Global Health Cast 18

October 25, 2022

Dr. Melvin Sanicas

Prof. Dr. Joe Schmitt

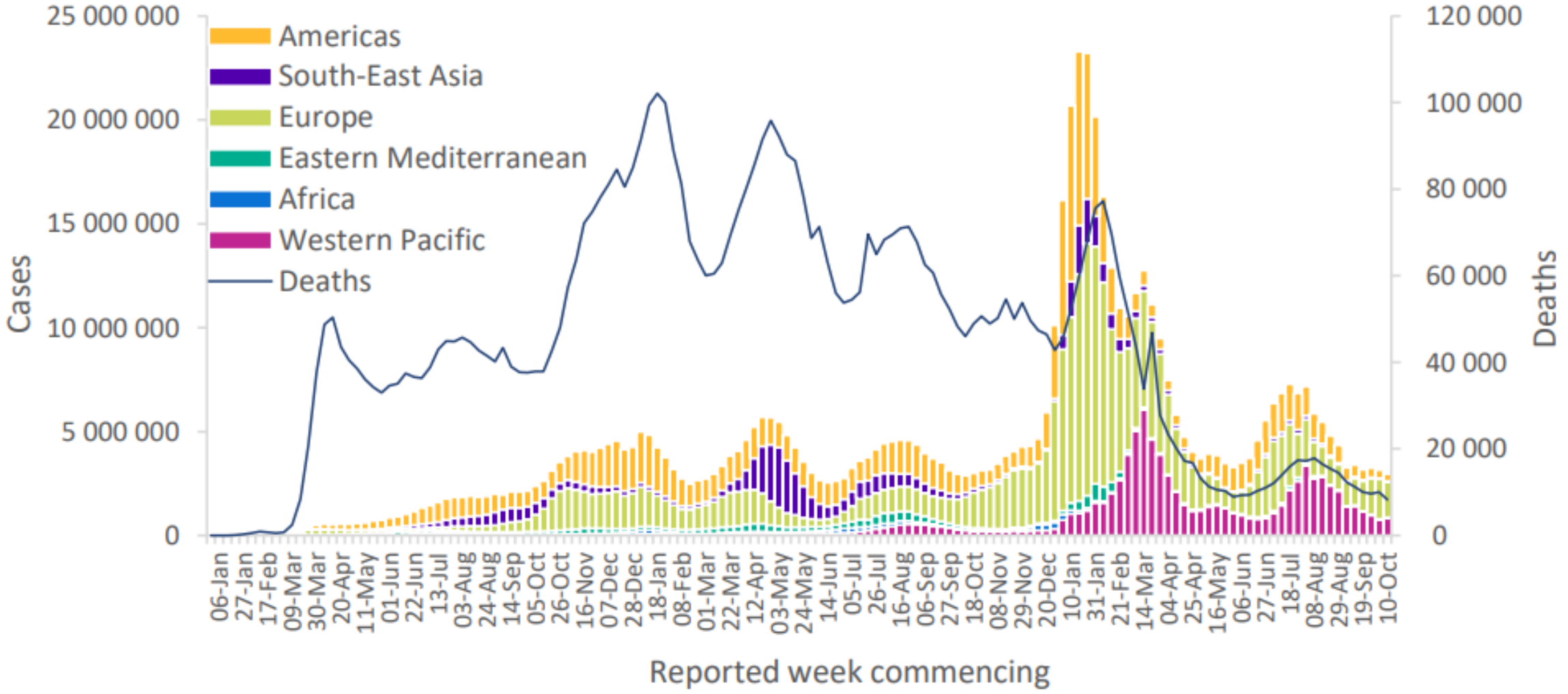
Every Tuesday

12.00 noon - CET

What we talk about today

- COVID-19 update
- Update on SARS-CoV-2 variants / subvariants
- Monkeypox global update
- Immunogenicity and efficacy/effectiveness of the Bavarian Nordic MPX vaccine

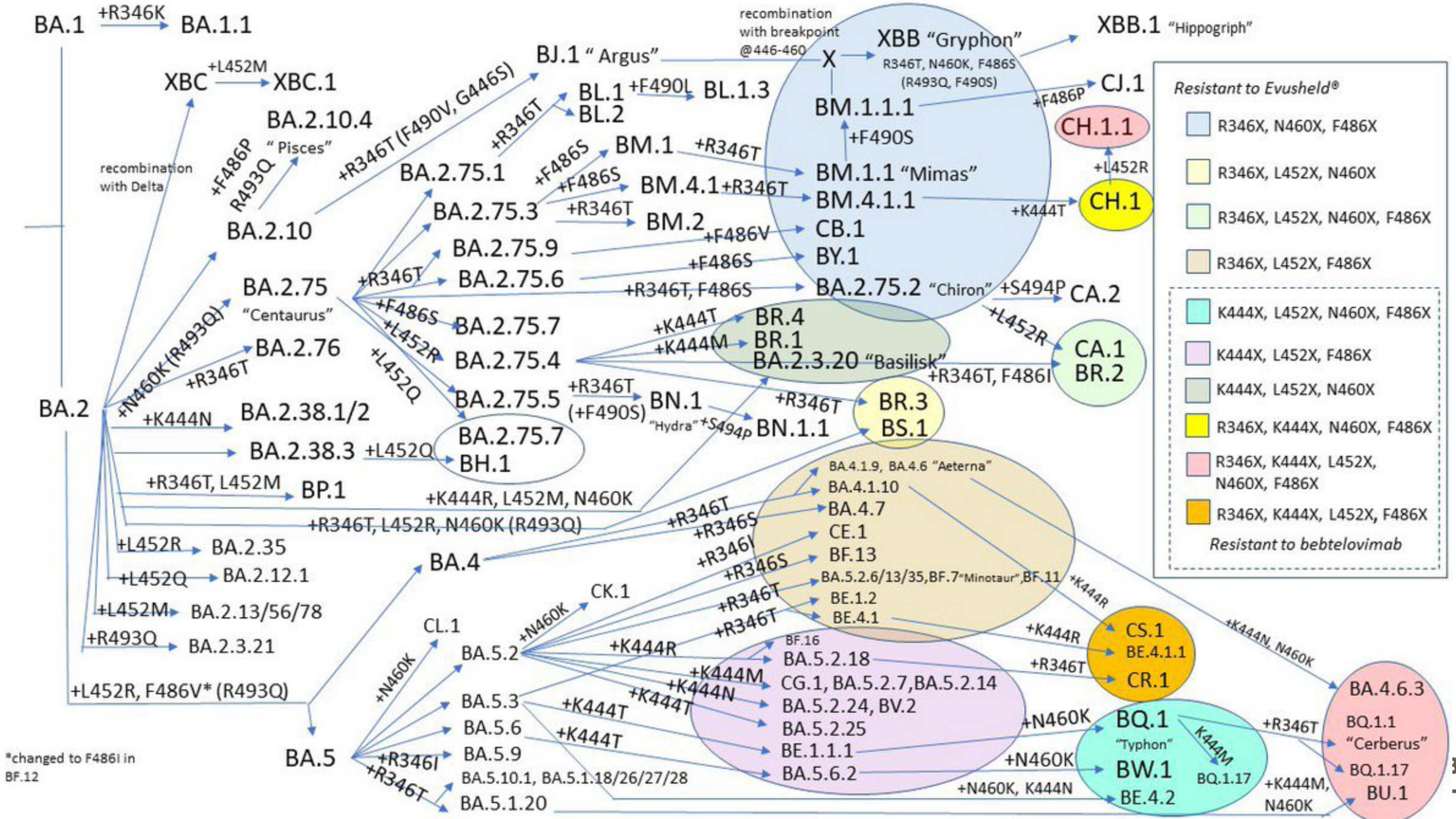
Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 16 October 2022**



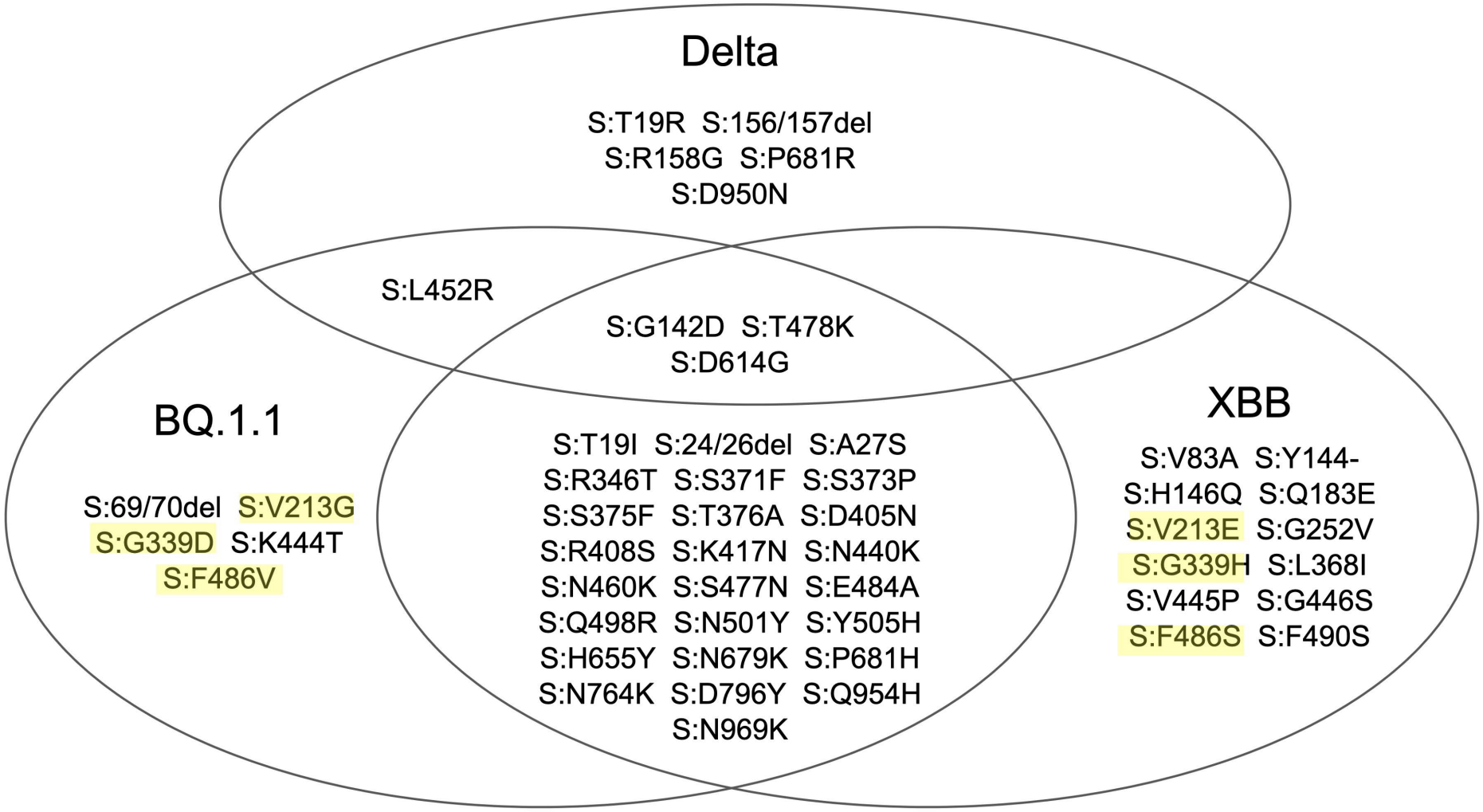
Currently circulating variants of concern (VOCs)

WHO label	Pango lineage•	GISAID clade	Nextstrain clade	Additional amino acid changes monitored°	Earliest document samples
Omicron*	B.1.1.529	GR/484A	21K, 21L, 21M, 22A, 22B, 22C, 22D	+S:R346K +S:L452X +S:F486V	Multiple countries, Nov-2021

* Includes BA.1, BA.2, BA.3, BA.4, BA.5 and descendent lineages. It also includes BA.1/BA.2 circulating recombinant forms such as XE. WHO emphasizes that these descendant lineages should be monitored as distinct lineages by public health authorities and comparative assessments of their virus characteristics should be undertaken.


BA.1
+R346K
BA.1.1
XBC
+L452M
XBC.1
recombination with Delta
BA.2.10.4 " Pisces"
+F486P
R493Q
BA.2.10
+R346T (F490V, G446S)
BJ.1 " Argus"
BL.1
+F490L
BL.1.3
BL.2
+R346T
BA.2.75.1
+F486S
BM.1
+R346T
BM.1.1 "Mimas"
+F486S
BM.4.1
+R346T
BM.4.1.1
BA.2.75.3
+R346T
BM.2
+F486V
CB.1
BA.2.75.9
+F486S
BY.1
BA.2.75
"Centaurus"
+R346T
BA.2.75.6
+R346T, F486S
BA.2.75.2 "Chiron"
+S494P
CA.2
+L452R
CA.1
BR.2
+F486S
BA.2.75.7
+L452R
BA.2.75.4
+K444T
BR.4
+K444M
BR.1
BA.2.3.20 "Basilisk"
+R346T, F486I
+L452Q
BA.2.75.5
+R346T
(+F490S)
BN.1
"Hydra"
+S494P
BN.1.1
+R346T
BR.3
BS.1
+N460K (R493Q)
BA.2.76
+R346T
BA.2
+K444N
BA.2.38.1/2
BA.2.38.3
+L452Q
BA.2.75.7
BH.1
+R346T, L452M
BP.1
+K444R, L452M, N460K
+R346T, L452R, N460K (R493Q)
BA.4
+L452R
BA.2.35
+L452Q
BA.2.12.1
+L452M
BA.2.13/56/78
+R493Q
BA.2.3.21
+L452R, F486V* (R493Q)
BA.5
CL.1
+N460K
CK.1
+N460K
BA.5.2
BA.5.3
BA.5.6
BA.5.9
+R346I
+R346T
BA.5.10.1, BA.5.1.18/26/27/28
BA.5.1.20
+K444R
+K444M
+K444N
+K444T
+K444T
BF.16
BA.5.2.18
CG.1, BA.5.2.7,BA.5.2.14
BA.5.2.24, BV.2
BA.5.2.25
BE.1.1.1
BA.5.6.2
+R346T
+R346S
+R346I
+R346T
+R346T
BA.4.1.9, BA.4.6 "Aeterna"
BA.4.1.10
BA.4.7
CE.1
BF.13
BA.5.2.6/13/35,BF.7"Minotaur",BF.11
BE.1.2
BE.4.1
+K444R
CS.1
BE.4.1.1
CR.1
+R346T
+K444N, N460K
BA.4.6.3
BQ.1.1 "Cerberus"
BQ.1.17
BU.1
+N460K
BQ.1
"Typhon"
BW.1
BE.4.2
K444M
BQ.1.17
+N460K
+N460K, K444N
+R346T
+K444M, N460K
recombination with breakpoint @446-460
X
XBB "Gryphon"
R346T, N460K, F486S
(R493Q, F490S)
XBB.1 "Hippogriph"
BM.1.1.1
+F490S
+F486P
CJ.1
CH.1.1
+L452R
CH.1
+K444T
Resistant to Evusheld®
R346X, N460X, F486X
R346X, L452X, N460X
R346X, L452X, N460X, F486X
R346X, L452X, F486X
K444X, L452X, N460X, F486X
K444X, L452X, F486X
K444X, L452X, N460X
R346X, K444X, N460X, F486X
R346X, K444X, L452X, N460X, F486X
R346X, K444X, L452X, F486X
Resistant to bebtelovimab
*changed to F486I in BF.12

Venn Diagram of Spike Mutations in Delta, BQ.1.1 and XBB



Created by @CorneliusRoemer (Nextstrain) on 2022-10-14 (v1.1)
Data from covSpectrum: https://tinyurl.com/spikevenndata
Available at: https://tinyurl.com/spikevenn under CC BY-SA 4.0

Update on SARS-CoV-2 variants

- XBB is a recombinant variant – it's a combination of two other BA.2 Omicron subvariants (specifically, BA.2.10.1 + BA.2.75).

- As of 17 October 2022, XBB, a BA.2.10.1 and BA.2.75 recombinant with 14 additional mutations in the BA.2 spike protein, has been reported by 26 countries.

- Available preliminary laboratory-based evidence suggests that XBB is the most antibody-evasive SARS-CoV-2 variant identified to date.

- As of 17 October, there have been 233 XBB sequences and 609 sequences of the XBB.1 variant (XBB with additional substitution in spike at the G252V locus) reported on GISAID.

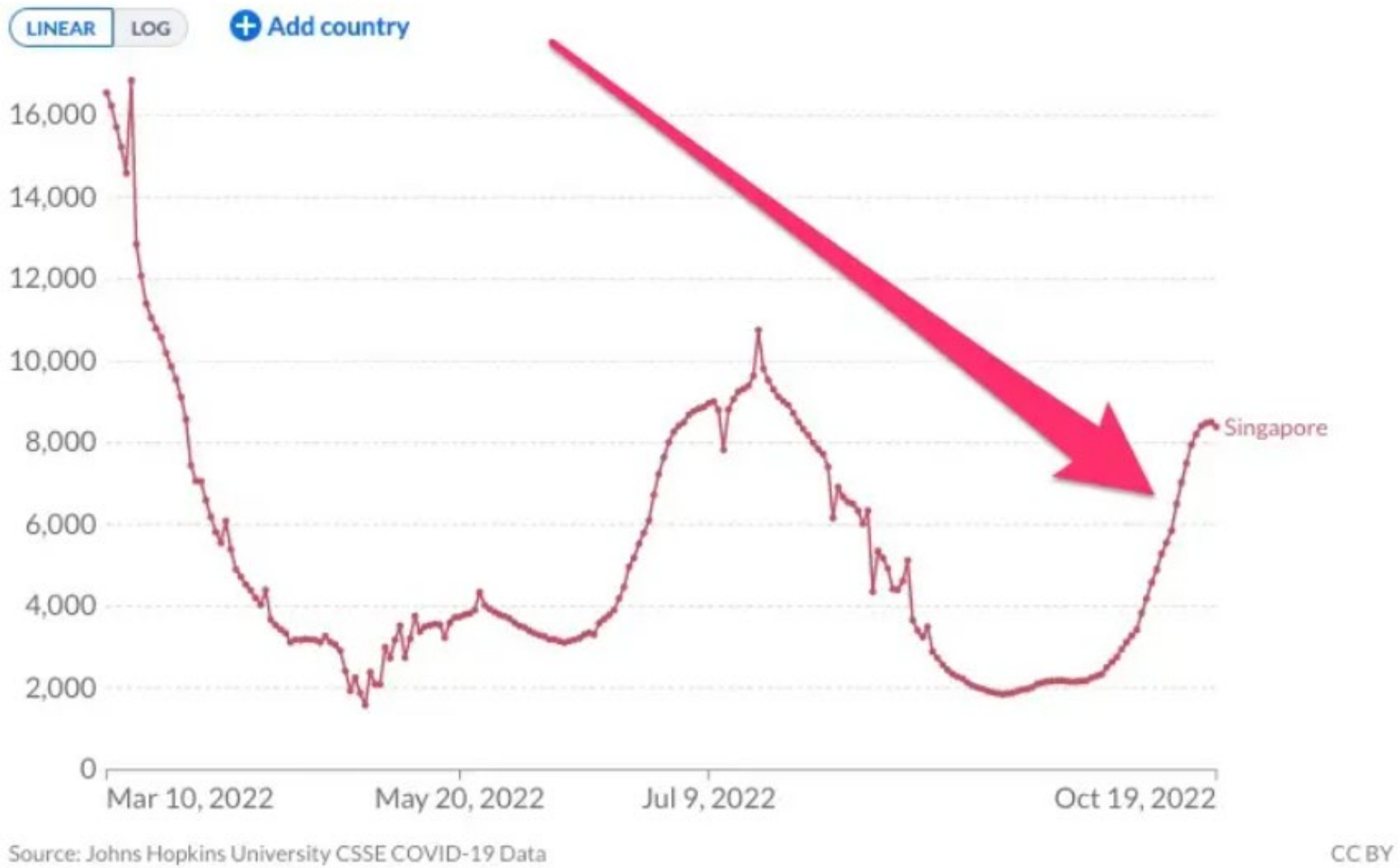
E-CDC on new Variant of Interest (VOI) - BQ1.

- **BQ.1, including its sub-lineages, has been designated as Variant of Interest (VOI) by ECDC as of 20 October 2022**.
- Based on modelling estimates, it is expected that by mid-November to beginning of December 2022, more than 50% of SARS-CoV-2 infections will be due to BQ.1/BQ.1.1. By the beginning of 2023, more than 80% of SARS-CoV-2 cases are expected to be due to BQ.1/BQ.1.1.
- The observed **increase in the growth rate of BQ.1 is probably driven mainly by immune escape**.
- **Based on limited available data, there is no evidence of BQ.1 being associated with a greater infection severity than the circulating variants BA.4/BA.5**.
- Countries should **remain vigilant for signals of BQ.1 emergence** and spread
- **Improving COVID-19 vaccine uptake of the primary course and first booster dose remains a priority** A
- Additional booster dose should also be offered, **prioritising individuals who are at risk of progression to severe disease,** such as older adults (e.g. above 60 years of age), immunocompromised individuals and those with underlying medical conditions, and pregnant women. Residents and staff in long-term care facilities, as well as healthcare workers should also be considered among priority groups.

GLOBAL HEALTH PRESS

Spread of the SARS-CoV-2 Omicron variant sub-lineage BQ.1 in the EU/EEA (europa.eu) (2022-10-25)

COVID-19 cases in Singapore increased because of XBB



Higher risk in those who never had COVID-19 or COVID vaccine

No severe cases or deaths linked to XBB so far

Current and highest number of cases in general wards, those requiring oxygen supplementation and in intensive care units in previous waves

	Oct 14	Peak of Delta wave	Peak of Omicron (BA. 1/2 wave)
Cases in general wards	509	1,352	1,442
Cases requiring oxygen supplementation	**44**	**308**	**242**
Cases in ICUs	**9**	**171**	**54**

SOURCE: Ministry of Health

Higher infection risk during XBB wave for those who've never caught Covid-19

Reinfection rates, infection by previous variant, time from previous infection (Oct 1-14)

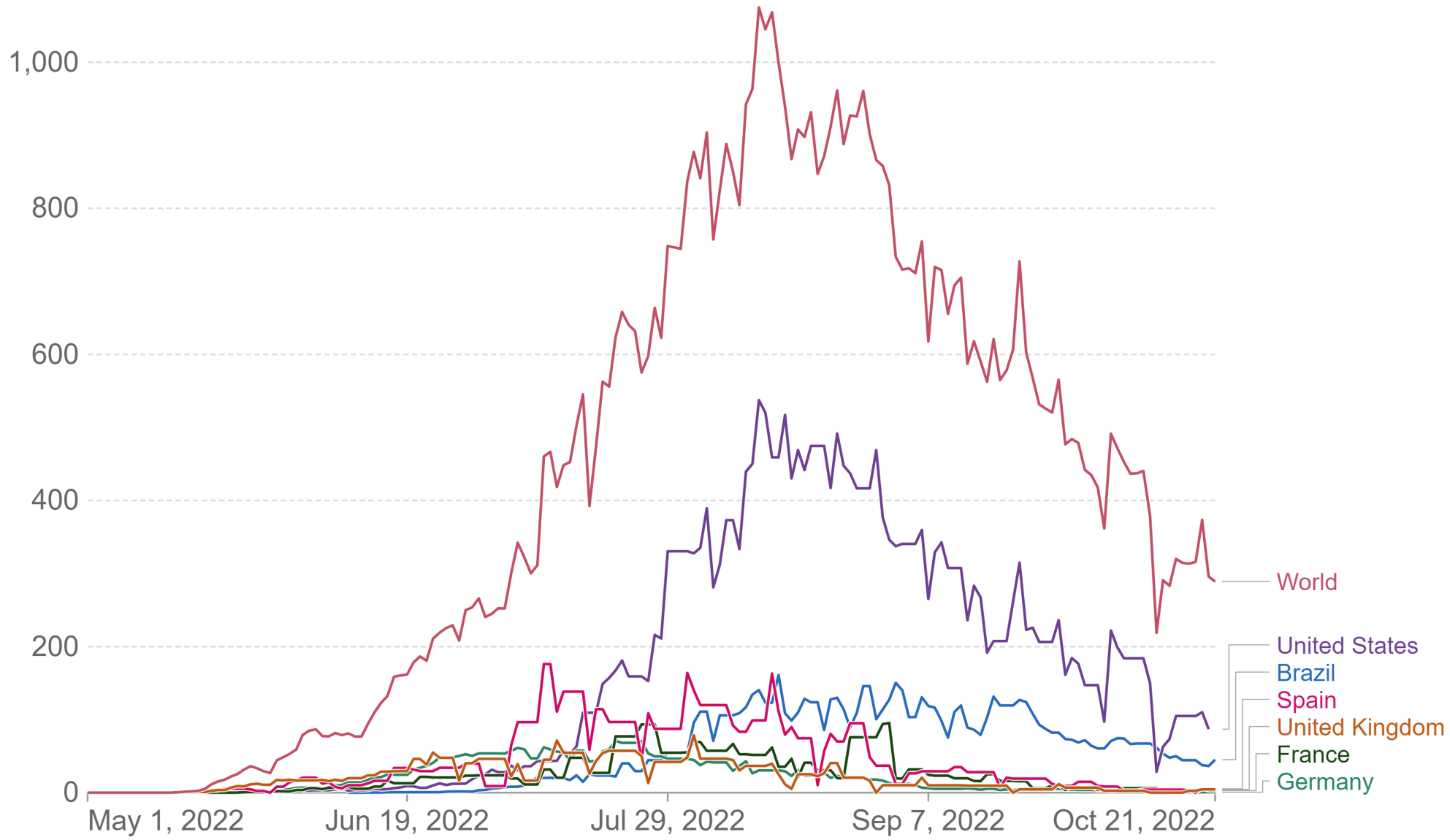
	Previous infection variant type/time from previous infection	No. of reinfections/new infections per 100k persondays	
		Oct 1-7	Oct 8-14
Reinfections	**Pre-Delta/Delta**	**133.2**	**147.4**
	Omicron	25.8	42.4
	7-10 months	42.3	70.9
	4-6 months	19	26.4
	1-3 months	**0.5**	**0.7**
New infections	**Covid-naive**	**121.6**	**162.5**

SOURCE: Ministry of Health

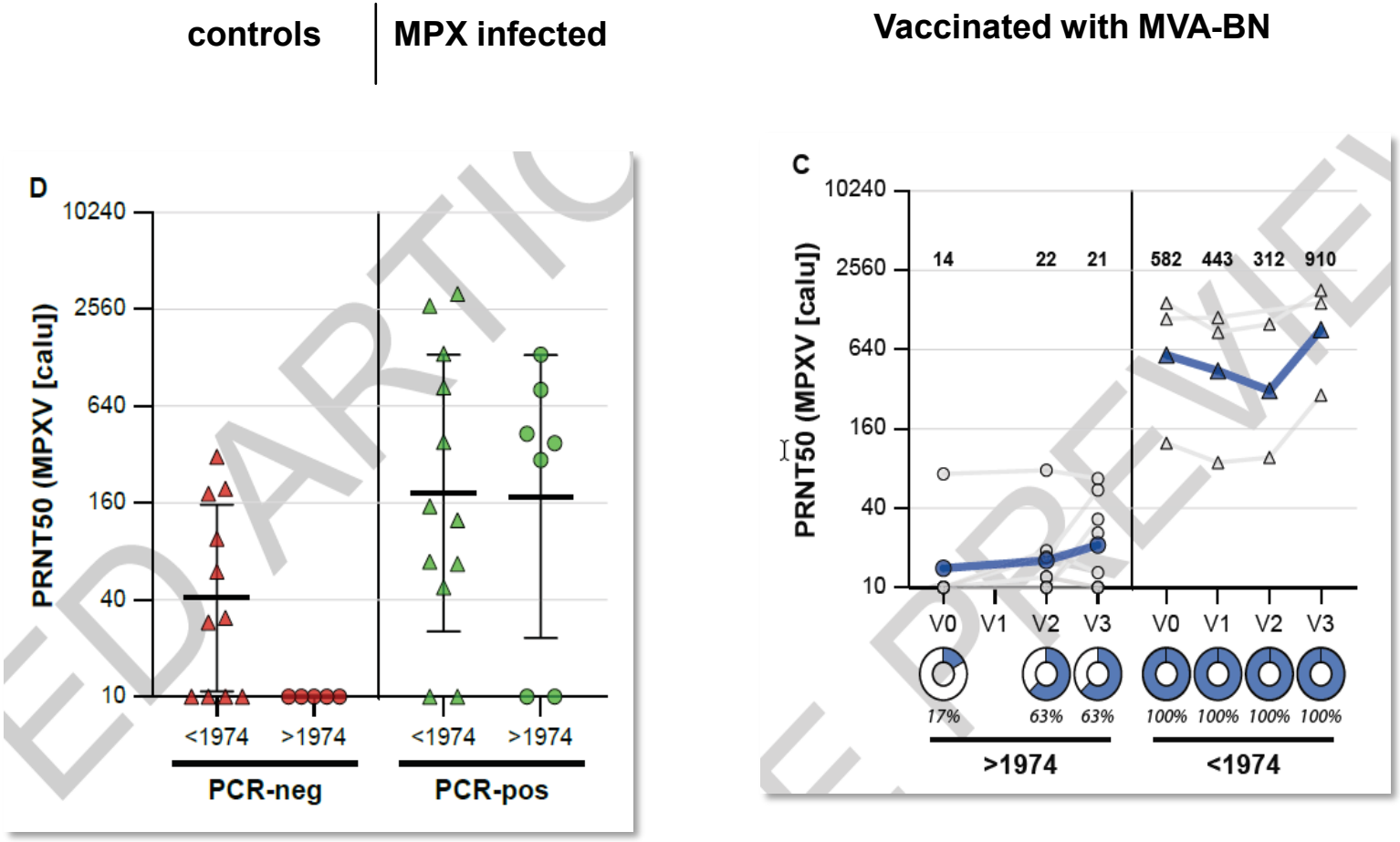
GLOBAL HEALTH PRESS

Monkeypox: Daily confirmed cases

7-day rolling average



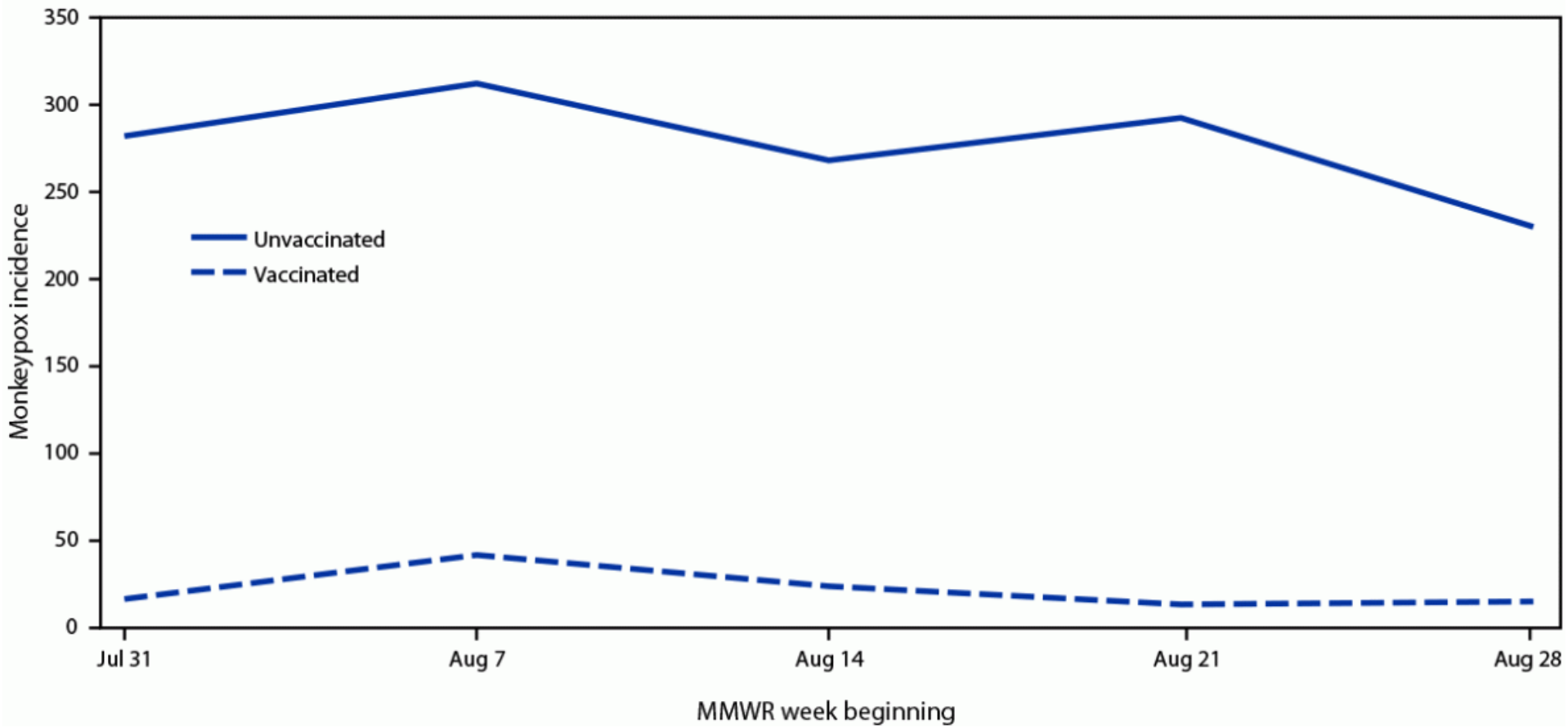
Dutch study reporting low MPXV-specific nAb titers after MVA-BN vaccination



"At this moment it is unclear what the relatively low MPXV neutralizing titers mean for protection against disease, severity of symptoms, and transmissibility"

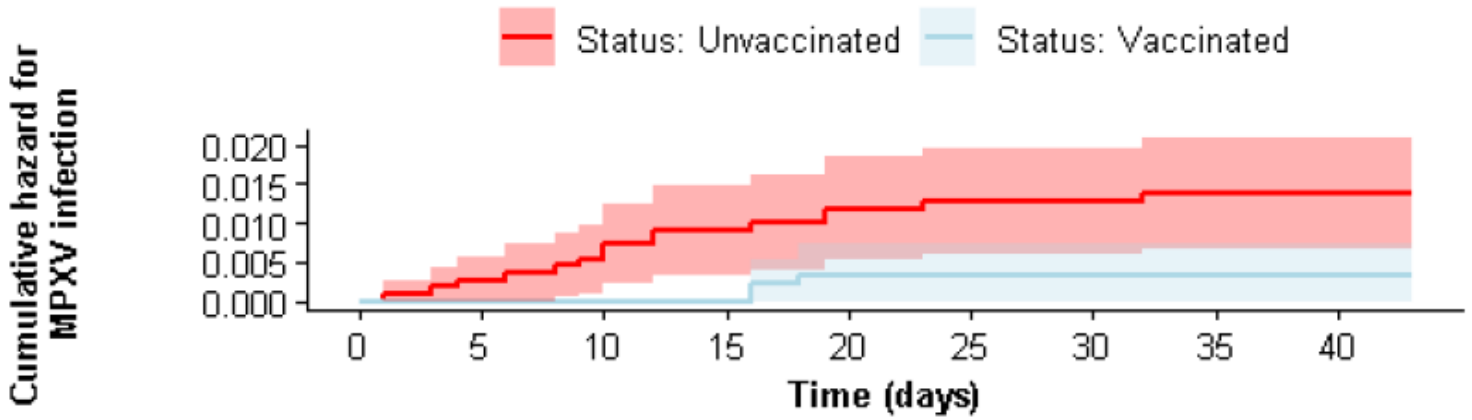
MPX incidence in unvaccinated 14x higher than in persons vaccinated with 1 dose of MVA-BN

FIGURE. Weekly monkeypox incidence,* by first-dose vaccination status[†,§] among males aged 18–49 years eligible for vaccination[¶] — 32 U.S. jurisdictions**,[††] July 31–September 3, 2022



Payne AB, Ray LC, Kugeler KJ, et al. Incidence of Monkeypox Among Unvaccinated Persons Compared with Persons Receiving ≥1 JYNNEOS Vaccine Dose — 32 U.S. Jurisdictions, July 31–September 3, 2022. MMWR Morb Mortal Wkly Rep. ePub: 30 September 2022. DOI: http://dx.doi.org/10.15585/mmwr.mm7140e3

Preprint: 79% effectiveness in high risk individuals meeting Israeli government monkeypox vaccine eligibility criteria[1*]



Number at risk

Unvaccinated	1100	1096	1093	1089	1086	1085	1085	1084	1084
Vaccinated	871	872	872	872	869	869	773	708	548

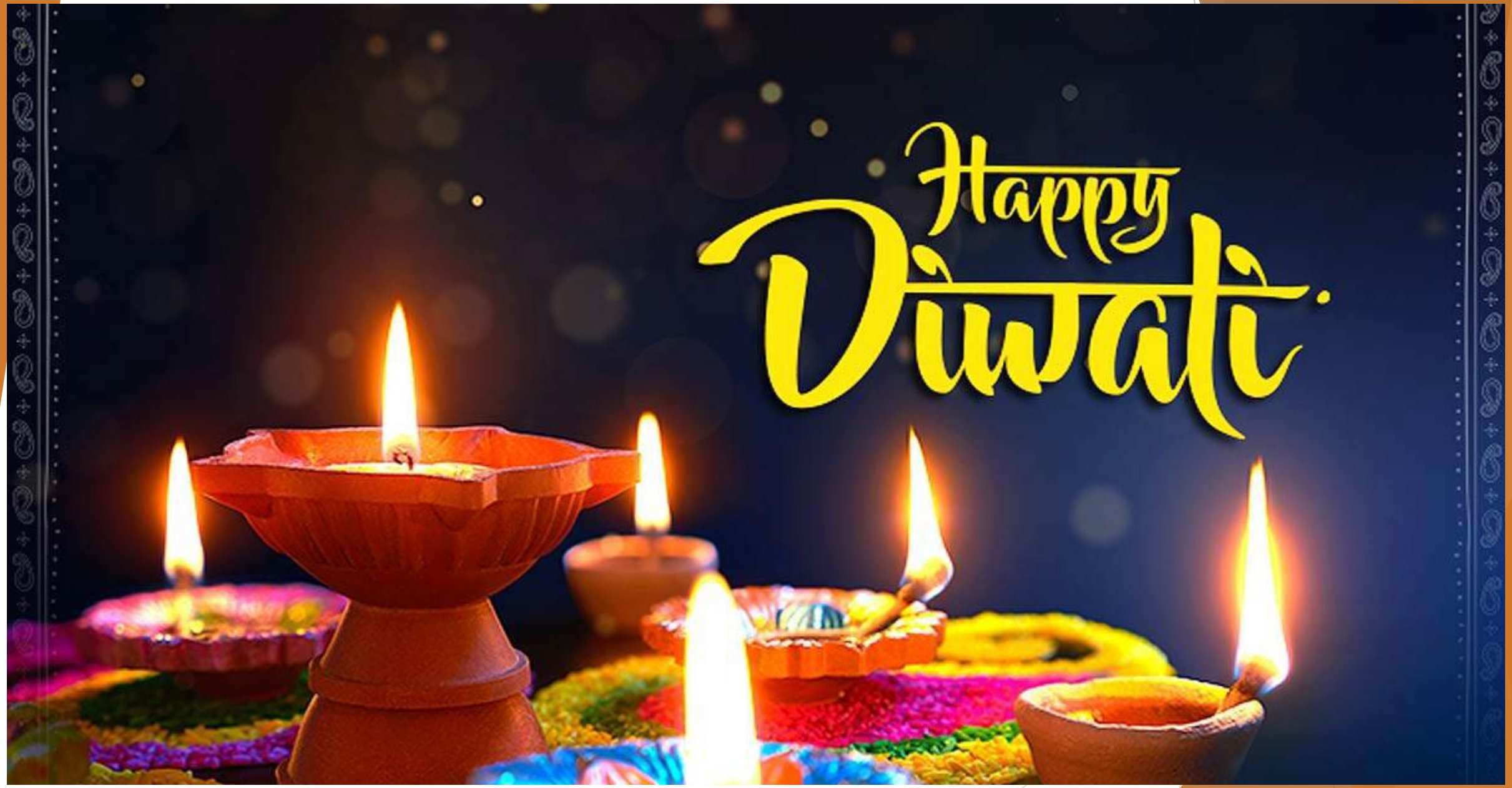
Cumulative number of events

Unvaccinated	0	3	8	10	13	14	14	15	15
Vaccinated	0	0	0	0	3	3	3	3	3

Arbel R. et al. Effectiveness of a single-dose Modified Vaccinia Ankara in Human Monkeypox: an observational study. Preprint posted on Research Square. September 23rd, https://doi.org/10.21203/rs.3.rs-1976861/v2

What we talked about today

- COVID-19 update
- Update on SARS-CoV-2 variants / subvariants
- Monkeypox global update
- Immunogenicity and efficacy/effectiveness of the Bavarian Nordic MPX vaccine


Happy
Diwali