Pre GMT | Post GMT | % with HI titer > 40 |              |
|------------------------------|----|-----------------------------|--------|---------|----------|----------------------|--------------|
|                              |    |                             |        |         |          | Pre Vaccine          | Post Vaccine |
| <b>USA<sup>1</sup></b>       |    |                             |        |         |          |                      |              |
|                              | 24 | A/Panama/2007/99 Resvir-17* | 38     | 33      | 123      | 50                   | 96           |
|                              | 24 | A/Hong Kong/762/2001        | 33     | 32      | 85       | 54                   | 100          |
|                              | 24 | A/Chile/6416/2001           | 42     | 23      | 73       | 54                   | 88           |
|                              | 24 | A/Hawaii/21/2001            | 46     | 57      | 226      | 67                   | 100          |
|                              | 24 | A/Singapore/15/2001         | 50     | 13      | 34       | 25                   | 58           |
| <b>UK<sup>2</sup></b>        |    |                             |        |         |          |                      |              |
|                              | 24 | A/Panama/2007/99 Resvir-17* | 100    | 9       | 165      | 13                   | 100          |
|                              | 24 | A/Hong Kong/762/2001        | 96     | 12      | 120      | 13                   | 100          |
|                              | 24 | A/Chile/6416/2001           | 96     | 7       | 58       | 4                    | 79           |
|                              | 24 | A/Hawaii/21/2001            | 96     | 12      | 261      | 21                   | 100          |
|                              | 24 | A/Singapore/15/2001         | 88     | 6       | 39       | 0                    | 71           |
|                              |    |                             |        |         |          |                      |              |
| <b>Australia<sup>3</sup></b> | 24 | A/Panama/2007/99 Resvir-17* | 96     | 15      | 261      | 25                   | 100          |
|                              | 24 | A/Hong Kong/762/2001        | 96     | 17      | 98       | 29                   | 100          |
|                              | 24 | A/Chile/6416/2001           | 92     | 26      | 339      | 46                   | 100          |
|                              | 24 | A/Hawaii/21/2001            | 100    | 20      | 349      | 42                   | 100          |
|                              | 24 | A/Singapore/15/2001         | 100    | 12      | 85       | 8                    | 88           |

Preliminary Data 09/05/2001

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Yamanashi/166/98-like hemagglutinin.

2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug 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 Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like hemagglutinin.

\* A/Panama/2007/99 is the H3N2 component of the vaccine.

**Hemagglutination Inhibition Antibody Responses to the H3\* Component  
of the 2001-2002 Influenza Vaccine  
ELDERLY POPULATIONS**

| Population                   | N  | Antigen                     | %<br>Rise | Pre<br>GMT | Post<br>GMT | % with HI titer ≥ 40 |                 |
|------------------------------|----|-----------------------------|-----------|------------|-------------|----------------------|-----------------|
|                              |    |                             |           |            |             | Pre<br>Vaccine       | Post<br>Vaccine |
| <b>USA<sup>1</sup></b>       |    |                             |           |            |             |                      |                 |
|                              | 23 | A/Panama/2007/99 Resvir-17* | 43        | 30         | 75          | 52                   | 91              |
|                              | 23 | A/Hong Kong/762/2001        | 13        | 31         | 57          | 61                   | 91              |
|                              | 23 | A/Chile/6416/2001           | 39        | 40         | 102         | 78                   | 91              |
|                              | 23 | A/Hawaii/21/2001            | 52        | 42         | 134         | 70                   | 100             |
|                              | 23 | A/Singapore/15/2001         | 30        | 14         | 27          | 17                   | 43              |
| <b>UK<sup>2</sup></b>        |    |                             |           |            |             |                      |                 |
|                              | 24 | A/Panama/2007/99 Resvir-17* | 71        | 10         | 76          | 17                   | 83              |
|                              | 24 | A/Hong Kong/762/2001        | 71        | 11         | 60          | 21                   | 79              |
|                              | 24 | A/Chile/6416/2001           | 58        | 8          | 36          | 8                    | 58              |
|                              | 24 | A/Hawaii/21/2001            | 75        | 12         | 123         | 21                   | 92              |
|                              | 24 | A/Singapore/15/2001         | 42        | 7          | 20          | 8                    | 38              |
|                              |    |                             |           |            |             |                      |                 |
| <b>Australia<sup>3</sup></b> | 24 | A/Panama/2007/99 Resvir-17* | 71        | 15         | 127         | 21                   | 96              |
|                              | 24 | A/Hong Kong/762/2001        | 63        | 17         | 60          | 21                   | 92              |
|                              | 24 | A/Chile/6416/2001           | 71        | 33         | 196         | 63                   | 96              |
|                              | 24 | A/Hawaii/21/2001            | 83        | 20         | 190         | 38                   | 96              |
|                              | 24 | A/Singapore/15/2001         | 67        | 8          | 36          | 8                    | 71              |

Preliminary Data 09/05/01

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1)-like, and B/Yamanashi/166/98-like hemagglutinin.

2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug 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 Alan Hampson, WHO Collaborating Center, Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like hemagglutinin.

\* A/Panama/2007/99 is the H3N2 component of the vaccine.

# Hemagglutination Inhibition Antibody Responses to the H3\* Component of the 2001-2002 Influenza Vaccine

## ADULT POPULATIONS

|                              |           |                                    |            |           |            | % with HI titer $\geq$ 40 |            |
|------------------------------|-----------|------------------------------------|------------|-----------|------------|---------------------------|------------|
|                              |           |                                    | %          | Pre       | Post       | Pre                       | Post       |
| <b>USA<sup>1</sup></b>       | <b>24</b> | <b>A/Panama/2007/99 Resvir-17*</b> | <b>35</b>  | <b>25</b> | <b>65</b>  | <b>30</b>                 | <b>70</b>  |
|                              | <b>24</b> | <b>A/South Australia/102/2001</b>  | <b>26</b>  | <b>17</b> | <b>42</b>  | <b>26</b>                 | <b>71</b>  |
|                              | <b>24</b> | <b>A/Phillippines/78890/2001</b>   | <b>32</b>  | <b>25</b> | <b>67</b>  | <b>42</b>                 | <b>85</b>  |
|                              | <b>24</b> | <b>A/Alaska/14/2001</b>            | <b>42</b>  | <b>48</b> | <b>160</b> | <b>68</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>A/Argentina/3759/2001</b>       | <b>37</b>  | <b>17</b> | <b>49</b>  | <b>21</b>                 | <b>60</b>  |
| <b>UK<sup>2</sup></b>        | <b>24</b> | <b>A/Panama/2007/99 Resvir-17*</b> | <b>75</b>  | <b>11</b> | <b>65</b>  | <b>0</b>                  | <b>75</b>  |
|                              | <b>24</b> | <b>A/South Australia/102/2001</b>  | <b>67</b>  | <b>10</b> | <b>38</b>  | <b>0</b>                  | <b>67</b>  |
|                              | <b>24</b> | <b>A/Phillippines/78890/2001</b>   | <b>88</b>  | <b>11</b> | <b>71</b>  | <b>0</b>                  | <b>88</b>  |
|                              | <b>24</b> | <b>A/Alaska/14/2001</b>            | <b>100</b> | <b>12</b> | <b>143</b> | <b>13</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>A/Argentina/3759/2001</b>       | <b>58</b>  | <b>10</b> | <b>44</b>  | <b>0</b>                  | <b>58</b>  |
| <b>Australia<sup>3</sup></b> | <b>24</b> | <b>A/Panama/2007/99 Resvir-17*</b> | <b>96</b>  | <b>9</b>  | <b>147</b> | <b>8</b>                  | <b>96</b>  |
|                              | <b>24</b> | <b>A/South Australia/102/2001</b>  | <b>92</b>  | <b>9</b>  | <b>60</b>  | <b>4</b>                  | <b>92</b>  |
|                              | <b>24</b> | <b>A/Phillippines/78890/2001</b>   | <b>100</b> | <b>13</b> | <b>155</b> | <b>17</b>                 | <b>96</b>  |
|                              | <b>24</b> | <b>A/Alaska/14/2001</b>            | <b>100</b> | <b>19</b> | <b>368</b> | <b>45</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>A/Argentina/3759/2001</b>       | <b>96</b>  | <b>8</b>  | <b>110</b> | <b>4</b>                  | <b>96</b>  |
| <b>Japan<sup>4</sup></b>     | <b>29</b> | <b>A/Panama/2007/99 Resvir-17*</b> | <b>12</b>  | <b>13</b> | <b>18</b>  | <b>20</b>                 | <b>24</b>  |
|                              | <b>29</b> | <b>A/South Australia/102/2001</b>  | <b>10</b>  | <b>10</b> | <b>15</b>  | <b>17</b>                 | <b>21</b>  |
|                              | <b>29</b> | <b>A/Phillippines/78890/2001</b>   | <b>10</b>  | <b>18</b> | <b>26</b>  | <b>24</b>                 | <b>41</b>  |
|                              | <b>29</b> | <b>A/Alaska/14/2001</b>            | <b>24</b>  | <b>21</b> | <b>40</b>  | <b>34</b>                 | <b>62</b>  |
|                              | <b>29</b> | <b>A/Argentina/3759/2001</b>       | <b>7</b>   | <b>9</b>  | <b>12</b>  | <b>14</b>                 | <b>21</b>  |

Preliminary Data 01/23/02

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

3. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/5/99) hemagglutinin.

4. Sera were kindly provided by Dr. Takato Odagiri, WHO Collaborating Center Tokyo, Japan. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

\*A/Panama/2007/99 Resvir-17 is the H3 component of the vaccine

# Hemagglutination Inhibition Antibody Responses to the H3\* Component of the 2001-2002 Influenza Vaccine

## ELDERLY POPULATIONS

| Population             | N  | Antigen                     | % Rise | Pre GMT | Post GMT | % with HI titer $\geq$ 40 |              |
|------------------------|----|-----------------------------|--------|---------|----------|---------------------------|--------------|
|                        |    |                             |        |         |          | Pre Vaccine               | Post Vaccine |
| USA <sup>1</sup>       | 24 | A/Panama/2007/99 Resvir-17* | 17     | 12      | 24       | 17                        | 42           |
|                        | 24 | A/South Australia/102/2001  | 13     | 12      | 21       | 13                        | 33           |
|                        | 24 | A/Philippines/78890/2001    | 13     | 22      | 41       | 33                        | 67           |
|                        | 24 | A/Alaska/14/2001            | 25     | 36      | 67       | 58                        | 92           |
|                        | 24 | A/Argentina/3759/2001       | 21     | 10      | 19       | 17                        | 33           |
| UK <sup>2</sup>        | 24 | A/Panama/2007/99 Resvir-17* | 54     | 12      | 39       | 4                         | 58           |
|                        | 24 | A/South Australia/102/2001  | 33     | 11      | 27       | 4                         | 38           |
|                        | 24 | A/Philippines/78890/2001    | 54     | 13      | 41       | 8                         | 67           |
|                        | 24 | A/Alaska/14/2001            | 71     | 14      | 73       | 17                        | 83           |
|                        | 24 | A/Argentina/3759/2001       | 38     | 11      | 26       | 4                         | 42           |
| Australia <sup>3</sup> | 24 | A/Panama/2007/99 Resvir-17* | 75     | 10      | 82       | 17                        | 92           |
|                        | 24 | A/South Australia/102/2001  | 83     | 8       | 41       | 4                         | 75           |
|                        | 24 | A/Philippines/78890/2001    | 79     | 13      | 90       | 13                        | 96           |
|                        | 24 | A/Alaska/14/2001            | 83     | 18      | 190      | 29                        | 96           |
|                        | 24 | A/Argentina/3759/2001       | 83     | 8       | 62       | 4                         | 83           |
| Japan <sup>4</sup>     | 29 | A/Panama/2007/99 Resvir-17* | 40     | 16      | 40       | 23                        | 60           |
|                        | 29 | A/South Australia/102/2001  | 40     | 13      | 28       | 20                        | 60           |
|                        | 29 | A/Philippines/78890/2001    | 43     | 20      | 50       | 33                        | 73           |
|                        | 29 | A/Alaska/14/2001            | 50     | 25      | 86       | 57                        | 87           |
|                        | 29 | A/Argentina/3759/2001       | 43     | 10      | 26       | 13                        | 53           |

Preliminary Data 01/23/02

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

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\*A/Panama/2007/99 Resvir-17 is the H3 component of the vaccine

# Influenza B Viruses

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# INFLUENZA B WORLDWIDE ACTIVITY<sup>1</sup>

| <b>Geographical Region</b> | <b>October 2000 - March 2001</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|----------------------------------|--------|--------|--------|--------|--------|--|
|                            | Oct-00                           | Nov-00 | Dec-00 | Jan-01 | Feb-01 | Mar-01 |  |
| United States              | [                                | [      | [      | [ [    | [ [    | [ [    | B/Sichuan/379/99<br>B/Beijing/184/93               |
| Canada                     | [                                | [      | [ [    | [ [    | [ [    | [ [    | B/Sichuan/379/99<br>B/Beijing/184/93               |
| Europe                     | [                                | [      | [      | [ [    | [ [    | [ [    | B/Sichuan/379/99                                   |
| Aus/NZ                     | [                                | [      |        | [      | [      | [      | B/Sichuan/379/99                                   |
| Cen/So America             |                                  |        | [      | [      | [      | [      | B/Sichuan/379/99                                   |
| Asia                       | [                                | [ [    | [      | [      | [ [    | [ [    | B/Sichuan/379/99<br>B/Hong Kong/22/2001            |
| N Africa/E Med             | [ [                              | [      | [      | [      | [      | [      | B/Sichuan/379/99                                   |
| Southern Africa            |                                  |        |        |        |        |        |  |

| <b>Geographical Region</b> | <b>April 2001 - September 2001</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|------------------------------------|--------|--------|--------|--------|--------|--|
|                            | Apr-01                             | May-01 | Jun-01 | Jul-01 | Aug-01 | Sep-01 |  |
| United States              | [                                  | [      | [      | [      |        | [      | B/Hong Kong/22/2001<br>B/Sichuan/379/99            |
| Canada                     | [                                  |        |        |        | [      |        | B/Sichuan/379/99                                   |
| Europe                     | [                                  | [      | [      |        | [      | [      | B/Sichuan/379/99                                   |
| Aus/NZ                     | [                                  | [      | [ [    | [ [    | [ [    | [      | B/Sichuan/379/99                                   |
| Cen/So America             | [                                  | [      | [ [    | [ [    | [      | [      | B/Sichuan/379/99                                   |
| Asia                       | [ [                                | [      | [      | [      | [      | [      | B/Sichuan/379/99<br>B/Hong Kong/22/2001            |
| N Africa/E Med             | [                                  |        | [      | [      | [      | [ [    | B/Sichuan/379/99                                   |
| Southern Africa            |                                    | [ [    | [ [    | [      |        |        | B/Sichuan/379/99                                   |

| <b>Geographical Region</b> | <b>October 2001 - January 2002</b> |        |        |        |        |        | <b>Most Frequently Isolated Strain<sup>2</sup></b> |
|----------------------------|------------------------------------|--------|--------|--------|--------|--------|--|
|                            | Oct-01                             | Nov-01 | Dec-01 | Jan-02 | Feb-02 | Mar-02 |  |
| United States              | [                                  | [      | [      | [      |        |        | B/Sichuan/379/99                                   |
| Canada                     |                                    |        | [      | [      |        |        | B/Sichuan/379/99<br>B/Hong Kong/22/2001            |
| Europe                     | [                                  | [      | [      | [      |        |        | B/Sichuan/379/99                                   |
| Aus/NZ                     | [                                  | [      |        |        |        |        | B/Sichuan/379/99                                   |
| Cen/So America             | [                                  | [      | [      |        |        |        | B/Sichuan/379/99                                   |
| Asia                       | [ [                                | [      | [      | [      |        |        | B/Sichuan/379/99                                   |
| N Africa/E Med             | [ [                                |        | [      |        |        |        | B/Sichuan/379/99<br>B/Hong Kong/22/2001            |
| Southern Africa            |                                    |        |        |        |        |        |  |

<sup>1</sup> Activity level. + = Sporadic, ++ = Outbreak, +++ = Epidemic

<sup>2</sup> Strain data based on characterization tests performed at CDC and other WHO Collaborating Centers.

# HEMAGGLUTINATION INHIBITION REACTIONS OF INFLUENZA TYPE B VIRUSES (01/16/02)

| STRAIN DESIGNATION            |  | REFERENCE FERRET ANTISERA |              |              |              |              | Date collected | Passage    |
|-------------------------------|--|---------------------------|--------------|--------------|--------------|--------------|----------------|------------|
| REFERENCE ANTIGENS            |  | A<br>YAM/166              | B<br>SIC/379 | C<br>VIC/504 | D<br>SHIZ/15 | E<br>SIC/317 |                |            |
| 1. B/YAMANASHI/166/98         |  | <b>640</b>                | 640          | 80           | 1280         | 160          | 02/21/98       | E2/E3      |
| 2. B/SICHUAN/379/99           |  | 320                       | <b>640</b>   | 80           | 640          | 80           | 12/02/99       | E2/E4      |
| 3. B/VICTORIA/504/2000*       |  | 320                       | 640          | <b>80</b>    | 640          | 160          | 12/18/00       | CEK1E12/E1 |
| 4. B/SHIZUOKA/15/2001         |  | 160                       | 320          | 40           | <b>640</b>   | 80           | 06/29/01       | E3/E2      |
| 5. B/SICHUAN/317/2001*        |  | 160                       | 160          | 40           | 320          | <b>160</b>   | 05/24/01       | E1/E3      |
| TEST ANTIGENS                 |  |                           |              |              |              |              |                |            |
| 6. B/HAWAII/43/2001           |  | 160                       | 80           | 80           | 320          | 80           | 11/23/01       | M2/C1      |
| 7. B/HAWAII/44/2001           |  | 160                       | 80           | 80           | 320          | 40           | 11/16/01       | M2/C1      |
| 8. B/MINNESOTA/14/2001        |  | 160                       | 80           | 80           | 320          | 80           | 11/17/01       | M2/C1      |
| 9. B/URUGUAY/38/2001          |  | 640                       | 320          | 320          | 1280         | 320          | 08/23/01       | C3/C1      |
| 10. B/URUGUAY/62001           |  | 640                       | 320          | 320          | 1280         | 320          | 07/31/01       | C2/C1      |
| 11. B/AUCKLAND/76/2001        |  | 640                       | 1280         | 160          | 5120         | 1280         | 09/24/01       | CXC3/C1    |
| 12. B/VICTORIA/505/2001       |  | 320                       | 320          | 160          | 640          | 160          | 10/26/01       | C3/C1      |
| 13. B/PERTH/221/2001          |  | 320                       | 320          | 80           | 1280         | 80           | 11/09/01       | C4/C1      |
| 14. B/OMAN/16279/2001         |  | 320                       | 160          | 80           | 640          | 40           | 08/28/01       | C2/C1      |
| 15. B/OMAN/16304/2001         |  | 320                       | 160          | 80           | 640          | 40           | 09/27/01       | C2/C1      |
| 16. B/OMAN/16321/2001         |  | 320                       | 160          | 80           | 640          | 80           | 09/11/01       | C2/C1      |
| 17. B/OMAN/16314/2001         |  | 320                       | 320          | 80           | 640          | 80           | 09/10/01       | C2/C1      |
| 18. B/MALAYSIA/04/2001        |  | 640                       | 640          | 160          | 1280         | 320          | UNKN           | CXC2/C1    |
| 19. B/THAILAND/92092/2001     |  | 2560                      | 1280         | 160          | 2560         | 320          | 11/19/01       | XC         |
| 20. B/THAILAND/78381/2001     |  | 320                       | 320          | 80           | 640          | 80           | 11/12/01       | XC         |
| 21. B/THAILAND/94157/2001     |  | 160                       | 160          | 40           | 640          | 80           | 11/12/01       | XC         |
| 22. B/THAILAND/105979/2001    |  | 160                       | 160          | 80           | 640          | 80           | 11/06/01       | XC         |
| 23. B/THAILAND/105980/2001    |  | 160                       | 160          | 80           | 640          | 80           | 11/06/01       | XC         |
| 24. B/PHILIPPINES/108429/2001 |  | 320                       | 320          | 80           | 320          | 80           | 11/07/01       | XC         |
| 25. B/HONG KONG/675/2001      |  | 160                       | 160          | 80           | 320          | 80           | 09/11/01       | C2/C1      |
| 26. B/HONG KONG/672/2001      |  | 160                       | 80           | 40           | 160          | 40           | 09/10/01       | C2/C1      |

\* Serology antigens

# HEMAGGLUTINATION INHIBITION REACTIONS OF B/VICTORIA/2/87-LIKE VIRUSES (01/25/02)

| STRAIN DESIGNATION             |  | REFERENCE FERRET ANTISERA |                   |                   |                   |                   |                    | Date collected | Passage |
|--------------------------------|--|---------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|----------------|---------|
| REFERENCE ANTIGENS             |  | A<br>VIC/02               | C<br>SHD/07       | D<br>BJ/243       | F<br>HK/22        | E<br>HI/10        | F<br>HK/330        |                |         |
| 1. B/VICTORIA/02/87            |  | <b><u>320</u></b>         | 320               | 640               | 640               | 320               | 2560               | 03/31/87       | SpFE5E2 |
| 2. B/SHANGDONG/07/97           |  | 160                       | <b><u>320</u></b> | 320               | 320               | 160               | 1280               | 11/03/97       | E4/E3   |
| 3. B/BEIJING/243/97            |  | 160                       | 320               | <b><u>640</u></b> | 320               | 160               | 1280               | 01/09/97       | E2/E4   |
| 4. B/HONG KONG/22/2001*        |  | 80                        | 80                | 160               | <b><u>640</u></b> | 160               | 2560               | 01/18/01       | C2/C1   |
| 5. B/HAWAII/10/2001*           |  | 80                        | 80                | 320               | 640               | <b><u>320</u></b> | 1280               | 05/09/01       | E3      |
| 6. B/HONG KONG/330/2001*       |  | 40                        | 80                | 320               | 320               | 160               | <b><u>1280</u></b> | 04/09/01       | E2      |
| TEST ANTIGENS                  |  |                           |                   |                   |                   |                   |                    |                |         |
| 7. B/CANADA/13/2001            |  | 80                        | 80                | 320               | 320               | 640               | 1280               | ~12/25/01      | X1/C1   |
| 8. B/CANADA/29/2002            |  | 80                        | 80                | 320               | 320               | 320               | 1280               | 01/04/02       | X1/C1   |
| 9. B/HONG KONG/652/2001        |  | 160                       | 160               | 320               | 640               | 320               | 1280               | 08/22/01       | C2/C1   |
| 10. B/HONG KONG/666/2001       |  | 80                        | 160               | 320               | 320               | 160               | 1280               | 08/29/01       | C2/C1   |
| 11. B/HONG KONG/666/2001       |  | 160                       | 160               | 320               | 320               | 160               | 1280               | 08/29/01       | C2/C1   |
| 12. B/PHILLIPPINES/649/2001    |  | 80                        | 80                | 320               | 320               | 160               | 1280               | 08/10/01       | C2/C1   |
| 13. B/PHILLIPPINES/105042/2001 |  | 20                        | 80                | 160               | 320               | 320               | 640                | 10/26/01       | CX      |
| 14. B/PHILLIPPINES/93176/2001  |  | 20                        | 40                | 160               | 320               | 160               | 640                | 10/29/01       | CX      |
| 15. B/PHILLIPPINES/105001/2001 |  | 20                        | 40                | 160               | 320               | 80                | 640                | 11/05/01       | CX      |
| 16. B/PHILLIPPINES/93079/2001  |  | 10                        | 120               | 80                | 160               | 40                | 320                | 10/15/01       | CX      |
| 17. B/PHILLIPPINES/105112/2001 |  | 20                        | 40                | 80                | 160               | 160               | 640                | 10/29/01       | CX      |
| 18. B/PHILLIPPINES/105021/2001 |  | 10                        | 20                | 80                | 160               | 20                | 320                | 11/09/01       | CX      |
| 19. B/PHILLIPPINES/78057/2001  |  | 10                        | 20                | 80                | 160               | 40                | 320                | 11/13/01       | CX      |
| 20. B/INDIA/77341/2001         |  | 20                        | 40                | 80                | 160               | 80                | 320                | 10/19/01       | CX      |
| 21. B/INDIA/77276/2001         |  | 20                        | 40                | 80                | 160               | 40                | 320                | 10/23/01       | CX      |
| 22. B/INDIA/107569/2001        |  | 20                        | 40                | 80                | 160               | 80                | 160                | 11/07/01       | CX      |
| 23. B/INDIA/107605/2001        |  | 20                        | 40                | 80                | 160               | 40                | 160                | 11/10/01       | CX      |
| 24. B/OMAN/16299/2001          |  | 40                        | 80                | 320               | 320               | 320               | 320                | 09/22/01       | C2/C1   |
| 25. B/OMAN/16291/2001          |  | 40                        | 80                | 160               | 160               | 80                | 320                | 09/26/01       | C2/C1   |
| 26. B/OMAN/16284/2001          |  | 80                        | 80                | 640               | 160               | 160               | 320                | 10/02/01       | C2/C1   |
| 27. B/OMAN/16305/2001          |  | 40                        | 80                | 320               | 160               | 160               | 320                | 09/26/01       | C2/C1   |

\* Serology antigen

# Geographic Distribution of B/Victoria/02/87-Like Viruses (April 2001 to Present)



## Influenza B Isolates Characterized by CDC

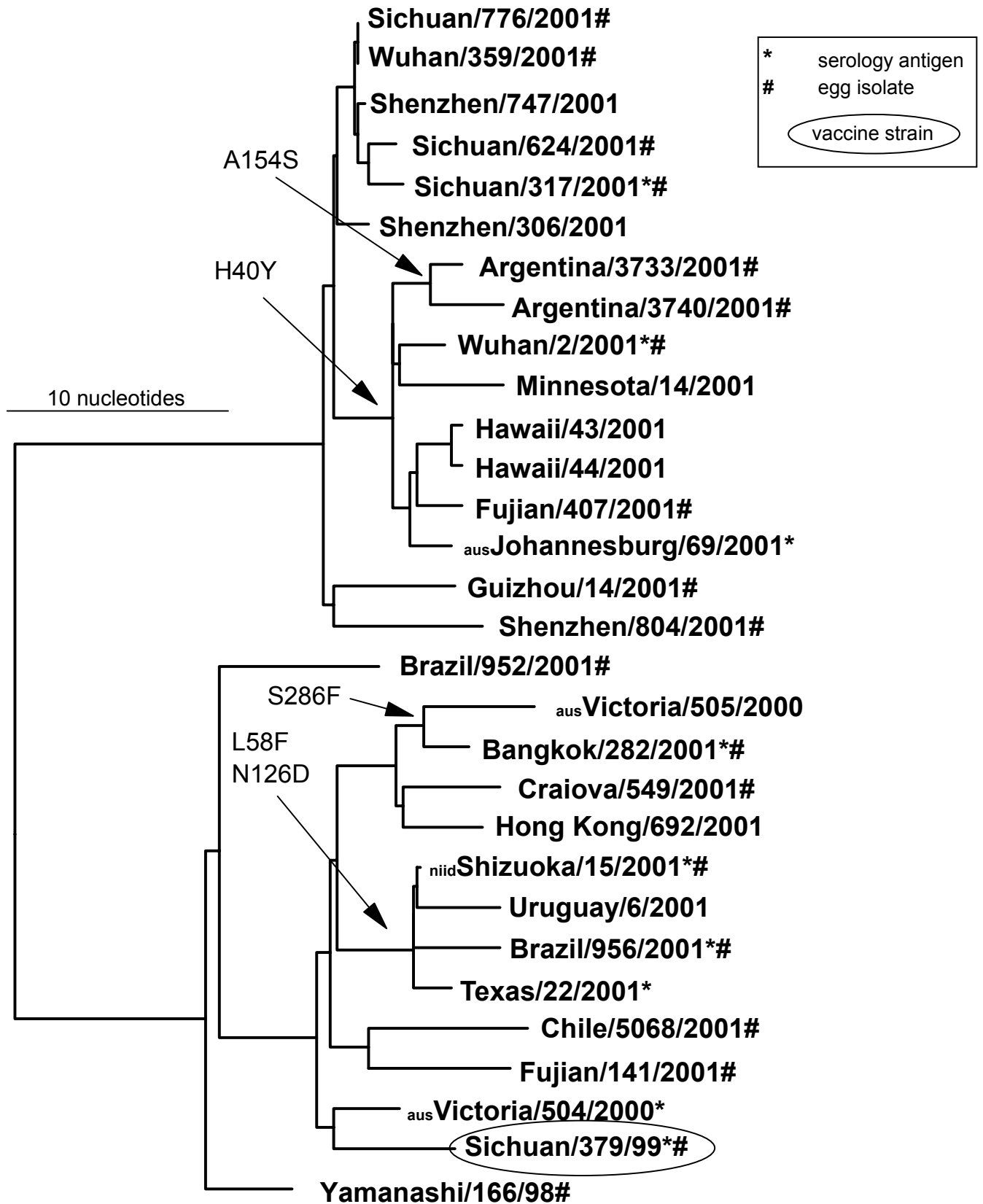
|                                    | U.S.A.     | North America | Europe    | Asia       | Cent/So America | Africa, Australia, New Zealand | Total (%)  |
|------------------------------------|------------|---------------|-----------|------------|-----------------|--------------------------------|------------|
| <b>October 2000 - March 2001</b>   |            |               |           |            |                 |                                |            |
| B/Beijing/243/97-like              |            | 1             |           | 1          |                 |                                | 2 (0.5%)   |
| B/Hong Kong/22/2001-like           |            |               |           | 12         |                 |                                | 12 (2%)    |
| B/BJ/184/93-B/Yam/166-like*        | 20         | 5             |           | 4          |                 |                                | 29 (5%)    |
| B/Sichuan/379/99-like              | 268        | 10            | 39        | 127        | 17              | 34                             | 495 (85%)  |
| B/Sichuan/379/99 (low)             | 23         |               | 4         | 14         | 2               |                                | 43 (7.5%)  |
|                                    |            |               |           |            |                 | <b>Total</b>                   | <b>581</b> |
| <b>April 2001 - September 2001</b> |            |               |           |            |                 |                                |            |
| B/Beijing/243/97-like              | 5          |               |           | 3          |                 |                                | 8 (5%)     |
| B/Hong Kong/22/2001-like           | 21         |               |           | 17         |                 |                                | 38 (22%)   |
| B/Sichuan/379/99-like              | 10         |               | 8         | 35         | 49              | 8                              | 110 (64%)  |
| B/Sichuan/379/99 (low)             | 1          | 1             | 2         | 8          | 4               |                                | 16 (9%)    |
|                                    |            |               |           |            |                 | <b>Total</b>                   | <b>172</b> |
| <b>October 2001 - January 2002</b> |            |               |           |            |                 |                                |            |
| B/Hong Kong/22/2001-like           |            | 2             |           | 25         |                 |                                | 27 (66%)   |
| B/Sichuan/379/99-like              |            |               |           | 5          |                 | 2                              | 7 (17%)    |
| B/Sichuan/379/99 (low)             | 4          |               |           | 3          |                 |                                | 7 (17%)    |
|                                    |            |               |           |            |                 | <b>Total</b>                   | <b>41</b>  |
| <b>Total</b>                       | <b>352</b> | <b>19</b>     | <b>53</b> | <b>254</b> | <b>72</b>       | <b>44</b>                      | <b>794</b> |

Preliminary Data

01/26/02

\*Includes viruses antigenically related to B/Beijing/184/93, the reference strain, or to the equivalent B/Yamanashi/166/98 vaccine strain.

# Evolutionary Relationships Among Influenza B Hemagglutinin (HA1) Genes - Yamagata Lineage



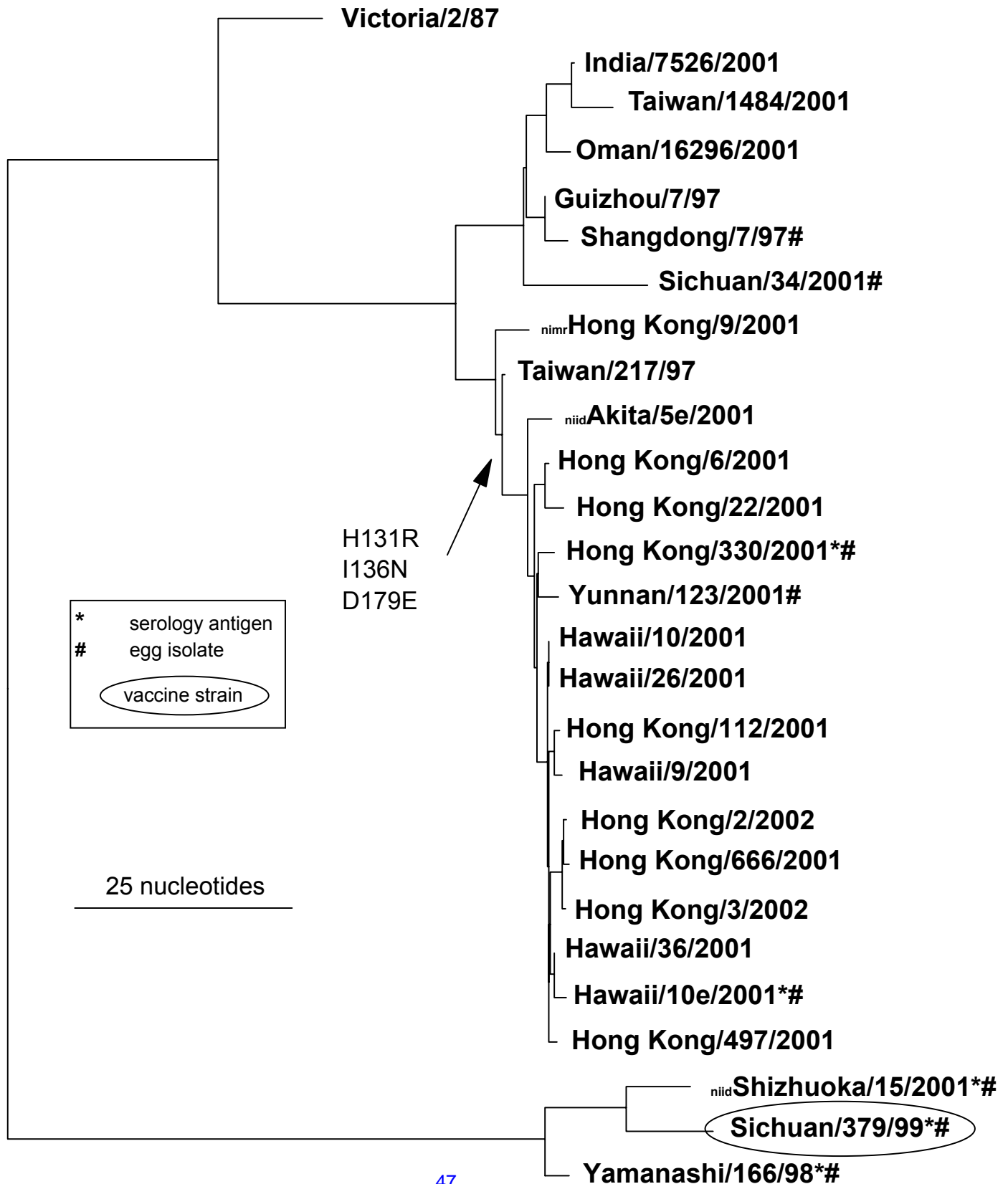
## Number of Amino Acid Differences from B/Yamanashi/166/98-like Consensus HA1 Sequence

| Isolate                        | Passage | AA<br>Diff. | Positions<br>Different   |
|--------------------------------|---------|-------------|--|
| Shizuoka/15/2001*              | e3/e2   | 1           | 58   |
| Johannesburg/5/99              | e6/e1   | 2           | 126, 197   |
| Fujian/141/2001                | e2/e2   | 2           | 163, 199   |
| Craiova/549/2001               | e2/e2   | 3           | 126, 175, 199  |
| Egypt/87/2001                  | ex/e1   | 3           | Same as above  |
| Sichuan/379/99*                | e2      | 3           | 87, 88, 126  |
| Brazil/956/2001*               | ex/e1   | 3           | 58, 148, 271   |
| Chile/5068/2001                | e2/e2   | 3           | 104, 121, 126  |
| Victoria/504/2000              | e13/e1  | 3           | 88, 126, 233   |
| Bangkok/282/2001               | e4/e1   | 4           | 126, 175, 197, 286   |
| Brazil/952/2001                | ex/e1   | 5           | 29, 126, 146, 220, 307   |
| Sichuan/776/2001 <sup>1</sup>  | e3      | 12          | 29, 48, 56, 75, 116, 162, 168, 180,<br>183, 184, 220, 267                    |
| Wuhan/359/2001 <sup>1</sup>    | e3/e1   | 12          | Same as above  |
| Sichuan/317/2001* <sup>1</sup> | e1/e3   | 13          | Same as above plus 199   |
| Sichuan/624/2001 <sup>1</sup>  | e2/e1   | 13          | Same as above  |
| Shenzhen/804/2001 <sup>1</sup> | e2      | 14          | 29, 48, 56, 75, 116, 131, 162, 168,<br>179, 183, 184, 199, 220, 267          |
| Guizhou/14/2001 <sup>1</sup>   | e2/e2   | 15          | 29, 48, 56, 75, 110, 116, 162, 168,<br>179, 180, 183, 184, 199, 220, 267     |
| Johann./69/2001* <sup>1</sup>  | e2      | 15          | 29, 40, 48, 56, 75, 116, 162, 168, 179,<br>180, 183, 184, 199, 220, 267      |
| Fujian/407/2001 <sup>1</sup>   | e1      | 16          | 29, 40, 48, 52, 56, 75, 116, 162, 168,<br>177, 179, 180, 183, 184, 220, 267  |
| Wuhan/2/2001* <sup>1</sup>     | e2/e1   | 16          | 29, 40, 48, 56, 75, 116, 162, 168, 175,<br>179, 180, 183, 184, 199, 220, 267 |
| Argent./3733/2001 <sup>1</sup> | e2/e1   | 16          | 29, 40, 48, 56, 75, 116, 141, 154, 162,<br>168, 179, 180, 183, 184, 220, 267 |

\* Serology Antigens

<sup>1</sup> B/Harbin/7/94 genetic lineage

# Evolutionary Relationships Among Influenza B Hemagglutinin (HA1) Genes - Victoria Lineage



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

| Isolate             | Passage | AA<br>Diff. | Positions<br>Different          |
|---------------------|---------|-------------|---------------------------------|
| Hawaii/10/2001*     | e2      | 1           | 199                             |
| Akita/5/2001        | e4/e1   | 1           | 197                             |
| Hong Kong/330/2001* | e2      | 1           | 197                             |
| Yunnan/123/2001     | e2/e2   | 1           | 199                             |
| Akita/27/2001       | e3/e1   | 2           | 129, 199                        |
| Sichuan/34/2001     | e2/e1   | 6           | 116, 121, 164,<br>197, 172, 291 |

\* Serology Antigens

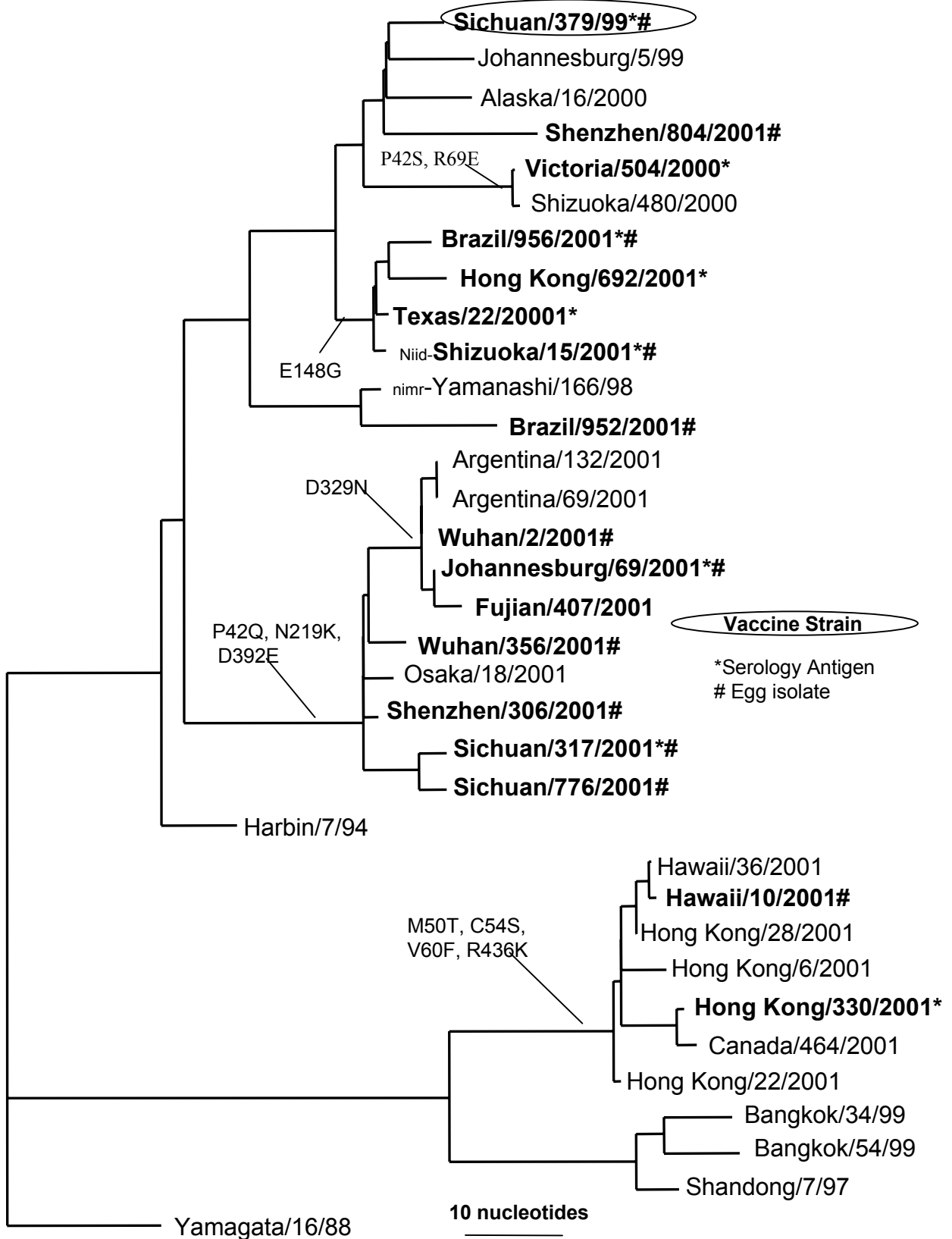
## Restriction Analysis of Influenza B Isolates

|   | U.S.A.    | North America | Europe    | Asia       | Cent/So America | Africa, Australia, New Zealand | Total (%)  |
|---|-----------|---------------|-----------|------------|-----------------|--------------------------------|------------|
| <b>October 2000 - March 2001</b>                |           |               |           |            |                 |                                |            |
| B/Victoria/2/87-lineage                         |           |               |           | 8          |                 |                                | 8 (5%)     |
| B/Yamanashi/166/98/<br>B/Sichuan/379/99-lineage | 47        |               | 15        | 32         | 21              |                                | 115 (72%)  |
| B/Harbin/7/94-lineage                           |           | 2             |           | 35         |                 |                                | 37 (23%)   |
|   |           |               |           |            |                 | <b>Total</b>                   | <b>160</b> |
| <b>April 2001 - September 2001</b>              |           |               |           |            |                 |                                |            |
| B/Victoria/2/87-lineage                         | 28        |               |           | 18         |                 |                                | 46 (34%)   |
| B/Yamanashi/166/99/<br>B/Sichuan/379/99-lineage | 3         |               | 2         | 26         | 33              | 1                              | 65 (47%)   |
| B/Harbin/7/94-lineage                           |           |               |           | 14         | 11              | 1                              | 26 (19%)   |
|   |           |               |           |            |                 | <b>Total</b>                   | <b>137</b> |
| <b>October 2001 - January 2002</b>              |           |               |           |            |                 |                                |            |
| B/Victoria/2/87-lineage                         |           | 2             |           | 28         |                 |                                | 30 (48%)   |
| B/Yamanashi/166/99/<br>B/Sichuan/379/99-lineage | 1         | 1             |           | 15         |                 | 1                              | 18 (29%)   |
| B/Harbin/7/94-lineage                           | 3         |               |           | 10         |                 | 1                              | 14 (23%)   |
|   |           |               |           |            |                 | <b>Total</b>                   | <b>62</b>  |
| <b>Total</b>                                    | <b>82</b> | <b>5</b>      | <b>17</b> | <b>186</b> | <b>65</b>       | <b>4</b>                       | <b>359</b> |

Preliminary Data

01/26/02

# Evolutionary Relationships Among Influenza B Neuraminidase Genes



## Number of Amino Acid Differences from Consensus B Neuraminidase Sequence

| Isolate              | Passage | AA<br>Diff. | Position   |
|----------------------|---------|-------------|--|
| B/Sichuan/379/99     | E2/E2   | 1           | 60   |
| B/Shizuoka/15/2001   | E2      | 1           | 148  |
| B/Shenzhen/804/2001  | E4      | 2           | 42, 342  |
| B/Brazil/956/2001    | Ex/E1   | 3           | 27, 73, 148  |
| B/Wuhan/2/2001       | E2/E1   | 7           | 42, 186, 219, 235, 329,<br>392, 436                  |
| B/Johannesb./69/2001 | E1      | 7           | 42, 186, 219, 235, 329,<br>392, 436                  |
| B/Fujian/407/2001    | EX/E2   | 7           | 42, 186, 219, 235, 329,<br>392, 436                  |
| B/Sichuan/317/2001   | E1/E2   | 8           | 42, 75, 186, 219, 235,<br>342, 392, 436              |
| B/Sichuan/776/2001   | E3      | 8           | 42, 75, 186, 219, 235,<br>342, 392, 436              |
| B/Brazil/952/2001    | Ex/E1   | 11          | 42, 53, 65, 74, 186, 235,<br>272, 372, 389, 395, 463 |

\*Consensus sequence was generated from 27 viruses isolated in 2000- 2001.

**Hemagglutination Inhibition Antibody Responses to the B\* Component  
of the 2001-2002 Influenza Vaccine  
ADULT POPULATIONS**

| Population                   | N  | Antigen                 | % Rise | Pre GMT | Post GMT | % with HI titer $\geq$ 40 |              |
|------------------------------|----|-------------------------|--------|---------|----------|---------------------------|--------------|
|                              |    |                         |        |         |          | Pre Vaccine               | Post Vaccine |
| <b>UK<sup>1</sup></b>        |    |                         |        |         |          |                           |              |
|                              | 24 | B/Sichuan/379/99* ET    | 96     | 9       | 293      | 8                         | 100          |
|                              | 24 | B/Victoria/504/2000 ET  | 96     | 11      | 311      | 8                         | 100          |
|                              | 24 | B/Brazil/956/2001 ET    | 96     | 16      | 370      | 25                        | 100          |
|                              | 24 | B/Wuhan/02/2001 ET      | 96     | 7       | 165      | 8                         | 100          |
|                              | 24 | B/Shizuoka/15/2001 ET   | 96     | 10      | 302      | 17                        | 100          |
|                              | 24 | B/Hong Kong/330/2001 ET | 71     | 6       | 48       | 4                         | 71           |
|                              | 24 | B/Hawaii/10/2001 ET     | 75     | 6       | 42       | 4                         | 67           |
| <b>Australia<sup>2</sup></b> |    |                         |        |         |          |                           |              |
|                              | 24 | B/Sichuan/379/99* ET    | 100    | 19      | 226      | 38                        | 100          |
|                              | 24 | B/Victoria/504/2000 ET  | 100    | 19      | 277      | 33                        | 100          |
|                              | 24 | B/Brazil/956/2001 ET    | 100    | 21      | 302      | 42                        | 100          |
|                              | 24 | B/Wuhan/02/2001 ET      | 100    | 10      | 151      | 13                        | 96           |
|                              | 24 | B/Shizuoka/15/2001 ET   | 96     | 18      | 329      | 38                        | 100          |
|                              | 24 | B/Hong Kong/330/2001 ET | 46     | 8       | 24       | 8                         | 46           |
|                              | 24 | B/Hawaii/10/2001 ET     | 42     | 8       | 22       | 8                         | 46           |

Preliminary Data 08/30/01

1. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug 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 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like hemagglutinin.

\* B/Sichuan/379/99 is the recommended B component of the vaccine.

**Hemagglutination Inhibition Antibody Responses to the B\* Component  
of the 2001-2002 Influenza Vaccine  
ELDERLY POPULATIONS**

| Population                   | N  | Antigen                 | % Rise | Pre GMT | Post GMT | % with HI titer $\geq$ 40 |              |
|------------------------------|----|-------------------------|--------|---------|----------|---------------------------|--------------|
|                              |    |                         |        |         |          | Pre Vaccine               | Post Vaccine |
| <b>UK<sup>1</sup></b>        |    |                         |        |         |          |                           |              |
|                              | 24 | B/Sichuan/379/99* ET    | 79     | 11      | 101      | 17                        | 92           |
|                              | 24 | B/Victoria/504/2000 ET  | 83     | 12      | 101      | 17                        | 88           |
|                              | 24 | B/Brazil/956/2001 ET    | 86     | 18      | 165      | 32                        | 100          |
|                              | 24 | B/Wuhan/02/2001 T       | 83     | 8       | 57       | 17                        | 71           |
|                              | 24 | B/Shizuoka/15/2001 ET   | 83     | 12      | 120      | 21                        | 96           |
|                              | 24 | B/Hong Kong/330/2001 ET | 58     | 8       | 31       | 8                         | 58           |
|                              | 24 | B/Hawaii/10/2001 ET     | 57     | 7       | 27       | 4                         | 58           |
| <b>Australia<sup>2</sup></b> |    |                         |        |         |          |                           |              |
|                              | 24 | B/Sichuan/379/99* ET    | 63     | 16      | 95       | 25                        | 83           |
|                              | 24 | B/Victoria/504/2000 ET  | 71     | 15      | 95       | 25                        | 88           |
|                              | 24 | B/Brazil/956/200 ET     | 63     | 24      | 143      | 38                        | 92           |
|                              | 24 | B/Wuhan/02/2001ET       | 67     | 12      | 67       | 21                        | 79           |
|                              | 24 | B/Shizuoka/15/2001 ET   | 58     | 23      | 138      | 29                        | 92           |
|                              | 24 | B/Hong Kong/330/2001 T  | 42     | 10      | 24       | 17                        | 54           |
|                              | 24 | B/Hawaii/10/2001 ET     | 38     | 10      | 22       | 13                        | 54           |

Preliminary Data 08/30/01

1. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug 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 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2)-like, A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like hemagglutinin.

\* B/Sichuan/379/99 is the recommended B component of the vaccine.

# Hemagglutination Inhibition Antibody Responses to the B\* Component of the 2001-2002 Influenza Vaccine

## ADULT POPULATIONS

|                              |           |                                | %          | Pre       | Post       | % with HI titer $\geq$ 40 |            |
|------------------------------|-----------|--------------------------------|------------|-----------|------------|---------------------------|------------|
|                              |           |                                |            |           |            | Pre                       | Post       |
| <b>USA<sup>1</sup></b>       | <b>24</b> | <b>B/Victoria/504/2000-ET</b>  | <b>38</b>  | <b>44</b> | <b>143</b> | <b>71</b>                 | <b>92</b>  |
|                              | <b>24</b> | <b>B/Sichuan/317/2001-ET</b>   | <b>38</b>  | <b>36</b> | <b>110</b> | <b>63</b>                 | <b>92</b>  |
|                              | <b>24</b> | <b>B/Texas/22/2001-ET</b>      | <b>38</b>  | <b>34</b> | <b>110</b> | <b>54</b>                 | <b>88</b>  |
|                              | <b>24</b> | <b>B/Hong Kong/692/2002-ET</b> | <b>38</b>  | <b>32</b> | <b>104</b> | <b>50</b>                 | <b>92</b>  |
|                              | <b>24</b> | <b>B/Johannesb./69/2001-ET</b> | <b>33</b>  | <b>18</b> | <b>52</b>  | <b>25</b>                 | <b>71</b>  |
| <b>UK<sup>2</sup></b>        | <b>24</b> | <b>B/Victoria/504/2000-ET</b>  | <b>92</b>  | <b>12</b> | <b>302</b> | <b>4</b>                  | <b>96</b>  |
|                              | <b>24</b> | <b>B/Sichuan/317/2001-ET</b>   | <b>100</b> | <b>12</b> | <b>269</b> | <b>8</b>                  | <b>100</b> |
|                              | <b>24</b> | <b>B/Texas/22/2001-ET</b>      | <b>96</b>  | <b>12</b> | <b>226</b> | <b>13</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>B/Hong Kong/692/2002-ET</b> | <b>100</b> | <b>11</b> | <b>196</b> | <b>0</b>                  | <b>100</b> |
|                              | <b>24</b> | <b>B/Johannesb./69/2001-ET</b> | <b>100</b> | <b>10</b> | <b>131</b> | <b>0</b>                  | <b>100</b> |
| <b>Australia<sup>3</sup></b> | <b>24</b> | <b>B/Victoria/504/2000-ET</b>  | <b>100</b> | <b>17</b> | <b>320</b> | <b>42</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>B/Sichuan/317/2001-ET</b>   | <b>96</b>  | <b>16</b> | <b>220</b> | <b>42</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>B/Texas/22/2001-ET</b>      | <b>96</b>  | <b>15</b> | <b>202</b> | <b>38</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>B/Hong Kong/692/2002-ET</b> | <b>92</b>  | <b>14</b> | <b>232</b> | <b>38</b>                 | <b>100</b> |
|                              | <b>24</b> | <b>B/Johannesb./69/2001-ET</b> | <b>100</b> | <b>9</b>  | <b>143</b> | <b>8</b>                  | <b>92</b>  |
|                              | <b>24</b> | <b>B/Hong Kong/22/2001-ET</b>  | <b>58</b>  | <b>7</b>  | <b>25</b>  | <b>0</b>                  | <b>50</b>  |
| <b>Japan<sup>4</sup></b>     | <b>29</b> | <b>B/Victoria/504/2000-ET</b>  | <b>24</b>  | <b>32</b> | <b>62</b>  | <b>59</b>                 | <b>83</b>  |
|                              | <b>29</b> | <b>B/Sichuan/317/2001-ET</b>   | <b>21</b>  | <b>25</b> | <b>44</b>  | <b>52</b>                 | <b>69</b>  |
|                              | <b>29</b> | <b>B/Texas/22/2001-ET</b>      | <b>21</b>  | <b>13</b> | <b>21</b>  | <b>17</b>                 | <b>34</b>  |
|                              | <b>29</b> | <b>B/Hong Kong/692/2002-ET</b> | <b>21</b>  | <b>21</b> | <b>34</b>  | <b>41</b>                 | <b>59</b>  |
|                              | <b>29</b> | <b>B/Johannesb./69/2001-ET</b> | <b>17</b>  | <b>21</b> | <b>32</b>  | <b>45</b>                 | <b>59</b>  |

Preliminary Data 01/17/02

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.
2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.
3. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/5/99) hemagglutinin.
4. Sera were kindly provided by Dr. Takato Odagiri, WHO Collaborating Center Tokyo, Japan. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

# Hemagglutination Inhibition Antibody Responses to the B\* Component of the 2001-2002 Influenza Vaccine

## ELDERLY POPULATIONS

| Population             | N  | Antigen                 | % Rise | Pre GMT | Post GMT | % with HI titer > 40 |              |
|------------------------|----|-------------------------|--------|---------|----------|----------------------|--------------|
|                        |    |                         |        |         |          | Pre Vaccine          | Post Vaccine |
| USA <sup>1</sup>       | 24 | B/Victoria/504/2000-ET  | 4      | 28      | 42       | 50                   | 67           |
|                        | 24 | B/Sichuan/317/2001-ET   | 13     | 22      | 35       | 42                   | 63           |
|                        | 24 | B/Texas/22/2001-ET      | 8      | 22      | 33       | 38                   | 50           |
|                        | 24 | B/Hong Kong/692/2002-ET | 13     | 24      | 35       | 46                   | 67           |
|                        | 24 | B/Johannesb./69/2001-ET | 13     | 15      | 19       | 29                   | 38           |
| UK <sup>2</sup>        | 24 | B/Victoria/504/2000-ET  | 71     | 15      | 15       | 13                   | 79           |
|                        | 24 | B/Sichuan/317/2001-ET   | 75     | 15      | 15       | 17                   | 88           |
|                        | 24 | B/Texas/22/2001-ET      | 71     | 14      | 14       | 17                   | 83           |
|                        | 24 | B/Hong Kong/692/2002-ET | 63     | 15      | 15       | 17                   | 75           |
|                        | 24 | B/Johannesb./69/2001-ET | 54     | 12      | 12       | 8                    | 63           |
| Australia <sup>3</sup> | 24 | B/Victoria/504/2000-ET  | 63     | 16      | 16       | 33                   | 83           |
|                        | 24 | B/Sichuan/317/2001-ET   | 63     | 17      | 17       | 33                   | 88           |
|                        | 24 | B/Texas/22/2001-ET      | 58     | 19      | 19       | 38                   | 88           |
|                        | 24 | B/Hong Kong/692/2002-ET | 63     | 14      | 14       | 33                   | 88           |
|                        | 24 | B/Johannesb./69/2001-ET | 58     | 13      | 13       | 29                   | 79           |
| Japan <sup>4</sup>     | 29 | B/Victoria/504/2000-ET  | 37     | 9       | 9        | 17                   | 40           |
|                        | 29 | B/Sichuan/317/2001-ET   | 33     | 8       | 8        | 13                   | 33           |
|                        | 29 | B/Texas/22/2001-ET      | 27     | 8       | 8        | 7                    | 27           |
|                        | 29 | B/Hong Kong/692/2002-ET | 33     | 9       | 9        | 13                   | 40           |
|                        | 29 | B/Johannesb./69/2001-ET | 17     | 7       | 7        | 3                    | 23           |

Preliminary Data 01/17/02

1. Sera were kindly provided by Dr. Roland Levandowski, FDA, Bethesda, MD. The populations were vaccinated with the 2000-20001 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/504/2000) hemagglutinin.

2. Sera were kindly provided by Dr. John Wood, NIBSC, Hertfordshire, UK. The populations were vaccinated with the 2001-20002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

3. Sera were kindly provided by Alan Hampson, WHO Collaborating Center Melbourne, Australia. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Victoria/5/99) hemagglutinin.

4. Sera were kindly provided by Dr. Takato Odagiri, WHO Collaborating Center Tokyo, Japan. The populations were vaccinated with the 2001-2002 trivalent influenza vaccine containing 15ug each of A/Panama/2007/99(H3N2), A/New Caledonia/20/99(H1N1), and B/Sichuan/379/99-like (B/Johannesburg/5/99) hemagglutinin.

# Hemagglutination Inhibition Antibody Responses to the B/Beijing/243/97\* Component of the SSW Experimental Vaccine

## ADULT AND ELDERLY POPULATIONS

|             |    |                                      |        |         |          | % with HI titer $\geq 40$ |              |
|-------------|----|--------------------------------------|--------|---------|----------|---------------------------|--------------|
| Population  | N  | Antigen                              | % Rise | Pre GMT | Post GMT | Pre Vaccine               | Post Vaccine |
|             |    |                                      |        |         |          |                           |              |
| Adults      | 39 | B/Beijing/243/97-ET <sup>1*</sup>    | 51     | 8       | 32       | 10                        | 49           |
| (vacc.prev. | 39 | B/Sichuan/136/99-ET <sup>1</sup>     | 54     | 9       | 37       | 13                        | 51           |
| year)       | 39 | B/Hawaii/10/2001-ET <sup>1</sup>     | 46     | 8       | 25       | 10                        | 46           |
|             | 39 | B/Hong Kong/300/2001-ET <sup>1</sup> | 46     | 8       | 26       | 8                         | 41           |
|             | 39 | B/Victoria/504/2000-ET <sup>2</sup>  | 18     | 15      | 24       | 28                        | 41           |
|             | 39 | B/Anhui/134/2001-ET <sup>2</sup>     | 13     | 7       | 9        | 5                         | 13           |
|             |    |                                      |        |         |          |                           |              |
| Adults      | 22 | B/Beijing/243/97-ET <sup>1*</sup>    | 73     | 7       | 51       | 9                         | 59           |
| (Not vacc.  | 22 | B/Sichuan/136/99-ET <sup>1</sup>     | 77     | 8       | 64       | 5                         | 73           |
| prev. year) | 22 | B/Hawaii/10/2001-ET <sup>1</sup>     | 68     | 7       | 44       | 9                         | 59           |
|             | 22 | B/Hong Kong/300/2001-ET <sup>1</sup> | 73     | 7       | 41       | 5                         | 55           |
|             | 22 | B/Victoria/504/2000-ET <sup>2</sup>  | 45     | 6       | 20       | 5                         | 41           |
|             | 22 | B/Anhui/134/2001-ET <sup>2</sup>     | 27     | 6       | 10       | 0                         | 18           |
|             |    |                                      |        |         |          |                           |              |
| Elderly     | 39 | B/Beijing/243/97-ET <sup>1*</sup>    | 41     | 13      | 39       | 26                        | 54           |
| (vacc.prev. | 39 | B/Sichuan/136/99-ET <sup>1</sup>     | 38     | 15      | 38       | 26                        | 59           |
| year)       | 39 | B/Hawaii/10/2001-ET <sup>1</sup>     | 44     | 14      | 38       | 23                        | 56           |
|             | 39 | B/Hong Kong/300/2001-ET <sup>1</sup> | 41     | 13      | 37       | 26                        | 54           |
|             | 39 | B/Victoria/504/2000-ET <sup>2</sup>  | 21     | 20      | 32       | 31                        | 46           |
|             | 39 | B/Anhui/134/2001-ET <sup>2</sup>     | 13     | 8       | 9        | 13                        | 15           |

Preliminary Data 11/09/01

\* B/Beijing/243/97 was the vaccine component

1 Viruses from the B/Victoria/2/87-B/Hong Kong/22/2001 lineage

2 Viruses from the B/Yamagata/16/88-B/Sichuan/379/99 lineage