Influenza Updates

The newsletter of the WHO Collaborating Centre for Reference and Research on Influenza in Melbourne

@WHOCCFluMelb

Volume 11, Issue 3, December 2022

Reflection on 2022: Thank you, and Happy Holidays

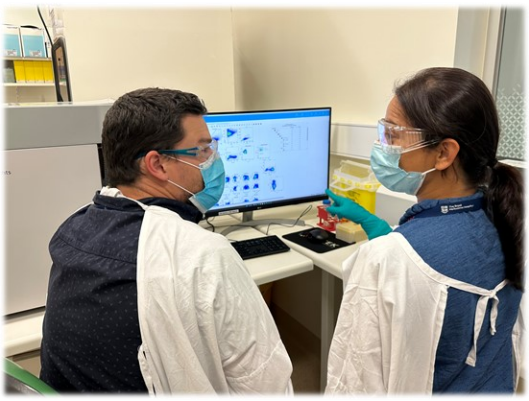
As the year draws to a close, we would like to thank all of the laboratories that sent us influenza samples in 2022.

It has been an exceptionally busy year for influenza around the world, due in part to the easing of restrictions on travel and other measures that have been in place for the COVID-19 pandemic.

The Centre continued to receive more influenza samples than usual and the other CCs had a similar experience. The Centre staff put in a lot of hard work and kept the Centre running through an unprecedented busy period. They have once again earned a big thank you- what a wonderful team effort!

We are now turning our attention to the Northern Hemisphere winter and, with your help, will continue to monitor influenza activity. The February 2023 vaccine composition meeting will be held in Geneva, Switzerland.

We wish you all the very best for the holiday season and look forward to working with you again in 2023.



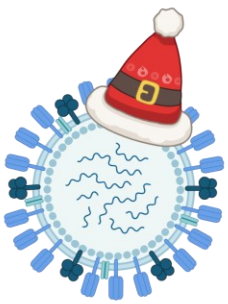


Image made with Biorender.com

WHO Collaborating Centre for Reference and Research on Influenza
VIDRL

Doherty Institute
The University of Melbourne
The Royal Melbourne Hospital

A joint venture between The University of Melbourne and The Royal Melbourne Hospital

WHO Shipping Fund Project reminder

In anticipation of the WHO Consultation on the Composition of Influenza Vaccines for the Northern Hemisphere 2023-2024, which will be held in February 2023, this is a reminder that the WHO Shipping Fund Project (SFP) is available to assist National Influenza Centres in shipping samples to WHO Collaborating Centres up to four times per year.

The recommended timing of these shipments is:

- One between the end of December to mid-January and one between the end of June and mid-August, to support the WHO vaccine composition recommendation-making for each hemisphere;
- The third and fourth shipments can be used at your own judgement, which may depend on the seasonality, intensity of the season, the finding of unusual or untypable viruses, or notable outbreaks.

If you have any questions about shipping samples or would like information about accessing the WHO Shipping Fund, please contact us at whoflu@influenzacentre.org.

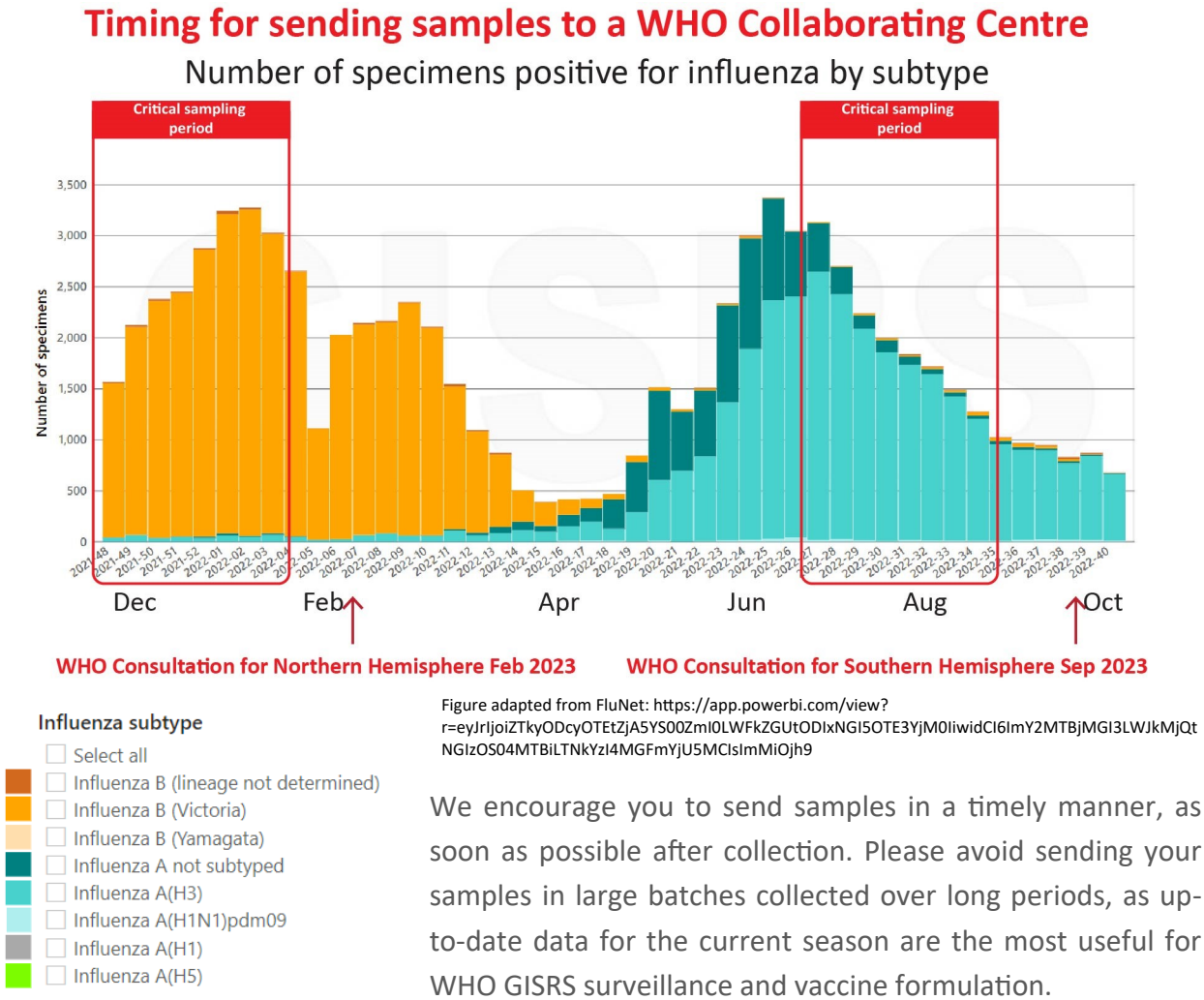


Figure adapted from FluNet: https://app.powerbi.com/view?r=eyJrIjoiZTkyODcyOTEtZjA5YS00ZmI0LWFkZGUtODIxNGI5OTE3YjM0IiwidCI6ImY2MTBjMGI3LWJkMjQtNGIzOS04MTBiLTNkYzI4MGFmYjU5MCIsImMiOjh9

We encourage you to send samples in a timely manner, as soon as possible after collection. Please avoid sending your samples in large batches collected over long periods, as up-to-date data for the current season are the most useful for WHO GISRS surveillance and vaccine formulation.

Please note that the Centre will be closed between Saturday the 24th of December to Monday the 2nd of January. Please ensure that all samples are received by us no later than Tuesday the 20th of December.

Featured Research Article

'SARS-CoV-2 Omicron BA.1 Challenge after Ancestral or Delta Infection in Mice'

Featuring former Senior Scientist for the Antiviral group Mariana Baz, Nikita Deshpande, and Centre Director Kanta Subbarao

SARS-CoV-2 Omicron BA.1 Challenge after Ancestral or Delta Infection in Mice

Mariana Baz, Nikita Deshpande, Charlie Mackenzie-Kludas, Francesca Mordant, Danielle Anderson, Kanta Subbarao

Author affiliations: World Health Organization Collaborating Centre for Reference and Research on Influenza, Melbourne, Victoria, Australia (M. Baz, N. Deshpande, K. Subbarao); University of Melbourne Peter Doherty Institute for Infection and Immunity, Melbourne (C. Mackenzie-Kludas, F. Mordant, D. Anderson, K. Subbarao); Victorian Infectious Diseases Reference Laboratory, Melbourne (D. Anderson)

DOI: https://doi.org/10.3201/eid2811.220718

Published in November, this research letter assessed the cross-reactivity of neutralising antibodies elicited by ancestral, Delta, and Omicron BA.1 against BA.1, BA.2, and BA.5 SARS-CoV-2 during infection in mice.

Primary infection elicited homologous antibodies with poor cross-reactivity to Omicron strains. This pattern remained after BA.1 challenge, although ancestral– and Delta-infected mice were protected from BA.1 infection.

Baz M, Deshpande N, Mackenzie-Kludas C, Mordant F, Anderson D, Subbarao K. SARS-CoV-2 Omicron BA.1 Challenge after Ancestral or Delta Infection in Mice. Emerg Infect Dis. 2022 Nov;28(11):2352-2355. doi: 10.3201/eid2811.220718. PubMed Link.

Detection of influenza in managed quarantine in Australia and the estimated risk of importation

Clinical Infectious Diseases

MAJOR ARTICLE

IDSA Infectious Diseases Society of America | hivma hiv medicine association | OXFORD

Detection of Influenza in Managed Quarantine in Australia and the Estimated Risk of Importation

Heidi Peck,[1,0] Nithila Anbumurali,[2] Kimberley McMahon,[3] Kevin Freeman,[4] Ammar Aziz,[1] Leah Gillespie,[1] Bingyi Yang,[5] Jean Moselen,[1] Yi-Mo Deng,[1] Benjamin J. Cowling,[5,6] Ian G. Barr,[1,7] Kanta Subbarao,[1] and Sheena G. Sullivan[1,2]

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Featuring Head of Serology Heidi Peck and many others from the Centre

Currently available online ahead of print, this article described the surveillance efforts for influenza during the 2020/2021 travel restrictions in Australia. Quarantine measures in place at the time meant the community influenza outbreak risk from these returned travellers was near zero. However, surveillance efforts enabled the development of the A(H3N2) vaccine seed viruses included in the 2022 Southern Hemisphere influenza vaccine, during a time when community transmission was extremely low.

Findings from this study highlight that surveillance testing of quarantined returned travellers is important to better inform public health preparedness.

Peck H, Anbumurali N, McMahon K, Freeman K, Aziz A, Gillespie L, Yang B, Moselen J, Deng YM, Cowling BJ, Barr IG, Subbarao K, Sullivan SG. Detection of influenza in managed quarantine in Australia and the estimated risk of importation. Clin Infect Dis. 2022 Aug 12:ciac648. doi: 10.1093/cid/ciac648. PubMed Link

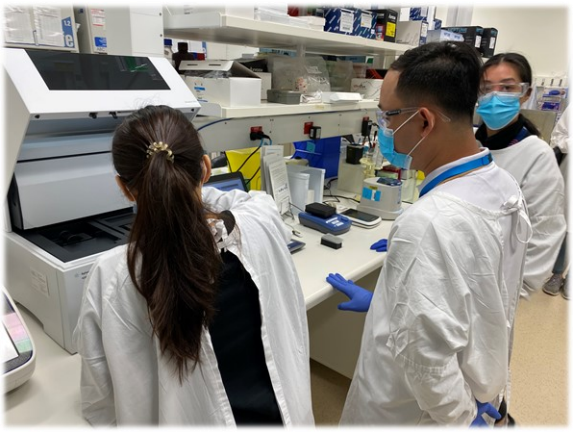
Training at the Centre

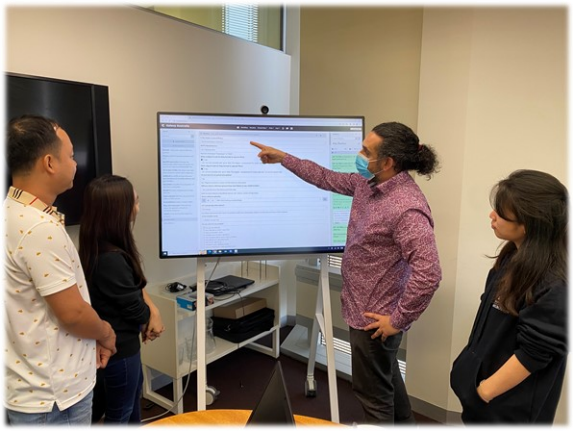
The Centre recently held the first on-site training workshop for visiting scientists since before the COVID-19 pandemic.

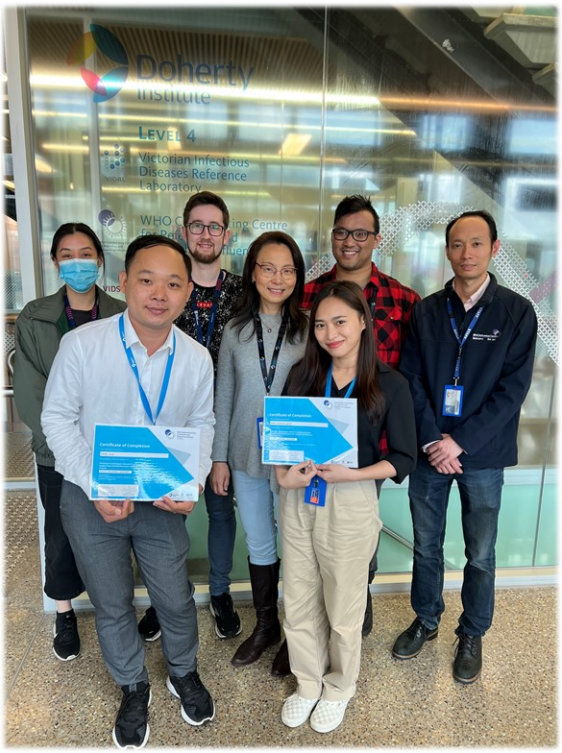
We welcomed Sarath Sin and Sophoannadedh Rath from Institut Pasteur in Phnom Penh, Cambodia, and Sreng Panha, Visal Chhe, and Phally Phan from the National Institute of Public Health, Phnom Penh, Cambodia, from 3-14 October for a two week training program.

During their time at the Centre, Sarath, Sreng, and Phally undertook training in detecting and characterising influenza virus in clinical samples and virus isolates, as well as techniques in genetic analysis. Meanwhile, Sophoannadedh and Visal undertook training in whole genome sequencing and bioinformatic analysis of influenza viruses.

We hope the skills gained from this training stands everyone in good stead.





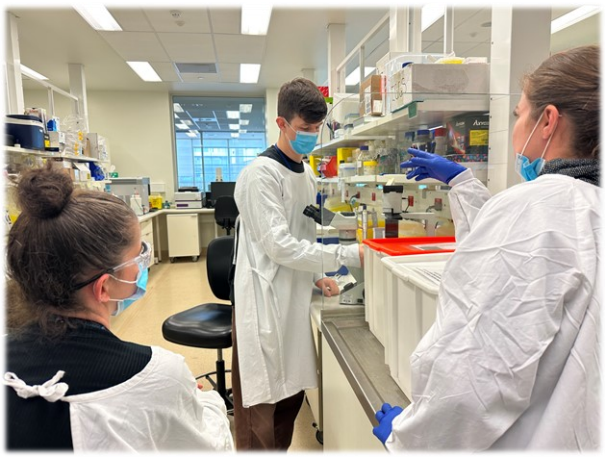


Training at the Centre continued

We also welcomed Bryden Bird from the Institute of Environmental Science and Research, New Zealand, from 7-21 November for a two week training program.

He underwent training for virus isolation and culture techniques, as well as routine serology techniques for both influenza virus and RSV. We hope the skills gained from this training will be useful for his future work.

Thank you to all Centre staff who took part in facilitating these training programs.



Upcoming Conferences

Asia-Pacific Vaccine and Immunotherapy Congress (APVIC) 2023

26-28 April 2023, Brisbane, Australia

This conference will bring together experts from a wide range of areas, including immunology, clinical trials, cellular and gene therapies, vaccine manufacturing, immuno-oncology, drug development, and many more.

For more information on the event, click here.

Recent activities at the Centre (1 January— 30 November 2022)

Below is a summary of surveillance activities at the Centre during this current reporting period. The Southern Hemisphere influenza season in 2022 has been especially busy for us, with high levels of influenza cases in Australia. We have received and processed an unprecedented number of samples this year, with further isolation and characterisation of samples still underway.

Samples received:

The Centre received 12,059 influenza samples from the laboratories and institutions listed below during the period 1 January — 30 November 2022.

AUSTRALIA: Canberra Hospital, John Hunter Hospital, 4Cyte Pathology, The Children's Hospital at Westmead, Prince of Wales Hospital, Westmead Hospital, Royal Darwin Hospital, Pathology Queensland (Cairns), Queensland Children's Hospital, Queensland Health Forensic and Scientific Services (QHFSS), SA Pathology, Hobart Pathology, Royal Hobart Hospital, Australian Clinical Labs (Geelong), Alfred Hospital, Australian Clinical Labs, Austin Pathology, Box Hill Hospital, Dorevitch Pathology (Heidelberg), Eastern Health Pathology, Melbourne Pathology, Monash Medical Centre, Royal Children's Hospital Molecular Microbiology Department (Bio21), Royal Children's Hospital, Royal Melbourne Hospital, St Vincent's Hospital, VIDRL, PathWest QEII Medical Centre

BRUNEI: RIPAS Hospital

CAMBODIA: Institut Pasteur du Cambodge

FIJI: Center for Communicable Disease Control

INDIA: National Institute of Virology

MALAYSIA: Institute for Medical Research

NEW CALEDONIA: Centre Hospitalier de Nouvelle Calédonie

NEW ZEALAND: Institute of Environmental Science and Research

PHILIPPINES: Research Institute for Tropical Medicine

SINGAPORE: National Public Health Laboratory

SOUTH AFRICA: National Institute for Communicable Diseases

SRI LANKA: Medical Research Institute

THAILAND: Thai National Influenza Center

TIMOR-LESTE: Laboratório Nacional de Saúde

TUVALU: Princess Margaret Hospital

VANUATU: Vila Central Hospital Laboratory Department

Isolation of viruses in eggs:

The Centre undertakes primary isolation of selected viruses in eggs to obtain potential vaccine strains. From 1 January — 30 November 2022, 12 A(H1N1)pdm09 and 12 A(H3N2) viruses were successfully isolated in eggs at the Centre.

Recent activities at the Centre (1 January— 30 November 2022) continued

Antigenic analysis
3534 viruses analysed by haemagglutination inhibition (HI) assay

Antiviral drug susceptibility
2841 viruses analysed by neuraminidase inhibition (NAI) assay

Sequencing
1782 viruses analysed
1762 HA genes
1725 NA genes
1663 MP genes
779 NS genes

Country of submitting laboratory	No. of viruses analysed by HI assay*					No. of viruses tested by NAI assay*				No. of viruses sequenced by NGS or Sanger sequencing		
	A(H1N1)pdm09	A(H3N2)	A unsubtyped	B lineage undetermined	B/Victoria	A(H1N1)pdm09	A(H3N2)	B lineage undetermined	B/Victoria	A(H1N1)pdm09	A(H3N2)	B/Victoria
Australia	642	2299		6	14	549	1689		7	439	934	5
Brunei		23	1								9	
Cambodia		11			1						11	
Fiji		21					21				30	
India	17	14			17	17	14		17	16	8	10
Malaysia		50					89				15	
New Caledonia		44					43				39	
New Zealand	4	101				4	144			3	79	
Philippines	2	17			3	2	1			2	17	3
Singapore		46		1	28		44	1	28		1	
South Africa	36	14			4	37	14		4	33	14	4
Sri Lanka											6	1
Thailand		9					9				9	
Timor-Leste		65			32		64		26		63	19
Vanuatu		12									12	
Total	**701**	**2726**	**1**	**7**	**9**	**609**	**2146**	**1**	**85**	**493**	**1247**	**42**

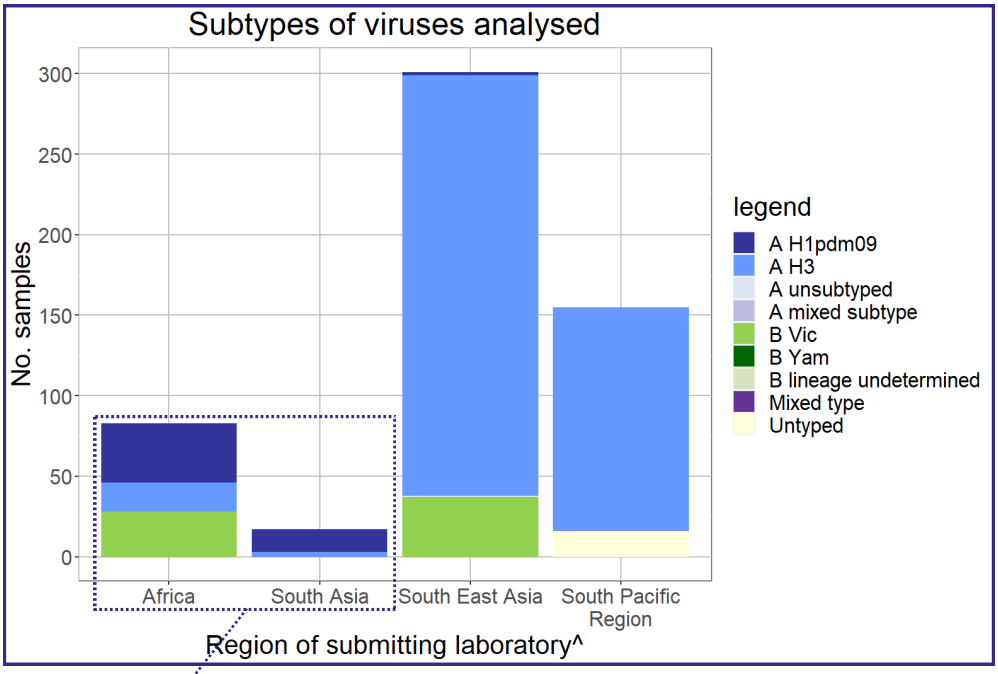
* *Subtypes and lineages are based on analysis of HA and in some cases confirmed by genetic analysis of NA.*

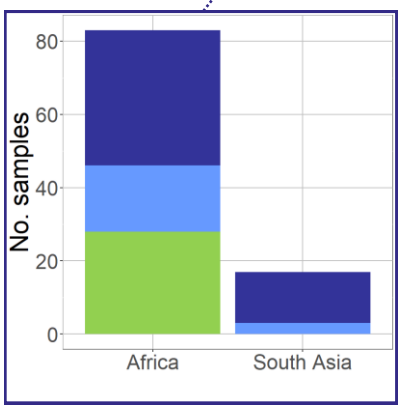
Surveillance update: Virus activity 1 January — 30 November 2022

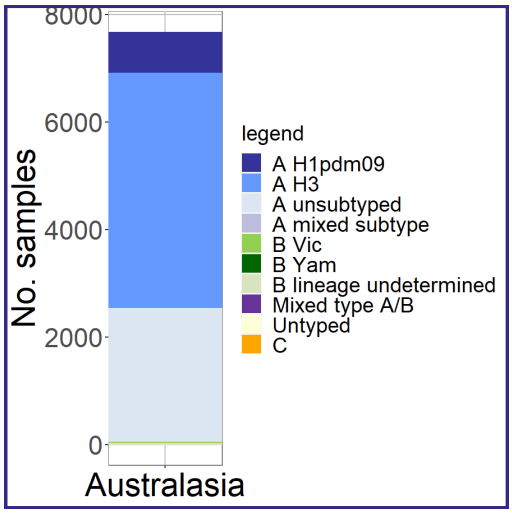
The data below are results for viruses collected or sampled between 1 January and 30 November 2022 that have been analysed at the Centre as of 2 December 2022.

Virus types/subtypes*
The type and subtype/lineage of 8236 viruses have been determined.

10.0% A(H1N1)pdm09
58.2% A(H3N2)
0.9% B/Victoria





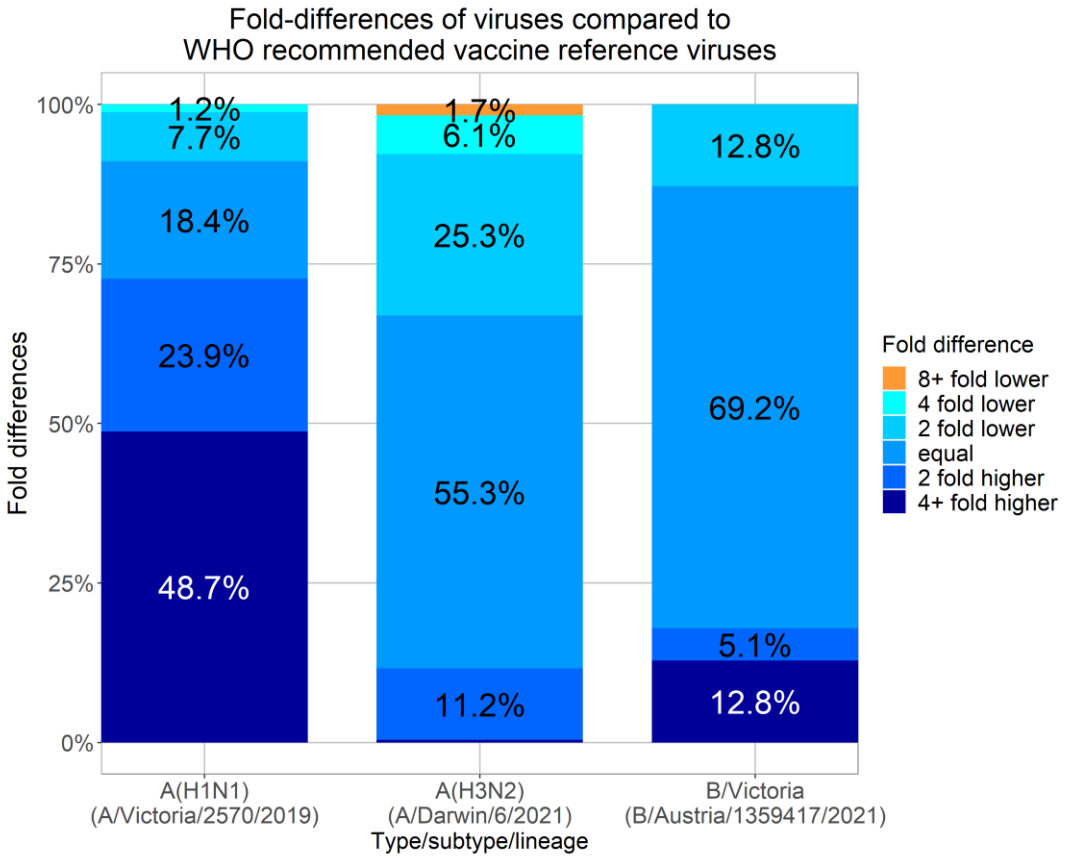


**Subtypes and lineages are based on analysis of the HA and in some cases confirmed by genetic analysis of NA.*
^The Pacific region comprises countries in Polynesia, Melanesia, and Micronesia.

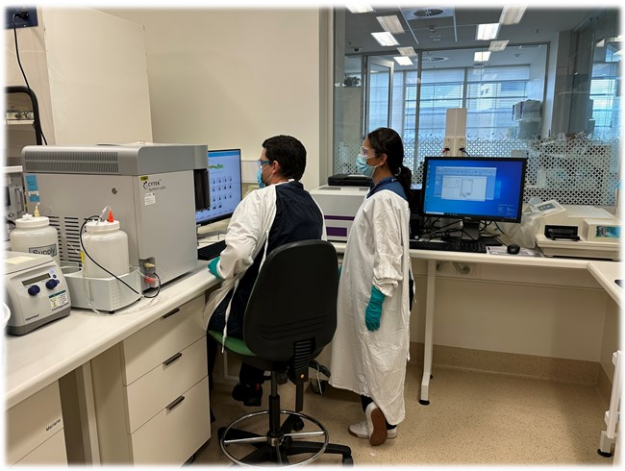
Antigenic analysis*

A total of 3150 viruses were tested using the haemagglutination inhibition (HI) assay.

Viruses were identified as low-reactors if their titre with reference antiserum was at least 8-fold lower than the titre of the reference virus. The vast majority of A(H1N1)pdm09, A(H3N2), and B/Victoria lineage viruses were antigenically similar to their respective reference viruses.



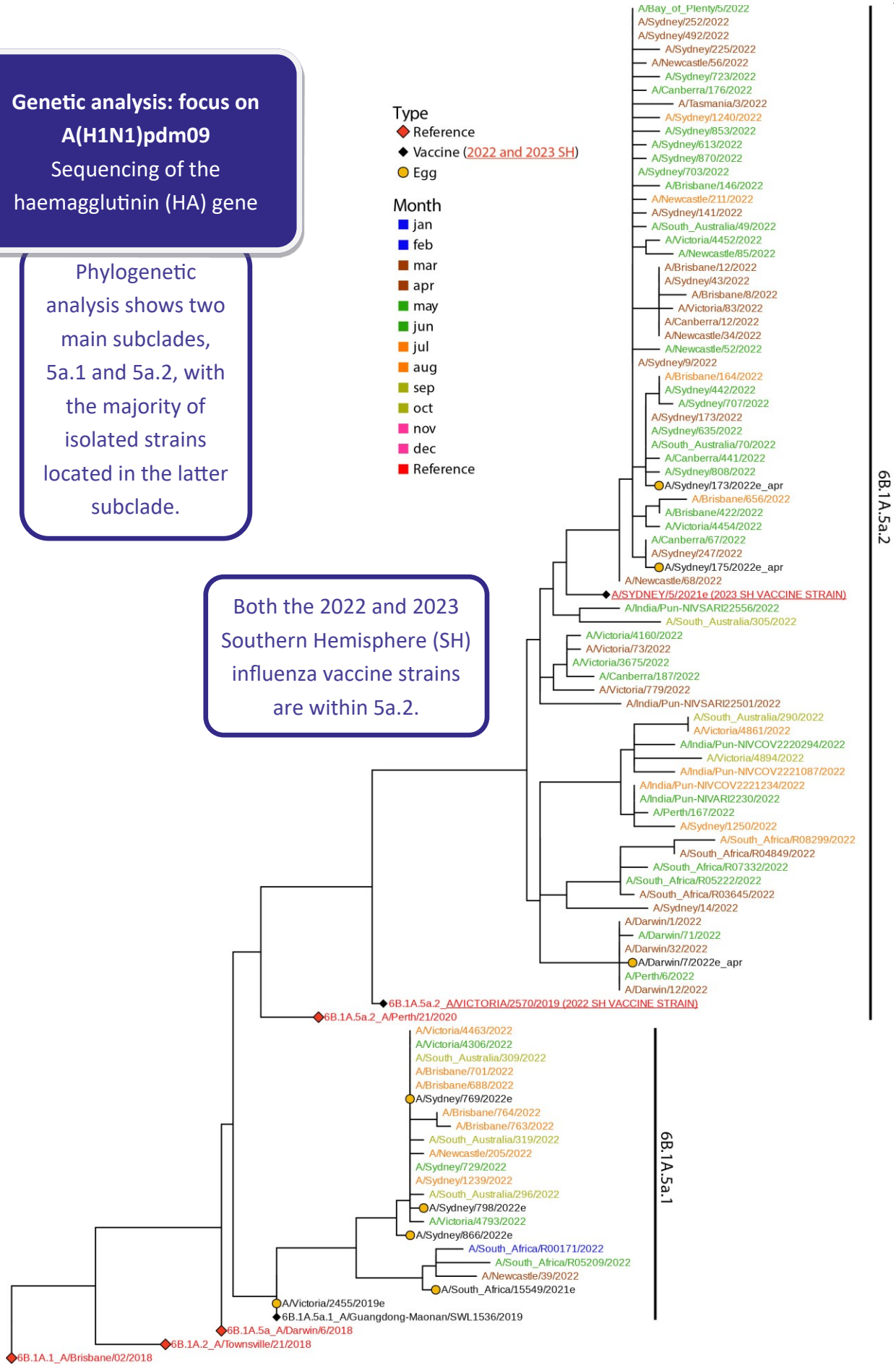
* *Subtypes and lineages are based on analysis of the HA and in some cases confirmed by genetic analysis of NA.*



Genetic analysis: focus on A(H1N1)pdm09
Sequencing of the haemagglutinin (HA) gene

Phylogenetic analysis shows two main subclades, 5a.1 and 5a.2, with the majority of isolated strains located in the latter subclade.

Both the 2022 and 2023 Southern Hemisphere (SH) influenza vaccine strains are within 5a.2.



Surveillance update: Virus activity 1 January — 30 November 2022 continued

Antiviral drug susceptibility testing:
2724 viruses tested by neuraminidase inhibition (NAI) assay

Testing for susceptibility to the antiviral drugs oseltamivir (Tamiflu), zanamivir (Relenza), peramivir, and laninamivir showed that no viruses had highly reduced inhibition by one or more neuraminidase inhibitors (NAI).

Type/ subtype/ lineage	Oseltamivir		Peramivir		Laninamivir		Zanamivir	
	Normal inhibition	Reduced inhibition / Highly reduced Inhibition	Normal inhibition	Reduced inhibition / Highly reduced Inhibition	Normal inhibition	Reduced inhibition / Highly reduced Inhibition	Normal inhibition	Reduced inhibition / Highly reduced Inhibition
A(H1N1) pdm09	598	2	598	2	600		600	
A(H3N2)	2084		2084		2084		2084	
B/Victoria	40		40		40		40	
Total	**2722**	**2**	**2722**	**2**	**2724**		**2724**	

Viruses with reduced inhibition by antiviral drugs in the NAI assay undergo genetic analysis of the neuraminidase gene to detect mutations associated with the functional change. The relationship between reduced inhibition and the clinical effectiveness of a neuraminidase inhibitor is not well understood. Further studies would be required to determine whether a virus with reduced inhibition in the NAI assay is clinically resistant.

Viruses with highly reduced inhibition to one or more NAI

Type/subtype/lineage		Country of submitting laboratory	NAI(s) with highly reduced inhibition (marked with *)			
			Oseltamivir	Peramivir	Laninamivir	Zanamivir
A(H1N1) pdm09	A/Sydney/200/2022	Australia	*	*	Normal	Normal
	A/Sydney/202/2022	Australia	*	*	Normal	Normal

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