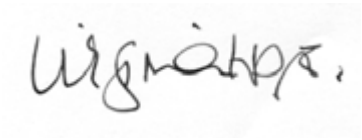
RECOMMENDATION FOR SEASONAL INFLUENZA VACCINE COMPOSITION FOR NEW ZEALAND 2012



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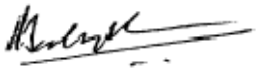

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RECOMMENDATION FOR SEASONAL INFLUENZA VACCINE COMPOSITION FOR NEW ZEALAND 2012

A report prepared for the Ministry of Health
as part of the 2011/12 contract
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by

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Client Report
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- The National Institute of Communicable Diseases, Johannesburg in South Africa and Department of Health and Ageing (DOHA) in Australia for sharing information on their influenza activity.
- The Therapeutic Goods Administration, DOHA for hosting the Australian Influenza Vaccine Committee.

Recommendations

The Australian Influenza Vaccine Committee (AIVC) met with New Zealand representatives (Appendix 1) in Melbourne on 5 October 2011 to consult on the influenza vaccine composition for 2012 for New Zealand, Australia and South Africa. The recommended composition was:

- A(H1N1) an A/California/7/2009 (H1N1) - like virus*
- A(H3N2) an A/Perth/16/2009 (H3N2) - like virus
- B a B/Brisbane/60/2008 - like virus

* Note: A/California/7/2009 is an A(H1N1)pdm09 virus, also known as a pandemic (H1N1) 09 virus.

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It is known that influenza viruses frequently go through antigenic changes in their two surface proteins, the haemagglutinin (HA) and neuraminidase (NA). It is also known that protection by vaccines is dependent on achieving a good match between vaccine strains and the circulating viruses, particularly for the haemagglutinin antigen. A combination of antigenic and genetic analyses is used to identify emergent antigenic variants of potential future epidemic importance and for consideration of their inclusion in vaccines. Antigenic relationships among contemporary viruses and vaccine strains are of prime importance in determining vaccine composition. These relationships are evaluated mainly in haemagglutination-inhibition (HI) tests using post-infection ferret sera against egg and/or cell grown reference and vaccine viruses using red blood cells principally from turkeys but also from other species, as appropriate. Virus neutralization tests provide complementary data. Antigenic cartography is used as an additional analytical tool to visualize and integrate antigenic data. Phylogenetic analyses of haemagglutinin and neuraminidase genes help to define the genetic relatedness of antigenic variants to their predecessors and to elucidate the molecular basis for antigenic drift. The spread of antigenic variants associated with influenza outbreaks in different countries is also an important criterion for selection of epidemiologically relevant vaccine candidates.

The World Health Organization (WHO) makes twice-yearly recommendations to guide national/regional authorities on the formulation of influenza vaccines: one recommendation in February for the northern hemisphere winter and another in September for the southern hemisphere winter. This recommendation is published in 14 October issue of the *Weekly Epidemiological Record, 2011 86(42):457-468 (Appendix 6)*.

It should be noted that the WHO recommendations are made with respect to reference strains which may or may not be suitable for vaccine production. Thus, even where the WHO recommendation is adopted it is necessary for country/regional authorities to approve the specific vaccine strains to be used and this, in turn, requires the preparation of specific reagents for vaccine standardization.

Since 1969, the Australian Influenza Vaccine Committee (AIVC), with representatives from New Zealand, Australia and South Africa, has met annually in October to approve or update the WHO recommended formulation for influenza vaccines intended for the following winter (March to September of the following year) for these countries. New Zealand uses the influenza vaccine strains recommended by AIVC in the subsequent year.

The Australian Influenza Vaccine Committee met with New Zealand representatives (Appendix 1) on 5 October 2011 to consult on the seasonal influenza vaccine composition for New Zealand, Australia and South Africa for 2012. The recommended composition (Table 1) was:

- A(H1N1) an A/California/7/2009 (H1N1) - like virus*
- A(H3N2) an A/Perth/16/2009 (H3N2) - like virus
- B a B/Brisbane/60/2008 - like virus

* Note: A/California/7/2009 is an A(H1N1)pdm09 virus, also known as a pandemic (H1N1) 09 virus.

TABLE 1. Influenza Vaccine Recommendations for New Zealand, 1991-2012

Formulation Recommendations		Vaccine used for	A H3N2	A H1N1	B
NZ & WHO*	2011	2012	A/Perth/16/2009	A/California/7/2009	B/Brisbane/60/2008
NZ & WHO*	2010	2011	A/Perth/16/2009	A/California/7/2009	B/Brisbane/60/2008
NZ & WHO*	2009	2010	A/Perth/16/2009	A/California/7/2009	B/Brisbane/60/2008
NZ & WHO*	2008	2009	A/Brisbane/10/2007	A/Brisbane/59/2007	B/Florida/4/2006
NZ & WHO*	2007	2008	A/Brisbane/10/2007	A/Solomon Islands/3/2006	B/Florida/4/2006
NZ & WHO*	2006	2007	A/Wisconsin/67/2005	A/New Caledonia/20/99	B/Malaysia/2506/2004
NZ & WHO*	2005	2006	A/California/7/2004	A/New Caledonia/20/99	B/Malaysia/2506/2004
NZ & WHO*	2004	2005	A/Wellington/1/2004	A/New Caledonia/20/99	B/Shanghai/361/2002
NZ & WHO*	2003	2004	A/Fujian/411/2002	A/New Caledonia/20/99	B/Hong Kong/330/2001
NZ & WHO*	2002	2003	A/Moscow/10/99	A/New Caledonia/20/99	B/Hong Kong/330/2001
NZ & WHO*	2001	2002	A/Moscow/10/99	A/New Caledonia/20/99	B/Sichuan/379/99
NZ	2000	2001	A/Sydney/5/97	A/New Caledonia/20/99	B/Beijing/184/93
WHO*	2000	2001	A/Moscow/10/99	A/New Caledonia/20/99	B/Beijing/184/93
NZ & WHO*	1999	2000	A/Sydney/5/97	A/Beijing/262/95	B/Beijing/184/93
NZ	1998	1999	A/Sydney/5/97	A/Bayern/7/95	B/Beijing/184/93
WHO**	1997-98		A/Wuhan/359/95	A/Bayern/7/95	B/Beijing/184/93
NZ	1997	1998	A/Wuhan/359/95	A/Texas/36/91	B/Beijing/184/93
WHO**	1996-97		A/Wuhan/359/95	A/Singapore/6/86***	B/Beijing/184/93
NZ	1996	1997	A/Johannesburg/33/94	A/Texas/36/91	B/Beijing/184/93
WHO**	1995-96		A/Johannesburg/33/94	A/Singapore/6/86	B/Beijing/184/93
NZ	1995	1996	A/Guangdong/25/93	A/Texas/36/91	B/Panama/45/90
WHO**	1994-95		A/Shangdong/9/93	A/Singapore/6/86	B/Beijing/184/93
NZ	1994	1995	A/Beijing/32/92	A/Texas/36/91	B/Panama/45/90
WHO**	1993-94		A/Beijing/32/92	A/Singapore/6/86	B/Panama/45/90
NZ	1993	1994	A/Shanghai/24/90	A/Texas/36/91	B/Panama/45/90
WHO**	1992-93		A/Beijing/353/89	A/Singapore/6/86	B/Yamagata/16/88 or B/Panama/45/90
NZ	1992	1993	A/Beijing/353/89	A/Victoria/36/88	B/Yamagata/16/88 or B/Panama/45/90
WHO**	1991-92		A/Beijing/353/89	A/Singapore/6/86	B/Yamagata/16/88 or B/Panama/45/90
NZ	1991	1992	A/Beijing/353/89	A/Victoria/36/88	B/Yamagata/16/88
WHO**	1990-91		A/Guizhou/54/89	A/Singapore/6/86	B/Yamagata/16/88

* WHO recommendations are for the Southern Hemisphere winter;
* * WHO recommendations are for the Northern Hemisphere winter
*** USA selected the variant A/Texas/36/91

1. INFLUENZA EPIDEMIOLOGY

1.1 World-wide influenza activity, February-September 2011

From February to September 2011, influenza was active worldwide and reported in Africa, the Americas, Asia, Europe and Oceania. In general, activity was low or moderate in comparison to previous years and was due to circulation/co-circulation of influenza A(H1N1)pdm09, A(H3N2) and B viruses. No former seasonal A(H1N1) viruses that circulated before the 2009 pandemic were detected during this period.

In the northern hemisphere, influenza activity continued to be high in February, started to decline in March, and remained very low from April onwards. In the southern hemisphere, activity generally increased from May and had declined to baseline levels by September, except in Australia and New Zealand where regional outbreaks were still reported at that time. In tropical areas, activity was generally reported throughout the period with regional outbreaks in some countries, including Bangladesh, Cambodia, Cuba, Dominican Republic and Honduras.

Influenza A(H1N1)pdm09 viruses predominated in many parts of the world with widespread and regional outbreaks reported in February and March in a number of countries in Asia, northern Africa, North America and Europe. Influenza A(H1N1)pdm09 activity increased in the southern part of South America and became regional in May-June in Argentina, the Dominican Republic, Uruguay and South Africa, and declined in August-September. From July onwards, outbreaks of A(H1N1)pdm09 were widespread in Australia and regional in Cambodia and New Zealand.

Influenza A(H3N2) activity was reported in many countries during this period. In the northern hemisphere widespread activity continued to be reported in Canada, the United States of America and Japan in February and March, and declined in April. In many Latin American countries, A(H3N2) virus predominated and caused local to regional outbreaks from June to August.

Widespread influenza B activity continued to be reported in the northern hemisphere during February and March in many countries, including Canada and the United States of America, most countries in Europe, and Japan. Influenza B activity increased in Central America and South Africa in June and July, and it declined in August. In several countries of Asia and Oceania, influenza B activity was regional from July onwards.

From 16 February 2011 to 19 September 2011, 45 confirmed human cases of A(H5N1), 24 of which were fatal, were reported by Bangladesh, Cambodia, Egypt and Indonesia, countries in which highly pathogenic avian influenza A(H5N1) is present in poultry. Since December 2003, a total of 564 cases with 330 deaths have been confirmed in 15 countries. To date there has been no evidence of sustained human-to-human transmission.
(Abridged from the Weekly Epidemiological Record, 2011 86(42): 457-468)

The WHO Collaborating Centre for Reference and Research on Influenza in Melbourne, Australia (Melbourne WHOCC) analysed influenza isolates received from 1 March to 30 September 2011. Influenza A(H1N1)pdm09 virus was the predominant strain which accounted for 41.5% (1161/2800) of isolates while 35.4% (992/2800) were influenza B and 15.1% (423/2800) were seasonal influenza A(H3N2) (Table 2.1 in Appendix 2).

1.2 Influenza activity in Australia, March-September 2011

Influenza activity in Australia in 2011 was low with some regional variations regarding influenza activities and types/subtypes. There are ten forms of influenza surveillance systems in Australia which can be divided into three categories:

- **Influenza-like-illness surveillance**
  - **Australian Sentinel Practice Research Network (ASPREN).** This system has general practitioners (GPs) who report influenza-like illness (ILI) presentation rates in New South Wales, South Australia, Victoria, Queensland, Tasmania, Western Australia and Northern Territory. As jurisdictions joined ASPREN at different times and the number of GPs reporting has changed over time, the representativeness of ASPREN data in 2011 may be different from that of previous years. The national case definition for ILI is presentation with fever, cough and fatigue. Overall, ILI presentations to GPs were similar to the 2010 data and lower than that of 2008–2009.

  - **Emergency department surveillance.** Emergency departments across New South Wales and Western Australia participated in influenza surveillance. Both Western Australia and New South Wales emergency department surveillance indicated that influenza activity in 2011 was similar to the 2010 and lower than that of 2007–2009.

  - **FluTracking.** FluTracking is an online health surveillance system to detect epidemics of influenza. It involves participants from around Australia completing a simple online weekly survey, which collects data on the rate of ILI symptoms in communities. Overall, FluTracking data in 2011 was similar to the 2010 data, lower than that of 2007-2009.

- **Laboratory surveillance:**
  - **National Notifiable Disease Surveillance System (NNDSS).** In Australia, laboratory-confirmed cases of influenza became nationally notifiable from 1 January 2001. All laboratory-confirmed cases are required to be reported to state and territory health departments. From January to 30 September 2011, there have been 24 049 laboratory confirmed notifications of influenza diagnosed and reported to NNDSS. Of these, 17,167 (71%) cases were reported as influenza A (36% influenza A (unsubtyped), 29% A(H1N1)pdm09 and 6% A(H3N2) and 6 676 (<28%) were influenza B. A further 75 (<1%) were type A&B and 131 (<1%) were untyped. Overall, the 2011 notification data are higher than that of 2010.

  - **WHOCC Laboratory Surveillance.** This is conducted by the Melbourne WHOCC. A total of 2074 influenza viruses from Australia were received for analysis at the Melbourne WHOCC (Appendix 2) from 1 March to 30 September 2010. Nine hundred and twenty-eight A(H1N1)pdm09 viruses (44.7%, 928/2074) were isolated and antigenically closely related to A/California/7/2009 (H1N1)-like strain. Three hundred and twelve (15.1%, 312/2074) of the isolates were A(H3N2) viruses with the majority relating antigenically to the A/Perth/16/2009-like strain. Six hundred and sixty-one (31.9%, 661/2074) influenza B viruses were isolated with most of them belonging to the B/Brisbane/60/2008 lineage. Regarding oseltamivir-resistant viruses, between 1 January to 2 October 2011, 15 influenza viral isolates (out of 1649 tested) have shown resistance to neuraminidase inhibitor oseltamivir by enzyme inhibition assay. A further 18 specimens, out of a total of 203 tested by pyrosequencing, have shown the H275Y mutation known to confer resistance to oseltamivir. Thus a total of 33 influenza viruses have shown resistance to oseltamivir in 2011, all have been A(H1N1)pdm09 viruses.

- **Sentinel Laboratory Surveillance.** Laboratory testing data are provided weekly directly from the three National Influenza Centres (PathWest (WA), VIDRL (VIC) and ICPMR (NSW) and also from Tasmanian laboratories. Additionally, approximately 30% of all ILI patients presenting to ASPREN based sentinel GPs are swabbed for laboratory testing and the results of ASPREN ILI laboratory respiratory viral tests now include Western Australia. From the fortnight ending 30 April 2011 to 30 September, a total of 11.4% of specimens have been positive for influenza.

- **Severity Surveillance:**
  - **Influenza hospitalisations.** The Influenza Complications Network (FluCAN) collects detailed clinical information on all hospitalised cases of influenza and pneumonia from a sample of 4 sentinel hospitals across Australia. From 1 May to 29 September 2011, FluCAN has reported a total of 223 influenza associated hospitalisations including 31 ICU admissions. Almost half (45%) of the hospitalisations and 45% of ICU admissions have been associated with influenza A(H1N1)pdm09 infection. The mean age of patients hospitalised has been 51 years.

  - **Australian Paediatric Surveillance.** This surveillance system reports on hospital admissions of children aged 15 years and under to ICUs around Australia following complications due to influenza infection, and was initiated at the start of June 2009 through the Australian Paediatric Surveillance Unit (APSU). Details of admissions are reported on a weekly basis. From 1 July to 11 October 2011, there have been 46 hospitalisations associated with severe influenza complications in children, including 18 ICU admissions. The majority of these hospitalisations were associated with influenza A(H1N1)pdm09 infection. Of the 31 hospitalisations with completed questionnaires, 13 were noted as having underlying chronic medical conditions.

  - **Death associated with influenza and pneumonia.** Nationally reported influenza deaths are notified by jurisdictions to the NNDSS. As of 30 September 2011, 14 influenza related deaths have been notified to this system with a median age of 47 years. Ten of these cases were reported as having influenza A(H1N1)pdm09 infection, two with influenza B and the other cases reported as having influenza type A (untyped).

  - **Death certificate survey.** The registered death certificates from the births, deaths and marriages office in New South Wales were collected for influenza and pneumonia deaths. Death registration data show that until the week ending 16 September 2011, there were 1.5 pneumonia or influenza associated deaths per 100 000 population in NSW, which is below the seasonal threshold of 1.7 per 100 000 NSW population for this period.

(Abridged from the Australian Influenza Surveillance Report 2011, No.14, Department of Health and Ageing, Australia and a report by Dr. Ian Barr, WHO Collaborating Centre for Influenza, Melbourne.)

1.3 Influenza activity in South Africa, March-September 2011

Influenza surveillance in South Africa has been expanded significantly during 2011 and includes three main active surveillance programmes:

- **Viral watch programme** – A total of 246 doctors and primary health care nurses have been recruited across the country to participate in the influenza like Illness (ILI) sentinel

surveillance programme from all nine provinces. This programme focuses on mild infections seen mainly by GPs as well as a few paediatricians and primary health care clinics across the country.

- **Enhanced viral watch programme** – This programme was established following the emergence of the influenza A(H1N1)pdm09 with the aim of expanding the "viral watch" to include hospitalised patients. This programme includes 11 hospitals covering all nine provinces and focuses on hospitalised patients with Severe Acute Respiratory-tract Infection (SARI) across the country.

- **SARI surveillance programme** - The SARI surveillance programme was established in 2009 which monitors cases of more severe disease in hospitalised patients. Detailed epidemiologic data are collected on all patients. This programme currently includes 6 hospitals at 4 sentinel sites, *Chris Hani Baragwanath Hospital (CHBH),* an urban setting hospital situated in Gauteng Province with a well defined population (Soweto); *Edendale Hospital (EH) a* semi-urban setting hospital situated in KwaZulu-Natal Province, *Klerksdorp and Tshepong Hospitals (KH)* situated in a semi-urban setting in the Northwest Province and *Mapulaneng and Matikwana Hospitals (MMHs),* rural setting hospitals in Mpumalanga Province. Apart from these active surveillance sites the NICD also offers support to National Health Laboratory Service laboratories that does routine testing for respiratory virus disease across the country.

In 2011, a total of 6373 suspected influenza specimens were processed. Influenza A was detected in 1321 (20.9%) specimens and influenza B in 122 (2.1%) specimens up to week 36. This gave an overall detection rte of 23% relative to 30% in 2009. In South Africa, influenza A(H1N1)pdm09 was the predominant strain (n=1124, 17.8%) compared with the seasonal A(H3N2) strain (n=183, 3.1%).

A total of 59 influenza A(H1N1)pdm09 viruses were sequenced. Two of the six lineages which have dominated the Northern hemisphere 2010/2011 influenza season were identified in South Africa. A total of 50 A(H1N1)pdm09 viruses were tested by hemagglutination inhibition assay and they were antigenically similar to the vaccine strain. The neuraminidase genes of the 25 A(H1N1)pdm09 viruses were sequenced and none had the H274Y mutation, indicating they were sensitive to oseltamivir.

A total of 22 seasonal influenza A(H3N2) viruses were sequenced and they were clustered genetically with the A/Victoria/208/2009 clade. Only two seasonal influenza A(H3N2) viruses haemagglutinated red blood cells and they were antigenically similar to the vaccine strain A/Perth/16/2009. The neuraminidase genes of the 19 seasonal influenza A(H3N2) viruses were sequenced and no resistance causing mutations were identified.

Both influenza B lineages (the B/Victoria/2/87 lineage and B/Yamagata/16/88 lineage) were detected.

(Extracted from a report by Professor Barry Schoub, National Institute for Communicable Diseases, South Africa.)

2. INFLUENZA ACTIVITY IN NEW ZEALAND IN 2011

2.1 The 2011 New Zealand Influenza Season

The national influenza surveillance system in New Zealand is an essential public health tool for assessing and implementing strategies to control influenza. The surveillance system includes sentinel general practitioners (GP) surveillance, non-sentinel laboratory surveillance, ICD code based hospitalisation surveillance and Healthline surveillance.

2.1.1 ESR's sentinel GP-based surveillance

The New Zealand sentinel GP surveillance system was established in 1991 as part of the World Health Organization (WHO) global program for influenza surveillance. The system is operated nationally by the Institute of Environmental Science and Research (ESR) and locally by surveillance coordinators in the public health units of the country's 20 District Health Boards (DHB). Surveillance is conducted during May–September (the southern hemisphere winter) by volunteer sentinel GP's distributed across New Zealand.

The sentinel system defines a case of ILI as *an acute respiratory tract infection characterized by an abrupt onset of at least two of the following: fever, chills, headache, and myalgia*. Each participating GP records the daily number of patients consulted for ILI, along with the patient's age. These data are collected by local district coordinators each week. Total crude national ILI consultation rates are calculated weekly using the sum of the GP patient populations as the denominator. As age group–specific GP patient population data are not provided by the participating practitioners, the denominator for age group–specific ILI consultation rates is based on New Zealand census data with the assumption that the age group distribution for GP patient populations is the same as the distribution for the entire New Zealand population.

Each participating GP also collects three respiratory samples (nasopharyngeal or throat swab) each week from the first ILI patients examined on Monday, Tuesday, and Wednesday. The GP's forward these samples to the WHO National Influenza Centre at ESR or to hospital virology laboratories in Auckland, Waikato, or Christchurch for virus characterization. Laboratory identification methods include molecular detection by polymerase chain reaction, isolation of the virus, or direct detection of viral antigen. Influenza viruses are typed and subtyped as influenza A, B, seasonal A (H1N1), seasonal A (H3N2), or influenza A(H1N1)pdm09. The virus identification data are forwarded by hospital laboratories to ESR each week. ESR compiles and reports national epidemiologic and virologic data on influenza to WHO and also publishes these data on the ESR website (http://www.esr.cri.nz/virology/virology_weekly_report.php)

In 2011, a total of 88 sentinel GPs were recruited, representing all of the country's 20 DHBs and with a combined patient population of 386 804 approximately 8.9% of the New Zealand population. From week 18 (the week ending 8 May 2011) through week 36 (the week ending 11 September 2011), a total of 2840 consultations for ILI were reported from the 20 District Health Boards (DHBs). It is estimated that ILI resulting in a visit to a general practitioner affected over 32 069 New Zealanders (0.73% of total population). The cumulative incidence of ILI consultation during this period was 734.2 per 100 000 population. The average weekly ILI consultation rate during this period was 40.1 per 100 000 population.

Weekly national ILI consultation rates for the study period were compared with the same period in 2009 and 2010. From week 18 (the week ending 8 May 2010) through week 27 (4–10 July 2011), the weekly ILI consultation rate remained below the baseline level of 50 consultations per 100 000 patient population (Figure 1). The ILI rate first crossed the baseline level in week 28 (11– 24 July

2011) and increased to the first peak in week 30 at 66.1 per 100 000 patient population (25-31 July 2011). This was lower than the peak rate of 151.6 consultations recorded in 2010 and the peak of 284.0 consultations in 2009. The peak ILI rate in 2011 was in the lowest range (the 2nd lowest) during 1992-2011 (Figure 2). The second peak ILI rate of 63.2 per 100 000 occurred in week 35 (29 August–4 September 2011). Since then, influenza activity has been declining.

Figure 1. Weekly Consultation Rates for Influenza-like Illness in New Zealand, 2009, 2010, 2011

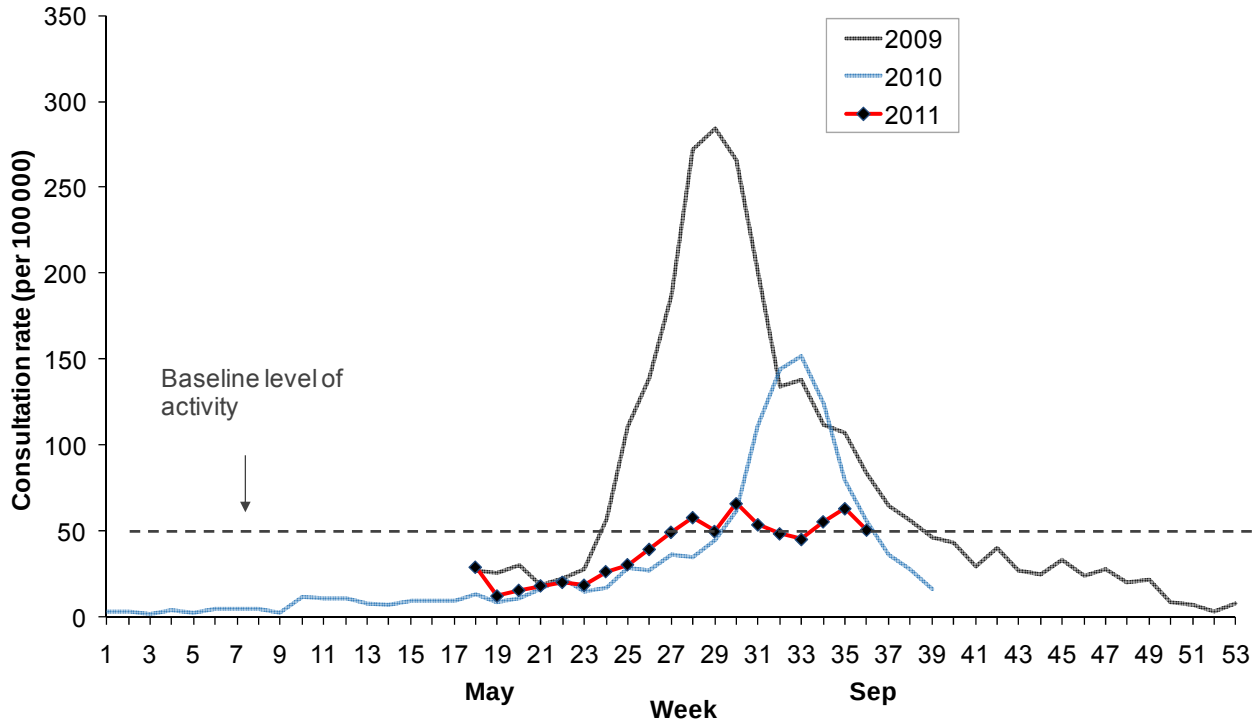
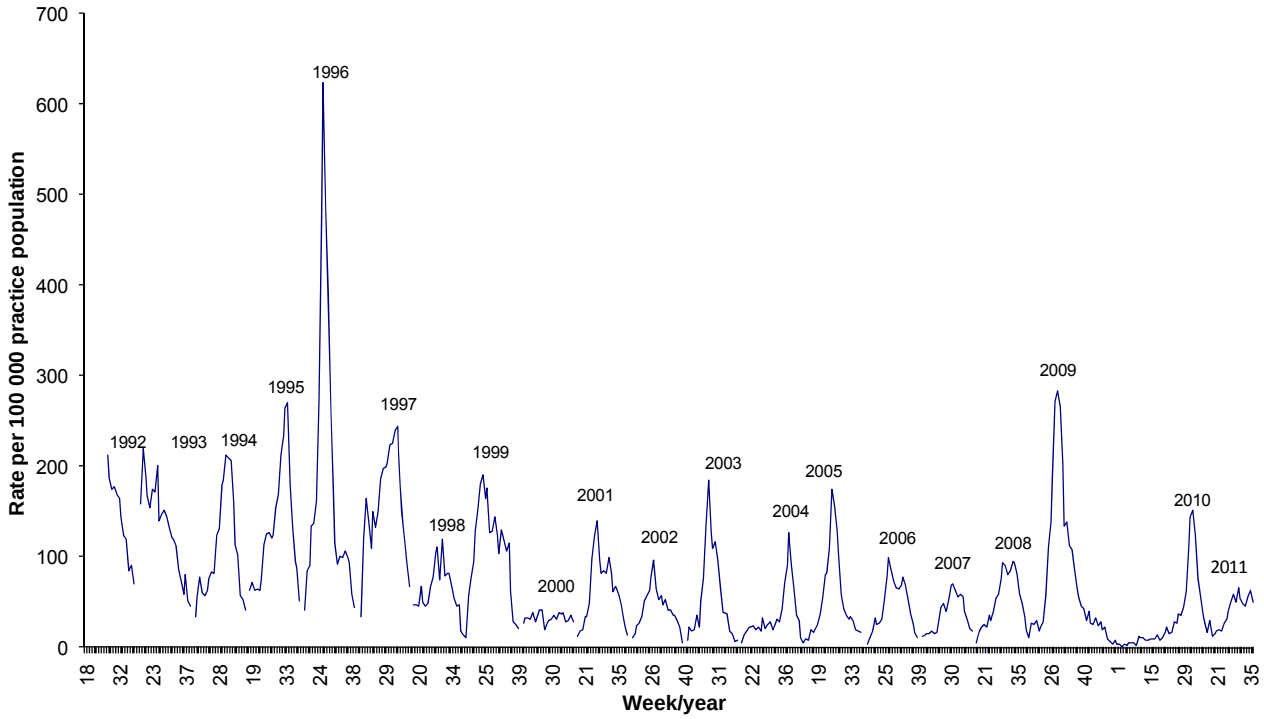


Figure 2. Weekly Consultation Rates for Influenza-like Illness in New Zealand, 1992-2011



As in previous years, 2011 consultation rates for ILI varied greatly among DHBs during the study period (Figure 3). Waitemata DHB had the highest consultation rate (76.7 per 100 000), followed by Northland (68.2 per 100 000) and Whanganui (63.0 per100 000).

Figure 3: Average weekly consultation rate for influenza-like illness by District Health Board, 2011

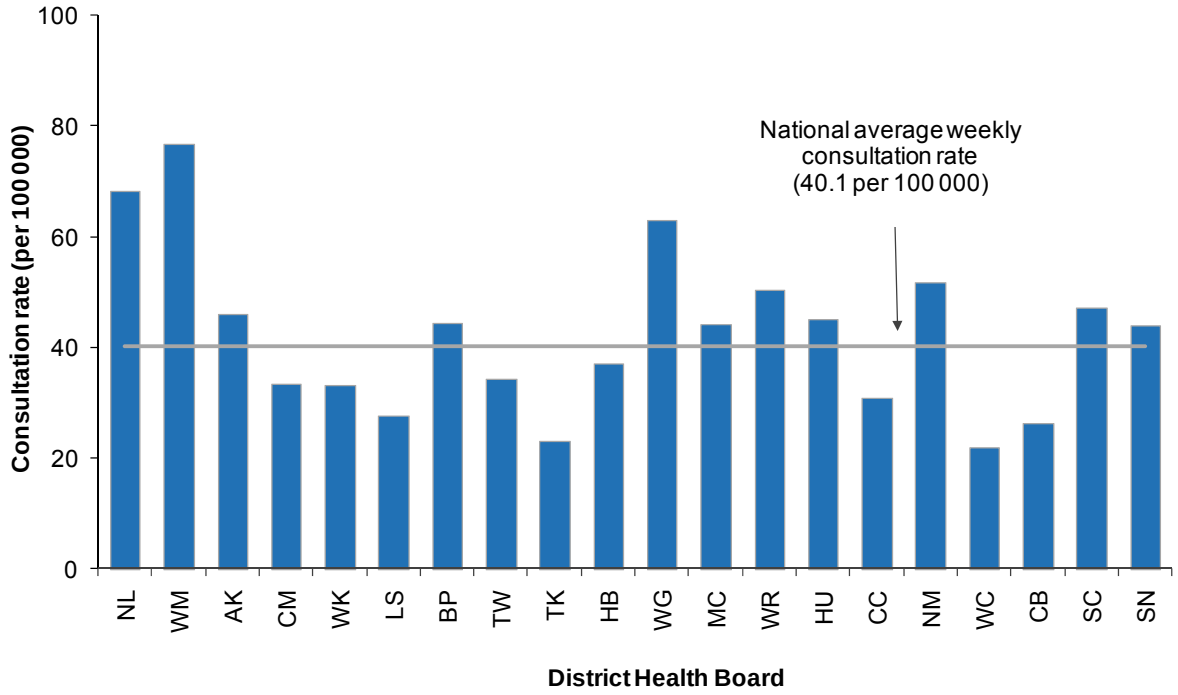
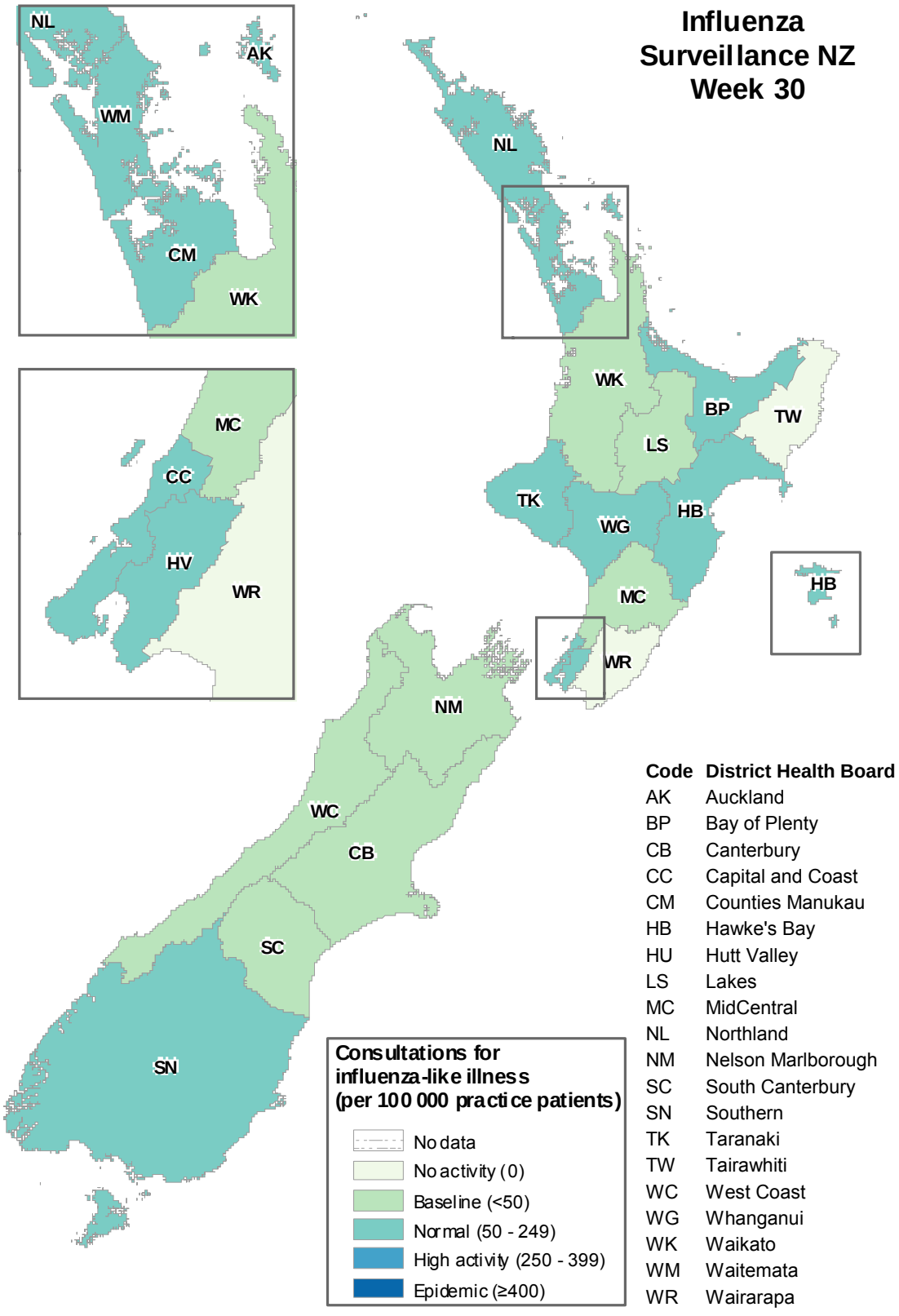


Figure 4 shows ILI consultations among DHBs during the peak week 30 (25–31 July 2011). Waitemata DHB (208.5 per 100 000, 22 cases) had the highest consultation rate, followed by Whanganui (128.4 per 100 000, 11 cases) and Hutt Valley (112.9 per 100 000, 39 cases).

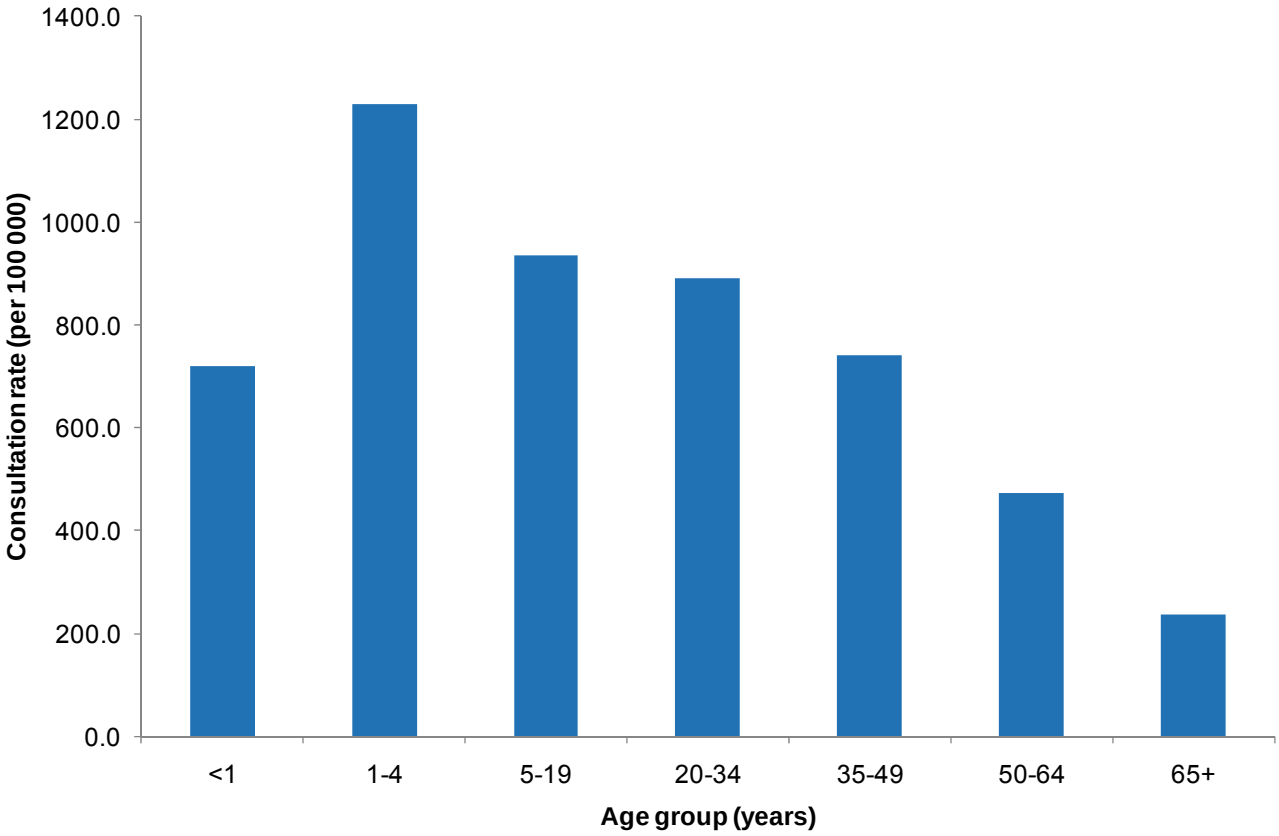
Figure 4. ILI consultation rates by District Health Board for the peak week 30 (25–31 July 2011)



A weekly rate <50 ILI consultations per 100 000 patient population is considered baseline activity. A rate of 50–249 is considered indicative of normal seasonal influenza activity, and a rate of 250–399 indicative of higher than expected influenza activity. A rate ≥400 ILI consultations per 100 000 patient population indicates an epidemic level of influenza activity.

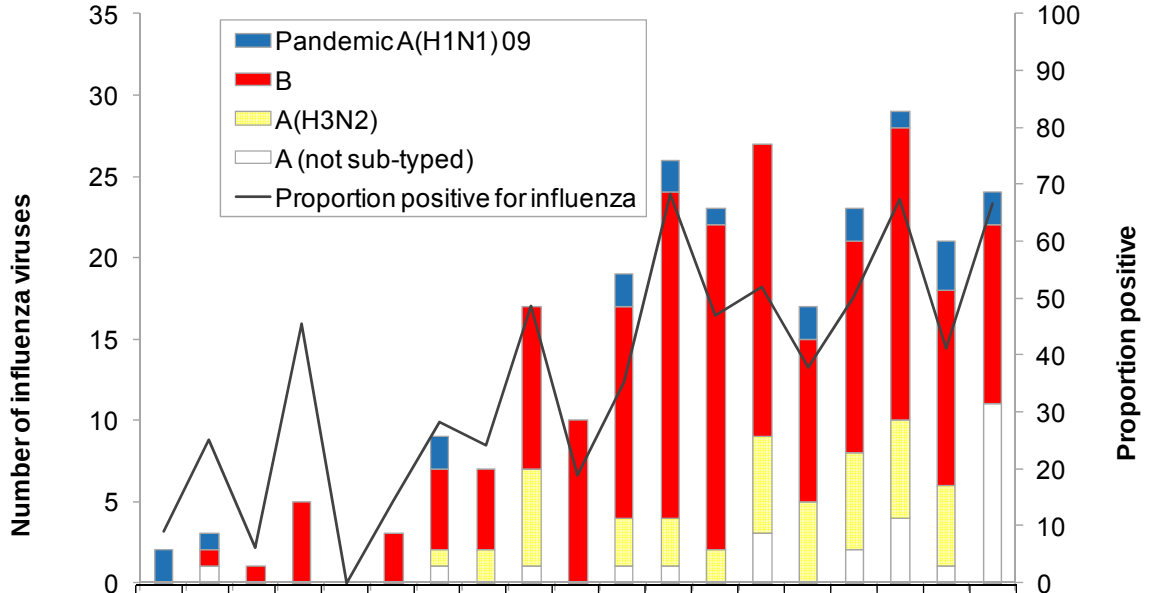
During the study period, the highest cumulative ILI consultation rates were recorded among children and youths aged ≤19 years (Figure 5). Children aged 1–4 years had the highest ILI consultation rate (1229.0 per 100 000 age group population), followed by persons aged 5–19 years (935.6), 20-34 years (891.8), 35–49 years (740.1), infants aged <1 year (718.6), 50–64 years (473.9) and elderly ≥65 years (237.5).

Figure 5: Sentinel Average Cumulative Consultation Rates for ILI by Age Group, 2011



A total of 663 swabs were sent to virology laboratories from sentinel GPs during May to September 2011. From these swabs, 266 influenza viruses were identified. This gave an overall detection rate of 40%. The predominant strain was influenza B (175) including 97 B/Brisbane/60/2008 - like viruses, A(H3N2) (45) including 27 A/Perth/16/2009 (H3N2) - like viruses, 20 influenza A(H1N1)pdm09 including six A/California/7/2009 (H1N1) like viruses and A (not sub-typed) (26) (Figure 6). Influenza B/Brisbane/60/2008 - like strain has been the predominant strain for the most of the winter season (weeks 26-36).

Figure 6. Number of influenza viruses reported by type and week from sentinel surveillance



	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
A (not sub-typed)	0	1	0	0	0	0	1	0	1	0	1	1	0	3	0	2	4	1	11
A(H3N2)	0	0	0	0	0	0	1	2	6	0	3	3	2	6	5	6	6	5	0
B	0	1	1	5	0	3	5	5	10	10	13	20	20	18	10	13	18	12	11
Pandemic A(H1N1) 09	2	1	0	0	0	0	2	0	0	0	2	2	1	0	2	2	1	3	2

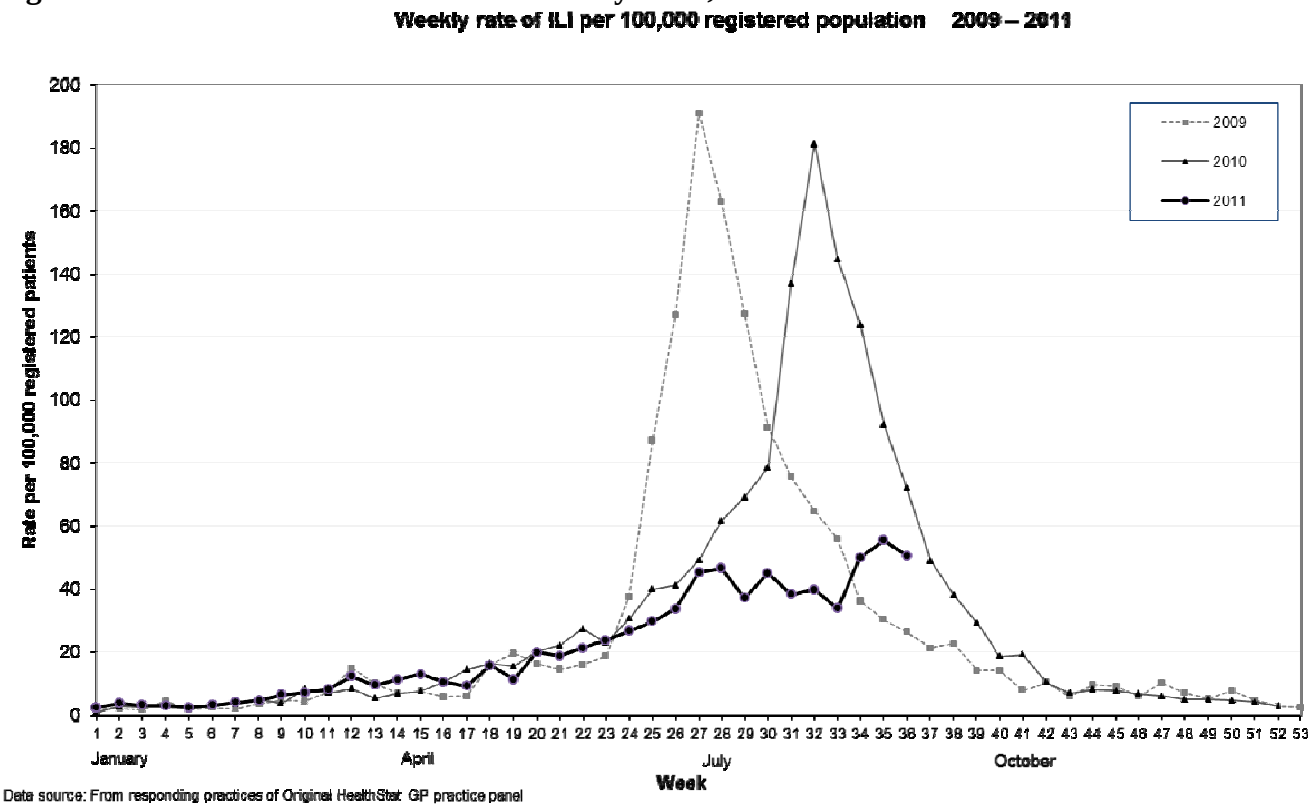
2.1.2 HealthStat GP-based surveillance

HealthStat is a computer-based routine surveillance system of a nationally representative random sample of approximately 100 general practices that code for influenza-like-illness (ILI). The case definition used for ILI by HealthStat is: "acute URTI, with abrupt onset of 2+ symptoms from chills, fever, headache and myalgia". This surveillance system monitors the number of people who have primary care (GP) consultations. HealthStat is based on the automated downloads from GP practice management computer systems. This service is provided to ESR by CBG Health Research Ltd. HealthStat GP-based surveillance does not contain a component of the virological surveillance.

Analysis is frequency based with alarms raised by identifying statistical deviations (aberations) from previous counts. The analysis of the ILI count is based on the cumulative summation (CUSUM) algorithm implemented in Early Aberration Reporting System (EARS) application developed by the Centres for Disease Control and Prevention (CDC), Atlanta, United States. EARS has three sensitivity thresholds (high, medium and low). If the daily call count exceeds a threshold a flag is signalled.

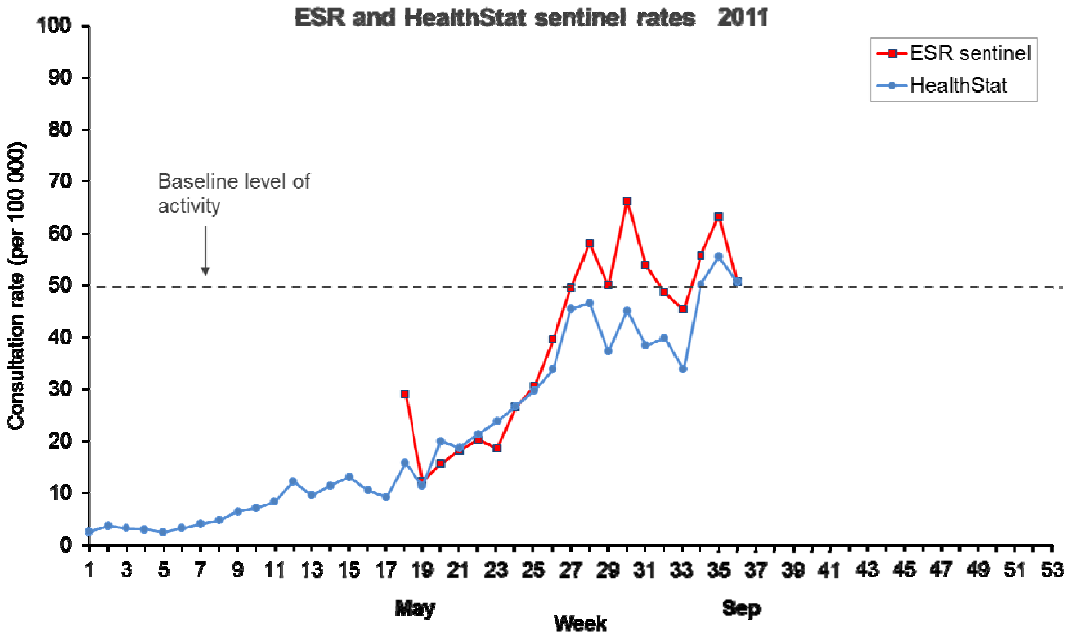
Figure 7 below shows the weekly rate of ILI per 100 000 registered population, 2009-2011. The 2009 and 2010 data shows major differences compared to other surveillance systems, probably reflecting low sensitivity of the coding practices in 2009. The coding practices have been improved since 2010.

Figure 7. HealthStat ILI consultation rates by week, 2009-2011



The trend of the 2011 data is similar to ESR's sentinel GP surveillance but with overall lower ILI rates (Figure 8 below). In addition, ESR's sentinel surveillance recorded the first peak in week 30 which was also confirmed through virological surveillance for sentinel GPs and non-sentinel surveillance as well as ICD-coded hospitalisation surveillance. ESR's sentinel GP surveillance showed that the first peak (66.1 per 100 000 in week 30) was slightly higher than the second peak (63.2 per 100 000 in week 35), whereas the HealthStat GP ILI rates showed that the second peak (55.5 per 100 000 in week 35) was higher than the first peak (46.5 per 100 000 in week 28) which did not surpass the baseline line of activity of 50 per 100 000.

Figure 8 ESR and HealthStat sentinel GP-based ILI rates comparison, 2011

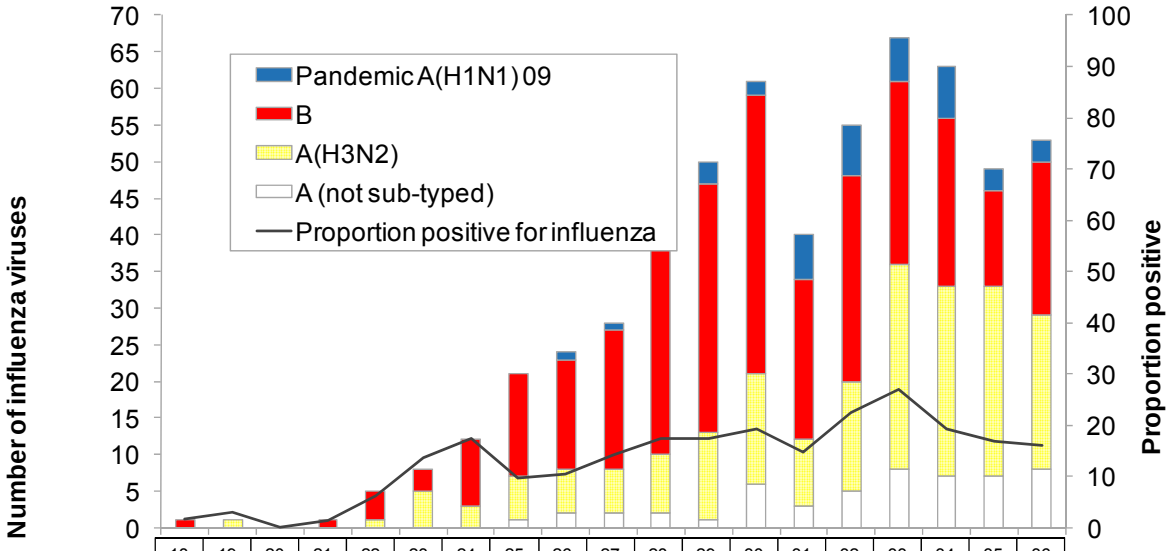


2.1.3 Non-sentinel laboratory surveillance

Non-sentinel laboratory surveillance is conducted by the New Zealand virus laboratory network consisting of the National Influenza Centre at ESR and four hospital virology laboratories in Auckland, Waikato, Wellington, and Christchurch. ESR collates year-round national laboratory data on influenza from hospital in-patient and outpatients during routine viral diagnosis.

A total of 3333 non-sentinel swabs were received during January to September 2011. Among them, 627 influenza viruses were identified. This gave an overall detection rate of 19%. The predominant strain was influenza B (314) including 130 B/Brisbane/60/2008 - like virus and three B/Florida/4/2006 – like, A(H3N2) (197) including 58 A/Perth/16/2009 (H3N2) - like virus, 62 influenza A(H1N1)pdm09 including nine A/California/7/2009 (H1N1) like virus and A (not sub-typed) (54) (Figure 9). Influenza B/Brisbane/60/2008 - like strain has been the predominant strain for the most of the winter season (weeks 26-36).

Figure 9 Number of influenza viruses reported by type and week from non-sentinel surveillance



	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
A (not sub-typed)	0	0	0	0	0	0	0	1	2	2	2	1	6	3	5	8	7	7	8
A(H3N2)	0	1	0	0	1	5	3	6	6	6	8	12	15	9	15	28	26	26	21
B	1	0	0	1	4	3	9	14	15	19	38	34	38	22	28	25	23	13	21
Pandemic A(H1N1) 09	0	0	0	0	0	0	0	0	1	1	2	3	2	6	7	6	7	3	3

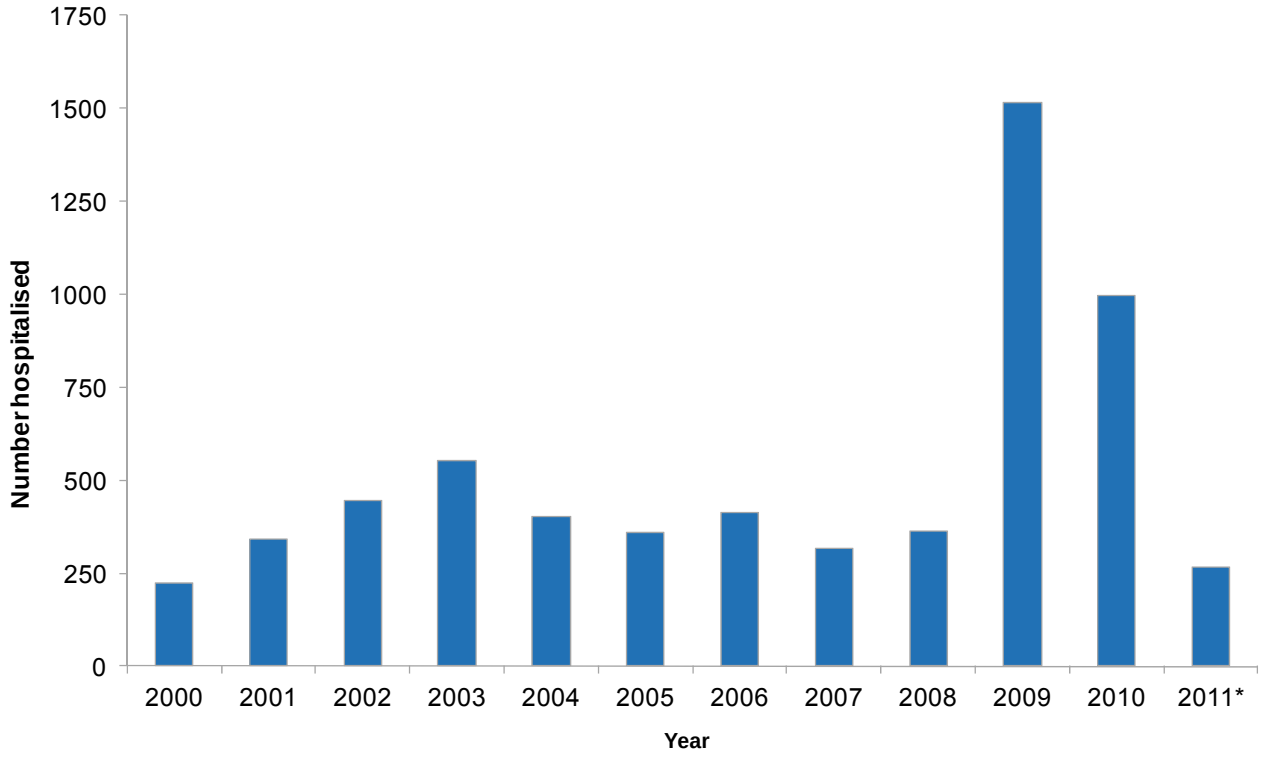
***data is only shown from week 18.**

2.1.4 ICD code based hospitalisation surveillance

Hospitalisation data for influenza (ICD-10AM-VI code I (J09-J11) for 2011 which correlate with previous versions of ICD-10AM codes J10-J11), were extracted from the New Zealand Ministry of Health's NMDS (by discharge date). In this dataset, people who received less than 1 day of hospital treatment in hospital emergency departments were excluded from any time series analysis of influenza hospitalisations during 2000–2011. Influenza-related hospitalisations were conservatively taken to include only those cases where influenza was the principal diagnosis. Repeat admissions were included, as infections with another influenza A subtype or B virus are possible.

From 1 January to 15 September 2011, there were a total of 268 hospitalisations for influenza (Figure 10). This is lower than the 1517 hospitalisations reported in 2009 and 998 reported in 2010. This was also lower than the 2008 and 2007 hospitalisations of 365 and 316, respectively.

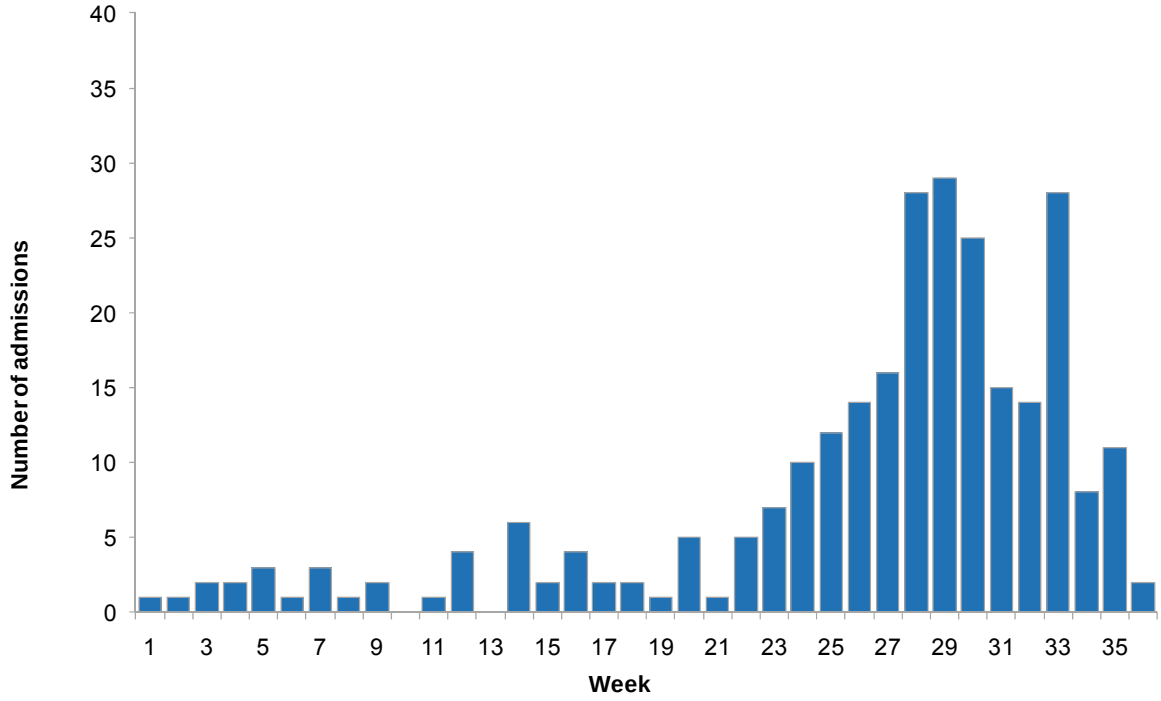
Figure 10 Influenza Hospitalisations, 2000–2011*



*Data from 1 Jan to 15 Sept 2011 only

Figure 11 shows influenza hospitalisations by week discharged. The highest number of hospitalisations (104) occurred in July. Hospitalisations peaked in weeks 29 and 33, which corresponds to the first and second peaks in virus detection for sentinel (weeks 31 & 34) and non-sentinel (weeks 30 & 33) surveillance and ESR's sentinel ILI consultations peaks (weeks 30 & 35).

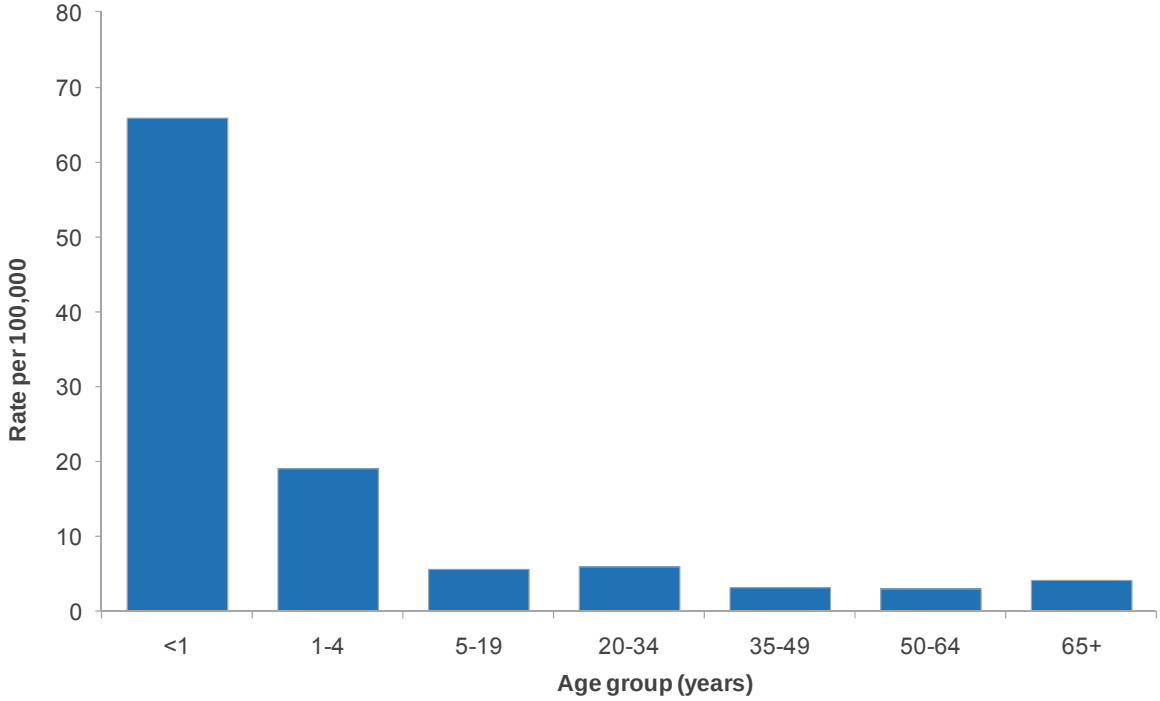
Figure 11. Influenza Hospitalisations by Week Discharged, 2011*



*Data from 1 Jan to 15 Sept 2011 only

During the study period, the highest influenza hospitalization rates were recorded among young children aged 0-4 years (Figure 12). Infants aged less than one year old had the highest influenza hospitalization rate (65.9 per 100 000 age group population), followed by persons aged 1-4 years (18.9), 20-34 years (6.0), 5-19 years (5.6), elderly ≥65 years (4.0), 35-49 years (3.2), 50–64 years and (3.0).

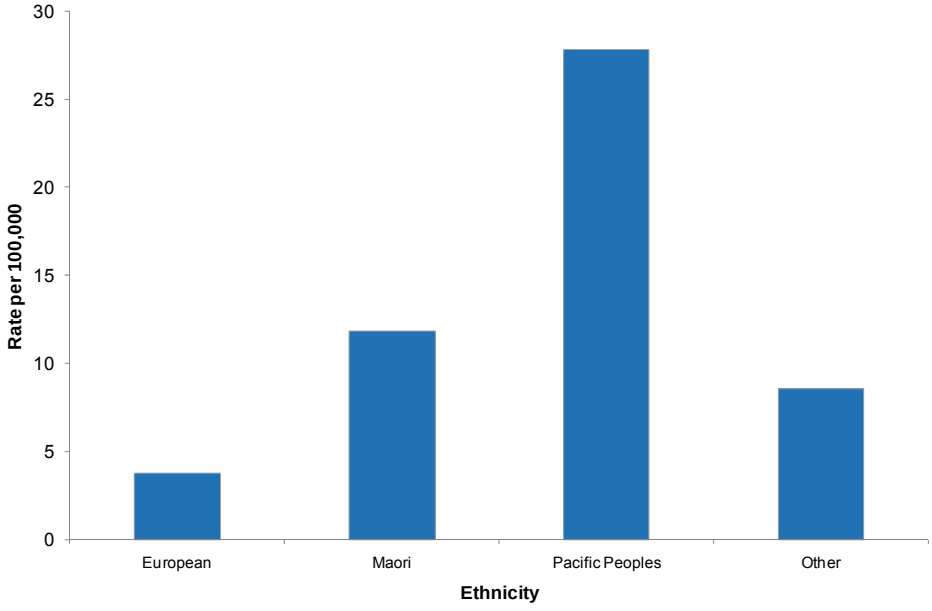
Figure 12: Influenza Hospitalisation Rates by Age Group, 2011*



*Data from 1 Jan to 15 Sept 2011 only

The ethnic distribution of influenza hospitalisations in 2011 is shown in Figure 13. Pacific ethnic group has the highest hospitalisation rate (27.8 per 100 000), followed by Maori (11.9), others (8.5) and European (3.8).

Figure 13: Hospitalisation Rates by Ethnicity (prioritised), 2011*



*Data from 1 Jan to 15 Sept 2011 only

2.1.5 Healthline

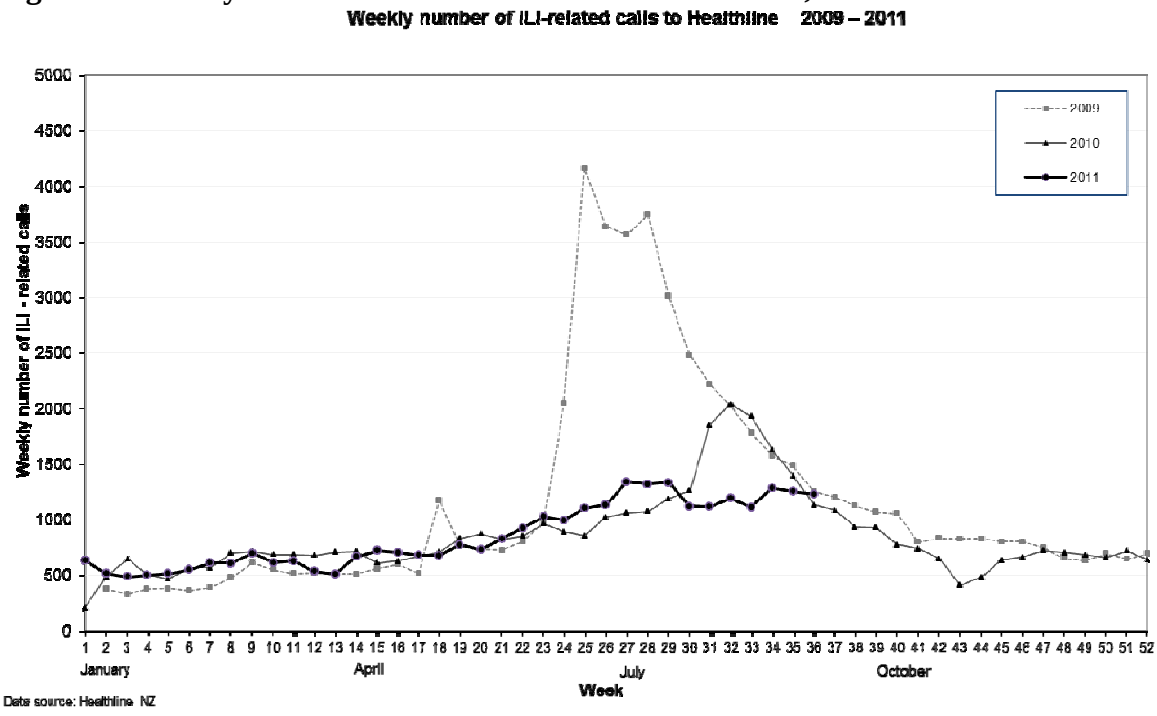
Healthline is the free national 0800 24 hour telephone health advice service funded by the Ministry of Health. Calls made to Healthline are triaged using electronic clinical decision support software. Data collected are daily counts of all symptomatic calls made to Healthline and those triaged for Influenza-Like-Illness (ILI). Note that about 70% of all calls to Healthline are symptomatic (other calls not part of this analysis include queries for information etc).

Analysis is frequency based with alarms raised by identifying statistical deviations (aberations) from previous calls. Data are reported for all ages and in five age bands (0–4, 5–14, 15–44, 45–64, 65+ years). The analysis of the call frequency is based on the cumulative summation (CUSUM) algorithm implemented in Early Aberration Reporting System (EARS) application developed by the Centres for Disease Control and Prevention (CDC), Atlanta, United States. EARS has three sensitivity thresholds (high, medium and low). If the daily call count exceeds a threshold a flag is signalled.

Cases of ILI are defined as those that are recorded in the Healthline database as having one of the following 18 guidelines: adult fever; breathing problems; breathing difficulty – severe (paediatric); colds (paediatric); cough (paediatric); cough – adult; fever (paediatric); flu-like symptoms or known/suspected influenza; flu like symptoms pregnant; influenza (paediatric); headache; headache (paediatric); muscle ache/pain; sore throat (paediatric); sore throat/hoarseness; sore throat/hoarseness pregnant; upper respiratory tract infections/colds; upper respiratory tract infections/colds – pregnant.

Figure 14 shows the weekly number of calls to Healthline for ILI during 2009, 2010 and 2011. Healthline calls in 2011 were lower than the previous two years. In 2011, Healthline calls had the first peak period in weeks 27-29, correlated with the first peak from the sentinel GP surveillance in week 30, the second peak in week 34, correlated with the second peak from the sentinel GP surveillance in week 35.

Figure 14 Weekly number of ILI-related calls to Healthline, 2009-2011

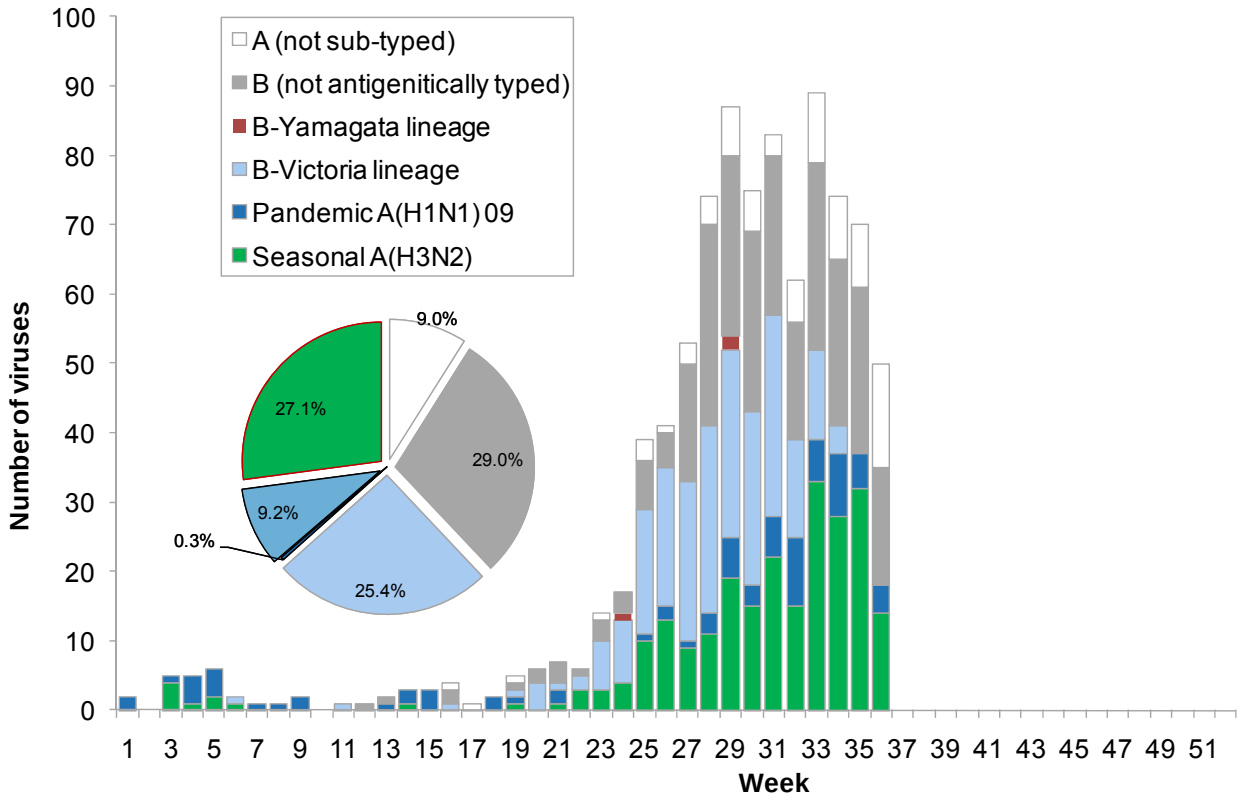


2.2 Recent Strain Characterisations in New Zealand

2.2.1 Circulating strains in 2011

A total of 893 influenza viruses were detected from sentinel and non-sentinel surveillance in 2011 from week 1 (the week ending 9 January 2011) to week 36 (September 5-11) (Figure 15). The predominant strain was influenza B (489) including 227 of B/Brisbane/60/2008 - like viruses and three B/Florida/4/2006 - like viruses, A(H3N2) (242) including 85 A/Perth/16/2009 (H3N2) - like viruses, influenza A(H1N1)pdm09(82) including 15 A/California/7/2009 (H1N1) - like viruses, and A (not sub-typed) (80).

Figure 15. Total influenza viruses by type and week specimen taken, 2011



The influenza virus detections by type and subtype for weeks 1 to 36, 2011 is shown in Table 1.

Table 2. Influenza viruses by type and subtype, 2011

Virus	All viruses n=893 (%)	Antigenically Typed/Subtyped n= 330 (%)
Influenza A		
Influenza A (not sub-typed) by PCR	80 (9.0)	
Influenza A(H1N1)pdm09		
Influenza A(H1N1)pdm09 by PCR	67 (7.5)	
A/California/7/2009 (H1N1)-like	15 (1.7)	15 (4.5)
Subtotal pandemic (H1N1) 09	**82 (9.2)**	
Seasonal Influenza A(H3N2)		
Influenza A subtype H3N2 by PCR	157 (17.6)	
A/Perth/16/2009 (H3N2) - like	85 (9.5)	85 (25.8)
Subtotal seasonal A(H3N2)	**242 (27.1)**	
Influenza B		
Influenza B by PCR	259 (29.0)	
B/Florida/4/2006 - like	3 (0.3)	3 (0.9)
B/Brisbane/60/2008 - like	227 (25.4)	227 (68.8)
Subtotal B	**489 (54.8)**	
Total	**893 (100)**	**330 (100)**

Overall, influenza B was the predominant strain among all influenza viruses. It represented 54.8% (489/893) of all viruses. B/Victoria lineage viruses (B/Brisbane/60/2008 – like strain) represented 68.8% (227/330) of all antigenically typed and subtyped viruses. B/Yamagata lineage viruses (B/Florida/4/2006 – like strain) represented 0.9% (3/330) of all antigenically typed and subtyped viruses.

Seasonal influenza A(H3N2) viruses represented 27.1% (242/893) of all viruses. A/Perth/16/2009 viruses represented 25.8% (85/330) of all antigenically typed and subtyped viruses.

A small proportion of influenza A(H1N1)pdm09 viruses (82) were detected, 9.2% (82/893) of all viruses. A/California/7/2009 viruses represented 4.5% (15/330) of all antigenically typed and subtyped viruses.

2.2.2 Predominant strains during 1990-2011

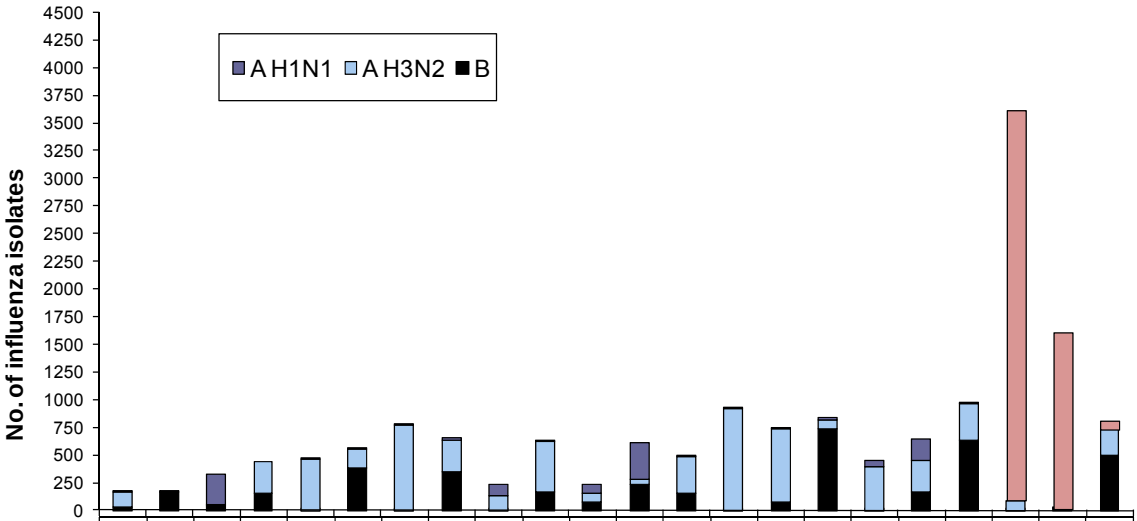
Overall, the patterns of the predominant strains during 1990-2011 are described below:

- Influenza A(H1N1)pdm09 strain has become the predominant strain in 2009 and 2010.
- Seasonal influenza A(H1N1) strain predominated in three seasons (1992, 2000 and 2001) with associated relatively low hospitalisations (193 in 1992, 228 in 2000 and 379 in 2001).
- Seasonal influenza A(H3N2) strain predominated for 11 seasons (1990, 1993, 1994, 1996, 1998, 1999, 2002, 2003, 2004, 2006, and 2007). A/Fujian/411/02 (H3N2)-like strain predominated in 2003 with the highest recorded hospitalistaions during 1990-2008. A/Wuhan/359/95 (H3N2)-like strain predominated in 1996 with associated 94 deaths (93 of these deaths were in people aged 65+).
- Influenza B strains predominated for six seasons (1991, 1995, 1997, 2005, 2008, and 2011). In 2005, the disease burden was high in children aged 5-19 years with associated deaths in 3 children.

- Since the introduction of the B-Victoria lineage viruses into New Zealand in 2002, this strain predominated over the B/Yamagata lineage viruses in every three years in New Zealand (2002, 2005, 2008 and 2011).

Figure 16 shows the number and percentage of typed and subtyped (not including A not subtyped) influenza viruses from 1990 to 2011.

Figure 16. Influenza viruses by type and subtypes, 1990-2011

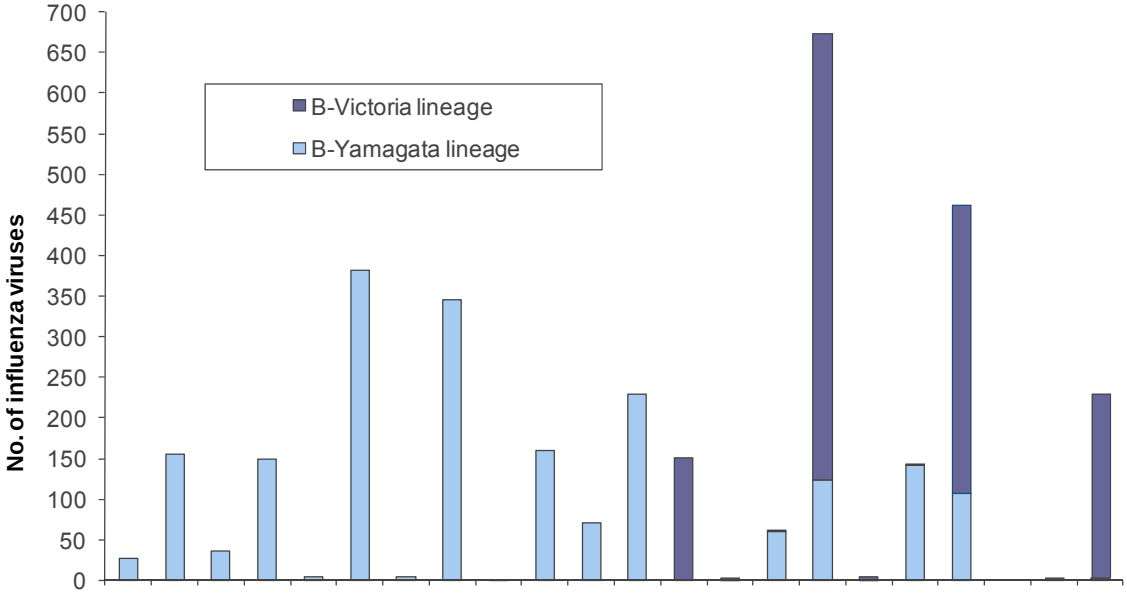


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
B	16%	92%	11%	34%	1%	69%	1%	53%	1%	26%	31%	38%	32%	0%	10%	88%	1%	25%	79%	0%	1%	60%
A H3N2	83%	0%	3%	66%	99%	30%	99%	43%	52%	74%	33%	8%	68%	100%	90%	10%	86%	44%	41%	2%	0%	30%
A H1N1	1%	8%	86%	0%	0%	1%	0%	4%	47%	0%	36%	54%	0%	0%	0%	2%	13%	31%	1%	98%	99%	10%

*2009-2011 A H1N1 is influenza A(H1N1)pdm09

Figure 17 shows the number and percentage of all antigenically typed B viruses from 1990 to 2011. Since the introduction of the B-Victoria lineage viruses into New Zealand in 2002, this strain predominated over the B/Yamagata lineage viruses in every three years in New Zealand in 2002, 2005, 2008 and 2011.

Figure 17. Influenza B antigenic types, 1990-2011



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
B-Victoria lineage	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	32%	0%	2%	82%	60%	1%	77%	0%	100%	99%
B-Yamagata lineage	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	0%	98%	18%	40%	99%	23%	0%	0%	1%

2.2.3 Influenza (H1N1)pdm09

Representative influenza (H1N1)pdm09 isolates (15) were antigenically subtyped at the WHO National Influenza Centre at ESR using sheep/rabbit antisera supplied by the WHO Collaborating Centre (WHOCC) in Melbourne. Some of these isolates were also sent to WHOCC-Melbourne. Results indicated that New Zealand isolates were antigenically closely related to the influenza (H1N1)pdm09 reference strain A/California/7/2009 (H1N1).

Figure 18 shows the results of the genetic analysis of the hemagglutinatin (HA) gene of the representative influenza (H1N1)pdm09 isolates. The New Zealand isolates were closely related to the reference virus A/California/7/2009 (H1N1).

2.2.4 Seasonal influenza A(H1N1)

No seasonal influenza A(H1N1) was detected in 2011.

2.2.5 Seasonal influenza A(H3N2)

Representative seasonal influenza A(H3N2) isolates (82) were antigenically subtyped at the WHO National Influenza Centre at ESR using HAI typing kit supplied by the WHO Collaborating Centre (WHOCC) in Melbourne. Some of these isolates were also sent to WHOCC-Melbourne. Results indicated that New Zealand isolates were antigenically related to the reference strain A/Perth/16/2009 (H3N2) with low reactor identified. The results of the genetic analysis of the hemagglutinatin (HA) gene of the representative viruses are shown in Figure 19.

2.2.6 Influenza B

Representative seasonal influenza B/Victoria lineage isolates (B/Brisbane/60/2008 – like) (227) and B/Yamagata lineage isolates (B/Florida/4/2006-like) (3) isolates were antigenically typed at the WHO National Influenza Centre at ESR using HAI typing kit supplied by the WHO Collaborating Centre (WHOCC) in Melbourne. Some of these isolates were also sent to WHOCC-Melbourne.

Results indicated that New Zealand isolates were antigenically related to the reference strain B/Brisbane/60/2008, and B/Florida/4/2006 –like viruses. The results of the genetic analysis of the hemagglutinatin (HA) gene of the representative viruses are shown in Figure 20.

Figure 18. Phylogenetic analysis of HA gene sequence of influenza A(H1N1)pdm09 viruses

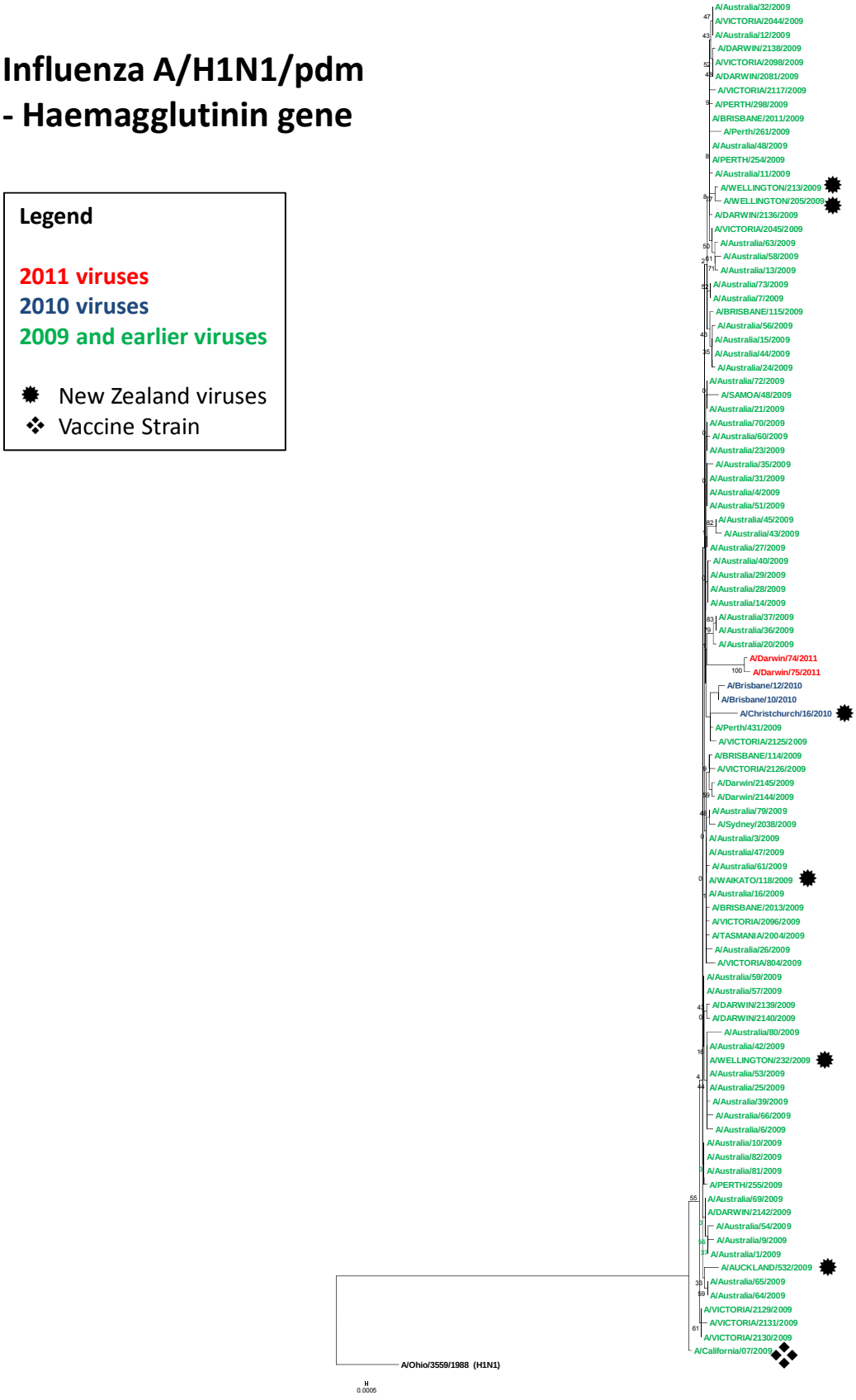


Figure 19. Phylogenetic analysis of HA gene sequence of A(H3N2) viruses

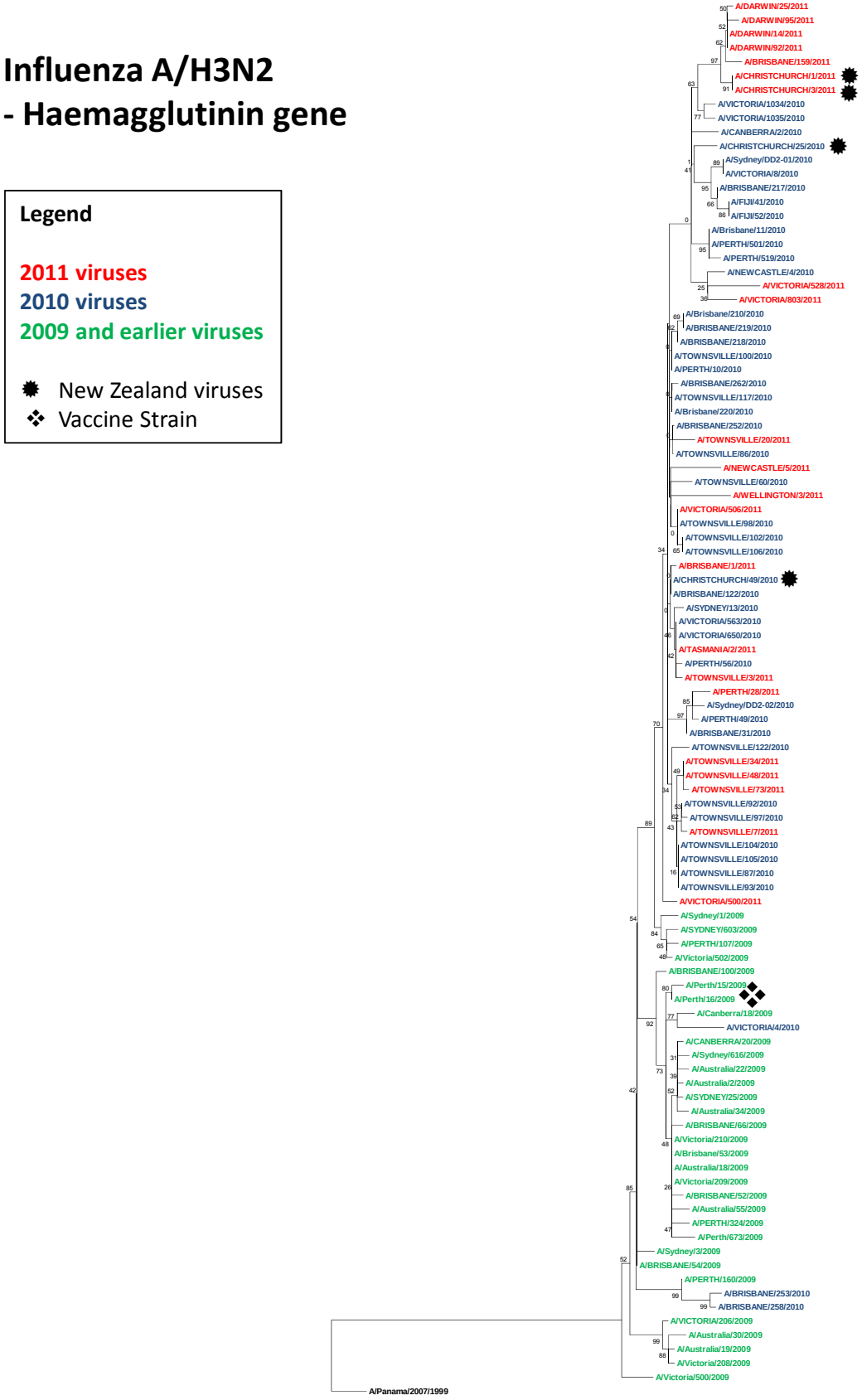
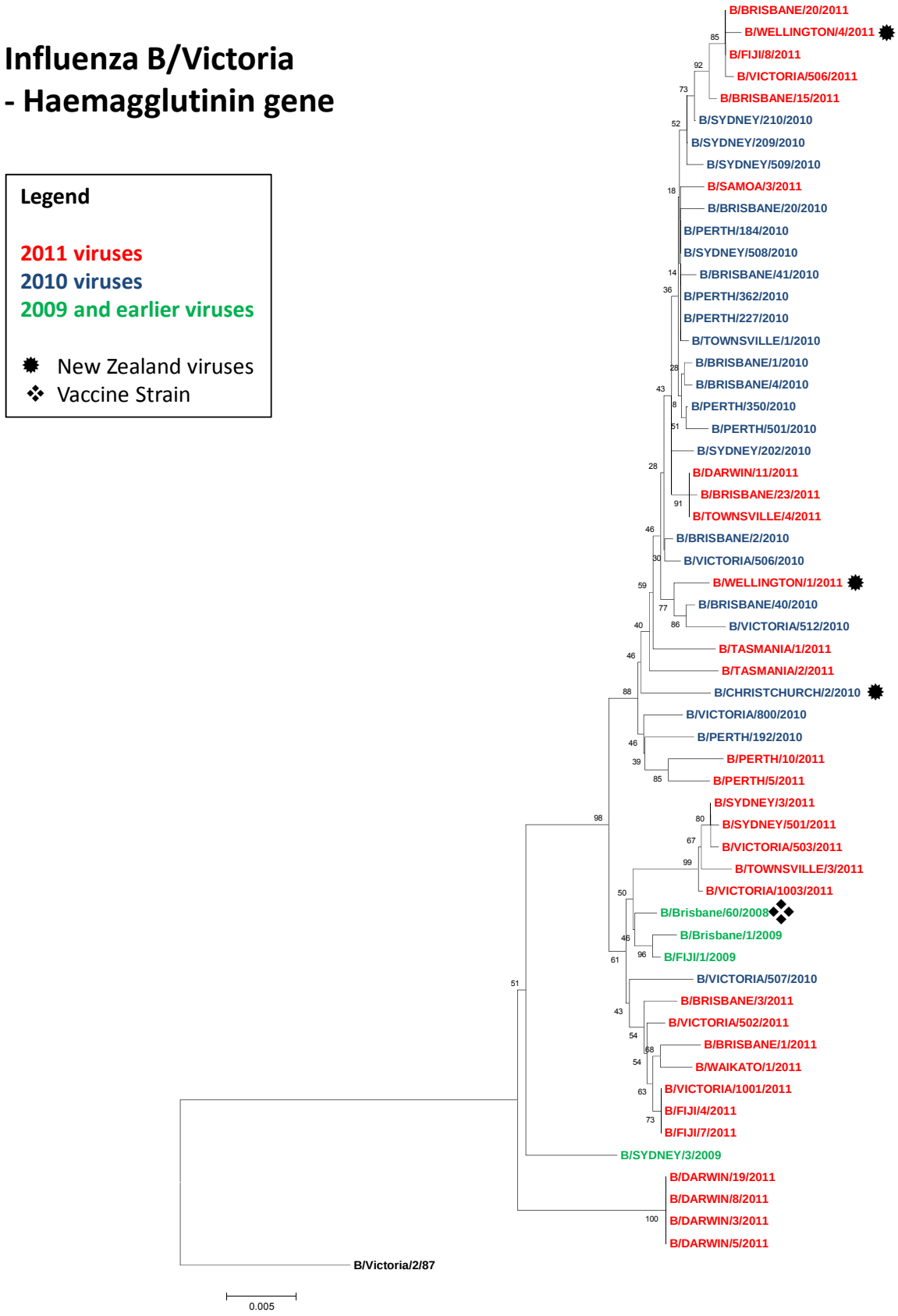


Figure 20. Phylogenetic analysis of HA gene sequence of B/Victoria lineage viruses



2.2.7 Oseltamivir resistance

The WHO National Influenza Centre at ESR employed a phenotypic method (fluorometric neuraminidase inhibition assay) for the surveillance of anti-viral drug resistance in influenza viruses. In addition, NIC at ESR employed a molecular method (PCR and sequencing) to monitor the H275Y mutation (histidine-to-tyrosine mutation at the codon of 275 in N1 numbering) which is known to confer resistance to oseltamivir.

In 2011, fluorometric neuraminidase inhibition assay was used to test a total of 261 influenza viruses. All viruses were sensitive to oseltamivir with mean IC50 values for A(H1N1)pdm at 0.54 nM, A(H3N2) at 0.46 nM and B at 31.9 nM (Table 2).

During 2006-2007, all influenza A(H1N1) viruses tested were sensitive to oseltamivir. In 2008, only six seasonal A(H1N1) viruses (0.8%) were detected, of which, only four were available for antiviral susceptibility testing and were all resistant to oseltamivir. The results of the fluorometric neuraminidase inhibition assay indicated that the four viruses had highly reduced sensitivity to oseltamivir with IC50 values in the range of 500-1700 nM, typical of the recent globally emerging oseltamivir-resistant A(H1N1) viruses. Genetic analysis of the neuraminidase gene confirmed that the four viruses had the H275Y mutation (histidine-to-tyrosine at codon 275 in N1 nomenclature), conferring resistance to oseltamivir. None of the patients or their close contacts had received Tamiflu prior to sample collection. In 2009, 25 seasonal A(H1N1) virus were phenotypically tested and all were resistant to oseltamivir. However, all A(H1N1)pdm09 viruses tested between 2009-2011 were were sensitive to oseltamivir.

Table 3. Antiviral susceptibility to oseltamivir for influenza viruses in New Zealand, 2006-2011

Influenza type / subtype		Year					
		2006	2007	2008	2009	2010	2011
Influenza B	Number of Isolates Tested	1	132	306	-	1	179
	Mean IC50 (nM)	-	37.5	26.5	-	-	31.9
	Standard Deviation (nM)	-	22.5	16.9	-	-	15.3
	Minimum IC50 (nM)	-	0.90	0.22	-	-	4.12
	Maximum IC50 (nM)	-	97.4	87.8	-	-	71.3
Influenza A/H3N2	Number of Isolates Tested	189	45	120	-	1	70
	Mean IC50 (nM)	0.70	0.38	0.28	-	-	0.46
	Standard Deviation (nM)	0.27	0.26	0.17	-	-	0.27
	Minimum IC50 (nM)	0.06	0.07	0.01	-	-	0.06
	Maximum IC50 (nM)	1.40	1.13	1.08	-	-	1.50
Seasonal Influenza A/H1N1	Number of Isolates Tested	18	136	4	25	-	-
	Mean IC50 (nM)	1.26	0.81	768	1385	-	-
	Standard Deviation (nM)	0.89	0.64	287	1996	-	-
	Minimum IC50 (nM)	0.20	0.05	573	305	-	-
	Maximum IC50 (nM)	3.00	2.70	1184	7912	-	-
Influenza A(H1N1)pdm09	Number of Isolates Tested	-	-	-	483	334	12
	Mean IC50 (nM)	-	-	-	0.40	0.68	0.54
	Standard Deviation (nM)	-	-	-	0.24	0.41	0.24
	Minimum IC50 (nM)	-	-	-	0.09	0.01	0.19

*IC50; inhibitory concentration of the drug at which a 50% reduction in enzymatic activity is observed.

2.3 Conclusions

Influenza activity during the 2011 New Zealand winter was at a low level compared to that of the past 20 years of surveillance. When the 2011 sentinel ILI consultation data were compared to the 1992-2011 data, the 2011 cumulative incidence rate of 734.2 per 100 000 was the 4th lowest. The 2011 peak consultation rate of 66.1 per 100 000 was the 2nd lowest. In addition, the 2011 influenza hospitalisations (268, 6.1 per 100 000) was the 6th lowest recorded over the period of 1992-2011.

The 2011 influenza activity started late in the winter season. It peaked in week 30 (25-31 July 2011) with another peak in week 35 (29 August- 4 September 2011). Again, the influenza activity in 2011 had uneven geographical distribution. Children (0-19 years) and young adults (20-34 years) had a higher disease burden compared to other age groups.

Influenza B was the predominant strain among all influenza viruses. It represented 54.8% (489/893) of all viruses. Influenza B/Victoria lineage virus was the predominant strain (227), overtaking B/Yamagata lineage viruses (3). Since the introduction of the B-Victoria lineage viruses

into New Zealand in 2002, this strain predominated over the B/Yamagata lineage viruses in every three years in New Zealand in 2002, 2005, 2008 and 2011.

Seasonal influenza A(H3N2) viruses represented 27.1% (242/893) of all viruses, including 85 of A/Perth/16/2009 viruses. A small proportion of influenza A(H1N1)pdm09 viruses were detected, 9.2% (82/893) of all viruses, including 15 of A/California/7/2009 viruses. All circulating influenza viruses were antigenically related to the 2011 vaccine strains.

3. RECENT STRAIN CHARACTERISATION AND LIKELY VACCINE CANDIDATES

3.1 Influenza A(H1N1)pdm09

The influenza A(H1N1)pdm09 virus was first detected in April 2009 in the United States and was responsible for outbreaks in Mexico in March and April 2009. Outbreaks subsequently occurred in all regions of the world and, by July 2009, influenza A(H1N1)pdm09 was the predominant influenza virus circulating in many countries in the Americas, Asia, Europe and Oceania.

During the 2011 influenza season, 1161 A(H1N1)pdm09 viruses were received at the Melbourne WHOCC from 13 countries with most coming from Australia and New Zealand. The virology laboratories in New Zealand use the kit supplied by the Melbourne WHOCC to analyse influenza A(H1N1)pdm09 strains. The antiserum used for antigenica typing was the rabbit/sheep antisera raised against A/California/7/2009-like strain. A total of 82 influenza A(H1N1)pdm09 viruses were detected in New Zealand in 2011, of which 15 had undergone antigenic typing and they were all antigenically closely related to A/California/7/2009-like strain.

Among all influenza A(H1N1)pdm09 viruses analysed at the Melbourne WHOCC, most of viruses reacted well with ferret sera to A/California/7/2009 with 19.9% of A(H1N1)pdm09 viruses being classified as low reactors (≥8 fold reduction compared to the homologous titre) (Tables 3.3, 3.4 and 3.5 in Appendix 3). In addition, a total of 184 influenza A(H1N1)pdm09 viruses were sequenced in the haemagglutinin gene. The sequence analysis indicated that there was genetic diversity evident in most of the viruses isolated during 2011 with two major sub-clades designated group 7 and group 6 (CDC designations, Figure 3.2 in Appendix 3). All Newcastle H275Y viruses grouped together in a single clade within group 7. The neuraminidase (N1) genes of the A(H1N1)pdm09 viruses were also sequenced, resulting in groups similar to their HA grouping (Figure 3.3 in Appendix 3). Furthermore, vaccines containing influenza A/California/7/2009-like antigen stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and recent influenza A(H1N1)pdm09 isolates. (WER 86(42), and Tables 3.9 & 3.10 & 3.11 in Appendix 3).

In summary, influenza A(H1N1)pdm09 viruses became the predominant circulating strain in southern hemisphere countries. HI tests showed that most isolates were antigenically similar to A/California/7/2009-like strain. Current vaccines containing A/California/7/2009 antigen stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and recent A(H1N1) influenza isolates. Based on all of the epidemiological, antigenic, genetic and serological data, the WHO consultation recommended vaccines containing a A/California/7/2009 (H1N1)–like strain. The AIVC accepted this recommendation.

3.2 Seasonal influenza A(H1N1)

No seasonal influenza A(H1N1) viruses was globally during 2011.

3.3 Seasonal influenza A(H3N2)

Influenza A(H3N2) has frequently been associated with severe disease and excess mortality in high-risk groups. This subtype has also shown the greatest tendency for antigenic drift as illustrated by the frequency of vaccine formulation changes recommended by the WHO and AIVC (Table 1).

The Melbourne WHOCC has analysed 423 A(H3N2) isolates from eight countries during this period. These viruses made up 15.1% of all viruses analysed at the Melbourne WHOCC. Virtually

all (99%) of the influenza A(H3N2) viruses were recognised by ferret sera raised against A/Perth/16/2009-like viruses with few viruses showing reduced reactivity (Tables 5.3 and 5.4 in Appendix 4). In addition, HA gene phylogenetic analysis of the influenza A(H3N2) viruses (76) sequenced showed that most viruses were A/Victoria/208/2009-like. Recent viruses fell into three main groups (CDC designations, Figure 5.2 in Appendix 4) designated as groups 3, 5, and 6 with the more recent viruses falling into groups 3 & 6. Group 3 had an A198S and V223I with a number of the smaller clades with additional amino acid changes. The most recent viruses from group 6 had an I217V change. Sequence analysis of the N2 NA gene analysed in 2011 showed that the most recent viruses grouped in a similar manner as their HA genes with the majority falling into different A/Victoria/208/2009 groups (Figure 5.3 in Appendix 4). Furthermore, vaccines containing influenza A/Perth/16/2009 (H3N2)-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and to recent A(H3N2) isolates. Similar results were obtained in microneutralisation tests for a subset of sera and viruses (WER 86(42), and Tables 5.12 and 5.13 in Appendix 4).

In summary, influenza A(H3N2) viruses were associated with widespread outbreaks in many southern hemisphere countries. Most isolates were antigenically similar to A/Perth/16/2009-like strain. Current vaccines containing the A/Perth/16/2009 antigen stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and to recent A(H3N2) isolates. Based on all of the epidemiological, antigenic, genetic and serological data, the WHO Consultative Group recommended the H3 component of the vaccines containing an A/Perth/16/2009 (H3N2)-like strain. AIVC accepted this recommendation.

3.4 Influenza B

Two distinct lines of influenza B have co-circulated in many countries during recent years. This dates from the late 1980's when the B/Panama/45/90 variant of influenza B was first observed. This strain and its further variants of the Yamagata/16/88 lineage (most recently representative strain-B/Florida/4/2006) spread worldwide, whereas strains of the previous B/Victoria/2/87-like viruses continued to circulate in Asia and subsequently underwent independent evolution as an antigenically distinct lineage (most recent representative strain-B/Brisbane/60/2008). For reasons not wholly understood, these remained geographically restricted to Asia until 2001. In 2002 the B/Victoria/2/87 lineage viruses were the predominant viruses worldwide.

Both recent B/Victoria-like strains (B/Brisbane/60/2008 is the current reference strain) and B/Yamagata-like strains (B/Florida/4/2006 is the current reference strain) continued to be isolated worldwide in 2011. Varying proportions of the two lineages were seen in many countries with mainly B/Victoria-like lineage strains circulating in southern hemisphere countries. A total of 489 influenza B viruses were detected in New Zealand in 2011, of which 227 as the B/Victoria lineage and 3 as the B/Yamagata lineage.

Nine hundred and ninty-two influenza B isolates were received in 2011 by the Melbourne WHOCC from 13 countries (35.4% of total isolates). The majority of isolates (95.2%) were typed as B/Victoria lineage with the majority of these viruses (95.8%) reacting well with ferret sera raised against egg grown B/Brisbane/60/2008 - like viruses of this lineage. Only 1.7% of B viruses were of the B/Yamagata lineage and were generally poorly reactive with ferret sera to egg derived B/Florida/4/2006 virus; they reacted somewhat better with ferret antisera against B/Bangladesh/3333/2007, B/Wisconsin/1/2010 or B/hubei-Wujiagang/158/2009 viruses. HI assays in Tables 6.2, 6.3, and 6.4 (Appendix 5) were performed at the Melbourne WHOCC. In addition, sequence analysis of the HA1 gene of recent isolates showed that recent isolates fell into one of the two major lineages of B viruses (B/Victoria/2/87 or B/Yamagata/16/88) consistent with their antigenic typing. The B/Victoria lineage viruses mostly grouped in the B/Brisbane/60/2008 group

with signature amino acid changes at S172P, N75K, N165K, V146I, with a smaller number of viruses grouping with the older B/Malaysia/2506/2004-like viruses with a T37I substitution. Very few viruses were available for sequencing from the B/Yamagata lineage and most fell into B/Bangladesh/3333/2007-like group (Group 3) with a S150I change along with more recent reference viruses such as B/Wisconsin/1/2010 (Figures 6.3, 6.4 and 6.5 in Appendix 5). All of the B viruses analysed in 2011 had NA sequences that were of the B/Yamagata lineage but can still be sub-divided into two groups that were similar to either the B/Florida/4/2006 or B/Bangladesh/3333/2007, or to the B/Malaysia/2506/2004 and B/Brisbane/60/2008 groups. Some evidence of recombination of NA genes was present in the B/Brisbane/60/2008 clade 1 viruses (Figure 6.5 in Appendix 5). Furthermore, vaccines containing influenza B/Brisbane/60/2008-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and to recent B/Victoria-lineage isolates. However, geometric mean HI titres were somewhat lower to recent B/Yamagata/16/88 lineage viruses than to the most recent B/Victoria/2/87 lineage vaccine virus (average reductions: adults, 63%; elderly adults, 60%; children, 83%) (WER 86(42), Tables 5.7 to 5.9 in Appendix 5).

In summary, influenza B outbreaks were reported in southern hemisphere countries. Most recent isolates were antigenically and genetically similar to B/Brisbane/60/2008 (B/Victoria/2/87 lineage). Current vaccines containing B/Brisbane/60/2008 antigen stimulated HA antibodies that were similar in titre to recently isolated B/Brisbane/60/2008– like viruses. Based on all of epidemiological, antigenic, genetic and serological data, the WHO consultation recommended the B component of the vaccines containing a B/Brisbane/60/2008–like strain. The AIVC accepted this recommendation.

4. SUMMARY OF VACCINE COMPOSITION RECOMMENDATION

It is recommended that the influenza vaccine formulation for New Zealand for 2011 is:

- A(H1N1) an A/California/7/2009 (H1N1) - like virus*
- A(H3N2) an A/Perth/16/2009 (H3N2) - like virus
- B a B/Brisbane/60/2008 - like virus

* Note: A/California/7/2009 is an influenza A(H1N1)pdm09 virus.

4.1 Explanation of "like" strains suitable for inclusion in vaccine

In the past, some strains of influenza recommended for inclusion in the vaccine formulation have been unsuitable vaccine candidates due to their poor growth potential with resulting low yields or poor serological responses in vaccinees. Under the "like" strain concession in the vaccine recommendation, an antigenically similar strain can be substituted which has the qualities that are lacking in the prototype strain.

The AIVC considered the information about international surveillance by WHO, recent data from Australia, New Zealand, South Africa and Argentina on influenza epidemiology and virus strain characterisation, and the recommendations of the WHO annual consultation on the composition of influenza vaccine for the southern hemisphere, held in Geneva on 26-28 September 2011.

The AIVC agreed to adopt the September 2011 WHO recommendations. The influenza vaccine components for year 2012 season should contain the following:

A (H1N1):	an A/California/7/2009 (H1N1) - like strain,	15 µg HA per dose
A (H3N2):	an A/Perth/16/2009 (H3N2) - like strain,	15 µg HA per dose
B:	a B/Brisbane/60/2008 - like strain,	15 µg HA per dose

The following available reassortants or viruses are recommended as suitable vaccine strains:

- A(H1N1)pdm09:
  - NYMC X-179A egg or cell, NYMC X-181, NYMC X-181A, NIBRG-121, NIBRG-121xp reassortants derived from A/California/7/2009.
  - NIBRG-122 reassortant derived from A/England/195/2009.
  - IVR-158 reassortant derived from A/Brisbane/10/2010.
- A(H3N2):
  - A/Wisconsin/15/2009 and A/Victoria/210/2009 (these are A/Perth/16/2009-like viruses)
  - NYMC X-183 reassortant derived from A/Wisconsin/15/2009;
  - NYMC X-187, NIB-65, IVR-155 reassortants derived from A/Victoria/210/2009
- B:
  - B/Brisbane/60/2008; NYMC BX-31, NYMC BX-35, NIB-65 reassortants derived from B/Brisbane/60/2008;
  - B/Brisbane/33/2008.

APPENDIX 1 - Composition of the Australian Influenza Vaccine Committee 2011

Australian Influenza Vaccine Committee 2011

The Australia Influenza Vaccine Committee (AIVC) meeting was convened at 3:00 pm on 5 October 2011 in Conference Room, Victoria Infectious Disease Reference Laboratory (VIDRL), Melbourne when overseas participants in the teleconference were connected by Telstra. The New Zealand representative attended the meeting in person.

Chairperson: Dr Gary Grohmann, TGAL, TGA
Secretary: Dr Tania Dalla Pozza, OLSS, TGA

Committee Members:

1. Mr Chris Rolls, OLSS, TGA
2. Dr Ian Barr, WHOCC
3. Dr Mike Catton, VIDRL
4. Prof Dominic Dwyer, ICPMR
5. Prof Ian Gust, University of Melbourne
6. Dr Alan Hampson, Interflu Pty Ltd
7. Dr Sue Huang, CDI, ESR, NZ
8. Assoc Prof Heath Kelly, VIDRL
9. Prof Anne Kelso, WHOCC
10. Kate Pennington, DoHA
11. *Prof Barry Schoub, NICD, SA
12. Dr David Smith, UWA
13. *Emeritus Prof Greg Tannock, Macfarlane Burnet Institute
14. Dr Tania Dalla Pozza, OLSS, TGA (Secretary)

Observers:

1. *Dr Florette Treurnicht, NICD, SA
2. Mr Tony Wilson-Williams, Abbott
3. *Ms Sze Sze Wong, Baxter Healthcare Pty Ltd
4. Mr Vincent Chung, CSL Ltd
5. Mr Bill Cracknell, CSL Ltd
6. Mr Peter Schoofs, CSL Ltd
7. Ms Nicole Schaefer, CSL Ltd
8. Mr Jonah Smith, CSL Ltd
9. Mrs Christine Wadey, CSL Ltd
10. Ms Reshma Ajinka, GlaxoSmithKline Australia Pty Ltd
11. Ms Louise Carter, GlaxoSmithKline Australia Pty Ltd
12. Dr Mandy Cooke, GlaxoSmithKline Australia Pty Ltd
13. Dr Neil Formica, GlaxoSmithKline Australia Pty Ltd
14. Ms Katerina Karanikolopoulos, GlaxoSmithKline Australia Pty Ltd
15. *Gabrielle Bodle, Novartis Vaccines and Diagnostics
16. *John Fox, NovartisVaccines and Diagnostics
17. 13. Dr Cheryl Keech, GlaxoSmithKline Australia Pty Ltd
18. 14. Ms Alicia Ham, Sanofi Pasteur
19. 15. Dr Glen Mason, Sanofi Pasteur
20. 16. Dr Nadim Naser, Sanofi Pasteur

*Participating by teleconference

APPENDIX 2 - Isolates Received For Analysis at the Australian WHO Collaborating Centre

TABLE 2.1
Influenza Viruses Analysed at the Melbourne WHO CC
1 March – 30 September 2011

Country	A(H1N1)pdm09	A(H3N2)	A (untyped)	B	TOTAL
Australia	928 (44.7%)	312 (15.1%)	173 (8.3%)	661 (31.9%)	2074
Brunei	69 (83.1%)	0	14 (16.9%)	0	83
Cambodia	4 (13.8%)	0	0	25 (86.2%)	29
Fiji	6 (27.3%)	0	0	16 (72.7%)	22
Hong Kong	0	0	4 (100%)	0	4
Macau	26 (35.1%)	5 (6.8%)	0	43 (58.1%)	74
Malaysia	6 (66.7%)	1 (11.1%)	0	2 (22.2%)	9
Nauru	0	0	3 (23.1%)	10 (76.9%)	13
New Caledonia	6 (46.1%)	7 (53.9%)	0	0	13
New Zealand	25 (10.2%)	60 (24.5%)	1 (0.4%)	159 (64.9%)	245
Papua New Guinea	0	0	0	7 (100%)	7
Philippines	56 (61.5%)	3 (3.3%)	17 (18.8%)	15 (16.4%)	91
Singapore	15 (35.7%)	15 (35.7%)	0	12 (28.6%)	42
Solomon Islands	1 (25%)	0	2 (50%)	1 (25%)	4
Sri Lanka	5 (20%)	0	10 (40%)	10 (40%)	25
Thailand	14 (21.5%)	20 (30.8%)	0	31 (47.7%)	65
Total	**1161**	**423**	**224**	**992**	**2800**
%	**41.5**	**15.1**	**8.0**	**35.4**	

APPENDIX 3 - Influenza A (H1N1)pdm09

Table 3.3

Date: September 7, 2011 Part A & B		Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne													
		Reference Antisera													
	Sequenced	A	B	C	D	E	F	G	H	I	J				
	Turkey RBC	F1656	FS5	F1616	F1614	F1620	F1686	F1704	F1860	F1857	F1903	MAB	Human	Passage	Sample
	Reference Antigens	CAL/7	AUCK/1	PHIL/344	ILLIN/9	BAY/69	BRIS/10	CHCH/16	PER/198	VIC/918	BRIS/70	175	Pool	History	Date
A	A/CALIFORNIA/7/2009	**1280**	320	320	640	640	1280	640	1280	2560	2560	>10240	320	E4	
B	A/AUCKLAND/1/2009	2560	**1280**	320	640	640	640	160	640	1280	1280	2560	160	E3	
C	A/PHILIPPINES/344/2004	640	160	**640**	320	160	640	320	640	640	1280	<80	80	MDCK8	
D	A/ILLINOIS/9/2007	640	320	320	**640**	320	640	320	640	1280	1280	5120	80	C2/MDCK5	
E	A/BAYERN/69/2009	<80	40	<40	<40	**320**	160	80	80	80	320	2560	320	MDCK8	
F	A/BRISBANE/10/2010	640	160	160	320	640	**5120**	2560	640	1280	1280	5120	640	E2	
G	A/CHRISTCHURCH/16/2010	1280	320	320	640	640	>10240	**>5120**	1280	2560	2560	5120	640	E3	
H	A/PERTH/198/2010	640	320	160	320	640	1280	640	**1280**	1280	1280	2560	320	E4	
I	A/VICTORIA/918/2010	1280	320	320	640	320	1280	640	1280	**2560**	2560	5120	320	MDCK2	
J	A/BRISBANE/70/2011	1280	320	320	640	640	1280	1280	1280	2560	**2560**	>10240	640	E3	
	Test Antigens														
1	A/BRISBANE/190/2011	2560	640	640	1280	1280	2560	2560	2560	5120	>5120	2560	640	E3	14/06/2011
2	A/CANBERRA/10/2011	1280	320	320	640	640	1280	640	1280	2560	2560	5120	320	MDCK1	08/06/2011
3	A/MALAYSIA/517/2011	640	320	160	320	320	640	640	1280	1280	1280	2560	320	E2	06/04/2011
4	A/BRISBANE/283/2011	640	160	160	320	320	640	320	1280	1280	1280	1280	320	MDCK4	17/07/2011
5	A/SOUTH AUSTRALIA/140/2011	640	320	160	320	320	640	320	640	1280	1280	5120	320	MDCK2	14/08/2011
6	A/SOUTH AUSTRALIA/142/2011	640	160	160	320	320	640	320	640	1280	1280	5120	320	MDCK2	11/08/2011
7	A/SOUTH AUSTRALIA/150/2011	640	160	160	320	320	640	320	640	640	640	5120	320	MDCK2	13/08/2011
8	A/SOUTH AUSTRALIA/151/2011	640	160	160	320	320	640	320	640	1280	1280	5120	320	MDCK2	11/08/2011
9	A/BRISBANE/273/2011	640	320	320	320	640	1280	640	1280	2560	2560	1280	320	MDCK3	17/07/2011
10	A/CAMBODIA/8/2011	640	160	<40	160	640	1280	640	640	1280	1280	320	160	X1,MDCK1	01/06/2011
11	A/NEWCASTLE/194/2011	640	160	<40	160	320	640	320	640	1280	1280	2560	160	MDCK2	14/08/2011
12	A/SYDNEY/51/2011	640	160	160	320	320	640	320	640	1280	1280	2560	160	MDCKX,MDCK2	17/07/2011
13	A/SOUTH AUSTRALIA/167/2011	640	320	160	320	320	640	320	1280	1280	1280	5120	320	MDCK1	18/08/2011
14	A/NEWCASTLE/197/2011	640	160	160	320	320	640	320	640	1280	640	320	160	MDCK2	15/08/2011
15	A/NEWCASTLE/198/2011	640	320	160	320	320	640	320	640	1280	1280	2560	160	MDCK2	11/08/2011
16	A/SYDNEY/65/2011	640	160	160	320	320	640	320	640	1280	1280	2560	160	MDCKX,MDCK2	03/07/2011
17	A/SYDNEY/73/2011	640	160	40	160	320	640	320	640	1280	1280	1280	160	MDCKX,MDCK2	13/07/2011
18	A/SYDNEY/75/2011	640	160	160	320	320	640	320	640	1280	1280	5120	320	MDCKX,MDCK2	10/07/2011
19	A/BRISBANE/292/2011	320	160	<40	160	320	640	320	640	640	1280	2560	320	MDCK3	31/07/2011
20	A/BRISBANE/291/2011	320	160	<40	<40	320	640	320	640	640	640	<80	80	MDCK3	30/07/2011
21	A/BRISBANE/296/2011	320	160	160	320	320	640	320	640	1280	640	5120	320	MDCK3	03/08/2011
22	A/NEWCASTLE/199/2011	320	160	80	160	320	640	320	640	1280	640	2560	160	MDCK2	12/08/2011
23	A/MALAYSIA/478/2011	160	80	<40	40	1280	640	320	320	160	640	5120	640	E2	02/04/2011
24	A/TOWNSVILLE/107/2011	80	40	<40	<40	320	320	160	320	320	640	160	160	MDCK2	27/07/2011
25	A/BRISBANE/272/2011	80	80	<40	<40	320	320	160	160	160	320	160	160	MDCK3	17/07/2011
26	A/TOWNSVILLE/109/2011	80	40	<40	40	640	320	160	160	160	640	2560	640	MDCK3	23/07/2011
27	A/BRISBANE/277/2011	80	40	<40	40	640	320	160	320	160	640	640	160	MDCK3	21/07/2011
28	A/BRISBANE/294/2011	<80	40	<40	<40	640	160	160	80	160	320	5120	320	MDCK3	31/07/2011
29	A/BRISBANE/268/2011	<80	<40	<40	<40	160	<80	40	40	<80	40	640	160	MDCK4	06/07/2011
30	A/BRISBANE/275/2011	<80	<40	<40	<40	160	80	40	40	80	80	640	160	MDCK4	11/07/2011
31	A/CAMBODIA/10/2011	<80	40	<40	<40	320	80	80	80	80	160	1280	320	X1,MDCK1	08/06/2011
32	A/TOWNSVILLE/106/2011	<80	40	<40	<40	320	80	80	80	80	160	1280	320	MDCK3	14/07/2011

Table 3.4

Comp: August 24 & September 1, 2011		Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne													
	H275Y virus	Reference Antisera													
	Sequenced	A	B	C	D	E	F	G	H	I	J	K			
	Turkey RBC	F1656	FS5	F1616	F1614	F1615	F1620	F1686	F1704	F1860	F1857	F1903	MAB	Passage	Sample
	Reference Antigens	CAL/7	AUCK/1	PHIL/344	ILLIN/9	BRIS/2013	BAY/69	BRIS/10	C'CH/16	PER/198	VIC/918	BRIS/70	175	History	Date
A	A/CALIFORNIA/7/2009	**1280**	320	320	640	2560	640	1280	640	1280	1280	2560	>10240	E4	
B	A/AUCKLAND/1/2009	2560	**640**	640	1280	>5120	1280	2560	1280	2560	2560	>5120	>10240	E3	
C	A/PHILIPPINES/344/2004	1280	320	**640**	640	1280	160	640	640	1280	1280	2560	<80	MDCK7	
D	A/ILLINOIS/9/2007	1280	320	320	**1280**	2560	320	1280	640	1280	1280	2560	5120	C2/MDCK3	
E	A/BRISBANE/2013/2009	1280	640	320	640	**2560**	640	1280	640	2560	2560	1280	>10240	MDCK4	
F	A/BAYERN/69/2009	<80	<40	<40	<40	80	**640**	160	80	40	<40	160	2560	MDCK6	
G	A/BRISBANE/10/2010	640	160	160	320	1280	640	**5120**	2560	1280	640	640	2560	E2	
H	A/CHRISTCHURCH/16/2010	1280	320	320	640	2560	640	5120	**>5120**	1280	640	1280	5120	E3	
I	A/PERTH/198/2010	640	320	160	640	1280	640	1280	640	**1280**	640	1280	2560	E3	
J	A/VICTORIA/918/2010	2560	640	640	1280	2560	640	1280	1280	2560	**2560**	2560	>10240	MDCK2	
K	A/BRISBANE/70/2011	1280	320	320	640	2560	640	1280	1280	1280	1280	**1280**	5120	E4	
	Test Antigens														
1	A/TASMANIA/22/2011	2560	640	640	1280	2560	640	2560	1280	2560	2560	2560	>10240	MDCK1	13/07/2011
2	A/BRISBANE/141/2011	1280	640	320	640	2560	640	2560	1280	2560	1280	2560	>10240	E2	14/04/2011
3	A/VICTORIA/17/2011	1280	320	160	320	1280	640	1280	320	1280	640	2560	5120	MDCK3	25/07/2011
4	A/SOUTH AUSTRALIA/74/2011	1280	320	<40	160	1280	320	1280	640	1280	1280	2560	5120	MDCK2	02/08/2011
5	A/SOUTH AUSTRALIA/76/2011	1280	320	320	640	2560	640	2560	1280	2560	2560	2560	>10240	MDCK2	29/07/2011
6	A/VICTORIA/822/2011	1280	320	160	320	1280	320	1280	640	1280	1280	2560	5120	MDCK2	08/08/2011
7	A/TASMANIA/23/2011	1280	320	320	640	2560	640	1280	1280	1280	1280	2560	>10240	MDCK1	12/07/2011
8	A/TASMANIA/24/2011	1280	320	320	640	2560	640	1280	640	1280	1280	2560	>10240	MDCK1	13/07/2011
9	A/VICTORIA/552//2011	1280	320	320	640	2560	640	1280	1280	1280	1280	2560	>10240	MDCK1	05/08/2011
10	A/VICTORIA/553/2011	1280	320	320	640	640	640	1280	640	1280	1280	2560	5120	MDCK1	05/08/2011
11	A/SYDNEY/508/2011	1280	320	320	640	2560	640	1280	640	2560	1280	2560	5120	R-MIX MDCK1	23/06/2011
12	A/NEWCASTLE/182/2011	1280	320	320	1280	2560	640	2560	640	2560	2560	2560	>10240	mdck1	09/08/2011
13	A/NEWCASTLE/189/2011	1280	320	160	320	1280	320	640	640	1280	640	1280	5120	MCCK1	11/08/2011
14	A/SYDNEY/41/2011	640	160	160	320	640	320	320	320	640	320	1280	5120	MDCKX,MDCK1	02/07/2011
15	A/SOUTH AUSTRALIA/68/2011	640	160	160	320	1280	320	640	320	640	640	1280	5120	MDCK2	01/08/2011
16	A/SOUTH AUSTRALIA/84/2011	640	160	40	320	1280	320	640	640	1280	640	1280	1280	MDCK2	02/08/2011
17	A/NEWCASTLE/190/2011	640	160	160	320	640	320	640	320	640	1280	1280	2560	MDCK1	11/08/2011
18	A/NEWCASTLE/204/2011	640	160	160	320	640	320	640	320	640	1280	1280	2560	MDCK1	14/08/2011
19	A/NEWCASTLE/211/2011	640	160	160	320	1280	320	640	320	640	1280	1280	2560	MDCK1	02/08/2011
20	A/NEWCASTLE/215/2011	640	160	160	320	640	320	640	320	640	1280	1280	2560	MDCK1	02/08/2011
21	A/SYDNEY/72/2011	640	160	160	160	640	320	320	320	640	1280	640	2560	MDCKX,MDCK1	12/07/2011
22	A/BRISBANE/263/2011	640	320	160	320	1280	640	1280	640	1280	1280	1280	2560	MDCK4	05/07/2011
23	A/NEWCASTLE/216/2011	640	160	160	320	640	320	640	320	640	1280	640	1280	MDCK1	03/08/2011
24	A/SYDNEY/58/2011	640	320	160	320	1280	320	640	320	640	1280	1280	1280	MDCKX,MDCK1	11/08/2011
25	A/BRISBANE/279/2011	640	320	160	160	640	320	640	640	640	1280	1280	320	MDCK3	25/07/2011
26	A/TOWNSVILLE/105/2011	320	80	80	160	640	640	640	320	640	640	640	2560	MDCK4	29/06/2011
27	A/BRISBANE/266/2011	320	160	160	160	640	320	320	320	640	640	640	320	MDCK3	13/07/2011
28	A/SYDNEY/25/2011	160	80	<40	<40	320	640	640	320	640	160	1280	160	MDCKX,MDCK2	10/06/2011
29	A/SYDNEY/36/2011	160	40	<40	<40	320	640	640	160	320	160	640	5120	MDCKX,MDCK2	30/06/2011
30	A/TOWNSVILLE/104/2011	80	40	<40	<40	80	160	160	80	320	160	320	<80	MDCK4	28/06/2011
31	A/BRISBANE/265/2011	80	40	<40	40	160	640	320	160	320	160	320	640	MDCK2	17/07/2011
32	A/BRISBANE/278/2011	80	40	<40	40	320	640	320	160	320	160	640	320	MDCK2	31/07/2011
33	A/BRISBANE/280/2011	80	<40	<40	<40	160	320	160	160	160	160	320	320	MDCK3	28/07/2011
34	A/SYDNEY/17/2011	<80	<40	<40	<40	<40	320	<80	40	40	<40	<40	1280	MDCKX,MDCK2	17/05/2011

Table 3.5

	Date: August 29, 2011 Part A & B	Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne													
	H275Y viruses	Reference Antisera													
	Sequenced	A	B	C	D	E	F	G	H	I	J	K			
	Turkey RBC	F1656	FS5	F1616	F1614	F1615	F1620	F1686	F1704	F1860	F1857	F1903	MAB	Passage	Sample
	Reference Antigens	CAL/7	AUCK/1	PHIL/344	ILLIN/9	BRIS/2013	BAY/69	BRIS/10	C'CH/16	PER/198	VIC/918	BRIS/70	175	History	
A	A/CALIFORNIA/7/2009	**1280**	320	320	640	1280	640	1280	640	1280	2560	1280	2560	E4	
B	A/AUCKLAND/1/2009	2560	**1280**	640	1280	2560	1280	2560	2560	2560	5120	>5120	2560	E3	
C	A/PHILIPPINES/344/2004	1280	320	**640**	640	1280	320	640	640	1280	1280	1280	<80	MDCK8	
D	A/ILLINOIS/9/2007	640	320	320	**640**	1280	320	640	640	1280	1280	1280	2560	C2/MDCK5	
E	A/BRISBANE/2013/2009	1280	320	320	640	**1280**	640	1280	640	1280	2560	2560	2560	MDCK5	
F	A/BAYERN/69/2009	<80	40	<40	<40	160	**640**	160	80	160	80	160	1280	MDCK8	
G	A/BRISBANE/10/2010	640	320	320	320	1280	640	**5120**	2560	1280	1280	1280	2560	E2	
H	A/CHRISTCHURCH/16/2010	1280	320	320	640	640	1280	5120	**2560**	1280	2560	2560	2560	E3	
I	A/PERTH/198/2010	640	320	160	320	1280	640	1280	640	**1280**	1280	160	320	E4	
J	A/VICTORIA/918/2010	1280	640	640	1280	2560	1280	2560	1280	2560	**5120**	>5120	5120	MDCK2	
K	A/BRISBANE/70/2011	1280	320	640	640	1280	640	1280	1280	2560	2560	**2560**	5120	E4	
	Test Antigens														
1	A/TASMANIA/29/2011	2560	640	640	1280	2560	640	2560	1280	2560	5120	2560	>10240	MDCK2	26/07/2011
2	A/VICTORIA/821/2011	1280	320	320	640	1280	640	1280	640	1280	2560	1280	5120	MDCK2	08/08/2011
3	A/VICTORIA/566/2011	1280	320	320	640	1280	320	1280	640	1280	1280	1280	5120	MDCK1	16/08/2011
4	A/VICTORIA/567/2011	1280	320	320	640	1280	640	1280	640	1280	2560	1280	5120	MDCK1	16/08/2011
5	A/SOUTH AUSTRALIA/147/2011	1280	320	320	640	1280	640	1280	640	1280	2560	1280	5120	MDCK1	12/08/2011
6	A/TASMANIA/27/2011	1280	640	640	1280	2560	640	2560	1280	2560	5120	2560	5120	MDCK1	15/08/2011
7	A/SYDNEY/513/2011	1280	320	320	640	1280	640	1280	640	1280	2560	2560	5120	R-MIX MDCK2	30/06/2011
8	A/SYDNEY/519/2011	1280	320	320	640	1280	640	1280	640	1280	2560	1280	5120	R-MIX MDCK2	22/07/2011
9	A/NEWCASTLE/167/2011	1280	320	320	640	2560	640	1280	640	1280	2560	1280	5120	mdck2	08/08/2011
10	A/NEWCASTLE/170/2011	1280	320	160	640	1280	320	1280	640	1280	2560	1280	5120	mdck2	05/08/2011
11	A/NEWCASTLE/174/2011	1280	320	320	640	2560	640	1280	640	1280	2560	2560	>10240	mdck2	08/08/2011
12	A/VICTORIA/568/2011	1280	320	320	640	1280	320	1280	640	1280	2560	1280	5120	MDCK1	16/08/2011
13	A/NEWCASTLE/207/2011	1280	320	320	640	1280	640	1280	640	1280	1280	1280	5120	MDCK1	03/08/2011
14	A/SYDNEY/60/2011	1280	320	320	640	1280	640	2560	2560	1280	2560	1280	2560	MDCKX,MDCK1	09/09/2010
15	A/SYDNEY/43/2011	1280	320	320	640	1280	320	1280	640	640	2560	1280	5120	MDCKX,MDCK2	08/06/2011
16	A/SYDNEY/49/2011	1280	640	640	640	2560	640	1280	640	1280	2560	1280	5120	MDCKX,MDCK2	14/07/2011
17	A/VICTORIA/817/2011	1280	320	320	320	1280	320	1280	640	1280	640	1280	2560	MDCK2	02/08/2011
18	A/SYDNEY/510/2011	1280	320	320	640	1280	320	1280	640	1280	2560	1280	5120	R-MIX MDCK2	27/06/2011
19	A/SYDNEY/515/2011	1280	320	320	640	2560	640	1280	640	1280	2560	2560	5120	R-MIX MDCK2	10/07/2011
20	A/VICTORIA/558/2011	640	320	160	320	1280	320	640	320	1280	1280	1280	5120	MDCK2	08/08/2011
21	A/NEWCASTLE/178/2011	640	320	160	320	640	320	640	320	640	1280	1280	5120	mdck2	04/08/2011
22	A/SYDNEY/46/2011	640	160	160	320	1280	320	640	320	640	1280	1280	5120	MDCKX,MDCK2	12/07/2011
23	A/SYDNEY/47/2011	640	320	320	640	160	640	1280	640	1280	2560	1280	5120	MDCKX,MDCK2	12/07/2011
24	A/SYDNEY/514/2011	640	320	80	320	640	320	640	320	640	1280	1280	5120	R-MIX MDCK2	30/06/2011
25	A/SYDNEY/517/2011	640	320	320	640	1280	320	1280	640	1280	2560	1280	5120	R-MIX MDCK2	09/07/2011
26	A/SYDNEY/518/2011	640	320	320	640	1280	320	1280	640	1280	2560	1280	5120	R-MIX MDCK2	15/07/2011
27	A/VICTORIA/23/2011	640	320	160	320	1280	320	1280	640	640	1280	1280	5120	MDCK2	04/08/2011
28	A/VICTORIA/557/2011	640	320	640	320	1280	320	640	320	640	1280	1280	5120	MDCK2	08/08/2011
29	A/NEWCASTLE/168/2011	640	320	160	320	1280	320	640	320	640	1280	1280	>10240	mdck2	12/07/2011
30	A/NEWCASTLE/179/2011	640	160	320	320	1280	320	640	320	1280	1280	1280	5120	mdck2	15/07/2011
31	A/SYDNEY/516/2011	160	80	<40	<40	320	1280	640	320	320	320	1280	5120	R-MIX MDCK2	11/07/2011

FIGURE 3.2
Phylogenetic relationships among influenza A(H1N1)pdm09 HA genes

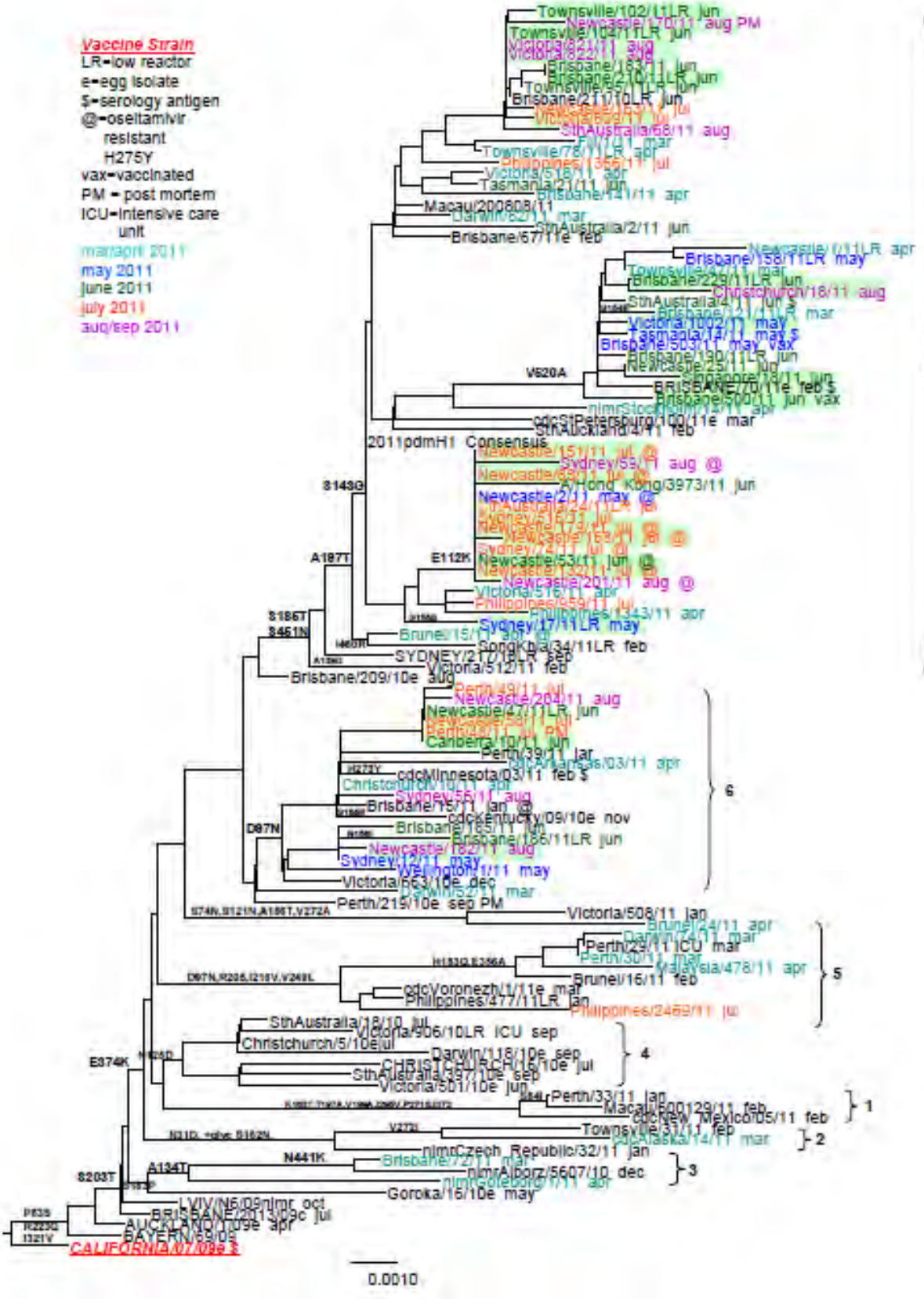


FIGURE 3.3
Phylogenetic relationships among influenza A(H1N1)pdm09 neuraminidase genes

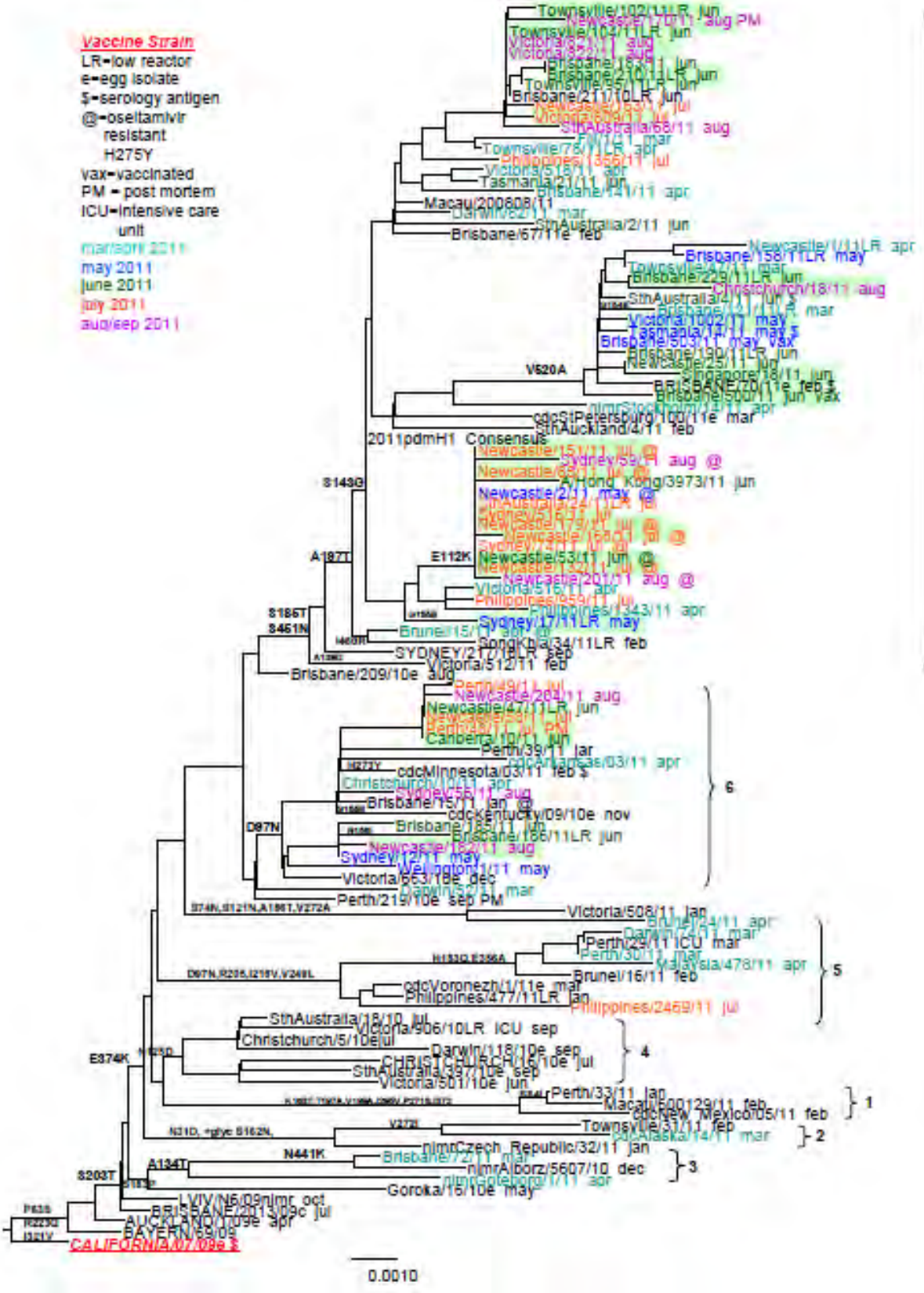


Table 3.9
Haemagglutination inhibition antibody responses
Influenza type A(H1N1)pdm09 vaccine component
Young Adults

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
Australian Young Adult	24	A/California/7/2009*	E4	63	11.2	87.2	25	79	4	42
		A/Brisbane/70/2011	E3	83	15.0	142.5	42	83	8	71
		A/South Australia/4/2011	MDCK3	25	5.0	10.3	0	17	0	4
		A/Tasmania/14/2011	MDCK3	67	7.9	50.4	17	71	4	25
		A/Minnesota/3/2011	E5	71	13.0	95.1	34	75	8	54
Japanese Young Adult	24	A/California/7/2009*	E4	58	7.9	36.7	13	58	0	33
		A/Brisbane/70/2011	E3	63	8.2	51.9	21	67	21	63
		A/South Australia/4/2011	MDCK3	4	5.0	5.5	0	4	0	0
		A/Tasmania/14/2011	MDCK3	21	5.0	10.0	0	21	0	13
		A/Minnesota/3/2011	E5	52	7.8	27.9	9	61	0	17

Table 3.10
Haemagglutination inhibition antibody titres
Influenza type A(H1N1)pdm09 vaccine component
Older Adults

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
Australian Older Adult	20	A/California/7/2009*	E4	65	10.4	45.9	15	70	5	30
		A/Brisbane/70/2011	E3	65	13.7	72.1	25	90	5	35
		A/South Australia/4/2011	MDCK3	20	5.9	10.7	0	25	0	0
		A/Tasmania/14/2011	MDCK3	50	7.3	25.5	5	90	0	35
		A/Minnesota/3/2011	E5	70	12.7	67.3	255	90	5	35
Japanese Older Adult	24	A/California/7/2009*	E4	58	7.5	37.7	13	71	0	17
		A/Brisbane/70/2011	E3	63	7.1	51.9	13	71	0	38
		A/South Australia/4/2011	MDCK3	21	6.5	10.9	8	29	0	0
		A/Tasmania/14/2011	MDCK3	29	5.9	14.1	4	38	0	13
		A/Minnesota/3/2011	E5	50	7.6	31.7	150	63	0	17

Table 3.11
Haemagglutination inhibition antibody titres
Influenza type A(H1N1)pdm09 vaccine component
Paediatric

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
American Paediatric	30	A/California/7/2009*	E4	43	13.8	62.0	30	60	17	40
		A/Brisbane/70/2011	E3	47	13.8	66.5	30	60	17	43
		A/South Australia/4/2011	MDCK3	23	10.2	15.9	23	30	7	23
		A/Tasmania/14/2011	MDCK3	40	12.3	38.2	26	60	17	43
		A/Minnesota/3/2011	E5	37	14.5	50.4	27	53	17	40

*Vaccine strain

APPENDIX 4 - Influenza A (H3N2)

TABLE 5.2

Date: September 15, 2011 Part A & B		Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne													
		Reference Antisera													
	Sequenced	A	B	C	D	E	F	F	G	H	H	I	J		
	Guinea Pig RBC	F1466	F1391	F1655	F1468	F1708	F1777	F1756	F1823	F1890	F1887	F1889	F2018	Passage	Sample
	Reference Antigens	BRIS/10	PHIL/16	PER/16	VIC/208	Vic/8	PER/10	PER/10	VIC/563	TVIL/87	TVIL/87	ALAS/5	ST.AUS/3	History	Date
A	A/BRISBANE/10/2007	**640**	40	40	80	160	40	160	20	40	80	40	160	E4	
B	A/PHILIPPINES/16/2009	40	**320**	80	160	320	80	320	40	160	160	160	160	MDCK4	
C	A/PERTH/16/2009	<20	320	**160**	160	160	80	320	40	160	160	160	320	E4	
D	A/VICTORIA/208/2009	160	1280	320	**1280**	1280	640	>2560	1280	1280	1280	1280	1280	E4	
E	A/VICTORIA/8/2010	80	160	80	80	**320**	80	160	40	160	160	160	160	MDCK5	
F	A/PERTH/10/2010	<20	80	40	320	320	**320**	1280	40	320	320	320	640	E3	
F	A/PERTH/10/2010	40	160	80	80	320	80	**160**	40	160	160	160	320	MDCKX,MDCK2	
G	A/VICTORIA/563/2010	160	320	160	320	1280	320	1280	**320**	640	640	640	1280	E5	
H	A/TOWNSVILLE/87/2010	<20	80	20	80	320	80	640	20	**160**	320	80	320	E3	
H	A/TOWNSVILLE/87/2010	160	320	160	320	640	80	640	80	320	**320**	320	640	MDCK5	
I	A/ALASKA/5/2010	80	160	160	160	1280	160	640	160	320	320	**640**	640	E3	
J	A/SOUTH AUSTRALIA/3/2011	80	160	80	160	320	80	160	40	160	160	160	**160**	MDCK2	
	Test Antigens														
1	A/VICTORIA/39/2011	80	160	160	160	640	160	320	80	160	160	160	320	MDCK1	18/08/2011
2	A/VICTORIA/835/2011	80	160	160	160	640	160	320	80	160	160	160	160	MDCK1	26/08/2011
3	A/VICTORIA/48/2011	80	320	160	320	640	160	320	40	320	320	320	640	MDCK1	26/08/2011
4	A/SOUTH AUSTRALIA/180/2011	80	160	160	320	640	160	320	40	160	160	160	320	MDCK2	16/08/2011
5	A/NEWCASTLE/213/2011	40	80	80	80	160	40	160	<20	80	80	80	160	MDCK1	02/08/2011
6	A/BRISBANE/297/2011	20	80	80	80	160	80	160	20	160	160	160	160	MDCK3	05/08/2011
7	A/BRISBANE/340/2011	40	160	80	160	320	80	160	40	160	160	160	160	MDCK1	11/08/2011
8	A/VICTORIA/828/2011	40	160	80	80	320	80	160	80	160	160	160	320	MDCK1	18/08/2011
9	A/SOUTH AUSTRALIA/171/2011	80	160	80	80	320	80	160	40	160	160	160	160	MDCK2	19/08/2011
10	A/SYDNEY/57/2011	40	160	80	160	320	80	320	80	320	160	320	320	MDCKX,MDCK3	07/08/2011
11	A/VICTORIA/834/2011	40	160	80	160	320	80	160	40	160	160	160	160	MDCK1	25/08/2011
12	A/VICTORIA/34/2011	40	160	80	160	640	160	320	40	160	160	160	160	MDCK1	09/08/2011
13	A/VICTORIA/43/2011	80	160	80	160	320	80	320	80	320	320	320	320	MDCK1	23/08/2011
14	A/BANGKOK/86/11	40	80	80	80	640	80	320	40	160	160	160	160	MDCK3	20/06/2011
15	A/NONTHABURI/87/11	80	160	80	160	320	80	320	40	160	160	160	160	MDCK3	13/06/2011
16	A/CHIANG RAI/107/11	40	80	80	80	320	80	320	40	160	80	80	160	MDCK3	04/07/2011
17	A/CHIANG RAI/108/11	40	80	80	80	160	40	160	40	80	80	80	80	MDCK3	04/07/2011
18	A/NONTHABURI/110/11	40	160	80	160	320	80	320	40	160	160	160	160	MDCK2	06/07/2011
19	A/CHRISTCHURCH/23/2011	40	80	80	80	160	80	160	40	80	80	80	160	R-MIX1,MDCK	04/08/2011
20	A/VICTORIA/565/2011	40	160	80	160	320	80	160	40	160	160	160	160	MDCK2	13/08/2011
21	A/AUCKLAND/10/2011	40	160	80	160	320	80	160	80	160	160	160	160	MDCKX,MDCK1	24/07/2011
22	A/CHRISTCHURCH/28/2011	40	80	80	80	320	80	160	40	160	160	160	160	R-MIX1,MDCK	05/08/2011
23	A/VICTORIA/31/2011	40	160	80	80	320	160	320	40	160	160	160	160	MDCK2	11/08/2011
24	A/VICTORIA/49/2011	40	160	80	80	160	80	160	40	160	160	160	160	MDCK2	27/08/2011
25	A/SOUTH AUCKLAND/11/2011	80	160	80	160	320	80	320	40	160	160	160	160	MDCKX, MDCK1	01/07/2011
26	A/SOUTH AUCKLAND/12/2011	40	160	80	80	320	80	320	40	160	160	160	160	MDCKX, MDCK1	03/07/2011
27	A/SOUTH AUSTRALIA/205/2011	80	160	80	160	320	80	320	40	160	160	160	160	MDCK1	05/09/2011
28	A/BRISBANE/290/2011	20	80	40	40	160	40	80	20	80	80	40	40	MDCK4	22/07/2011
29	A/SOUTH AUSTRALIA/177/2011	40	80	40	80	160	40	160	40	80	160	80	160	MDCK1	21/08/2011
30	A/SOUTH AUSTRALIA/175/2011	40	80	40	80	160	40	160	40	80	80	80	160	MDCK2	18/08/2011
31	A/VICTORIA/832/2011	40	80	40	80	160	40	80	40	80	80	80	160	MDCK2	23/08/2011
32	A/BANGKOK/85/11	40	80	40	80	320	80	160	40	80	80	80	160	MDCK3	20/06/2011
33	A/VICTORIA/30/2011	40	80	40	80	160	80	160	40	80	160	160	160	MDCK2	11/08/2011

TABLE 5.3

	Date: August 31, 2011	Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne														
		Reference Antisera														
	Sequenced	A	B	C	D	E	F	F	G	H	H	I	J			
	Guinea Pig RBC	F1466	F1391	F1655	F1468	F1708	F1777	F1756	F1823	F1890	F1887	F1889	F2018	MAB	Passage	Sample
	Reference Antigens	BRIS/10	PHIL/16	PERTH/16	VIC/208	VIC/8	PER/10	PER/10	VIC/563	T'VIL/87	T'VIL/87	ALAS/5	S.AUS/3	189	History	Date
A	A/BRISBANE/10/2007	**640**	20	20	40	80	<20	80	<20	20	80	20	80	<80	E4	
B	A/PHILIPPINES/16/2009	40	**160**	80	160	160	80	160	<20	80	80	80	80	1280	MDCK4	
C	A/PERTH/16/2009	<20	320	**160**	160	160	160	320	80	160	160	160	320	5120	E4	
D	A/VICTORIA/208/2009	160	1280	640	**1280**	1280	1280	>2560	>2560	>2560	>2560	>2560	1280	5120	E4	
E	A/VICTORIA/8/2010	40	160	80	160	**160**	80	160	20	160	160	160	160	<80	MDCK5	
F	A/PERTH/10/2010	20	160	80	320	640	**160**	640	80	160	640	160	640	5120	E3	
F	A/PERTH/10/2010	40	160	80	80	160	80	**160**	40	80	80	80	80	<80	MDCKX,MDCK2	
G	A/VICTORIA/563/2010	160	320	160	640	640	320	640	**640**	640	640	640	1280	5120	E5	
H	A/TOWNSVILLE/87/2010	<20	80	20	80	320	80	320	<20	**160**	320	80	320	5120	E3	
H	A/TOWNSVILLE/87/2010	80	320	160	320	640	80	320	40	160	**160**	160	320	>10240	MDCK5	
I	A/ALASKA/5/2010	320	1280	320	1280	>2560	640	1280	640	1280	>2560	**1280**	>2560	>10240	E3	
J	A/SOUTH AUSTRALIA/3/2011	80	320	160	320	320	160	320	40	160	320	160	**320**	2560	MDCK2	
	Test Antigens															
1	A/BRISBANE/232/2011	80	320	160	160	640	160	320	80	160	320	320	640	160	MDCK6	17/06/2011
2	A/SYDNEY/70/2011	40	160	160	160	320	80	160	40	80	80	80	160	320	MDCKX,MDCK1	12/07/2011
3	A/SYDNEY/20/2011	80	320	80	320	640	160	320	40	320	320	160	640	2560	MDCKX,MDCK2	01/06/2011
4	A/SYDNEY/13/2011	40	160	80	320	640	160	320	40	160	160	160	320	640	MDCKX,MDCK2	12/01/2011
5	A/SOUTH AUSTRALIA/56/2011	40	160	80	160	160	80	160	80	160	160	80	160	80	MDCK2	28/07/2011
6	A/VICTORIA/25/2011	40	160	80	160	320	80	320	80	160	160	160	160	160	mdck1	07/08/2011
7	A/TASMANIA/25/2011	40	160	80	160	320	80	320	40	160	160	80	160	160	MDCK1	15/07/2011
8	A/TASMANIA/26/2011	40	160	80	160	320	80	160	40	160	160	160	160	160	MDCK1	13/08/2011
9	A/TASMANIA/28/2011	40	160	80	160	320	80	320	40	160	160	160	160	160	MDCK2	13/07/2011
10	A/VICTORIA/26/2011 #	40	160	80	160	320	80	160	40	160	160	160	160	80	MDCK2	05/08/2011
11	A/NEWCASTLE/180/2011	40	160	80	160	320	80	320	40	80	80	80	160	640	mdck2	09/08/2011
12	A/SOUTH AUSTRALIA/144/2011	40	160	80	160	320	80	160	80	160	160	160	160	320	MDCK2	12/08/2011
13	A/VICTORIA/826/2011	40	160	80	160	320	80	160	40	160	160	80	160	320	MDCK2	16/08/2011
14	A/SYDNEY/50/2011	40	160	80	160	320	80	320	80	160	160	160	160	640	MDCKX,MDCK1	17/07/2011
15	A/SYDNEY/76/2011	40	160	80	160	320	160	320	40	160	160	160	160	640	MDCKX,MDCK1	31/07/2011
16	A/BRISBANE/284/2011	40	160	80	160	320	80	160	40	160	80	80	80	<80	MDCK4	19/07/2011
17	A/BRISBANE/298/2011	40	160	80	160	160	80	160	40	160	160	80	80	320	MDCK3	05/08/2011
18	A/VICTORIA/818/2011	40	80	40	80	160	80	160	40	80	80	80	80	160	MDCK1	03/08/2011
19	A/VICTORIA/548/2011	40	80	40	80	160	40	80	40	80	80	80	80	160	MDCK1	02/08/2011
20	A/VICTORIA/555/2011	20	80	40	80	160	40	80	20	80	80	80	80	320	MDCK1	06/08/2011
21	A/NEWCASTLE/181/2011	40	80	40	80	160	80	160	20	80	80	80	80	<80	mdck2	08/08/2011
22	A/BRISBANE/299/2011	20	80	40	80	160	40	160	40	80	80	80	80	80	MDCK2	13/08/2011
23	A/BRISBANE/281/2011	20	40	40	40	80	40	80	20	80	40	40	40	<80	MDCK4	19/07/2011

FIGURE 5.2

Phylogenetic relationships among influenza A(H3) HA genes

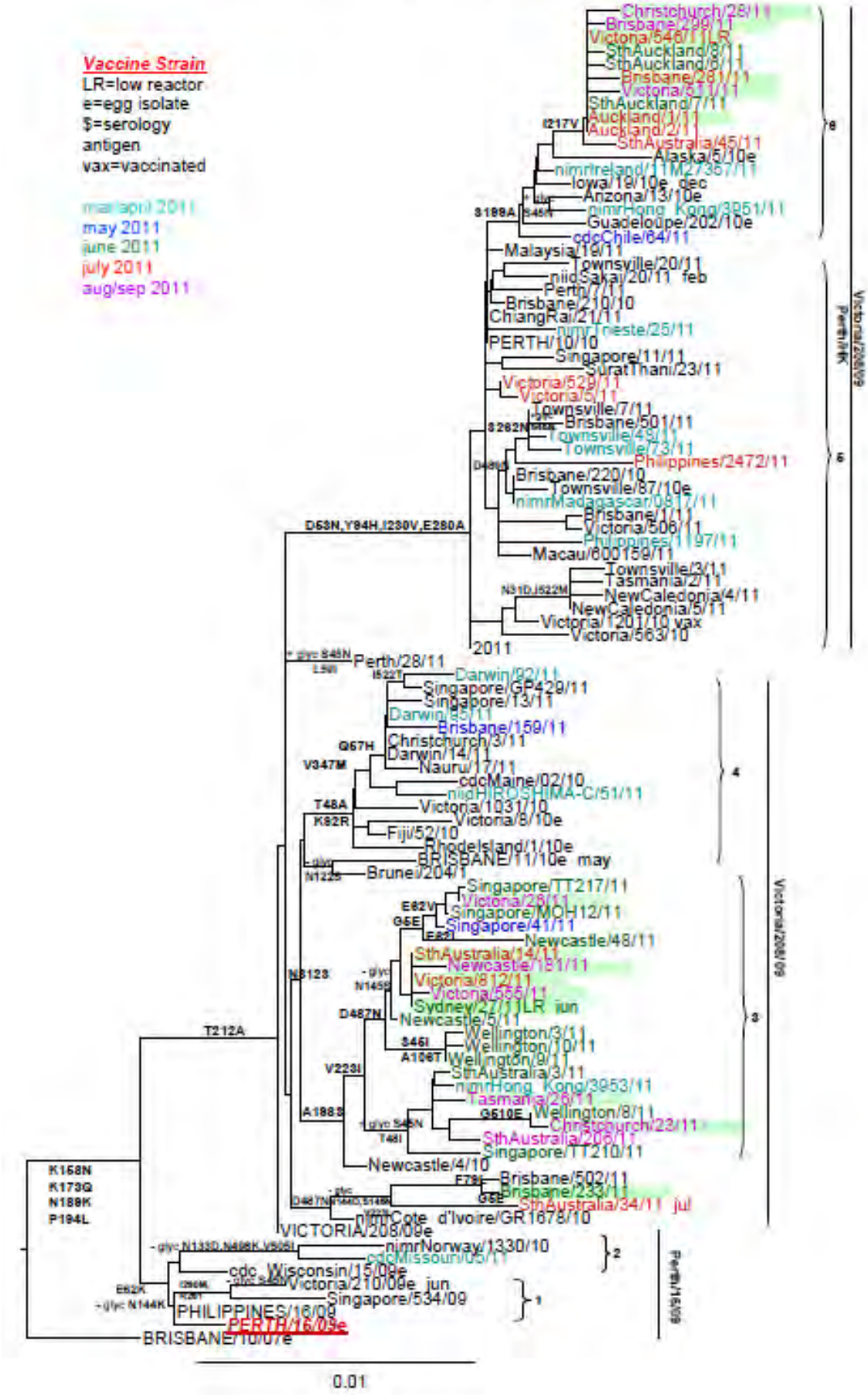


FIGURE 5.3
Phylogenetic relationships among influenza N2 neuraminidase genes

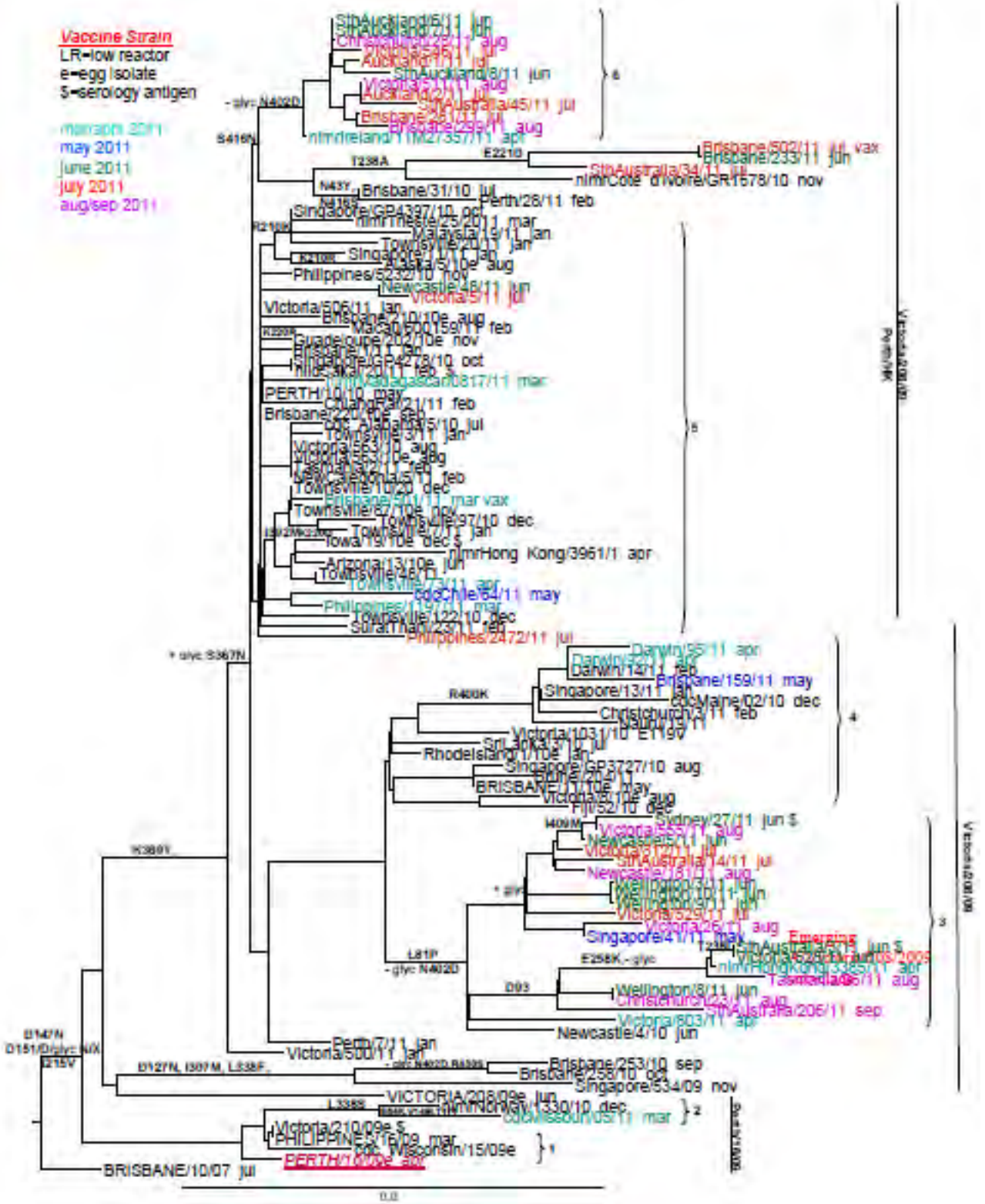


TABLE 5.12
Haemagglutination-inhibition antibody responses
Influenza type A(H3N2) vaccine component
Young Adults

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
Australian Young Adult	24	A/Victoria/210/2009*	E3	42	47.6	134.5	75	100	8	58
		A/Iowa/19/2010	E2	38	92.4	253.9	96	100	42	92
		A/Sakai/20/2011	MDCK2+2, MDCK1	25	47.6	87.2	83	100	4	21
		A/South Australia/3/2011	MDCK3	25	32.7	63.5	58	96	4	8
		A/Sydney/27/2011	MDCKX, MDCK2	17	25.2	44.9	42	96	0	0
Japanese Young Adult	24	A/Victoria/210/2009*	E3	25	41.2	95.1	79	100	8	38
		A/Iowa/19/2010	E2	33	69.2	190.2	92	100	29	67
		A/Sakai/20/2011	MDCK2+2, MDCK1	17	25.9	41.2	50	71	0	4
		A/South Australia/3/2011	MDCK3	21	17.3	34.6	25	58	0	4
		A/Sydney/27/2011	MDCKX, MDCK2	8	13.0	20.0	13	33	0	0

TABLE 5.13
Haemagglutination-inhibition antibody responses
Influenza type A(H3N2) vaccine component
Older Adults

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
Australian Older Adult	20	A/Victoria/210/2009*	E3	50	49.2	154.5	90	100	10	60
		A/Iowa/19/2010	E2	40	91.9	278.5	95	100	35	90
		A/Sakai/20/2011	MDCK2+2, MDCK1	25	47.6	101.9	85	100	10	45
		A/South Australia/3/2011	MDCK3	15	38.6	77.3	70	100	5	25
		A/Sydney/27/2011	MDCKX, MDCK2	8	32.5	54.6	50	83	0	0
Japanese Older Adult	24	A/Victoria/210/2009*	E3	25	33.6	67.3	75	92	4	33
		A/Iowa/19/2010	E2	21	63.5	119.8	96	96	8	54
		A/Sakai/20/2011	MDCK2+2, MDCK1	13	23.1	40.0	29	75	4	4
		A/South Australia/3/2011	MDCK3	25	15.4	30.0	8	58	4	4
		A/Sydney/27/2011	MDCKX, MDCK2	25	13.3	25.2	4	54	0	0

TABLE 5.13
Haemagglutination-inhibition antibody responses
Influenza type A(H3N2) vaccine component
Paediatrics

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
American Paediatric	30	A/Victoria/210/2009	E3	30	39.1	98.5	87	100	0	37
		A/Iowa/19/2010	E2	40	81.9	272.1	97	100	23	73
		A/Sakai/20/2011	MDCK2+2, MDCK1	23	24.1	45.9	57	63	0	20
		A/South Australia/3/2011	MDCK3	27	16.6	35.6	37	57	0	17
		A/Sydney/27/2011	MDCKX, MDCK2	23	15.2	26.4	33	53	0	0

* Vaccine Strain

APPENDIX 5 - Influenza B

TABLE 6.2 (B/Victoria Lineage)

Date: September 13, 2011 Part A & B		Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne													
		Reference Antisera													
	Sequenced	**A**	**B**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**				
	Turkey RBC	F1175	F1233	F1236	F1235	F1364	F1640	F1658	F1688	F1900	F1904	Mab	Human		
	Reference Antigens	MAL/2506	BRIS/60	BRIS/60	BRIS/33	HK/90	PHIL/6363	SING/616	HK/259	SYD/508	CAMB/30	172	Pool	History	
A	B/MALAYSIA/2506/2004	640	40	320	640	320	1280	1280	1280	320	1280	<80	160	E4	
B	B/BRISBANE/60/2008	40	160	160	1280	160	160	40	160	160	40	2560	40	MDCKX,MDCK4	
B	B/BRISBANE/60/2008	160	80	640	>2560	640	640	640	1280	640	640	1280	80	E6	
C	B/BRISBANE/33/2008	160	160	1280	>2560	640	640	640	>2560	1280	1280	1280	80	E4	
D	B/HONG KONG/90/2008	160	80	640	1280	640	640	640	1280	640	640	1280	80	E5	
E	B/PHILIPPINES/6363/2009	320	20	160	320	160	640	640	320	160	640	<80	160	MDCK4	
F	B/SINGAPORE/616/2008	320	20	160	320	160	640	640	320	160	640	<80	160	MDCK5	
G	B/HONG KONG/259/2010	320	80	640	1280	320	320	320	1280	640	640	1280	80	E4	
H	B/SYDNEY/508/2010	160	160	640	>2560	640	640	320	1280	1280	640	1280	80	E2	
I	B/CAMBODIA/30/2011	640	20	320	320	160	1280	1280	640	320	1280	<80	160	E3	
	Test Antigens														
1	B/SONG KHLA/101/11	80	160	640	>2560	640	640	320	1280	1280	320	640	160	MDCK3	27/06/2011
2	B/CHANTHABURI/102/11	80	160	320	>2560	320	320	160	640	640	160	1280	80	MDCK3	27/06/2011
3	B/AUCKLAND/45/2011	<20	320	320	>2560	320	160	80	320	320	80	640	40	MDCKX,MDCK1	15/07/2011
4	B/AUCKLAND/46/2011	20	1280	1280	>2560	1280	320	160	1280	640	160	1280	160	MDCKX,MDCK1	15/07/2011
5	B/CHRISTCHURCH/19/2011	<20	640	640	>2560	640	640	160	640	640	160	5120	80	R-MIX1,MDCK`	01/08/2011
6	B/CHRISTCHURCH/20/2011	20	1280	640	>2560	640	320	160	1280	640	160	>10240	160	R-MIX1,MDCK`	28/07/2011
7	B/CHRISTCHURCH/21/2011	<20	640	640	>2560	640	320	160	640	640	160	2560	80	R-MIX1,MDCK`	03/08/2011
8	B/CHRISTCHURCH/22/2011	<20	640	640	>2560	640	640	160	640	640	80	5120	80	R-MIX1,MDCK`	03/08/2011
9	B/CHANTHABURI/83/11	20	160	160	1280	160	160	80	160	160	40	1280	40	MDCK2	21/06/2011
10	B/SONG KHLA/94/11	20	160	320	1280	320	320	80	320	320	80	1280	80	MDCK3	20/06/2011
11	B/CHABTHABURI/95/11	20	80	160	1280	160	160	40	320	160	40	1280	40	MDCK3	14/06/2011
12	B/BANGKOK/98/11	<20	160	160	1280	160	80	40	160	160	40	1280	40	MDCK3	26/06/2011
13	B/BANGKOK/99/11	20	160	160	1280	160	80	40	320	160	40	1280	40	MDCK3	27/06/2011
14	B/BANGKOK/100/11	20	160	160	1280	160	80	40	160	160	40	1280	40	MDCK3	28/06/2011
15	B/NONG KHAI/112/11	<20	160	160	1280	160	80	40	160	160	40	1280	40	MDCK3	04/07/2011
16	B/NONTHABURI/1766/11	<20	160	160	1280	160	160	40	160	160	40	1280	40	MDCK1	19/07/2011
17	B/AUCKLAND/40/2011	<20	160	160	1280	160	160	40	160	160	40	1280	40	MDCKX,MDCK1	21/07/2011
18	B/AUCKLAND/41/2011	<20	160	160	1280	160	80	40	160	160	40	640	40	MDCKX,MDCK1	22/07/2011
19	B/AUCKLAND/42/2011	<20	160	160	1280	160	160	40	160	160	40	640	40	MDCKX,MDCK1	25/07/2011
20	B/AUCKLAND/44/2011	<20	160	160	1280	160	80	40	160	160	40	640	40	MDCKX,MDCK1	26/07/2011
21	B/AUCKLAND/36/2011	<20	160	160	1280	160	160	40	160	160	40	1280	40	MDCKX,MDCK1	16/07/2011
22	B/WELLINGTON/24/2011	<20	320	160	1280	160	160	80	160	160	40	1280	40	MDCKX, MDCK1	07/07/2011
23	B/WELLINGTON/25/2011	<20	160	160	1280	160	160	40	160	160	40	640	40	MDCKX, MDCK1	11/07/2011
24	B/SOUTH AUCKLAND/15/2011	<20	160	160	1280	160	80	40	160	160	40	1280	40	MDCKX, MDCK1	02/07/2011
25	B/CHRISTCHURCH/13/2011	<20	320	160	1280	160	160	80	320	320	40	1280	80	R-MIX1,MDCK`	21/07/2011
26	B/CHRISTCHURCH/25/2011	<20	160	160	1280	160	160	40	320	160	40	2560	80	R-MIX1,MDCK`	19/07/2011
27	B/VICTORIA/832/2011	<20	160	160	640	160	80	40	160	160	40	1280	40	MDCK1	27/08/2011
28	B/SONG KHLA/82/11	<20	160	160	640	160	160	40	160	160	40	1280	40	MDCK2	20/06/2011
29	B/CHANTHABURI/84/11	<20	80	80	640	80	80	20	160	80	<20	2560	40	MDCK2	16/06/2011
30	B/SURAT THANI/1685/11	<20	160	160	640	160	80	40	160	160	40	1280	40	MDCK1	14/07/2011
31	B/AUCKLAND/39/2011	<20	160	160	640	160	80	40	160	160	40	640	40	MDCKX,MDCK1	19/07/2011
32	B/WELLINGTON/26/2011	<20	160	160	640	160	160	40	160	160	40	640	40	MDCKX, MDCK1	12/07/2011
33	B/SOUTH AUCKLAND/17/2011	<20	160	160	640	160	80	40	160	160	40	640	20	MDCKX, MDCK1	29/06/2011
34	B/WELLINGTON/28/2011	<20	160	160	640	160	80	40	160	160	40	640	40	MDCKX, MDCK1	12/07/2011

TABLE 6.3 B/Victoria Lineage

Compilation: September 6, Part A & B, September 8, 2011 Part A & B		Haemagglutination Inhibition Assay – WHO Influenza Centre, Melbourne													
		Reference Antisera													
	Sequenced	A	B	B	C	D	E	F	G	H	I				
	Turkey RBC	F1175	F1233	F1236	F1235	F1364	F1640	F1658	F1688	F1900	F1904	MAB	Human		
	Reference Antigens	MAL/2506	BRIS/60	BRIS/60	BRIS/33	HK/90	PHIL/6363	SING/616	HK/259	SYD/508	CAMB/30	172	Pool	History	
A	B/MALAYSIA/2506/2004	**640**	20	320	640	160	1280	1280	640	320	1280	<80	160	E4	
B	B/BRISBANE/60/2008	<20	**160**	160	640	160	160	40	80	160	40	2560	40	MDCKX, MDCK4	
B	B/BRISBANE/60/2008	160	160	**1280**	>2560	640	640	640	1280	1280	640	1280	80	E6	
C	B/BRISBANE/33/2008	160	160	1280	**>2560**	640	640	640	1280	1280	640	1280	80	E4	
D	B/HONG KONG/90/2008	160	80	640	1280	**640**	640	640	640	640	320	640	80	E5	
E	B/PHILIPPINES/6363/2009	320	20	160	320	160	**640**	640	160	160	640	<80	160	MDCK4	
F	B/SINGAPORE/616/2008	320	20	160	640	160	640	**640**	320	160	640	<80	160	MDCK5	
G	B/HONG KONG/259/2010	320	80	640	1280	320	320	320	**640**	640	640	1280	80	E4	
H	B/SYDNEY/508/2010	80	80	640	>2560	640	320	320	640	**1280**	640	640	40	E2	
I	B/CAMBODIA/30/2011	320	20	160	640	160	640	640	320	320	**1280**	<80	160	E3	
	Test Antigens														
1	B/NEWCASTLE/42/2011	<20	320	160	1280	160	160	40	160	160	40	640	20	MDCK1	10/08/2011
2	B/NEWCASTLE/48/2011	<20	320	160	1280	160	160	40	160	160	40	640	20	MDCK1	11/08/2011
3	B/NEWCASTLE/49/2011	<20	320	160	1280	160	160	40	160	160	40	1280	20	MDCK1	12/08/2011
4	B/SYDNEY/18/2011	<20	160	160	1280	160	160	40	160	160	40	640	40	MDCKX,MDCK1	23/07/2011
5	B/SYDNEY/21/2011	<20	160	160	1280	160	80	40	160	160	40	1280	40	MDCKX,MDCK1	21/07/2011
6	B/BRISBANE/67/2011	<20	160	160	1280	160	160	40	160	160	40	640	40	MDCK2	03/08/2011
7	B/VICTORIA/829/2011	<20	320	160	1280	160	160	40	160	320	<20	1280	20	MDCK1	20/08/2011
8	B/SOUTH AUSTRALIA/294/2011	<20	320	320	1280	320	160	80	160	320	<20	1280	40	MDCK1	19/08/2011
9	B/SOUTH AUSTRALIA/297/2011	<20	320	160	1280	320	160	80	160	320	<20	1280	40	MDCK1	22/08/2011
10	B/SOUTH AUSTRALIA/298/2011	<20	320	160	1280	160	160	40	160	160	<20	640	40	MDCK1	20/08/2011
11	B/VICTORIA/831/2011	<20	320	160	1280	160	160	40	160	160	<20	640	20	MDCK1	24/08/2011
12	B/VICTORIA/25/2011	<20	160	160	1280	160	80	40	160	160	<20	640	<20	MDCK1	10/08/2011
13	B/VICTORIA/543/2011	<20	160	160	640	160	160	40	160	160	40	640	40	MDCK1	16/08/2011
14	B/VICTORIA/826/2011	<20	160	160	640	160	80	40	160	160	40	640	40	MDCK1	15/08/2011
15	B/SYDNEY/26/2011	<20	160	160	640	160	160	40	160	160	40	640	20	MDCKX,MDCK1	13/07/2011
16	B/NEWCASTLE/53/2011	<20	160	160	640	160	160	40	80	160	40	1280	20	MDCK1	16/08/2011
17	B/SYDNEY/17/2011	<20	160	160	640	160	80	40	160	160	20	640	40	MDCKX,MDCK1	16/07/2011
18	B/SYDNEY/19/2011	<20	160	160	640	160	160	40	160	160	40	640	40	MDCKX,MDCK1	24/07/2011
19	B/SYDNEY/20/2011	<20	160	160	640	160	160	40	160	160	40	1280	40	MDCKX,MDCK1	11/08/2011
20	B/SYDNEY/22/2011	<20	160	160	640	160	80	40	160	160	20	1280	40	MDCKX,MDCK1	20/06/2011
21	B/NEWCASTLE/50/2011	<20	160	160	640	160	160	40	160	160	40	640	40	MDCK1	15/08/2011
22	B/NEWCASTLE/55/2011	<20	160	160	640	160	80	40	80	160	40	640	20	MDCK1	15/08/2011
23	B/NEWCASTLE/63/2011	<20	160	160	640	160	80	40	160	160	40	640	20	MDCK1	10/08/2011
24	B/BRISBANE/68/2011	<20	160	160	640	160	80	40	160	160	40	640	40	MDCK2	03/08/2011
25	B/CAMBODIA/15/2011	20	<20	<20	80	20	640	160	20	20	80	<80	40	X1,MDCK1	30/05/2011
26	B/CAMBODIA/20/2011	40	<20	20	80	20	640	160	20	20	160	<80	40	X1,MDCK1	16/06/2011
27	B/CAMBODIA/22/2011	20	<20	<20	80	20	640	160	20	20	80	<80	40	X1,MDCK1	17/06/2011
28	B/CAMBODIA/24/2011	20	<20	<20	80	20	320	160	20	20	80	<80	40	X1,MDCK1	24/06/2011
29	B/CAMBODIA/26/2011	20	<20	<20	80	20	320	160	20	20	80	<80	40	X1,MDCK1	29/06/2011
30	B/CAMBODIA/13/2011	20	<20	<20	40	<20	160	40	<20	<20	40	<80	20	X2,MDCK1	10/03/2011

TABLE 6.4
B/Victoria Lineage

Date: August 24, 2011 Part A & B		Haemagglutination Inhibition Assay - WHO Influenza Centre, Melbourne													
		Reference Antisera													
	Sequenced	A	B	C	C	D	E	F	G	H	I	J			
	Turkey RBC	F1175	F1173	F1233	F1236	F1235	F1364	F1640	F1658	F1688	F1900	F1904	MAB	Passage	Sample
	Reference Antigens	MAL/2506	VIC/304	BRIS/60	BRIS/60	BRIS/33	HK/90	PHIL/6363	SING/616	HK/259	SYD/508	CAMB/30	172	History	Date
A	B/MALAYSIA/2506/2004	**640**	640	20	640	1280	640	1280	1280	1280	320	1280	<80	E4	
B	B/VICTORIA/304/2006	320	**640**	20	320	1280	320	1280	1280	640	320	1280	<80	E5	
C	B/BRISBANE/60/2008	20	80	**160**	160	1280	320	80	80	160	160	40	640	MDCKX,MDCK4	
C	B/BRISBANE/60/2008	160	320	160	**640**	1280	640	320	320	640	640	320	640	E6	
D	B/BRISBANE/33/2008	160	320	160	1280	**>2560**	1280	640	640	1280	1280	640	640	E4	
E	B/HONG KONG/90/2008	160	320	80	1280	1280	**1280**	640	640	1280	1280	640	640	E5	
F	B/PHILIPPINES/6363/2009	160	320	<20	160	320	160	**640**	640	160	160	320	<80	MDCK4	
G	B/SINGAPORE/616/2008	320	320	20	320	640	320	640	**640**	320	160	640	<80	MDCK5	
H	B/HONG KONG/259/2010	160	320	80	640	1280	1280	640	640	**1280**	640	640	640	E4	
I	B/SYDNEY/508/2010	160	320	80	640	>2560	640	320	320	640	**640**	320	320	E2	
J	B/CAMBODIA/30/2011	1280	1280	40	640	1280	640	1280	1280	1280	640	**1280**	80	E3	
	Test Antigens														
1	B/SYDNEY/13/2011	<20	160	320	320	>2560	640	320	80	320	320	40	1280	MDCKX,MDCK1	03/07/2011
2	B/NEWCASTLE/32/2011	320	320	160	1280	>2560	1280	640	640	1280	1280	640	640	mdck1	08/08/2011
3	B/SYDNEY/14/2011	<20	80	160	160	1280	320	160	80	160	160	40	640	MDCKX,MDCK1	14/07/2011
4	B/VICTORIA/530/2011	<20	80	160	80	1280	320	80	40	80	160	40	1280	MDCK1	01/08/2011
5	B/VICTORIA/532/2011	<20	80	320	320	1280	320	160	80	160	160	40	1280	MDCK1	01/08/2011
6	B/TASMANIA/5/2011	<20	160	320	320	1280	640	160	80	320	160	80	1280	MDCK1	29/07/2011
7	B/SYDNEY/505/2011	<20	80	160	160	1280	320	160	80	320	320	40	640	R-MIX MDCK1	23/07/2011
8	B/SYDNEY/506/2011	<20	80	160	160	1280	320	160	80	160	160	40	640	R-MIX MDCK1	23/07/2011
9	B/VICTORIA/823/2011	<20	80	320	320	1280	320	80	80	160	160	40	640	MDCK1	10/08/2011
10	B/TASMANIA/7/2011	<20	160	640	640	1280	640	320	80	320	320	80	1280	MDCK1	06/08/2011
11	B/TASMANIA/8/2011	<20	80	160	160	1280	320	160	80	160	160	40	640	MDCK1	06/08/2011
12	B/VICTORIA/537/2011	<20	160	320	320	1280	640	320	80	320	320	80	1280	MDCK1	06/08/2011
13	B/VICTORIA/531/2011	20	160	160	160	1280	320	80	80	160	160	40	640	MDCK1	01/08/2011
14	B/NEWCASTLE/20/2011	<20	80	160	160	1280	160	160	80	160	160	40	640	mdck1	08/08/2011
15	B/NEWCASTLE/34/2011	<20	80	160	160	1280	160	80	80	160	80	40	640	mdck1	05/08/2011
16	B/VICTORIA/541/2011	<20	40	160	160	1280	160	160	40	160	160	40	640	MDCK1	15/08/2011
17	B/VICTORIA/542/2011	<20	80	160	160	1280	320	160	80	160	160	40	640	MDCK1	15/08/2011
18	B/SOUTH AUSTRALIA/136/2011	20	80	320	320	1280	320	160	80	1280	1280	40	640	MDCK1	18/07/2011
19	B/SOUTH AUSTRALIA/221/2011	<20	160	320	320	1280	640	320	80	640	640	40	1280	MDCK1	01/08/2011
20	B/SOUTH AUSTRALIA/222/2011	<20	80	160	160	1280	320	160	'	160	160	40	640	MDCK1	28/07/2011
21	B/VICTORIA/535/2011	<20	160	160	320	1280	320	160	80	160	160	40	640	mdck1	08/08/2011
22	B/VICTORIA/536/2011	<20	80	160	160	1280	320	80	40	160	160	40	640	mdck1	08/08/2011
23	B/VICTORIA/23/2011	<20	160	160	320	1280	320	160	80	160	160	40	1280	mdck1	05/08/2011
24	B/NEWCASTLE/14/2011	<20	80	320	160	1280	320	160	80	160	160	40	640	mdck1	05/08/2011
25	B/NEWCASTLE/21/2011	<20	80	160	160	1280	320	80	80	160	160	40	640	mdck1	08/08/2011
26	B/NEWCASTLE/37/2011	<20	80	160	160	1280	320	160	80	160	160	40	1280	mdck1	07/08/2011
27	B/SYDNEY/9/2011	<20	80	160	160	1280	160	80	80	160	160	40	640	MDCKX,MDCK1	02/05/2011
28	B/NEWCASTLE/25/2011	<20	160	320	320	640	320	160	80	320	320	40	1280	mdck1	05/08/2011
29	B/TASMANIA/9/2011	<20	80	160	160	640	320	160	40	160	160	40	640	MDCK1	01/07/2011
30	B/VICTORIA/827/2011	<20	80	160	160	640	320	80	40	160	80	40	320	MDCK1	15/08/2011
31	B/SRI LANKA/4/2011	20	80	160	160	640	320	80	80	160	160	40	640	MDCK1	02/05/2011
32	B/SOUTH AUSTRALIA/196/2011	<20	80	160	160	640	640	80	40	160	80	40	640	MDCK1	01/08/2011
33	B/NEWCASTLE/31/2011	<20	40	160	160	640	160	160	40	160	160	20	320	mdck1	14/07/2011
34	B/NEWCASTLE/27/2011	20	<20	80	80	320	160	160	40	40	40	40	320	mdck1	13/07/2011

FIGURE 6.3

Phylogenetic relationships among influenza B HA genes

B/Victoria Lineage

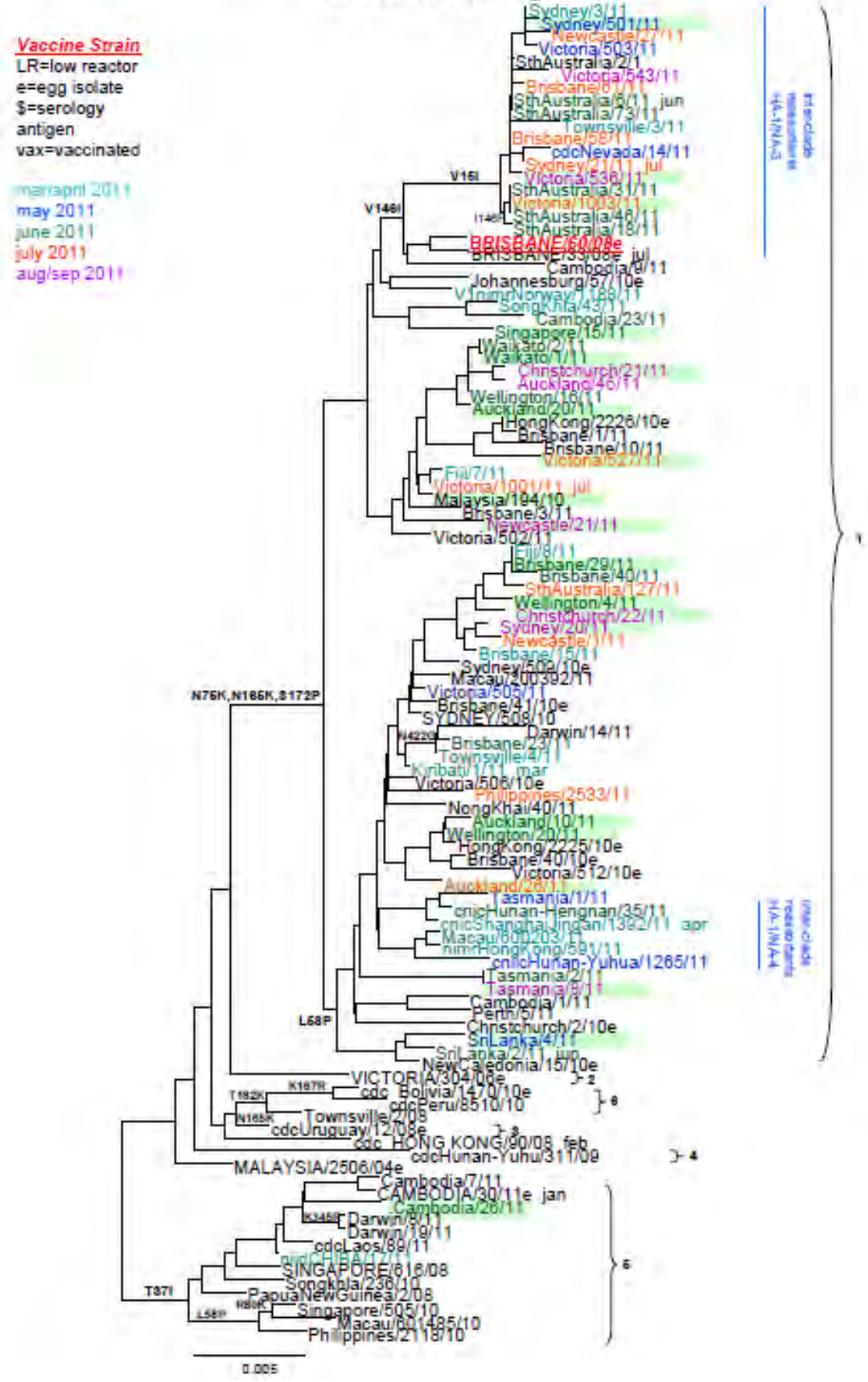


FIGURE 6.4
Evolutionary Relationships among Influenza B HA genes
B/Yamagata Lineage

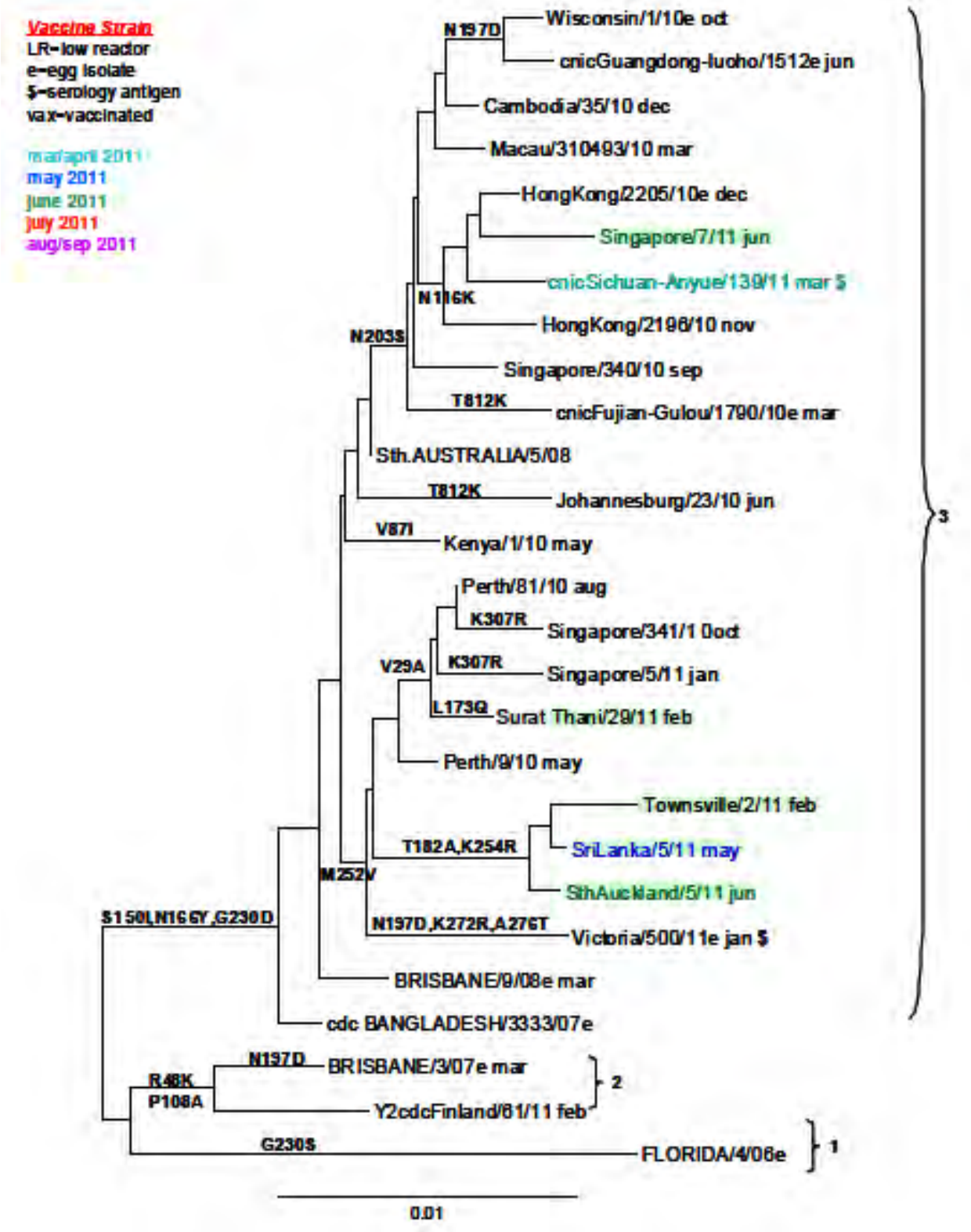


FIGURE 6.5

Phylogenetic relationships among influenza B neuraminidase genes 2011

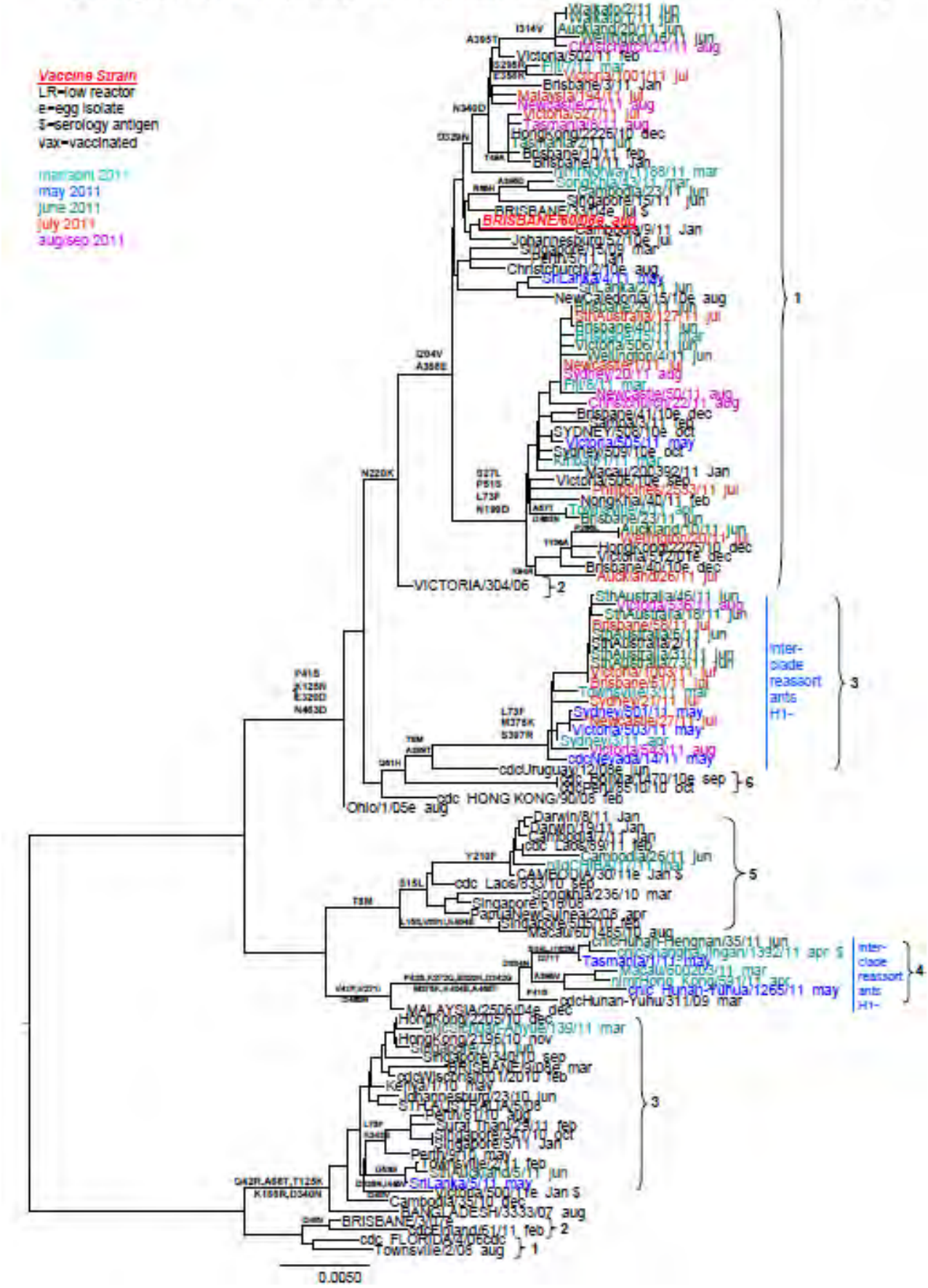


TABLE 5.7
Haemagglutination inhibition antibody responses
Influenza type B vaccine component
Young Adults

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
Australian Young Adult	24	B/Brisbane/33/2008^	E4	38	49.0	190.2	71	100	33	75
		B/Cambodia/30/2011^	E4	42	37.7	151.0	58	96	42	71
		B/Shanghai-Jingan/1392/2011^	E3	46	42.4	190.2	58	100	33	75
		B/Victoria/500/2011+	E3	25	29.1	67.3	54	79	25	42
		B/Sichuan-Anyue/139/2011+	E4	21	21.8	42.4	46	71	17	33
Japanese Young Adults	24	B/Brisbane/33/2008^	E4	17	27.5	47.6	54	79	8	13
		B/Cambodia/30/2011^	E4	29	13.7	30.0	38	58	4	15
		B/Shanghai-Jingan/1392/2011^	E3	25	21.2	43.6	50	71	4	25
		B/Victoria/500/2011+	E3	8	51.9	69.2	71	75	38	46
		B/Sichuan-Anyue/139/2011+	E4	8	30.8	43.6	58	67	21	33

TABLE 5.8
Haemagglutination inhibition antibody responses
Influenza type B vaccine component
Older Adults

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
Australian Older Adults	20	B/Brisbane/33/2008^	E4	60	18.0	69.6	30	85	10	30
		B/Cambodia/30/2011^	E4	60	12.3	52.8	25	75	10	20
		B/Shanghai-Jingan/1392/2011^	E3	60	12.3	60.6	30	80	10	25
		B/Victoria/500/2011+	E3	40	31.4	82.8	60	85	15	35
		B/Sichuan-Anyue/139/2011+	E4	30	21.4	51.0	50	70	15	20
Japanese Older Adults	24	B/Brisbane/33/2008^	E4	33	23.8	63.5	54	71	13	42
		B/Cambodia/30/2011^	E4	25	15.0	30.0	38	58	8	21
		B/Shanghai-Jingan/1392/2011^	E3	21	21.8	43.6	50	63	8	25
		B/Victoria/500/2011+	E3	13	10.9	15.0	33	38	0	0
		B/Sichuan-Anyue/139/2011+	E4	8	7.7	9.7	17	21	0	0

TABLE 5.9
Haemagglutination inhibition antibody responses
Influenza type B vaccine component
Paediatric

Population	N	Antigen	Passage History	% Rise	GMT		%>/=40		%>/=160	
					Pre	Post	Pre	Post	Pre	Post
American Paediatric	30	B/Brisbane/33/2008^	E4	47	6.2	40.0	7	57	0	37
		B/Cambodia/30/2011^	E4	43	5.1	22.4	0	47	0	13
		B/Shanghai-Jingan/1392/2011^	E3	43	6.0	34.0	7	57	0	37
		B/Victoria/500/2011+	E3	13	5.4	8.5	0	17	0	3
		B/Sichuan-Anyue/139/2011+	E4	7	5.1	6.6	0	7	0	3

^B/Vic – lineage viruses
+B/Yam – lineage viruses

APPENDIX 6 - WHO Recommendation for Influenza Vaccines

2011, 86, 457–468 No. 42

World Health Organization
Organisation mondiale de la Santé

Weekly epidemiological record
Relevé épidémiologique hebdomadaire

14 OCTOBER 2011, 86th YEAR / 14 OCTOBRE 2011, 86e ANNÉE
No. 42, 2011, 86, 457–468
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Sommaire

Recommended composition of influenza vaccines for use in the 2012 southern hemisphere influenza season

September 2011

WHO convenes technical consultations[1] in February and September each year to recommend viruses for inclusion in influenza vaccines[2] for the northern and southern hemispheres, respectively. The recommendation in this report relates to the influenza vaccines for the forthcoming influenza season in the southern hemisphere (2012). A recommendation will be made in February 2012 relating to vaccines that will be used for the influenza season in the northern hemisphere (2012–2013). For countries in equatorial regions, epidemiological considerations influence which recommendation (February or September) individual national and regional authorities consider more appropriate.

Influenza activity, February – September 2011

From February to September 2011, influenza was active worldwide and reported in Africa, the Americas, Asia, Europe and Oceania. In general, activity was low or moderate in comparison with previous years and was due to circulation/co-circulation of influenza A(H1N1)pdm09,[3] A(H3N2) and B viruses. No former seasonal A(H1N1) viruses that circulated before the 2009 pandemic were detected during this period.

In the northern hemisphere, influenza activity continued to be high in February, started to decline in March, and remained very low from April onwards. In the southern hemisphere, activity generally in-

[1] See http://www.who.int/influenza/vaccines/virus/en/; accessed October 2011.

[2] A description of the process of influenza vaccine virus selection and development is available at: http://www.who.int/gb/pip/pdf_files/Fluvaccvirusselection.pdf; accessed October 2011.

[3] Referring to pandemic A(H1N1)2009 virus.

Composition recommandée des vaccins antigrippaux pour la saison 2012 dans l'hémisphère Sud

Septembre 2011

L'OMS convoque chaque année des consultations techniques[1] en février et en septembre afin de recommander les virus qui doivent entrer dans la composition des vaccins contre la grippe saisonnière[2] dans l'hémisphère Nord et l'hémisphère Sud, respectivement. La présente recommandation s'applique à la composition des vaccins la prochaine saison grippale dans l'hémisphère Sud (2012). Une recommandation relative aux vaccins à utiliser pendant la saison grippale dans l'hémisphère Nord (2012-2013) sera formulée en février 2012. Dans les pays des régions équatoriales, les autorités nationales s'appuieront sur des considérations d'ordre épidémiologique pour déterminer quelle est la recommandation la mieux adaptée (février ou septembre).

Activité grippale, février-septembre 2011

Entre février et septembre 2011, une activité grippale a été signalée en Afrique, dans les Amériques, en Asie, en Europe et en Océanie. En général, l'activité a été faible ou modérée par comparaison avec les années précédentes et a été due à la circulation ou à la circulation conjointe des virus grippaux A (H1N1)pdm09,[3] A (H3N2) et B. Aucun des anciens virus de la grippe saisonnière A (H1N1) ayant circulé avant la pandémie de 2009 n'a été détecté au cours de cette période.

Dans l'hémisphère Nord, l'activité grippale est restée élevée en février, elle a commencé à décliner en mars et elle s'est maintenue à un niveau très faible depuis le mois d'avril. Dans l'hémisphère Sud, elle a généralement augmenté

[1] Voir http://www.who.int/influenza/vaccines/virus/en/; consulté en octobre 2011.

[2] Description du processus de sélection et de mise au point des virus vaccins (disponible à l'adresse suivante: http://www.who.int/gb/pip/pdf_files/Fluvaccvirusselection.pdf; consulté en octobre 2011).

[3] Qui fait référence au virus de la grippe pandémique A (H1N1) 2009.

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creased from May and had declined to baseline levels by September, except in Australia and New Zealand where regional outbreaks were still reported at that time. In tropical areas, activity was generally reported throughout the period with regional outbreaks in some countries, including Bangladesh, Cambodia, Cuba, Dominican Republic and Honduras.

Influenza A(H1N1)pdm09 viruses predominated in many parts of the world with widespread and regional outbreaks reported in February and March in a number of countries in Asia, northern Africa, North America and Europe. Influenza A(H1N1)pdm09 activity increased in the southern part of South America and became regional in May–June in Argentina, the Dominican Republic, Uruguay and South Africa, and declined in August–September. From July onwards, outbreaks of A(H1N1) pdm09 were widespread in Australia and regional in Cambodia and New Zealand.

Influenza A(H3N2) activity was reported in many countries during this period. In the northern hemisphere widespread activity continued to be reported in Canada, the United States and Japan in February and March, and declined in April. In many Latin American countries, A(H3N2) virus predominated and caused local to regional outbreaks from June to August.

Widespread influenza B activity continued to be reported in the northern hemisphere during February and March in many countries, including Canada and the United States, most countries in Europe, and Japan. Influenza B activity increased in Central America and South Africa in June and July, and declined in August. In several countries of Asia and Oceania, influenza B activity was regional from July onwards.

The extent and type of reported influenza activity worldwide are summarized in *Table 1*.

Zoonotic influenza infections caused by avian A(H5N1), avian A(H9N2) and swine A(H3N2) viruses

From 16 February to 19 September 2011, 45 confirmed human cases of A(H5N1), 24 of which were fatal, were reported by Bangladesh, Cambodia, Egypt and Indonesia, countries in which highly pathogenic avian influenza A(H5N1) is present in poultry. Since December 2003, a total of 564 cases with 330 deaths have been confirmed in 15 countries. To date there has been no evidence of sustained human-to-human transmission.

One human case of influenza A(H9N2) was detected in Bangladesh and 4 human infections caused by swine A(H3N2) viruses were detected in the United States during the same period.

Antigenic and genetic characteristics of recent isolates

Influenza A(H1N1) viruses

Between February and August 2011, all influenza A(H1N1) viruses detected worldwide were A(H1N1)pdm09; no former seasonal A(H1N1) viruses were detected.

depuis le mois de mai et elle est passée à un niveau de base en septembre, à l'exception de l'Australie et de la Nouvelle-Zélande, où l'on signalait encore des flambées régionales au cours de cette même période. Dans les régions tropicales, une activité grippale est généralement signalée au cours de la période des flambées régionales dans certains pays et notamment le Bangladesh, le Cambodge, Cuba, le Honduras et la République dominicaine.

Les virus grippaux A (H1N1)pdm09 ont été prédominants dans de nombreuses parties du monde, des flambées très étendues ou régionales ayant été signalées en février et en mars dans un certain nombre de pays d'Asie, d'Afrique du Nord, d'Amérique du Nord et d'Europe. L'activité de la grippe A (H1N1)pdm09 a augmenté dans la partie australe de l'Amérique du Sud et en mai-juin, elle a pris un caractère régional en Argentine, en Afrique du Sud, en République dominicaine et en Uruguay pour diminuer ensuite en août et septembre. À partir du mois de juillet, les flambées de A (H1N1)pdm09 ont été très étendues en Australie et régionales au Cambodge et en Nouvelle-Zélande.

L'activité de la grippe A (H3N2) a été signalée dans de nombreux pays au cours de cette période. Dans l'hémisphère Nord, une activité importante a continué d'être signalée au Canada, aux États-Unis et au Japon en février et mars, puis a diminué en avril. Dans de nombreux pays d'Amérique latine, le virus A (H3N2) a prédominé et a provoqué des flambées locales ou régionales depuis le mois de juin jusqu'au mois d'août.

Une activité importante de la grippe B a continué d'être signalée dans l'hémisphère Nord en février et en mars dans de nombreux pays, notamment au Canada et aux États-Unis, dans la plupart des pays européens et au Japon. L'activité de la grippe B a augmenté en Amérique centrale et en Afrique du Sud en juin et juillet, et a diminué en août. Dans plusieurs pays d'Asie et d'Océanie, l'activité de la grippe B a eu une extension régionale à partir du mois de juillet.

L'étendue et le type d'activité grippale rapportés dans le monde sont résumés dans le *Tableau 1*.

Infections grippales zoonosiques dues aux virus A (H5N1), A (H9N2), ainsi qu'au virus de la grippe porcine A (H3N2)

Entre le 16 février et le 19 septembre 2011, 45 cas humains confirmés de grippe A (H5N1), dont 24 mortels, ont été notifiés par le Bangladesh, le Cambodge, l'Égypte et l'Indonésie, pays dans lesquels la grippe aviaire A (H5N1) hautement pathogène est présente chez les volailles ou les oiseaux sauvages. Depuis décembre 2003, 564 cas au total et 330 décès ont été confirmés dans 15 pays. À ce jour, rien ne permet de penser qu'il y ait une transmission interhumaine soutenue.

Un cas humain de grippe A (H9N2) a été signalé au Bangladesh et 4 cas d'infection zoonosique dus à des virus porcins A (H1N1) et A (H3N2) ont été dépistés aux États-Unis au cours de la même période.

Caractéristiques antigéniques et génétiques des isolements de virus récents

Virus grippaux A (H1N1)

Entre février et août 2011, tous les virus A (H1N1) dépistés dans le monde étaient des virus A (H1N1)pdm09; aucun virus antérieur de la grippe saisonnière A (H1N1) n'a été dépisté.

Table 1 **Extent and type of influenza activity worldwide, February–September 2011**
Tableau 1 **Etendue et type d'activité grippale saisonnière dans le monde, février-septembre 2011**

Country, area or territory – Pays, région ou territoire	February – Février	March – Mars	April – Avril	May – Mai	June – Juin	July – Juillet	August – Août	September – Septembre
Africa – Afrique								
Algeria – Algérie	•••H1(pdm09), •H3, •••B	•••H1(pdm09)	•H1(pdm09), •H3, •B					
Angola		•H3	•H3	•H3				
Burkina Faso							•H3, •B	•H3, •B
Cameroon – Cameroun	•H1(pdm09), •H3, •B	•H1(pdm09)	•H1(pdm09)	•B	•H1(pdm09), •B	•H1(pdm09), •B	••H1(pdm09), ••B	••H1(pdm09), ••B
Côte d'Ivoire	•H1(pdm09)				•H1(pdm09)	•H1(pdm09), •H3		
Democratic Republic of the Congo – République démocratique du Congo	•H1(pdm09), •H3, •B	•H1(pdm09), •H3	•H3	•H3	•H1(pdm09)	•H3		•H1(pdm09), •B
Egypt – Egypte	•H1(pdm09)							•H3
Ethiopia – Ethiopie	•H1(pdm09)	•H3, •B	•B					
Ghana	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B
Kenya	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B
Madagascar	••H3, ••B	•H1(pdm09), •H3, •B	••H3, ••B	••H1(pdm09), ••H3, ••B	••H1(pdm09), ••H3, ••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3
Mali	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	•B				
Mauritius – Maurice		•H1(pdm09), •B			•B	•H3, •B	•B	•H3, •B
Morocco – Maroc	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B						
Nigeria – Nigéria	•B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B	•H1(pdm09), •B	•H1(pdm09), •B		
Rwanda	•H1(pdm09)	•H1(pdm09), •H3, •B	•H3	•H3	•H3, •B	•H1(pdm09), •H3	•H3	
Senegal – Sénégal	•H1(pdm09), •H3	•H1(pdm09), •H3, •B	•H1(pdm09)	•H1(pdm09)	•H1(pdm09)	•H1(pdm09), •H3	•H3, •B	
South Africa – Afrique du Sud	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	••••H1(pdm09), •H3, •B	••••H1(pdm09), •••H3, •••B	•••H1(pdm09), •••H3, ••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B
Togo	•H1(pdm09)	•H1(pdm09), •B	•H1(pdm09), •B	•H3, •B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	••H1(pdm09), ••H3, ••B	
Tunisia – Tunisie	••••H1(pdm09), ••B	••••H1(pdm09), ••B	••H1(pdm09), ••B					
Uganda – Ouganda	•B		•H1(pdm09)		•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B
United Republic of Tanzania – République-Unie de Tanzanie	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3	•H1(pdm09), •H3	•H1(pdm09), •H3
Zambia – Zambie			•H1(pdm09), •H3, •B			•B	•B	•B

Table 1 *(continued)* – Tableau 1 *(suite)*

Country, area or territory – Pays, région ou territoire	February – Février	March – Mars	April – Avril	May – Mai	June – Juin	July – Juillet	August – Août	September – Septembre
Americas								
Argentina – Argentine	•H3	•H1(pdm09), •H3, •B	•H3	••H1(pdm09), ••H3, •B	•••H1(pdm09), •••H3, •••B	•••H1(pdm09), •••H3, ••B	•••H1(pdm09), •••H3, ••B	••H1(pdm09)
Barbados – Barbade	•H3	•B						
Bolivia (Plurinational State of) – Bolivie (Etat plurinational de)	•H1(pdm09), •H3	•H3	•H3	•••H3	•H1(pdm09), •••H3	••H1(pdm09), ••H3, ••B	••H1(pdm09), ••H3, ••B	•H1(pdm09), •H3
Brazil – Brésil	•H3, •B	•H3, •B	•H3	•H3, •B	•H1(pdm09), ••H3, ••B	•H1(pdm09), ••H3, ••B	•H1(pdm09), •H3, •B	•B
Canada	•••H1(pdm09), ••••H3, ••••B	•••H1(pdm09), ••••H3, ••••B	••H1(pdm09), ••H3, ••••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, ••B	•H3, •B	•H3	
Cayman Islands – Iles Caïman	•H1(pdm09), ••H3		•H1(pdm09), •H3					
Chile – Chili					•H1(pdm09), •H3	••H1(pdm09), ••H3, ••B	••H1(pdm09), ••H3, ••B	••H1(pdm09), ••H3, ••B
Colombia – Colombie	•B	•H1(pdm09), •B	•H1(pdm09), •H3	•H1(pdm09), ••H3	••H1(pdm09), ••H3	••H1(pdm09)	••H1(pdm09)	
Costa Rica	•H1(pdm09), •H3, •B	•H3, •B	•H1(pdm09)	•H1(pdm09)		•H1(pdm09)	•H3	
Cuba	•H1(pdm09), •H3, •B	•H1(pdm09), •H3	•H3	•H3	•H3, •B	•••H3	•••H3	•••H3
Dominican Republic – République dominicaine	•B	•H1(pdm09), •B	•H1(pdm09)	••H1(pdm09)	•••H1(pdm09), •••B	•••H1(pdm09), ••B	•H1(pdm09), ••B	•H1(pdm09), •B
Ecuador – Equateur	•H1(pdm09), •H3	•A						
El Salvador		••H1(pdm09), •B	•B	•••B	•••B	•H3, •B	••H3	
France, French Guiana – France, Guyane française	•B	•H1(pdm09), •H3					•H3	
France, Guadeloupe	•B	•H1(pdm09), •B						
France, Martinique	•H1(pdm09), •H3							
Guatemala	•H1(pdm09), •H3	•H3	•H3	•H3	•H3	•H3	•H3	
Honduras	•B	•H1(pdm09), •H3, •B	•B	•H1(pdm09), •B	•B	••H1(pdm09), •••H3, ••B	••H1(pdm09), •••H3, ••B	•H1(pdm09), ••H3, ••B
Jamaica – Jamaïque	•H3, •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09)	•B			
Mexico – Mexique	••H1(pdm09), ••H3, ••B	••H1(pdm09), •H3, ••B	••H1(pdm09), ••H3, ••B	•B	•H1(pdm09), •H3, •B	•H3, •B	•H3	
Nicaragua	•B	•B						
Panama			•H1(pdm09)		•H1(pdm09)	•H1(pdm09)	•H1(pdm09)	•H1(pdm09)
Paraguay	••H3	•H3					•H3	
Peru – Pérou	•H3	•H1(pdm09), •H3		•H1(pdm09), •H3	•H1(pdm09), ••H3, •B	•H3	••H1(pdm09), •••H3	••H3
Saint Kitts and Nevis – Saint Kitts et Nevis						•B		
Suriname	••H1(pdm09)	•H3						

Table 1 *(continued)* – Tableau 1 *(suite)*

Country, area or territory – Pays, région ou territoire	February – Février	March – Mars	April – Avril	May – Mai	June – Juin	July – Juillet	August – Août	September – Septembre
Trindad and Tobago – Trinité et Tobago	•H1(pdm09)							
Turks and Caicos Islands	•H1(pdm09), •H3, •B							
United States of America – Etats-Unis d'Amérique	••••H1(pdm09), ••••H3, ••••B	••••H1(pdm09), ••••H3, ••••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3
Uruguay				•H1(pdm09)	•••H1(pdm09), •H3	•••H1(pdm09), •H3, •B	•H1(pdm09), •H3	
Venezuela (Bolivarian Republic of) – Venezuela (République bolivarienne du)	•H1(pdm09), •H3	•H1(pdm09), •H3						
Asia – Asie								
Afghanistan	•H1(pdm09)			•H1(pdm09)				
Armenia – Arménie	••H1(pdm09), ••B	•H1(pdm09)						
Bangladesh	•H1(pdm09)	•H1(pdm09), •B	•H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	••H1(pdm09), •••H3, •••B	••H1(pdm09), •••H3, ••B	
Cambodia – Cambodge	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	••H1(pdm09), ••B	•••H1(pdm09), •••B	•••H1(pdm09), •••B	•••H1(pdm09), •H3, •••B
China – Chine	•••H1(pdm09), •••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B
China, Hong Kong SAR – Hong Kong, RAS	••H1(pdm09), ••H3, ••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B
Taiwan, China – Taiwan, Chine	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•B	•H3, •B				
Georgia – Georgie	••••H1(pdm09), •H3, ••••B	•••H1(pdm09), •••B	••H1(pdm09), ••B					
India – Inde	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B
Indonesia – Indonésie	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B	•H3	•H3, •B	•B	
Iran (Islamic Republic of) – Iran (République islamique d')	••H1(pdm09), ••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B	•H3, •B	•H3, •B	•B
Israel – Israël	•••H1(pdm09), •H3, •••B	•H1(pdm09), •H3, •B						
Japan – Japon	••••H1(pdm09), ••••H3, ••••B	••••H1(pdm09), ••••H3, ••••B	•H1(pdm09), ••H3, •••B	•H1(pdm09), •H3, •B	••H3, ••B	•H3, •B	•B	
Kazakhstan	•H1(pdm09), •H3, •B	•H1(pdm09)						
Kyrgyzstan	•H1(pdm09), •H3, •B	•H3, •B						
Lao People's Democratic Republic – République démocratique populaire lao	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09)	•B	•H3, •B	•H3, •B	•H3
Mongolia – Mongolie	•H1(pdm09), •H3	•H1(pdm09), •B						
Nepal – Népal					•H1(pdm09), •B			

Table 1 *(continued)* – Tableau 1 *(suite)*

Country, area or territory – Pays, région ou territoire	February – Février	March – Mars	April – Avril	May – Mai	June – Juin	July – Juillet	August – Août	September – Septembre
Oman	•H1(pdm09), •H3, ••B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09)		
Pakistan	•••H1(pdm09), •B	•H1(pdm09), •B		•B		•H1(pdm09)		
Philippines	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•H1(pdm09)	•H1(pdm09), •B	•H1(pdm09), •H3, •B		
Republic of Korea – République de Corée	•H1(pdm09), •H3	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B	•H3	•H3, •B	•B	•H3
Singapore – Singapour	••H1(pdm09), •H3,•B	••H1(pdm09), •H3,•B	••H1(pdm09), •H3,•B	•H1(pdm09), •H3,•B	•H1(pdm09), ••H3,•B	•H1(pdm09), ••H3,•B	•H1(pdm09), ••H3,•B	•H1(pdm09), ••H3,•B
Sri Lanka	•H1(pdm09), ••B	•H1(pdm09), ••B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B		•B
Thailand – Thaïlande	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B	•H3, •B
Viet Nam	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B	•H1(pdm09), •B
Europe								
Albania – Albanie	••H1(pdm09), •H3, ••B	•H1(pdm09), •B	•H1(pdm09), •B	•H3		•H1(pdm09), •B		
Austria – Autriche	••••H1(pdm09), ••H3, ••••B	•••H1(pdm09), •H3, •••B	•H1(pdm09), •B	•B				
Belarus – Bélarus	••H1(pdm09), ••B	••H1(pdm09), •B	•H1(pdm09), •B					
Belgium – Belgique	••••H1(pdm09), ••••B	•B	•B					
Bosnia and Herzegovina – Bosnie-Herzégovine	••••H1(pdm09)	••H1(pdm09)						
Bulgaria – Bulgarie	•••H1(pdm09), •••B	••H1(pdm09), ••B	•H1(pdm09), •B					
Croatia – Croatie	••••H1(pdm09)	•••H1(pdm09), •••B	••B	•B				
Czech Republic – République tchèque	••••H1(pdm09), •H3, ••••B	••H1(pdm09), ••B	•H1(pdm09), •B					
Denmark – Danemark	••••H1(pdm09), •H3, ••••B	••H1(pdm09), ••B	•H1(pdm09), •B	•H3, •B	•H1(pdm09)	•H3		
Estonia – Estonie	••••H1(pdm09), ••••B	••H1(pdm09), ••B	•H1(pdm09), •B	•H1(pdm09), •B				
Finland – Finlande	••••H1(pdm09), ••••B	•••H1(pdm09), •••B	••B					
France	••••H1(pdm09), •H3, ••••B	••H1(pdm09), •H3, •••B	•H1(pdm09), •H3, •B	•H3, •B	•H3			
Germany – Allemagne	•••H1(pdm09), •H3, •••B	•••H1(pdm09), •H3, •••B	••H1(pdm09), ••B				•H1(pdm09)	
Greece – Grèce	••••H1(pdm09), •H3, ••B	•••H1(pdm09), •H3, ••B	•H1(pdm09), •B	•B				
Hungary – Hongrie	••••H1(pdm09), •B	••H1(pdm09), •B	•B					
Iceland – Islande	••H1(pdm09), •H3, ••••B	••H1(pdm09), ••B	•B	•B				

Table 1 *(continued)* – Tableau 1 *(suite)*

Country, area or territory – Pays, région ou territoire	February – Février	March – Mars	April – Avril	May – Mai	June – Juin	July – Juillet	August – Août	September – Septembre
Ireland – Irlande	••••H1(pdm09), •H3, ••••B	•H1(pdm09), •H3, •B	•H3, •B	•B			•H3	
Italy – Italie	•••H1(pdm09), •H3, •••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B					
Latvia – Lettonie	••••H1(pdm09), •H3, ••••B	••H1(pdm09), •••B	•H3, •B	•B				
Lithuania – Lituanie	••••H1(pdm09), ••••B	•••H1(pdm09), •••B						
Luxembourg	••••H1(pdm09), ••••B	••H1(pdm09), ••B						
Malta – Malte	••H1(pdm09)	••B	•B					
Netherlands – Pays-Bas	••••H1(pdm09), •H3, ••••B	•••H1(pdm09), •••B	•H1(pdm09), •B					•H3
Norway – Norvège	•••H1(pdm09), •H3, •••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B	•H3, •B	•H3	•H3	•H3, •B	
Poland – Pologne	•••H1(pdm09), •••B	••H1(pdm09), ••B	•H1(pdm09), •B	•B				•B
Portugal	••••H1(pdm09), •••B	•H1(pdm09)						
Republic of Moldova – République de Moldavie	••H1(pdm09), •H3, ••B							
Romania – Roumanie	••••H1(pdm09), ••••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •B	•H1(pdm09), •B				
Russian Federation – Fédération de Russie	••••H1(pdm09), •••H3, ••••B	•••H1(pdm09), ••H3, •••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •B			
Serbia – Serbie	•••H1(pdm09), •H3, ••B	••H1(pdm09), •H3, ••B	•H3, •B					
Slovakia – Slovaquie	•••H1(pdm09), ••B	••H1(pdm09), ••B	•H1(pdm09)				•H1(pdm09), •B	
Slovenia – Slovénie	••••H1(pdm09), ••••B	••H1(pdm09), ••B	•H1(pdm09), •B					
Spain – Espagne	•••H1(pdm09), •H3, •••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B	•H3, •B	•B		•B	
Sweden – Suède	••••H1(pdm09), •H3, ••••B	•••H1(pdm09), •H3, •••B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H3, •B	•H3, •B	•B	
Switzerland – Suisse	••••H1(pdm09), •H3, ••••B	•••H1(pdm09), •••B	•H1(pdm09), •B	•B				
Turkey – Turquie	•••H1(pdm09), ••H3, •••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B	•B				
Ukraine	••H1(pdm09), •H3, ••B	••H1(pdm09), •H3, ••B	•H1(pdm09), •B					
United Kingdom of Great Britain and Northern Ireland– Royaume-Uni et Irlande du Nord	••H1(pdm09), •H3, ••B	•H1(pdm09), •H3, •B	•H1(pdm09), •B	•B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	
Oceania – Océanie								
Australia – Australie	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3, •B	•H1(pdm09), •H3	••H1(pdm09), •H3, ••B	••••H1(pdm09), ••H3, ••••B	•••H1(pdm09), •••H3, •••B	•••H1(pdm09), •••H3, •••B

Table 1 *(continued)* – Tableau 1 *(suite)*

Country, area or territory – Pays, région ou territoire	February – Février	March – Mars	April – Avril	May – Mai	June – Juin	July – Juillet	August – Août	September – Septembre
Fiji – Fidji		•H1(pdm09), •B						
France, New Caledonia – Nouvelle Calédonie	•H3	•H3		•H3	•H1(pdm09)		•H1(pdm09)	••H1(pdm09)
Micronesia (Federated States of) – Micronésie (Etats fédérés de)				•H1(pdm09)				
New Zealand – Nouvelle Zélande				•H1(pdm09), •B	•H1(pdm09), •H3, ••B	•••H1(pdm09), •••H3, •••B	•••H1(pdm09), •••H3, •••B	•••H1(pdm09), •••H3, •••B
United States of America, Guam – Etats-Unis d'Amérique, Guam	•H1(pdm09)	•H3, •B						
United States of America, American Samoa – Etats-Unis d'Amérique, Samoa américaines	•H1(pdm09)	•H1(pdm09)						

Data in *Table 1* were provided by the Global Influenza Surveillance and Response System and other partners – Les données du *Tableau 1* ont été fournies par le réseau mondial de surveillance de la grippe et d'autres partenaires.

• = Sporadic activity – Activité sporadique
•• = Local activity – Activité locale
••• = Regional outbreaks – Flambées régionales
•••• = Widespread outbreaks – Flambées étendues

A = Influenza A (not subtyped) – Grippe A (sous-type non déterminé)
B = Influenza B – Grippe B
H1(pdm09) = influenza A(H1N1)pdm09 – H1(pdm09) = pandémie de grippe A (H1N1) 2009
H1 = former seasonal influenza A(H1N1) – H1 = ancien virus de la grippe saisonnière A (H1N1)
H3 = influenza A(H3N2) – H3 = grippe A(H3N2)

Haemagglutination inhibition (HI) tests using post-infection ferret antisera indicated that A(H1N1)pdm09 viruses remained antigenically homogeneous and closely related to the vaccine virus A/California/7/2009. Sequence analysis of the HA genes of A(H1N1)pdm09 viruses indicated that the viruses fell into at least 7 genetic groups which were antigenically indistinguishable. A small proportion of viruses showed reductions in reactivity in HI assays with some ferret antisera against A/California/7/2009-like reference viruses. Many of the viruses showing reduced HI titres had amino acid changes in HA positions 153–157, which is consistent with data obtained since May 2009.

Influenza A(H3N2) viruses

The majority of A(H3N2) viruses collected from February to August 2011 were antigenically closely related to the vaccine virus A/Perth/16/2009. Antigenic characteristics were assessed with panels of post-infection ferret antisera in HI and virus neutralization assays. The HA genes of recent viruses fell into 2 phylogenetic clades represented by A/Perth/16/2009 and A/Victoria/208/2009, with the vast majority falling within the A/Victoria/208/2009 clade. Phylogenetic subgroups have emerged within both clades, 2 within the A/Perth/16/2009 clade and at least 4 within the A/Victoria/208/2009 clade. Viruses within all these subgroups remained antigenically similar to A/Perth/16/2009.

Les épreuves d'inhibition de l'hémagglutination (IH) réalisées au moyen d'immunsérums de furet postinfection ont indiqué que les virus grippaux A (H1N1)pdm09 restaient homogènes sur le plan antigénique et étaient étroitement apparentés au virus vaccin A/California/7/2009. L'analyse des séquences des gènes de l'hémagglutinine (HA) des virus A (H1N1)pdm09 a indiqué qu'ils appartenaient à 7 groupes génétiques impossibles à distinguer sur le plan antigénique. Un petit nombre de virus ont montré une diminution de réactivité avec certains immunsérums de furet dans les épreuves IH obtenus après inoculation de virus de référence de type A/California/7/2009. Bon nombre des virus montrant des titres IH diminués montraient des changements des acides aminés de l'hémagglutinine en position 153-157, ce qui correspond aux données obtenues depuis mai 2009.

Virus grippaux A (H3N2)

La majorité des virus A (H3N2) collectés entre février et août 2011 étaient étroitement apparentés sur le plan génique au vaccin virus A/Perth/16/2009. Les caractéristiques antigéniques ont été évaluées au moyen de collections d'immunsérums de furet postinfection dans des épreuves IH et de neutralisation virale. Les gènes HA des virus récents appartenaient à 2 clades phylogénétiques représentés par les virus A/Perth/16/2009 et A/Victoria/208/2009, la majorité d'entre eux appartenant à ce dernier clade. Des sous-groupes phylogénétiques sont apparus au sein de ces 2 clades: 2 au sein du clade représenté par le virus A/Perth/16/2009 et 4 au sein du clade représenté par le virus A/Victoria/208/2009. Les virus appartenant à tous ces sous-groupes sont restés comparables sur le plan antigénétique au virus A/Perth/16/2009.

Influenza B viruses

Influenza B viruses of both the B/Victoria/2/87 and the B/Yamagata/16/88 lineages co-circulated, with B/Victoria/2/87 lineage viruses continuing to predominate globally. However, in northern China, B/Yamagata/16/88 lineage viruses predominated from February to May 2011 before influenza activity declined.

In HI tests with post-infection ferret antisera, the majority of the B/Victoria/2/87 lineage viruses were antigenically closely related to the vaccine virus B/Brisbane/60/2008. A small number of viruses from several countries were antigenically and genetically distinguishable from the vaccine virus. Most recent B/Yamagata/16/88 lineage viruses were antigenically and genetically distinguishable from the previous vaccine virus B/Florida/4/2006 and were more closely related to the reference viruses B/Hubei-Wujiagang/158/2009, B/Wisconsin/1/2010 and B/Sichuan-Anyue/139/2011 which are antigenically similar to each other.

Resistance to influenza antiviral drugs

Neuraminidase inhibitors

The vast majority of A(H1N1)pdm09 viruses were sensitive to oseltamivir. Of the small number of oseltamivir-resistant A(H1N1)pdm09 viruses detected, most were linked to the use of this drug for prophylaxis or treatment. However, in some countries e.g. Japan, the United Kingdom and the United States, and notably in a cluster in Australia, there were increased proportions of resistant cases with no known exposure to oseltamivir. In all cases, resistance was due to a histidine to tyrosine substitution at amino acid 275 (H275Y) in the neuraminidase; the viruses remained sensitive to zanamivir. There were no reports of oseltamivir – or zanamivir-resistant A(H3N2) viruses. The majority of influenza B viruses were sensitive to neuraminidase inhibitors; however a few viruses showed reduced sensitivity.

M2 inhibitors

M gene sequencing of A(H1N1)pdm09 and A(H3N2) viruses revealed that those tested had the serine to asparagine substitution at amino acid 31 (S31N) of the M2 protein which is known to confer resistance to the M2 inhibitors, amantadine and rimantadine.

Studies with inactivated influenza virus vaccines

The presence of antibodies to the HA of recent virus isolates was measured using HI and, in addition for A(H3N2) viruses, virus neutralization assays in 2 panels of sera from children, 5 from adults and 5 from older adults who had received seasonal trivalent inactivated vaccines. The trivalent vaccines contained the antigens of A/California/7/2009 (H1N1)pdm09-like, A/Perth/16/2009 (H3N2)-like and B/Brisbane/60/2008-like viruses.

Vaccines containing A/California/7/2009-like antigens stimulated anti-HA antibodies of similar geometric

Virus grippaux B

Les virus grippaux B des deux lignées B/Victoria/2/87 et B/Yamagata/16/88 ont circulé, ceux de la première ayant continué de prédominer partout dans le monde. Toutefois, dans le nord de la Chine, les virus de la lignée B/Yamagata/16/88 ont prédominé entre février et mai 2011, avant que l'activité grippale ne diminue.

Dans les épreuves IH effectuées au moyen d'immunsérums de furet postinfection, la majorité des virus de la lignée B/Victoria/2/87 étaient étroitement apparentés sur le plan antigénique au virus vaccin B/Brisbane/60/2008. Un petit nombre de virus provenant de plusieurs pays se distinguaient sur le plan antigénique et génétique du virus vaccin. La plupart appartenaient au sous-groupe représenté par les virus B/Singapore/616/2008 et B/Philippines/1617/2010. Les virus les plus récents de la lignée B/Yamagata/16/88 se distinguaient sur le plan antigénique et génétique du virus vaccin précédent B/Florida/4/2006 et étaient plus étroitement apparentés aux virus de référence B/Hubei-Wujiagang/158/2009, B/Wisconsin/1/2010 et B/Sichuan-Anyue/139/2011, comparables les uns aux autres sur la plan génétique.

Résistance aux antiviraux utilisés contre la grippe

Inhibiteurs de la neuraminidase

La grande majorité des virus grippaux A (H1N1)pdm09 ont été sensibles à l'oseltamivir. Parmi le petit nombre de virus résistants à l'oseltamivir dépistés, la plupart étaient liés à l'utilisation de ce médicament à titre prophylactique ou thérapeutique. Toutefois, dans certains pays comme les Etats-Unis, le Japon et le Royaume-Uni, et notamment dans un groupe de cas en Australie, on a constaté une augmentation du nombre de cas de résistance sans qu'il y ait eu d'exposition connue à l'oseltamivir. Dans tous ces cas, la résistance a été due à une substitution de l'histidine par la tyrosine au niveau de l'acide aminé 275 (H275Y) de la neuraminidase. La majorité des virus grippaux B ont été sensibles aux inhibiteurs de la neuraminidase; mais quelques virus ont montré une sensibilité réduite.

Inhibiteurs de la protéine M2

Le séquençage du gène M des virus A (H1N1)pdm09 et A (H3N2) a révélé que ceux qui ont été testés présentaient une substitution de la sérine en asparagine au niveau de l'acide aminé 31 (S31N) de la protéine M2 qui est connue pour conférer la résistance à l'amantadine et à la rimantadine, des inhibiteurs de la protéine M2.

Études sur les vaccins antigrippaux à virus inactivé

La présence d'anticorps dirigés contre l'hémagglutinine des isolements viraux récents a été mesurée par des épreuves IH ainsi que pour les virus A (H3N2) par des épreuves de neutralisation virales appliquées à 2 batteries de sérums provenant d'enfants, 5 provenant d'adultes et 5 provenant d'adultes plus âgés ayant reçu des vaccins inactivés trivalents contre la grippe saisonnière. Ces vaccins trivalents renfermaient les antigènes de virus de type A/California/7/2009 (H1N1), A/Perth/16/2009 (H3N2) et de virus B/Brisbane/60/2008.

Les vaccins renfermant des antigènes de type A/California/7/2009 ont suscité la formation d'anticorps HA avec des titres moyens

mean HI titres to the vaccine virus and the majority of representative recent A(H1N1)pdm09 viruses.

Vaccines containing influenza A/Perth/16/2009-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and the majority of representative recent A(H3N2) viruses. Similar results were obtained in micro-neutralization tests using a subset of sera and viruses.

Vaccines containing influenza B/Brisbane/60/2008-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and the majority of representative recent B/Victoria/2/87 lineage viruses. Geometric mean HI titres were lower to recent B/Yamagata/16/88 lineage viruses than to the most recent B/Victoria/2/87 lineage vaccine virus, B/Florida/4/2006 (average reductions: adults, 63%; elderly adults, 60%; children, 83%).

Recommended composition of influenza virus vaccines for use in the 2012 influenza season (southern hemisphere)

A(H1N1)pdm09 viruses co-circulated in varying proportions with A(H3N2) and B viruses between February and September 2011, with widespread activity in many countries. A(H1N1)pdm09 viruses were antigenically and genetically similar to A/California/7/2009. Vaccines containing A/California/7/2009-like antigens stimulated anti-HA antibodies of similar titres against the vaccine virus and recent A(H1N1)pdm09 viruses.

No viruses of the former seasonal influenza A(H1N1) lineage were reported.

Influenza A(H3N2) viruses were detected in many parts of the world with widespread activity reported in several countries. The majority of recent viruses were antigenically and genetically similar to the vaccine virus A/Perth/16/2009. Vaccines containing A/Perth/16/2009-like antigens stimulated anti-HA antibodies of similar titres against the vaccine virus and the majority of recently circulating A(H3N2) viruses.

Influenza B activity was reported in many countries. B/Victoria/2/87 lineage viruses predominated in many parts of the world but B/Yamagata/16/88 lineage viruses predominated in northern China. The majority of recent B/Victoria/2/87 lineage viruses were antigenically and genetically closely related to B/Brisbane/60/2008. Most recently isolated B/Yamagata/16/88 lineage viruses were antigenically distinguishable from the previous vaccine virus B/Florida/4/2006 and were more closely related to B/Hubei-Wujiagang/158/2009, B/Wisconsin/1/2010 and B/Sichuan-Anyue/139/2011. Current vaccines containing B/Brisbane/60/2008-like antigens stimulated anti-HA antibodies that had similar titres against the vaccine virus and recent viruses of the B/Victoria/2/87 lineage; however, titres were lower to recent viruses of the B/Yamagata/16/88 lineage.

géométriques analogues à ceux obtenus contre le virus vaccin et les virus récents A (H1N1)pdm09.

Les vaccins renfermant des antigènes grippaux de type A/Perth/16/2009 ont suscité la formation d'anticorps HA avec des titres moyens géométriques analogues à ceux obtenus contre le virus vaccin et la majorité des virus récents A (H3N2) représentatifs. Des résultats comparables ont été obtenus dans les épreuves de microneutralisation appliqués à une sous-série de sérums.

Les vaccins renfermant des antigènes grippaux de type B/Brisbane/60/2008 ont suscité la formation d'anticorps HA avec des titres moyens géométriques analogues à ceux obtenus contre le virus vaccin et la majorité des virus récents représentatifs de la lignée B/Victoria/2/87. Les titres moyens géométriques ont été plus faibles contre les virus récents de la lignée B/Yamagata/16/88 que contre le virus vaccin le plus récent appartenant à la lignée B/Victoria/2/87, à savoir le virus B/Florida/4/2006 (réductions moyennes: adultes, 63%; personnes âgées, 60%; enfants, 83%).

Composition recommandée pour les vaccins antigrippaux au cours de la saison 2012

Les virus grippaux A (H1N1)pdm09 ont circulé conjointement et en proportions variables avec les virus grippaux A (H3N2) et B entre février et septembre 2011, avec une activité étendue dans de nombreux pays. Les virus grippaux A (H1N1)pdm09 étaient comparables sur le plan antigénique et génétique au virus A/California/7/2009. Les vaccins renfermant des antigènes A/California/7/2009 ont suscité la formation d'anticorps HA contre le virus vaccin avec des titres analogues à ceux dirigés contre les virus grippaux récents A (H1N1)pdm09.

Aucun ancien virus de la grippe saisonnière A (H1N1) n'a été signalé.

Les virus grippaux A (H3N2) ont été dépistés dans de nombreuses parties du monde avec une activité étendue rapportée dans plusieurs pays. La majorité des virus récents étaient comparables sur le plan antigénique et génétique au virus vaccin A/Perth/16/2009. Les vaccins renfermant des antigènes de type A/Perth/16/2009 ont suscité la formation d'anticorps HA avec des titres comparables à ceux dirigés contre le virus vaccin et les virus A (H3N2) ayant récemment circulé.

Une activité de la grippe B a été signalée dans de nombreux pays. Les virus de la lignée B/Victoria/2/87 ont prédominé dans de nombreuses parties du monde mais ceux de la lignée B/Yamagata/16/88 ont prédominé dans le nord de la Chine. La majorité des virus récents de la lignée B/Victoria/2/87 étaient étroitement apparentés sur le plan antigénique et génétique au virus B/Brisbane/60/2008. Les virus de la lignée B/Yamagata/16/88 les plus récents étaient distincts sur le plan antigénique du virus vaccin précédent B/Florida/4/2006 et plus étroitement apparentés aux virus B/Hubei-Wujiagang/158/2009, B/Wisconsin/1/2010 et B/Sichuan-Anyue/139/2011. Les vaccins actuels renfermant des antigènes du virus B/Brisbane/60/2008 ont suscité la formation d'anticorps HA contre les virus vaccins avec des titres analogues à ceux obtenus contre les virus récents de la lignée B/Victoria/2/87; cependant, ces titres étaient inférieurs à ceux obtenus contre les virus récents de la lignée B/Yamagata/16/88.

It is expected that A(H1N1)pdm09, A(H3N2) and B viruses will co-circulate in the 2012 southern hemisphere season.

Candidate influenza vaccine viruses that are available or under development and reagents for vaccine standardization, including those for this recommendation, are listed on the WHO website.[1] Candidate vaccine viruses for the B/Yamagata/16/88 lineage, A(H5N1) and A(H9N2) viruses are also listed on the same website.

It is recommended that the following viruses be used for influenza vaccines in the 2012 influenza season (southern hemisphere):

– an A/California/7/2009 (H1N1)pdm09-like virus;

– an A/Perth/16/2009 (H3N2)-like virus;

– a B/Brisbane/60/2008-like virus.

As in previous years, national or regional authorities approve the composition and formulation of vaccines used in each country. National public health authorities are responsible for making recommendations regarding the use of the vaccine. WHO has published recommendations on the prevention of influenza.[4]

Candidate vaccine viruses (including reassortants) and reagents for use in the laboratory standardization of inactivated vaccine may be obtained from:

(i) Immunobiology, Office of Laboratory and Scientific Services, Monitoring and Compliance Group, Therapeutic Goods Administration, P.O. Box 100, Woden ACT, 2606 Australia (fax: +61 2 6232 8564, email: influenza.standards@tga.gov.au; web site: http://www.tga.gov.au);

(ii) Division of Virology, National Institute for Biological Standards and Control, Health Protection Agency, Blanche Lane, South Mimms, Potters Bar, Hertfordshire, EN6 3QG UK (fax: +44 1707 641050, e-mail: enquiries@nibsc.hpa.org.uk, web site:http://www.nibsc.ac.uk/spotlight/influenza_resource_centre/reagents.aspx);

(iii) Division of Product Quality, Center for Biologics Evaluation and Research, Food and Drug Administration, 1401 Rockville Pike, Rockville, MD 20892, United States (fax: +1 301 480 9748);

(iv) Center for Influenza Virus Research, National Institute of Infectious Diseases, Gakuen 4-7-1, Musashi-Murayama, Tokyo 208-0011, Japan (fax: +81 42 561 6156).

Requests for reference viruses for antigenic analysis should be addressed to:

(i) WHO Collaborating Centre for Reference and Research on Influenza, VIDRL, 10 Wreckyn Street, North Melbourne, Victoria 3051, Australia (fax: +61 3 9342 3939, web site: http://www.influenzacentre.org);

[4] See No. 28, 2002, pp. 230–239.

On s'attend à ce que les virus A (H1N1)pdm09, A (H3N2) et B circulent en même temps dans l'hémisphère Sud au cours de la saison 2012.

Les virus vaccins grippaux candidats qui sont disponibles ou à l'étude et les réactifs destinés à la standardisation du vaccin peuvent être trouvés sur le site Web de l'OMS.[1] Ce site renferme des informations sur les virus vaccins candidats correspondant à la recommandation ci-dessus. En outre, les virus vaccins candidats pour la lignée B/Yamagata/16/88 ainsi que les virus grippaux A (H5N1) et A (H3N2) figurent également sur ce même site Web.

Il est recommandé d'utiliser les virus suivants pour les vaccins au cours de la saison grippale 2012 (hémisphère Sud):

– un virus de type A/California/7/2009 (H1N1);

– un virus de type A/Perth/16/2009 (H3N2);

– un virus de type B/Brisbane/60/2008.

Comme lors des années précédentes, les autorités nationales de contrôle devront approuver la composition et la formulation des vaccins utilisés dans chaque pays. Les autorités nationales de santé publique sont chargées de la formulation des recommandations relatives à l'utilisation des vaccins. L'OMS a publié des recommandations relatives à la prévention de la grippe.[4]

Les virus vaccins candidats (y compris réassortis) et les réactifs nécessaires à la standardisation en laboratoire du vaccin inactivé peuvent être obtenus auprès des organismes suivants:

i) Immunobiology, Office of Laboratory and Scientific Services, Monitoring and Compliance Group, Therapeutic Goods Administration, P.O. Box 100, Woden ACT, 2606 Australie (télécopie: +61 2 6232 8564, courriel: influenza.standards@tga.gov.au; site Web: http://www.tga.gov.au);

ii) Division of Virology, National Institute for Biological Standards and Control, Health Protection Agency, Blanche Lane, South Mimms, Potters Bar, Hertfordshire, EN6 3QG, Royaume-Uni (télécopie: +44 1707 641050, courriel: enquiries@nibsc.hpa.org.uk, site Web: http://www.nibsc.ac.uk/spotlight/influenza_resource_centre/reagents.aspx);

iii) Division of Product Quality, Center for Biologics Evaluation and Research, Food and Drug Administration, 1401 Rockville Pike, Rockville, MD 20892, États-Unis (télécopie: +1 301 480 9748);

iv) Centre de Recherche sur le Virus grippal, Institut national des Maladies infectieuses, Gakuen 4-7-1, Musashi-Murayama, Tokyo 208 0011, Japon (télécopie: +81 42 561 6156).

Les souches de référence nécessaires à l'analyse antigénique peuvent être obtenues en s'adressant au:

i) WHO Collaborating Centre for Reference and Research on Influenza, VIDRL, 10 Wreckyn Street, North Melbourne, Victoria 3051, Australie (télécopie: +61 3 9342 3939, site Web: http://www.influenzacentre.org);

[4] Voir N° 28, 2002, pp. 30-39.

(ii) WHO Collaborating Centre for Reference and Research on Influenza, National Institute of Infectious Diseases, Gakuen 4-7-1, Musashi-Murayama, Tokyo 208-0011, Japan (fax: +81 42 561 6149 or +81 42 565 2498, web site: http://www.nih.go.jp/niid/index.html);

(iii) WHO Collaborating Center for Surveillance, Epidemiology and Control of Influenza, Centers for Disease Control and Prevention, 1600 Clifton Road, Mail Stop G16, Atlanta, GA 30333, United States (fax: +1 404 639 0080, web site: http://www.cdc.gov/flu/);

(iv) WHO Collaborating Centre for Reference and Research on Influenza, MRC National Institute for Medical Research, The Ridgeway, Mill Hill, London NW7 1AA, UK (fax: +44 208 906 4477, web site: http://www.nimr.mrc.ac.uk/wic/);

(v) WHO Collaborating Center for Reference and Research on Influenza, National Institute for Viral Disease Control and Prevention, China CDC, 155 Changbai Road, Changping District, 102206, Beijing, P.R. China. (tel:+8610 58900851, fax: +8610 58900851, email: whoccchina@cnic.org.cn, website: http://www.cnic.org.cn/eng/).

Influenza surveillance information is updated on the WHO web site.[5] ■

[5] See http://www.who.int/influenza/en/; accessed October 2011.

ii) au centre collaborateur OMS de référence et de recherche pour la grippe, Institut national des Maladies infectieuses, Gakuen 4-7-1, Musashi-Murayama, Tokyo 208-0011, Japon (télécopie: 81 42 561 6149 or +81 42 565 2498, site Web: http://www.nih.go.jp/niid/index.html);

iii) au WHO Collaborating Center for Surveillance, Epidemiology and Control of Influenza, Centers for Disease Control and Prevention, 1600 Clifton Road, Mail Stop G16, Atlanta, GA 30333, États-Unis (télécopie: +1 404 639 0080, site Web: http://www.cdc.gov/flu/);

iv) au WHO Collaborating Centre for Reference and Research on Influenza, MRC National Institute for Medical Research, The Ridgeway, Mill Hill, London NW7 1AA, Royaume-Uni (télécopie: +44 208 906 4477, site Web: http://www.nimr.mrc.ac.uk/wic/);

v) ou au centre collaborateur OMS de référence et de recherche pour la grippe, Institut national de Lutte contre les Maladies virales, Chine CDC, 155 route de Changbai, district de Changping, 102206, Beijing, République populaire de Chine (tél.: +8610 58900851, télécopie: +8610 58900851, courriel: whocc-china@cnic.org.cn, site Web: http://www.cnic.org.cn/eng/).

Les informations relatives à la surveillance de la grippe sont mises à jour sur le site Web de l'OMS.[5] ■

[5] Voir http://www.who.int/influenza/en; consulté en octobre 2011.

How to obtain the WER through the Internet

(1) WHO WWW SERVER: Use WWW navigation software to connect to the WER pages at the following address: **http://www.who.int/wer/**

(2) An e-mail subscription service exists, which provides by electronic mail the table of contents of the WER, together with other short epidemiological bulletins. To subscribe, send a message to **listserv@who.int**. The subject field should be left blank and the body of the message should contain only the line subscribe wer-reh. A request for confirmation will be sent in reply.

Comment accéder au REH sur Internet?

1) Par le serveur Web de l'OMS: A l'aide de votre logiciel de navigation WWW, connectez-vous à la page d'accueil du REH à l'adresse suivante: **http://www.who.int/wer/**

2) Il existe également un service d'abonnement permettant de recevoir chaque semaine par courrier électronique la table des matières du REH ainsi que d'autres bulletins épidémiologiques. Pour vous abonner, merci d'envoyer un message à **listserv@who**.int en laissant vide le champ du sujet. Le texte lui même ne devra contenir que la phrase suivante: subscribe wer-reh.

WWW access • **http://www.who.int/wer**
E-mail • send message **subscribe wer-reh** to **listserv@who.int**
Fax: (+4122) 791 48 21/791 42 85
Contact: wantzc@who.int/wer@who.int

Accès WWW • **http://www.who.int/wer**
Courrier électronique • envoyer message **subscribe wer-reh à listserv@who.int**
Fax: +41-(0)22 791 48 21/791 42 85
Contact: wantzc@who.int/wer@who.int