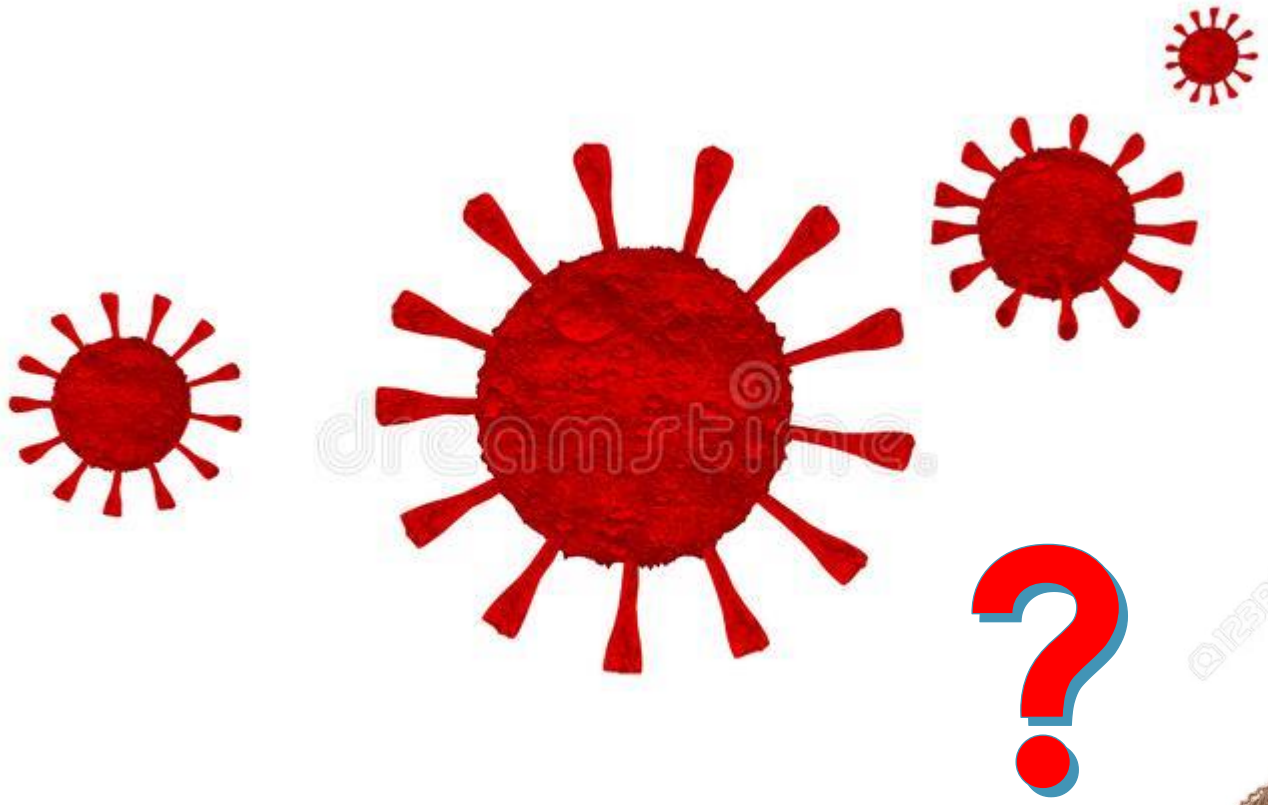
¿Conseguiremos proteger de COVID a toda la infancia?

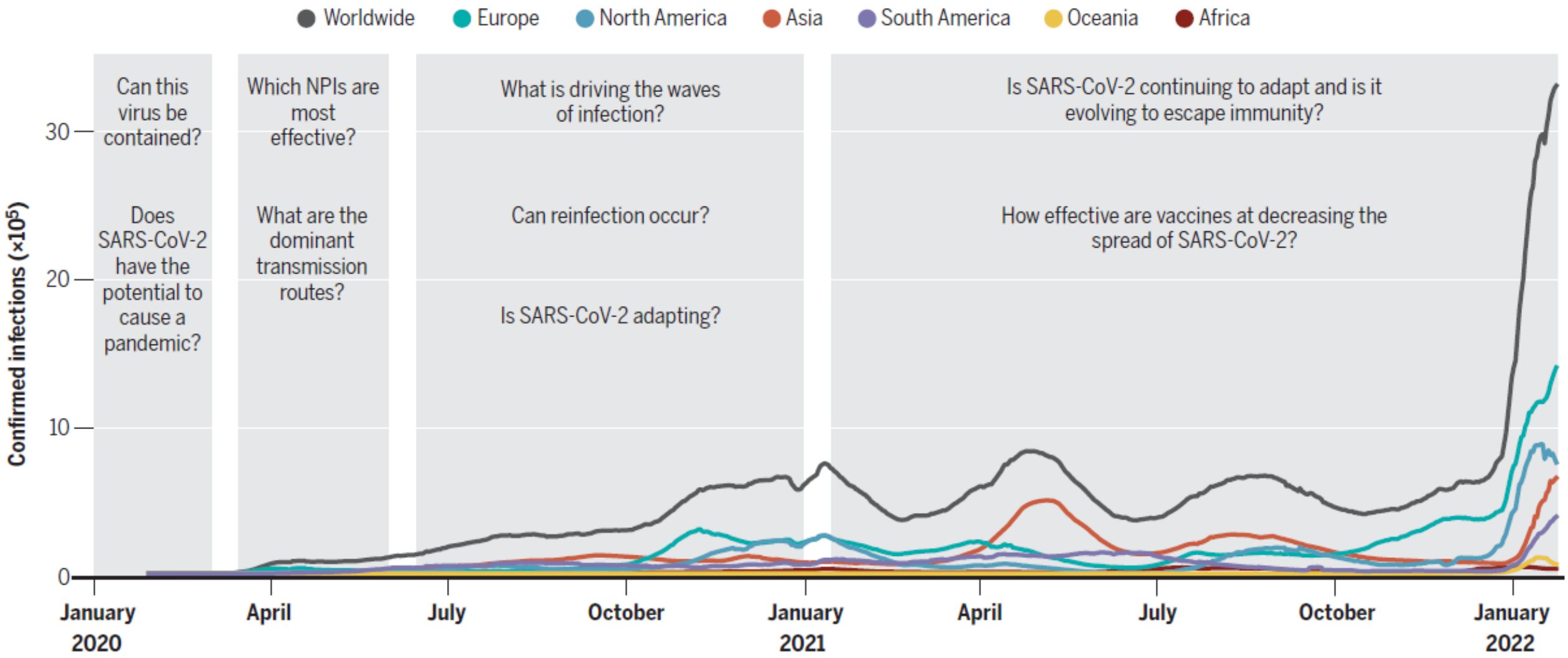
Jersús Ruiz Contreras

Hospital Universitario 12 de Octubre

Universidad Complutense de Madrid

XIII JORNADAS DE VACUNAS AEP
LEÓN, 1 Y 2 DE ABRIL DE 2022
vacunasaep.org

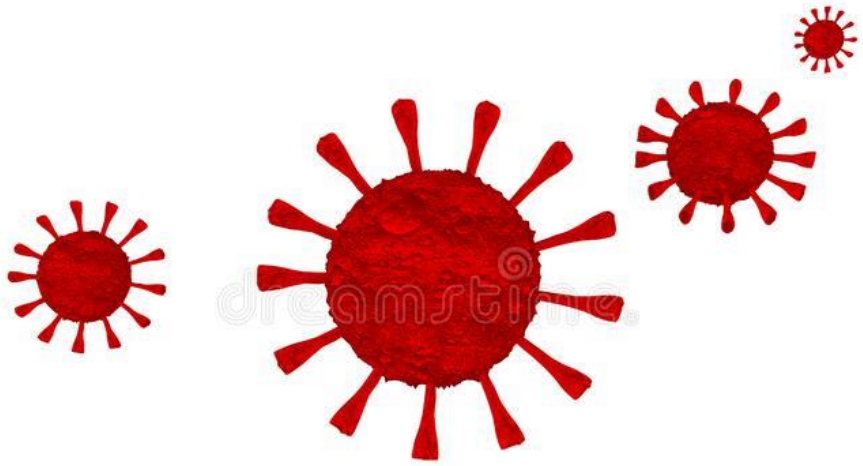




Koelle K, et al. Science 2022; 375: 1116-1121

Resistencia a la infección

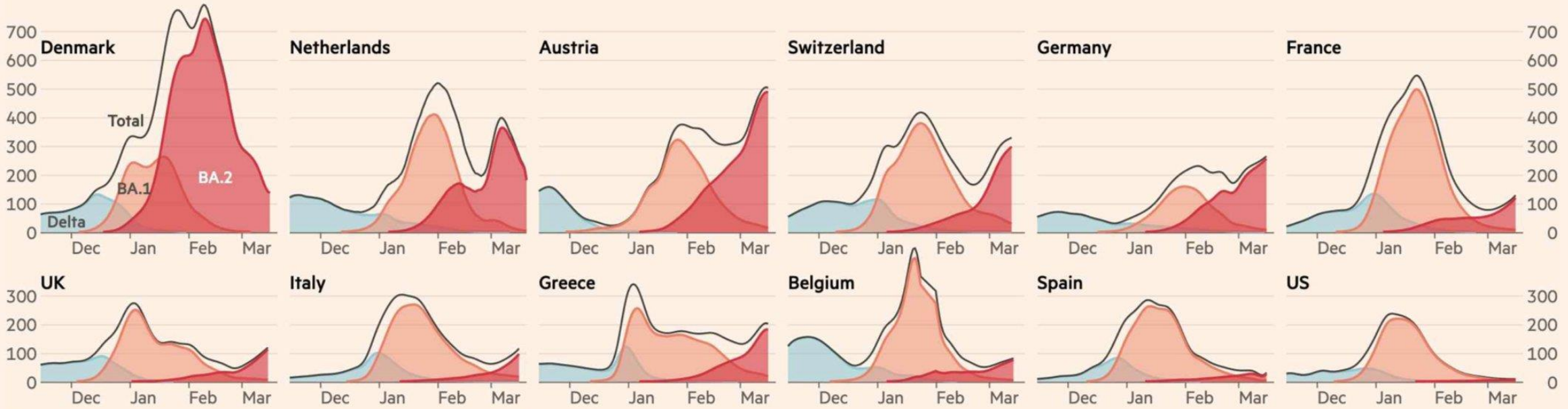
- Inmunidad inducida por la infección previa (calidad y duración de la inmunidad)
- Inmunidad por vacunas
  - Inmunogenicidad
  - Efectividad
  - Duración
  - Coberturas vacunales



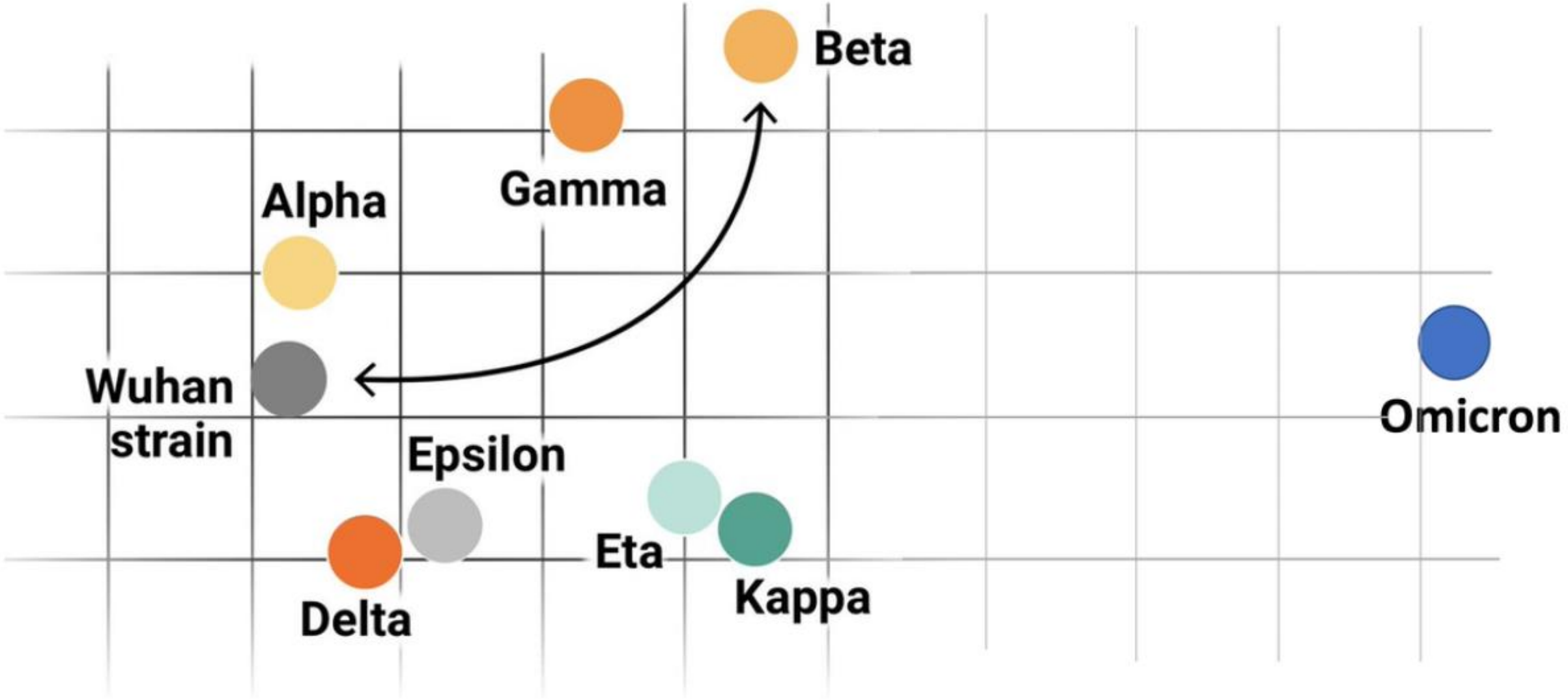
2 mutaciones mes

Capacidad para mutar
Nuevas variantes
Evasión de la respuesta inmune
Inducción de inmunidad duradera

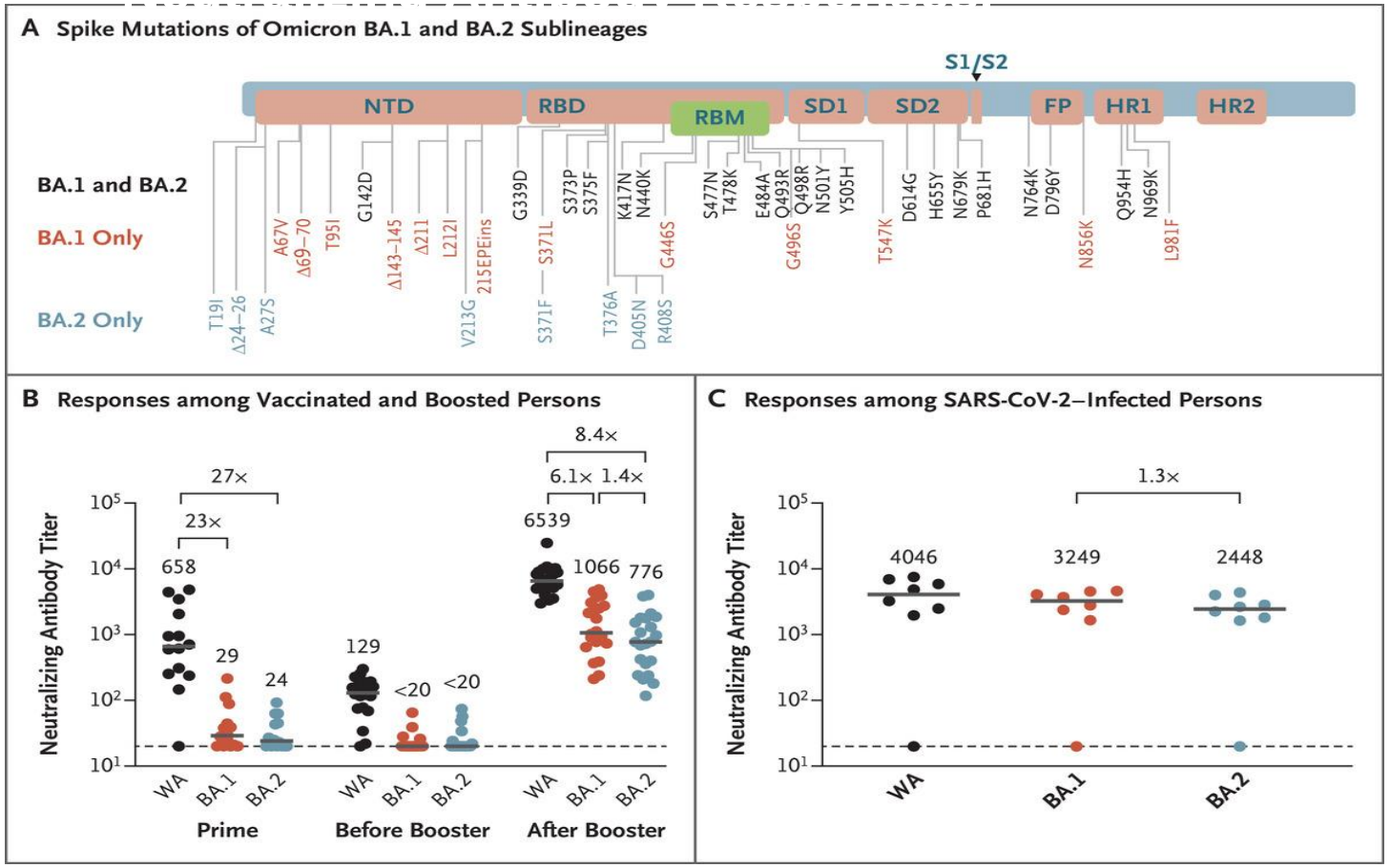
Evolución de las variantes



Variantes del SARS-CoV2

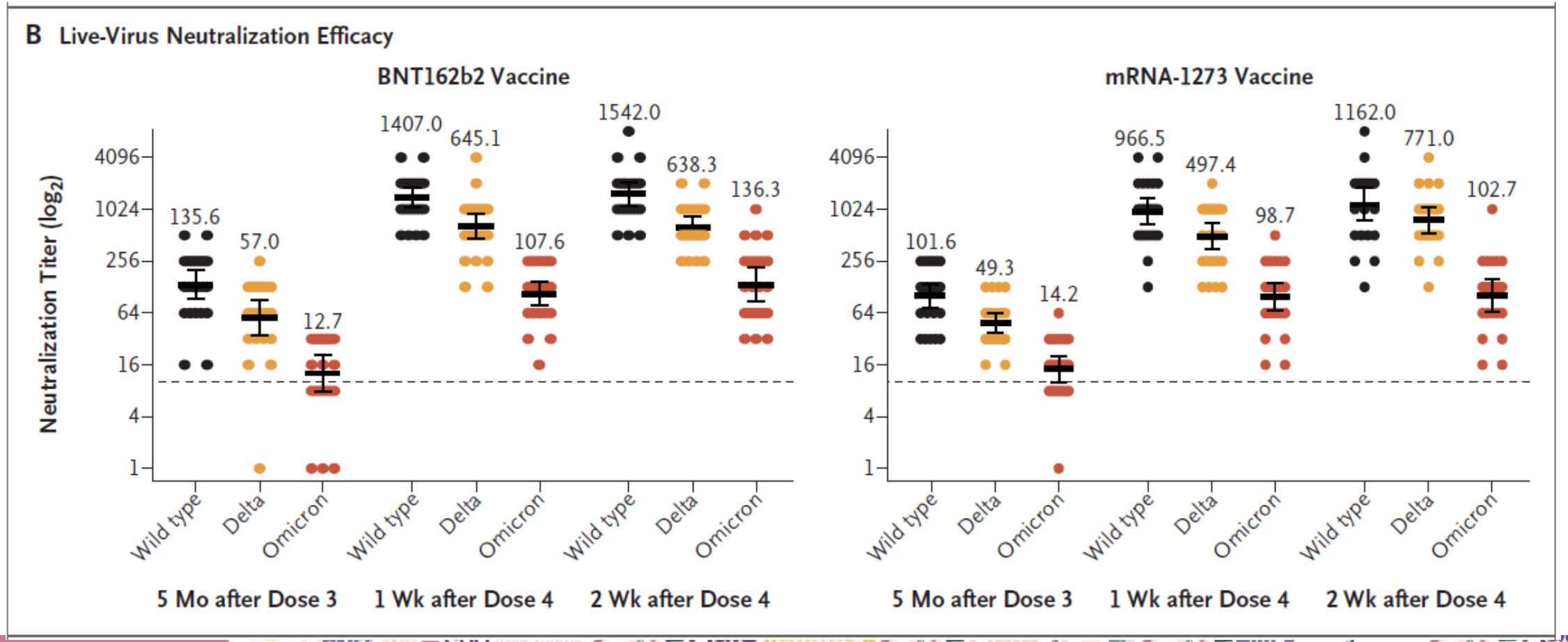


Neutralización frente a las variantes de ómicron



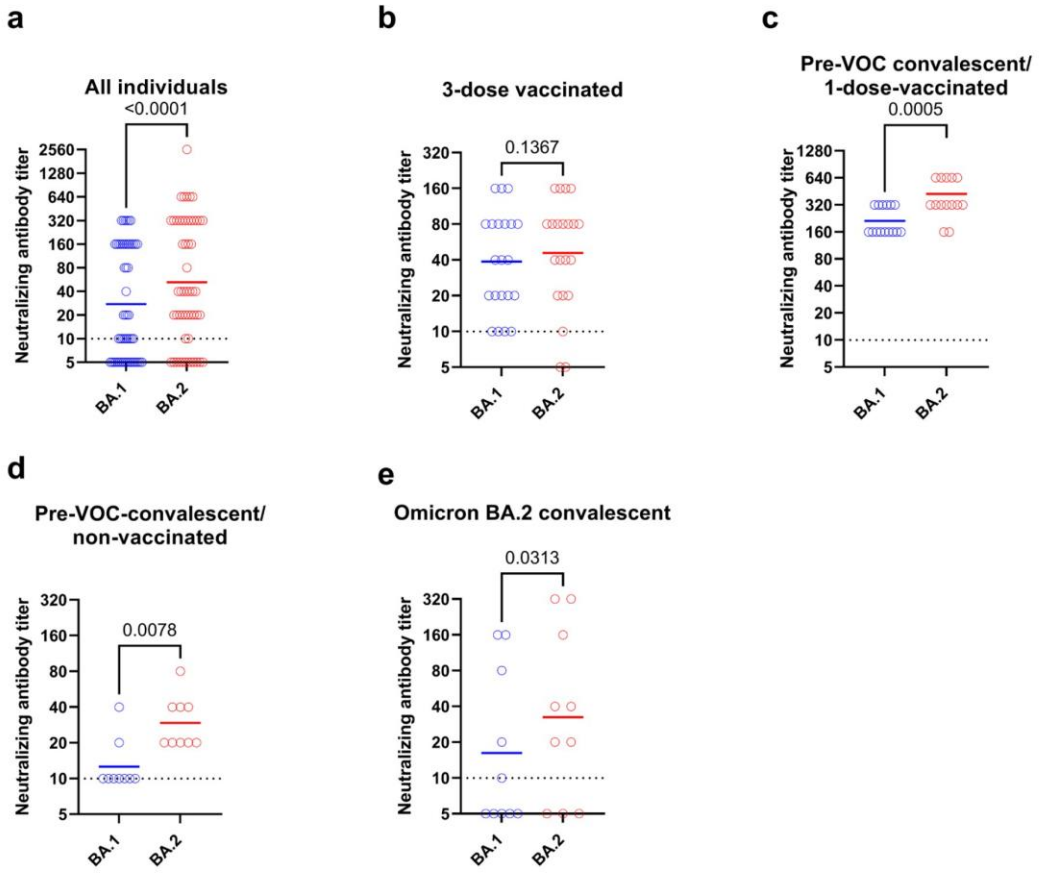
J Yu et al. N Engl J Med 2022. DOI: 10.1056/NEJMc2201849

Eficacia de una cuarta dosis de vacunas RNAm frente a delta y ómicron



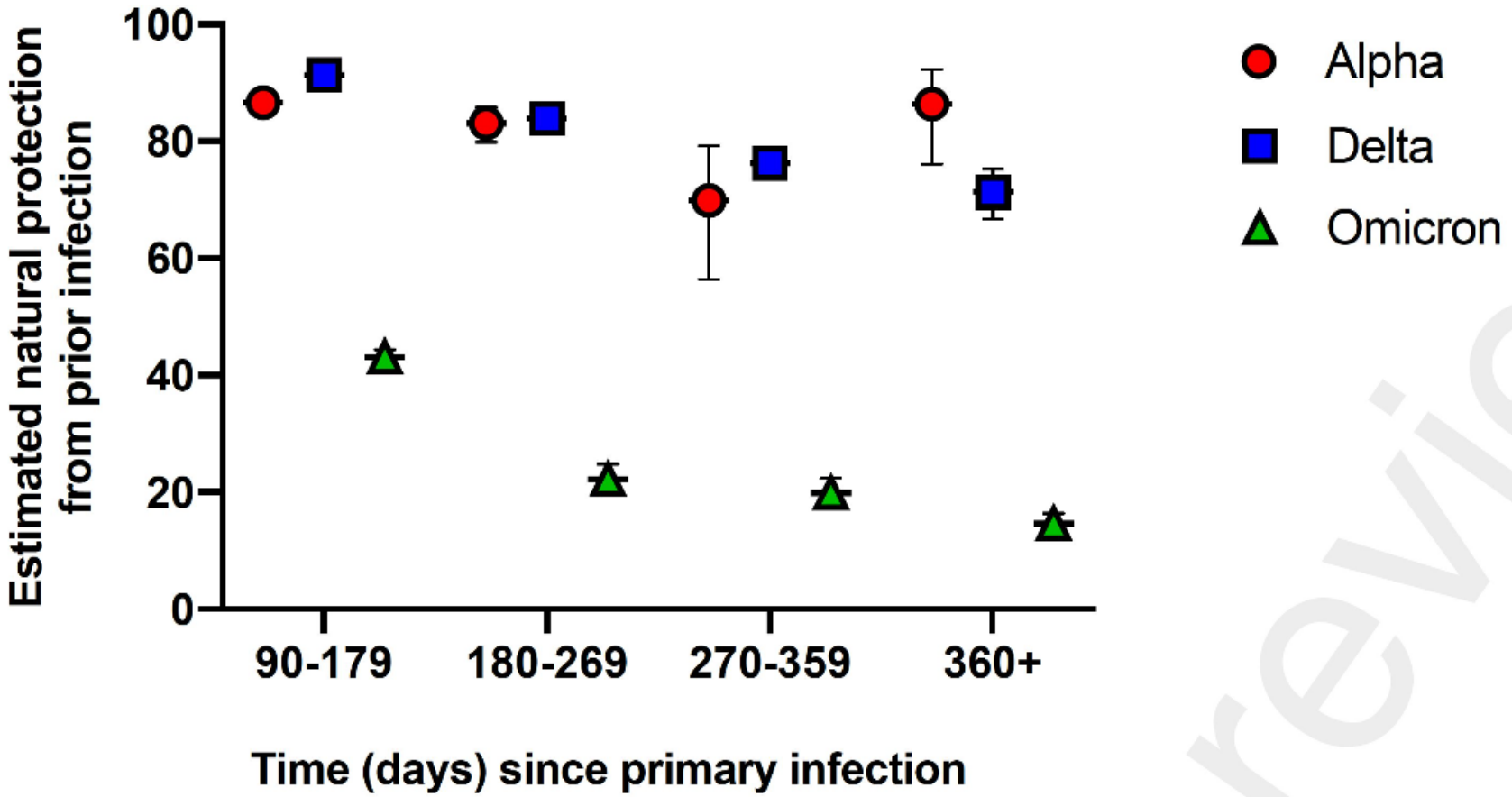
Amit S, et al. N Engl J Med 2022;

Anticuerpos neutralizantes frente a BA.1 y BA.2 de ómicron



Chen LL, et al. Lancet Microbe 2022

Protección frente a ómicron tras la infección natural por otras variantes



Michlmayr, D, et al. Lancet 2022preprint

Ground Truths

Humans 2, Omicron 1

Eric Topol

https://erictopol.substack.com/p/humans-2-omicron-1?s=r

SCIENCE TRANSLATIONAL MEDICINE | RESEARCH ARTICLE

CORONAVIRUS

Escape from recognition of SARS-CoV-2 variant spike epitopes but overall preservation of T cell immunity

Riou C, et al. Science Transl Med 2022

Inmunidad celular frente a ómicron

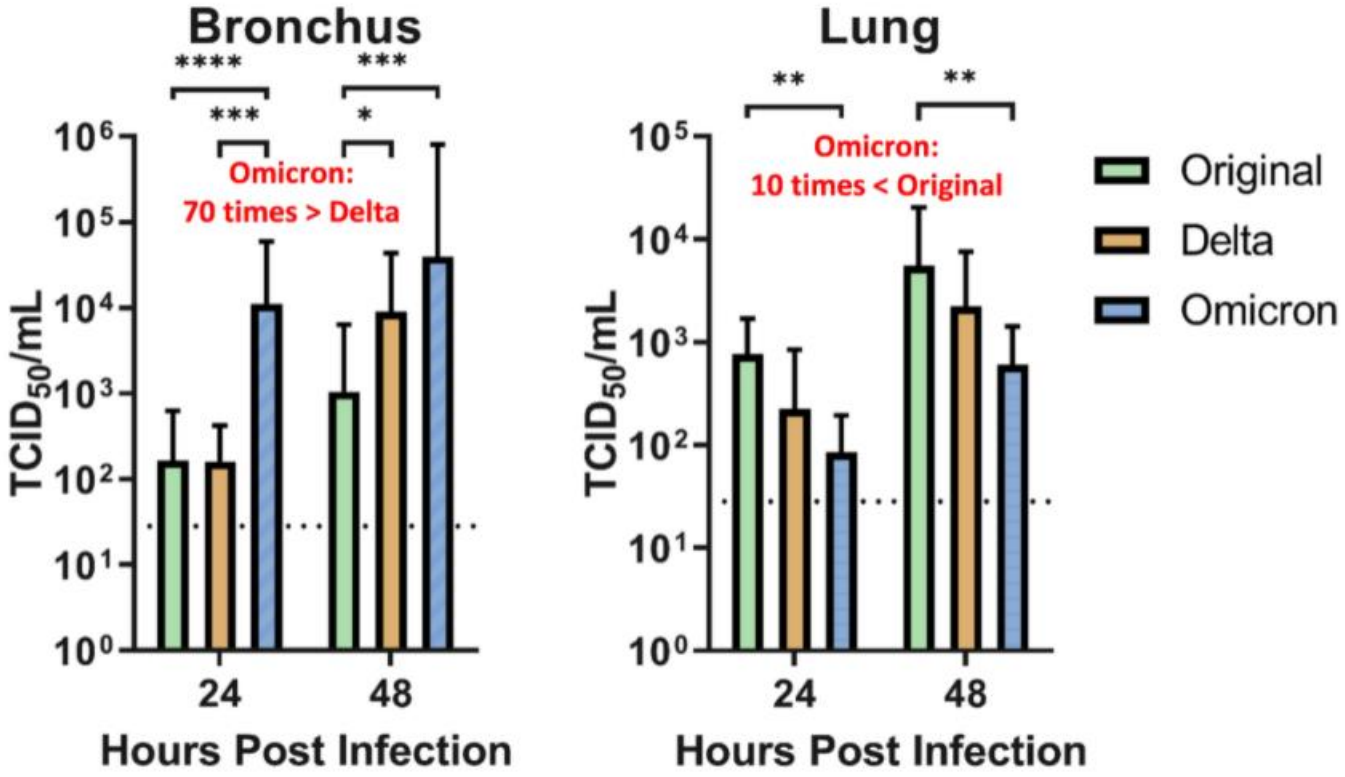
Primary Institution	Patient samples	Cross-Reactivity Metrics	Citation
University of Cape Town	Pfizer, J&J, vaccines; Prior Covid	Retained 70-80% of T cell response vs Omicron	Keeton R et al, MedRxiv 28 December 2021
La Jolla Immunology	Multiple vaccines and variants	Retained T cell functionality vs Omicron w/ epitope level binding data	Tarke et al, BioRxiv 28 December 2021
Beth Israel Deaconess	Pfizer, J&J vaccines	CD8+ T cell 80+% Omicron-specific, 8 months	Liu J et al, MedRxiv 3 January 2022
Santa Lucia Foundation	Multiple vaccines, mix	CD4+ and CD8+ retained response to Omicron	De Marco L et al , MedRxiv 30 December 2021
Erasmus University	mRNA, AZ and J&J vaccines, prior Covid	CD4+ 6months after mRNA , J&J vaccines, responsive to Omicron	GeurtsvanKessel C et al, MedRxiv, 29 December 2021
Karolinska Institutet	mRNA vaccine and prior Covid	CD4+ and CD8+ response largely intact, mRNA > Prior Covid	Gao Y et al Research Square 3 Jan 2022

@erictopol

Gravedad de la infección por ómicron en animales

Study	Type	Key Finding	Citation
USA SAVE Consortium	Syrian hamster and mouse models	Decreased lung infectivity, viral load, and pathology	M Diamond M et al https://www.researchsquare.com/article/rs-1211792/v1
Liverpool, UK	Mouse model	Decreased lung infectivity, viral load & inflammation	E Bentley et al https://www.biorxiv.org/content/10.1101/2021.12.26.474085v1
Belgium	Syrian hamster model	Markedly decreased lung infectivity, replication, and pathology	R Abdelnabi et al https://www.biorxiv.org/content/10.1101/2021.12.24.474086v1
Japan	Syrian hamster model	Decreased lung infectivity	K Seto et al https://drive.google.com/file/d/1rhCazFav1pokFKmsZI5_oqIeH9ofFckR/view
Cambridge, US	Syrian hamster model	Reduced pathogenicity, reduced viral load in lungs	K McMahan et al https://www.biorxiv.org/content/10.1101/2022.01.02.474743v1
Cambridge, UK	In vitro lab studies	Decreased lung cell infectivity	R Gupta et al https://www.biorxiv.org/content/10.1101/2021.12.17.473248v2
Hong Kong	In vitro lab studies	Decreased lung cell infectivity	MC Chi-wai et al https://www.med.hku.hk/en/news/press/20211215-omicron-sars-cov-2-infection

Capacidad infecciosa de ómicron en bronquio y pulmón



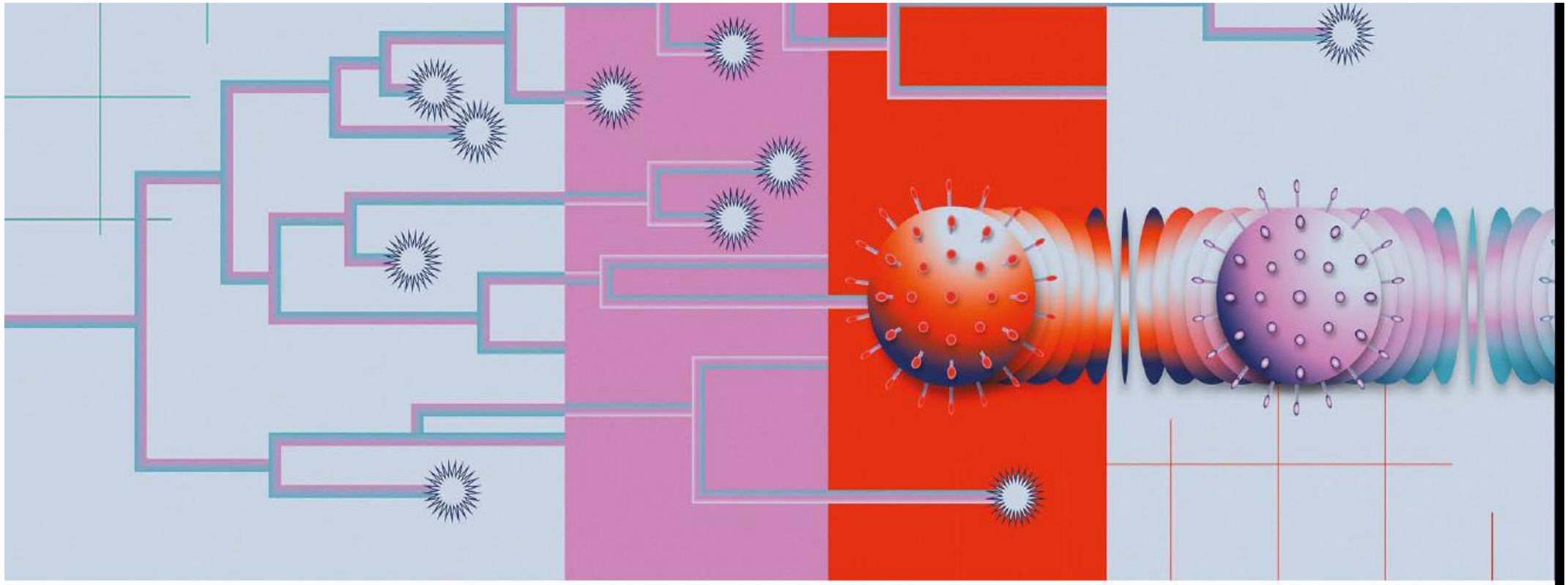
Gravedad de la infección por las diferentes variantes

Table 2. Outcomes of Patients Admitted With a Positive COVID-19 Result in the 4 Waves[a]

	No. (%) of patients				
	Wave 1 (n = 2628)	Wave 2 (n = 3198)	Wave 3 (n = 4400)	Wave 4[b] (n = 971)	*P* value
Receiving oxygen therapy	2119 (80.3)	2624 (82.0)	3260 (74.0)	171 (17.6)	<.001
Receiving mechanical ventilation	431 (16.4)	259 (8.0)	548 (12.4)	16 (1.6)	<.001
Admission to intensive care	1104 (42)	1172 (36.6)	1318 (29.9)	180 (18.5)	<.001
Length of stay, median (IQR), d	8.0 (9)	7.8 (8)	7 (9)	3 (3)	<.001
Deaths	520 (19.7)	790 (25.5)	1284 (29.1)	27 (2.7)	<.001

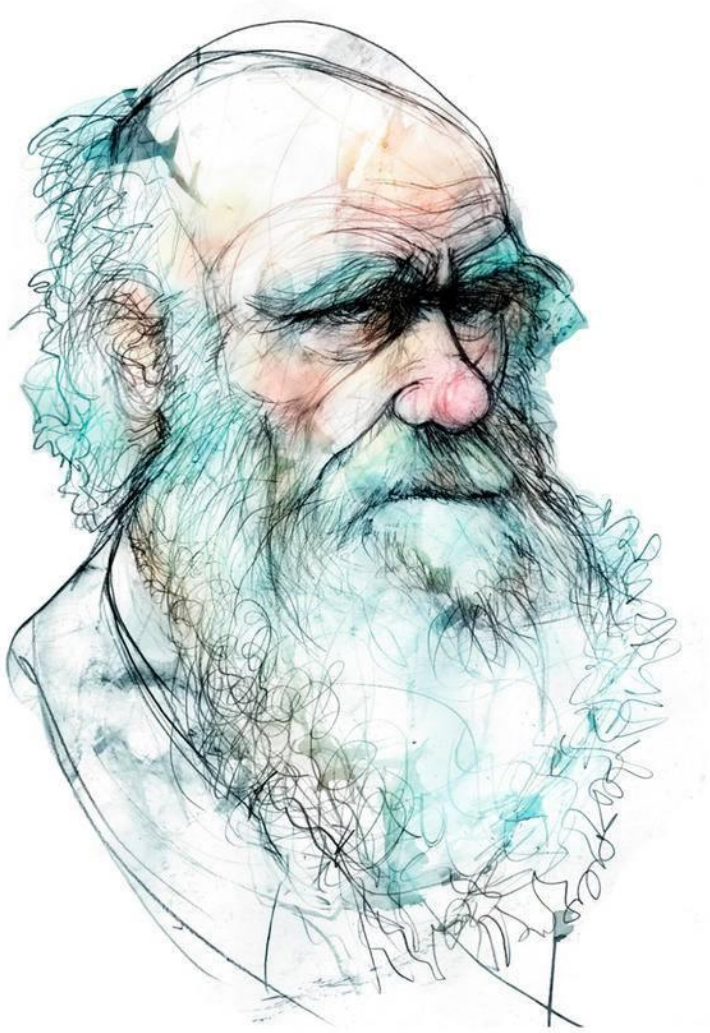
Maslo, c et al. JAMA. Dic 2021

Más transmisible
Enfermedad más leve



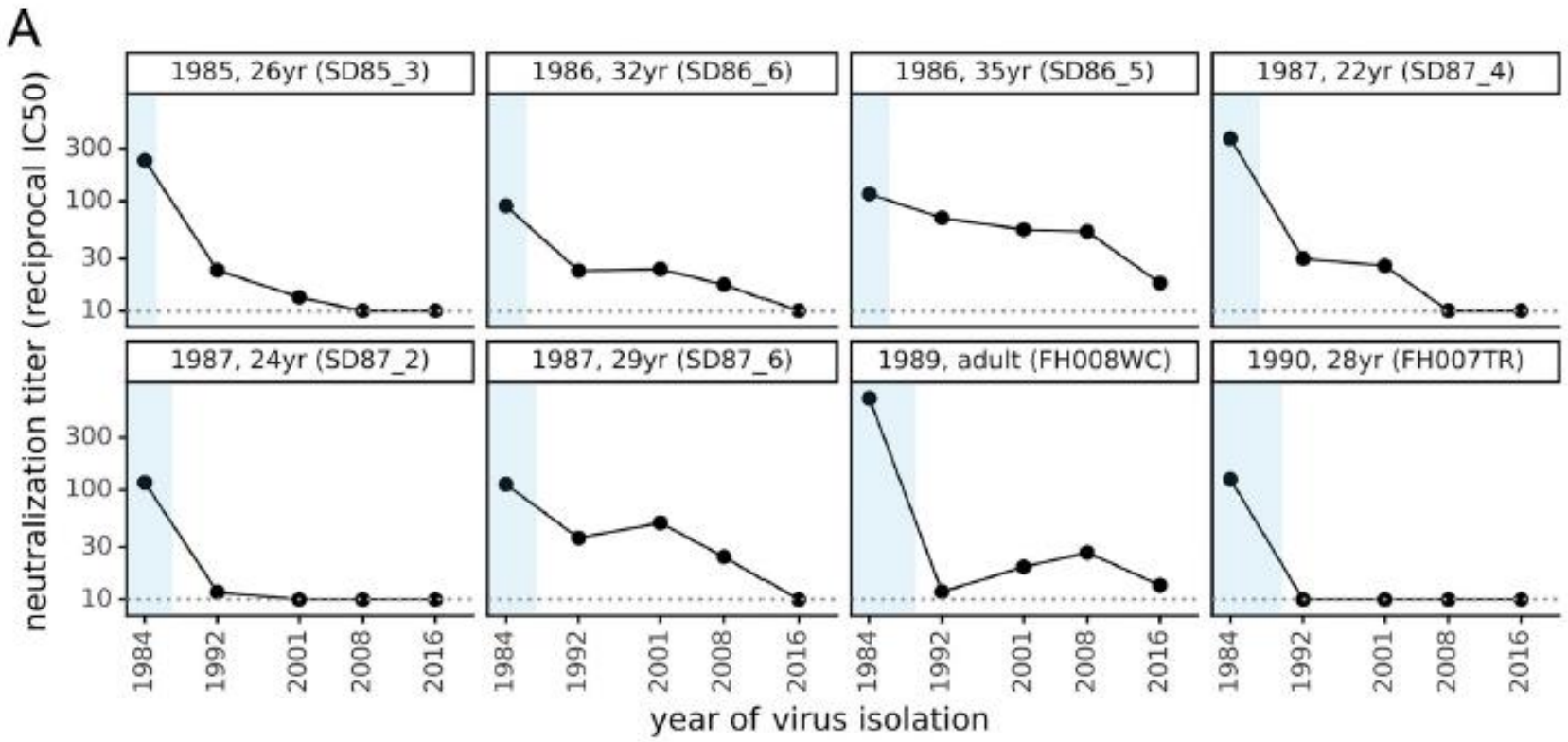
BEYOND OMICRON: WHAT'S NEXT FOR SARS-COV-2 EVOLUTION

¿Cómo debería evolucionar el SARS-Cov2?



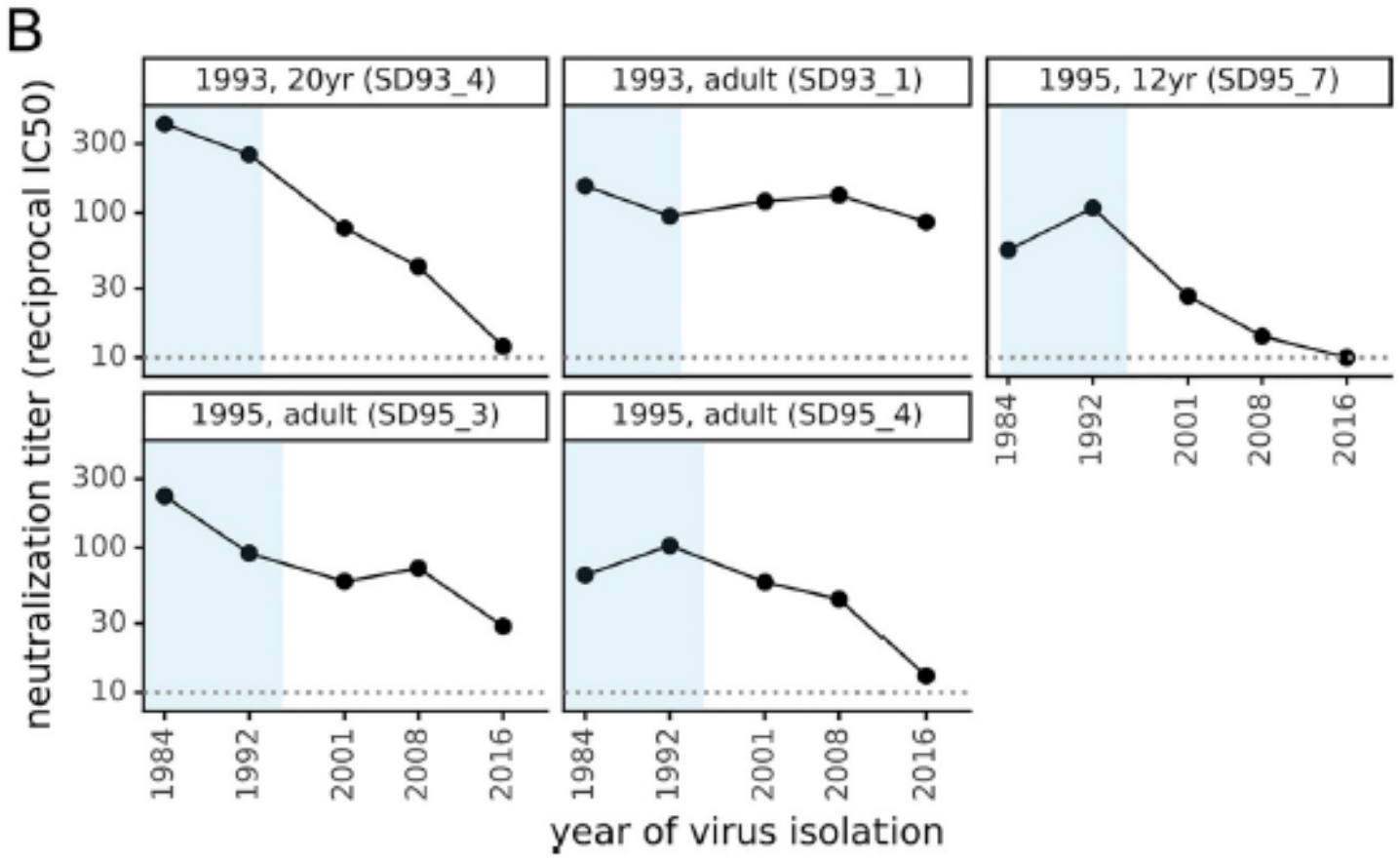
Los coronavirus endémicos marcan
la hoja de ruta del SARS-CoV2 (Jesse Bloom. Fred Hutchinson Center)

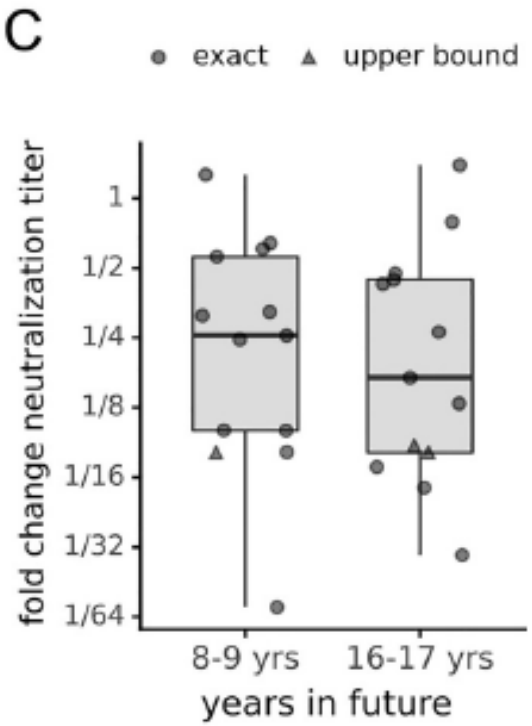
Evolución antigénica del coronavirus E229 y escape de inmunidad



Eguía RT, et al. PLOS Pathog 2021, 17 (4): e 1009453

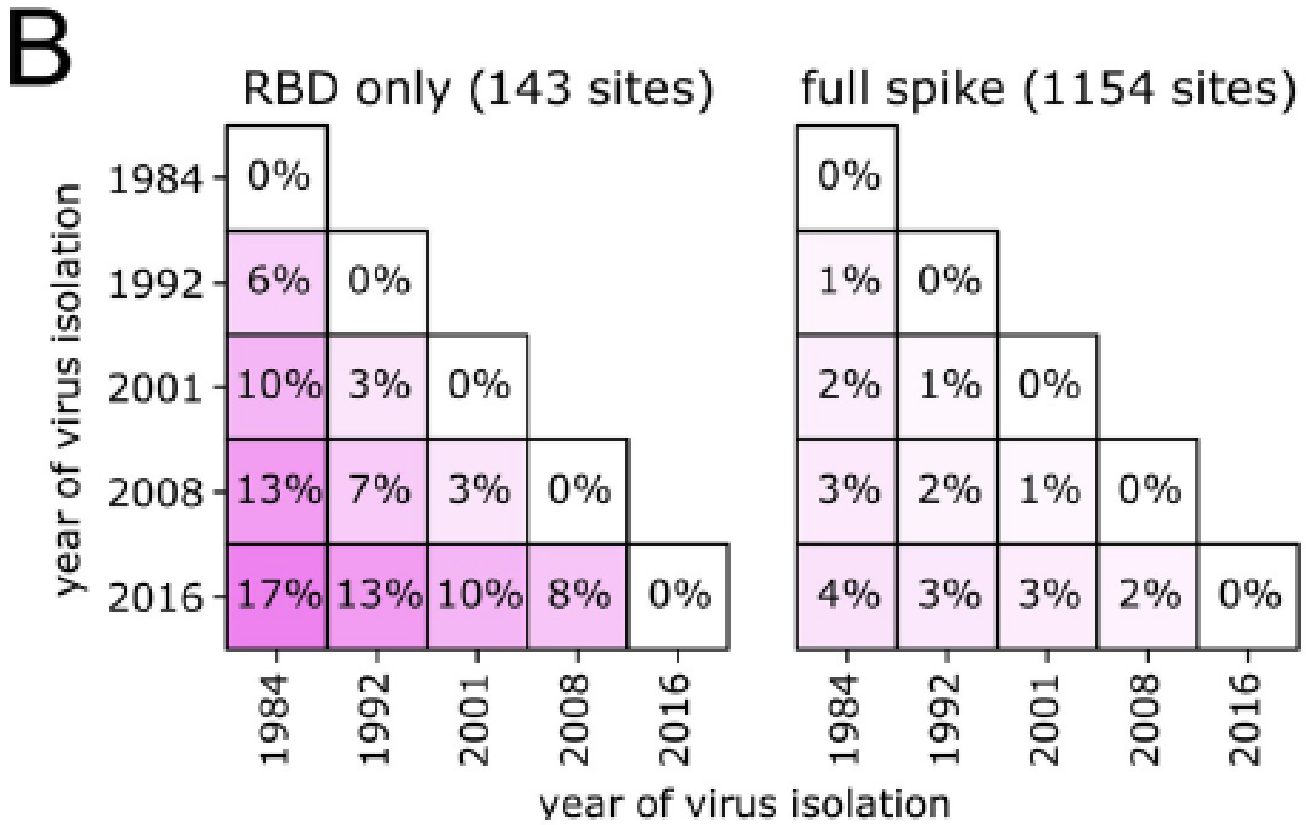
Evolución antigénica del coronavirus E229 y escape de inmunidad





Eguía RT, et al. PLOS Pathog 2021, 17 (4): e 1009453

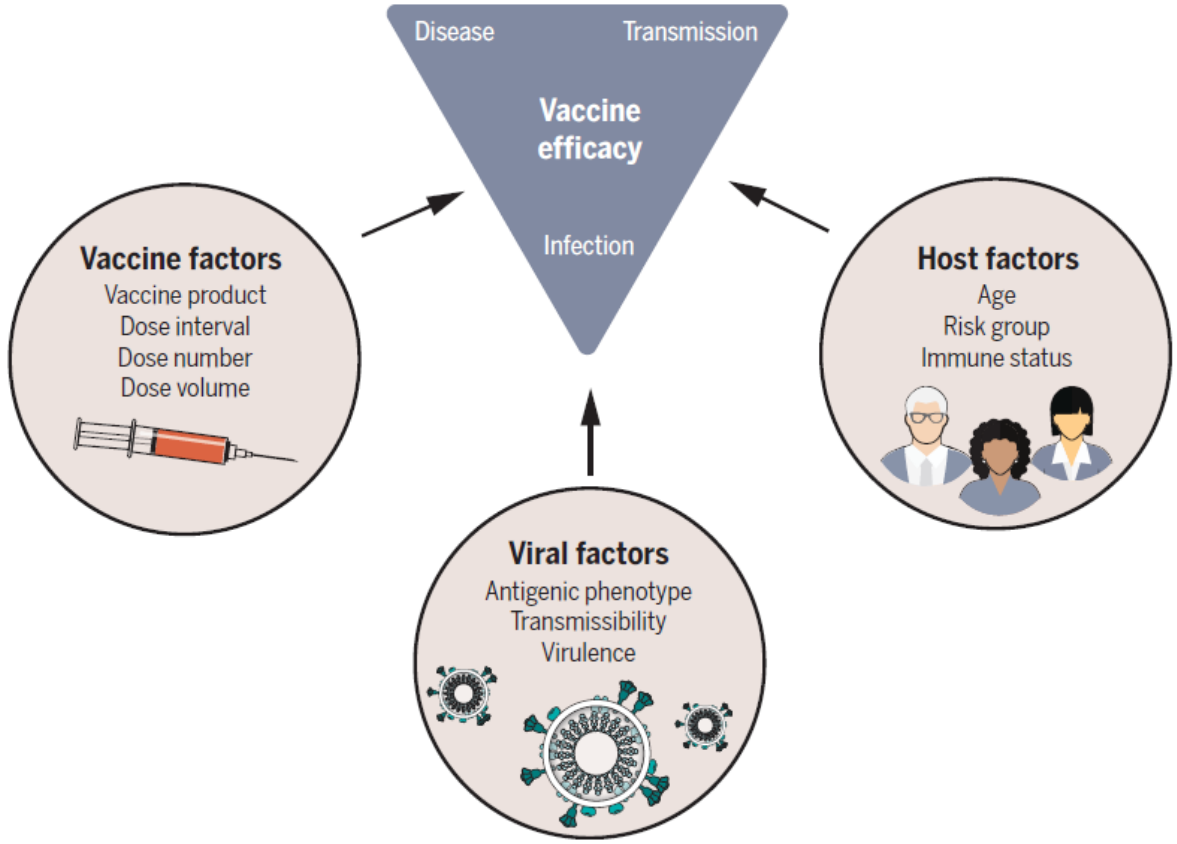
Divergencias de la proteínas S utilizadas en el experimento



Eguía RT, et al. PLOS Pathog 2021, 17 (4): e 1009453

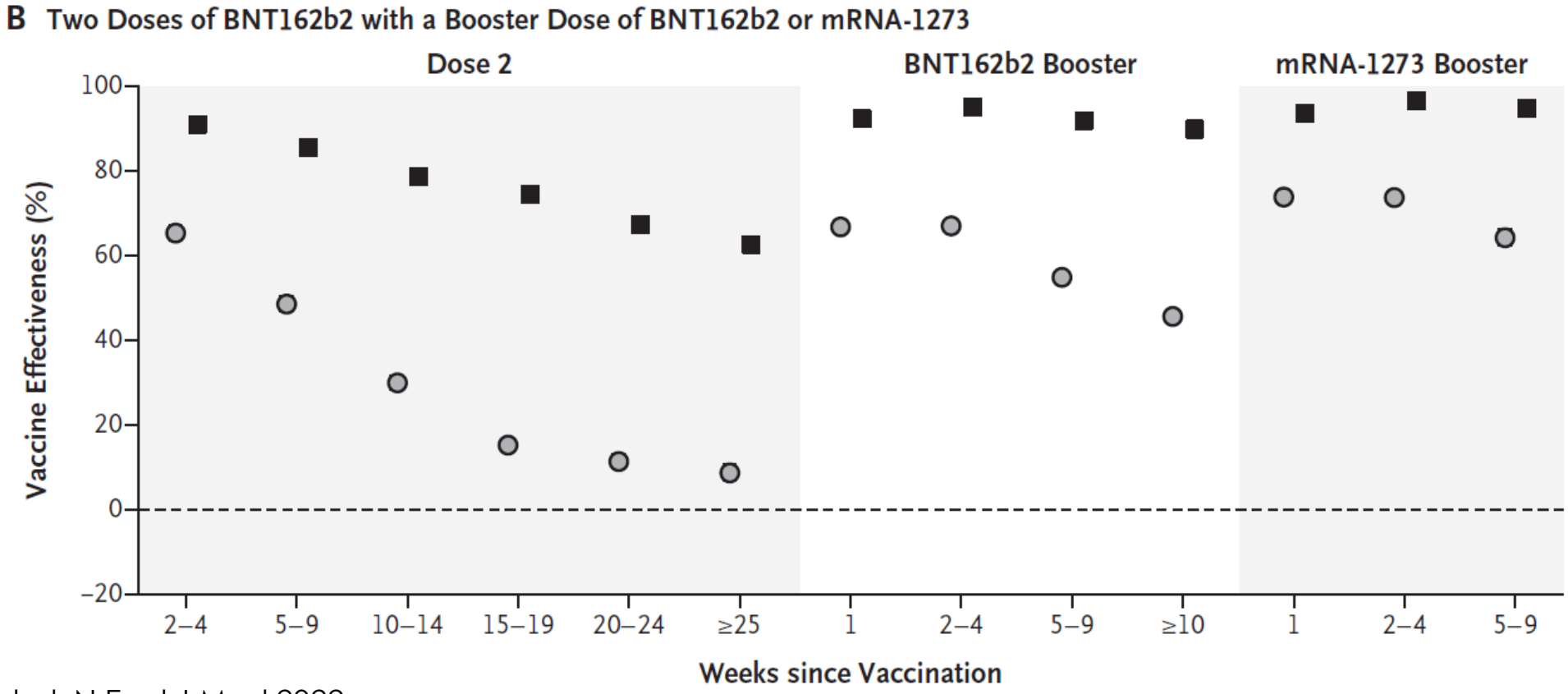

Vaccine
COVID-19

Factores que influyen en la efectividad vacunal



Koelle K, et al. Science 2022; 375: 1116-1121

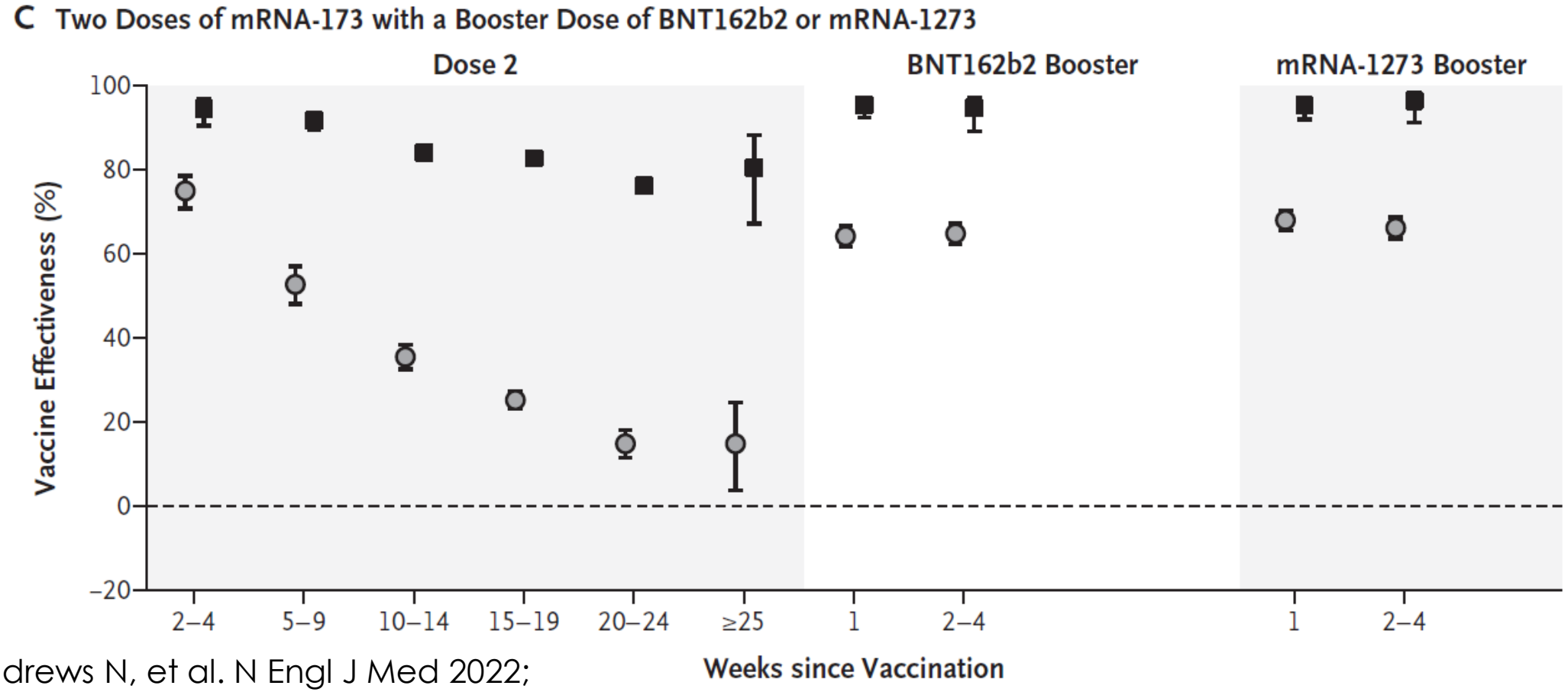
Efectividad de las vacunas frente enfermedad sintomática por la cepa ómicron



Andrews N, et al. N Engl J Med 2022;

DOI: 10.1056/NEJMoa2119451

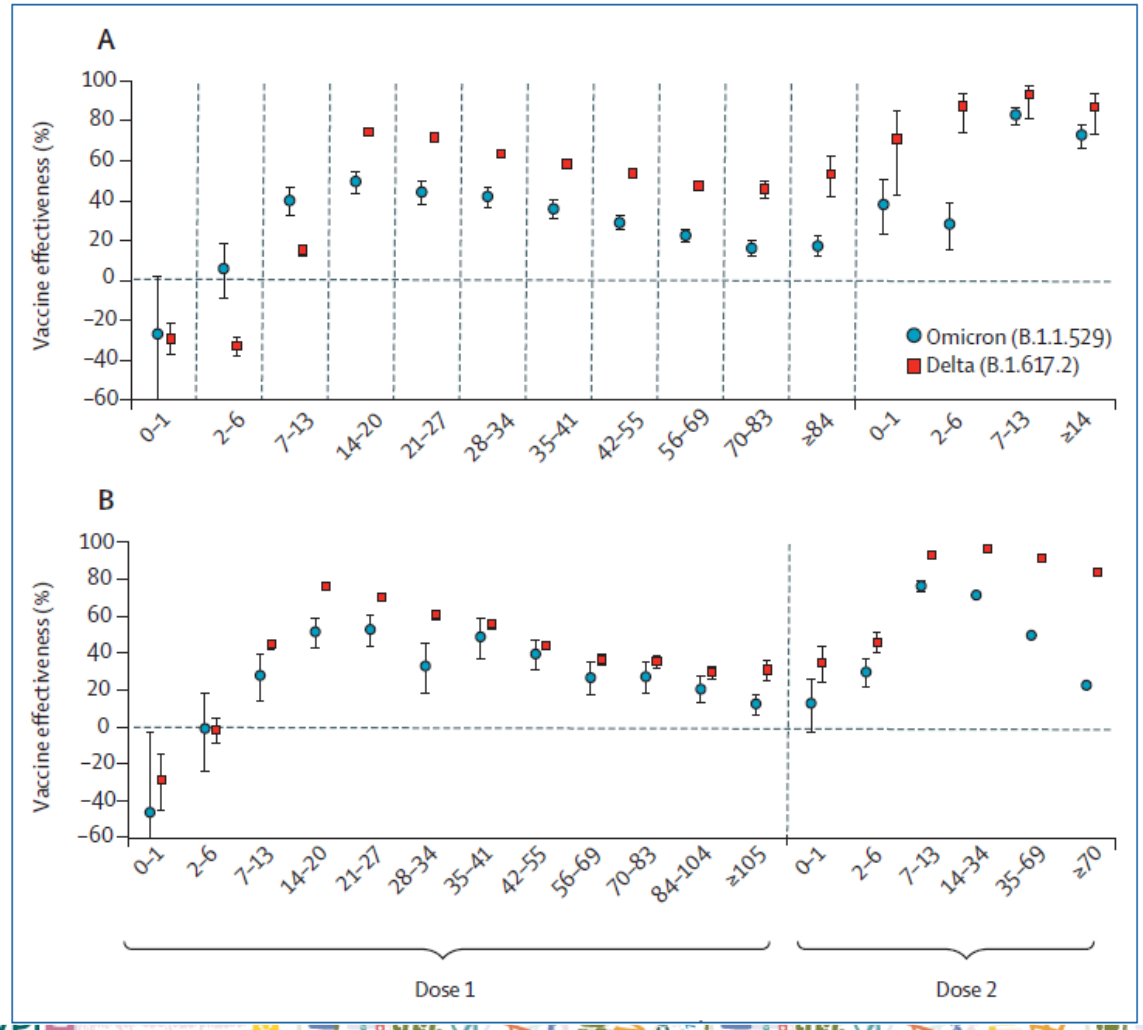
Efectividad de las vacunas frente enfermedad sintomática por la cepa ómicron



Andrews N, et al. N Engl J Med 2022;

DOI: 10.1056/NEJMoa2119451

Efectividad de Comirnaty frente delta y ómicron en adolescentes



12-15 años

16-17 años

Powell AA, et al. Lancet Infect Dis 2022

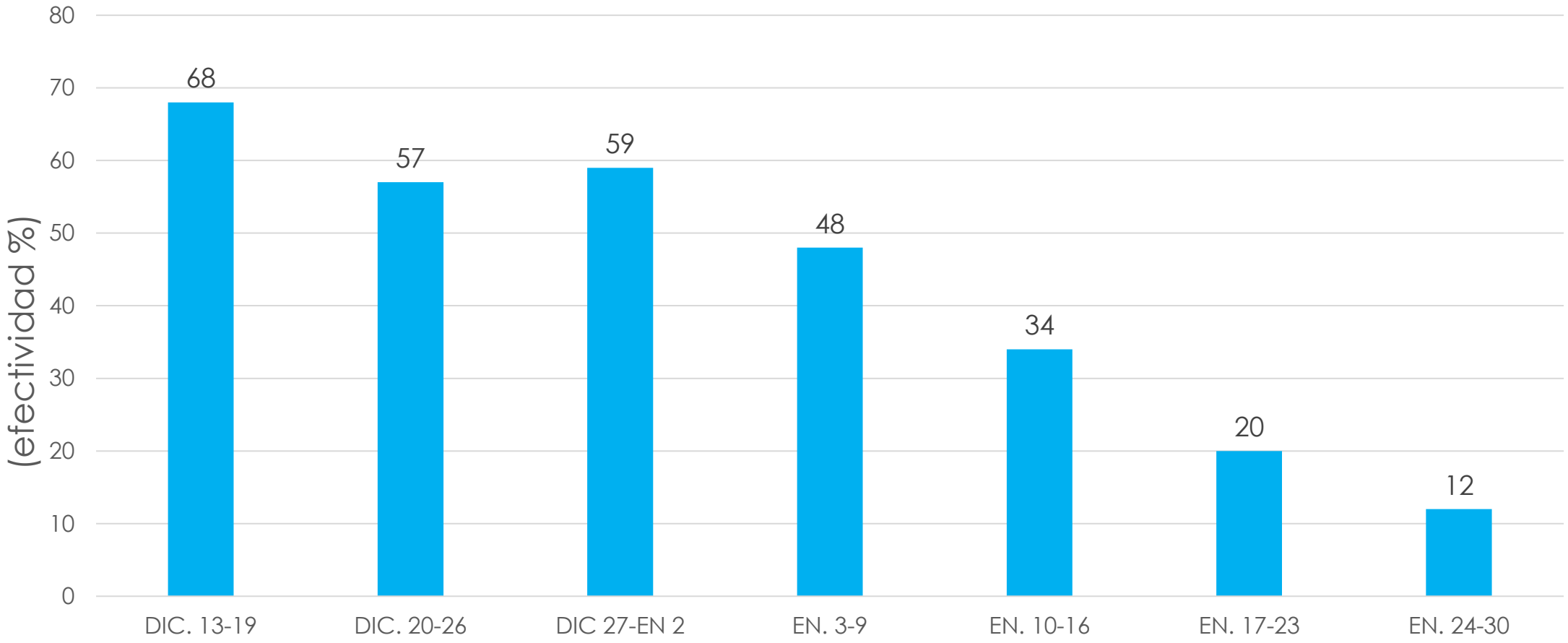
Efectividad de la vacuna BNT162b2 frente a las variantes delta y ómicron en niños

TABLE 3. COVID-19 Pfizer-BioNTech vaccine effectiveness against asymptomatic or symptomatic SARS-CoV-2 infection among children and adolescents aged 5–15 years, by time since receipt of second vaccine dose and variant — PROTECT* cohort study, four states, July 2021–February 2022

Age group and COVID-19 vaccination status (no. of days since receipt of most recent dose)	No. of contributing participants†	Total person-days	Median no. of days (IQR)	No. of SARS-CoV-2 infections§	VE, % (95% CI)	
					Unadjusted	Adjusted¶
Children aged 5–11 yrs						
Omicron variant infections						
Unvaccinated (referent)	336	13,801	41 (28 to 62)	137	—	—
2 doses (14–82 days)	640	29,996	53 (34 to 61)	184	47 (32 to 59)	31 (9 to 48)
Adolescents aged 12–15 yrs						
Delta variant infections						
Unvaccinated (referent)	139	9,786	65 (25 to 107)	23	—	—
2 doses (≥14 days)	193	23,575	142 (91 to 156)	7	87 (70 to 95)	81 (51 to 93)
2 doses (14–149 days)	188	16,517	97 (75 to 105)	3	93 (76 to 98)	87 (49 to 97)
2 doses (≥150 days)	138	7,058	57 (49 to 63)	4	67 (0 to 89)	60 (−35 to 88)
Omicron variant infections						
Unvaccinated (referent)	76	3,001	37 (24 to 62)	38	—	—
2 doses (≥14 days)	192	5,432	22 (22 to 31)	18	64 (37 to 80)	59 (24 to 78)
2 doses (14–149 days)	65	2,623	42 (28 to 56)	14	62 (30 to 79)	59 (22 to 79)
2 doses (≥150 days)	134	2,809	22 (22 to 22)	4	74 (16 to 92)	62 (−28 to 89)

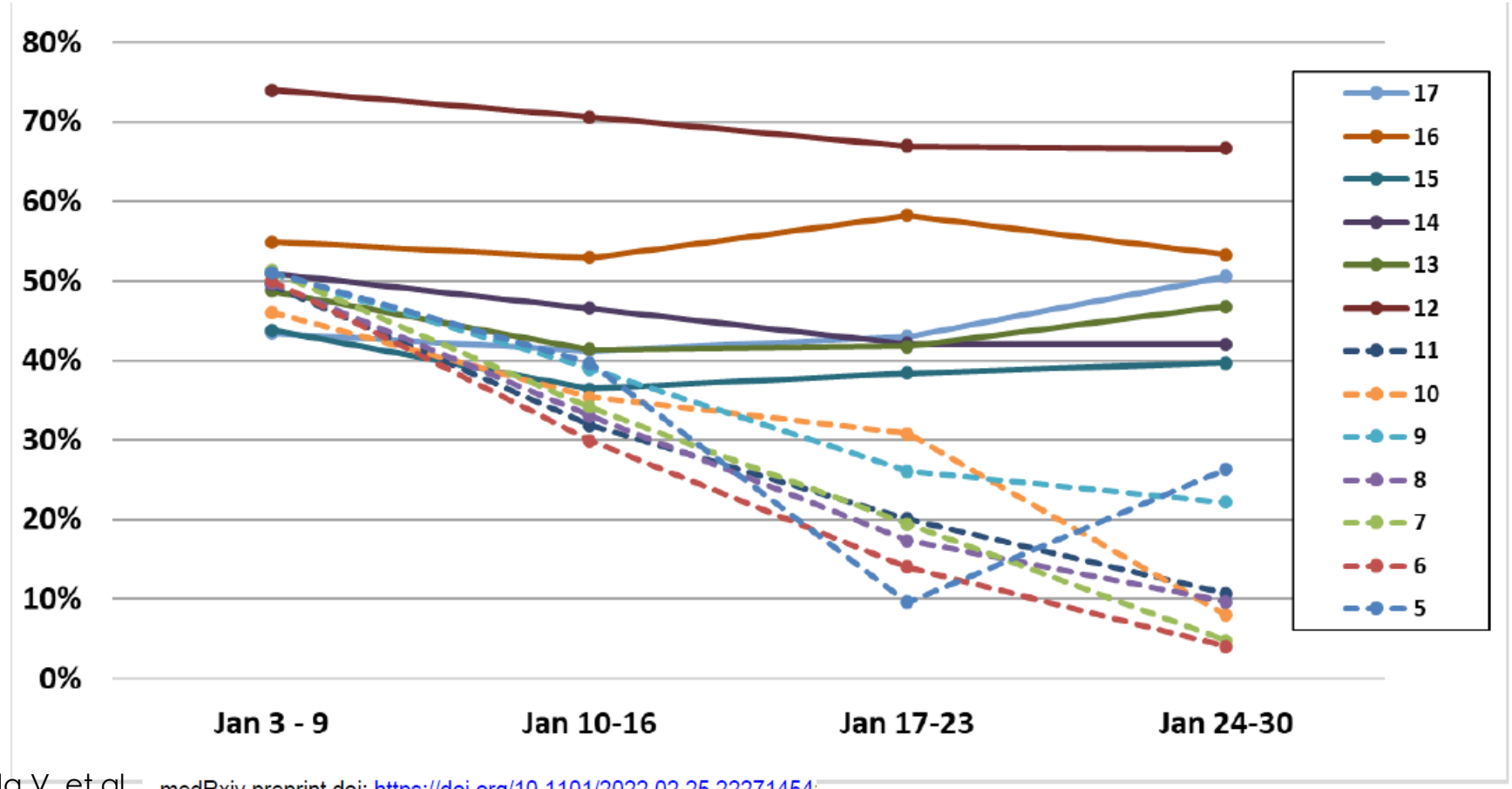
Fowlkes AL, et al. MMWR 2022; 11 marzo

Efectividad frente a casos y hospitalizaciones de la vacuna BNT162b2 (10µg) en niños de 11 años



Dorabawila V, et al. medRxiv preprint doi: https://doi.org/10.1101/2022.02.25.22271454

Efectividad frente a casos y hospitalizaciones de la vacuna BNT162b2 en niños

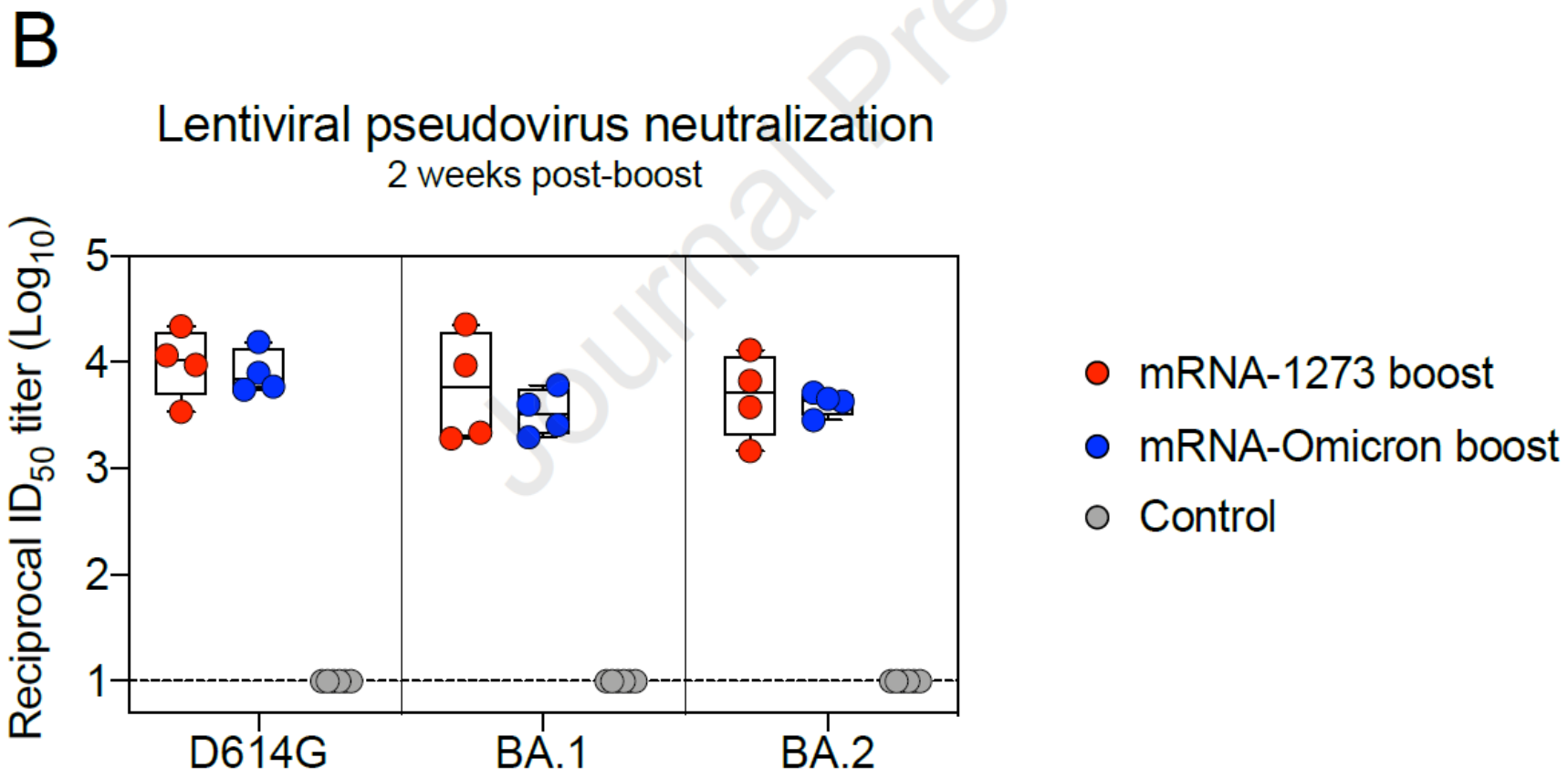


Dorabawila V, et al. medRxiv preprint doi: https://doi.org/10.1101/2022.02.25.22271454

Moderna to ask FDA to authorize Covid-19 vaccine in children 6 months to 6 years

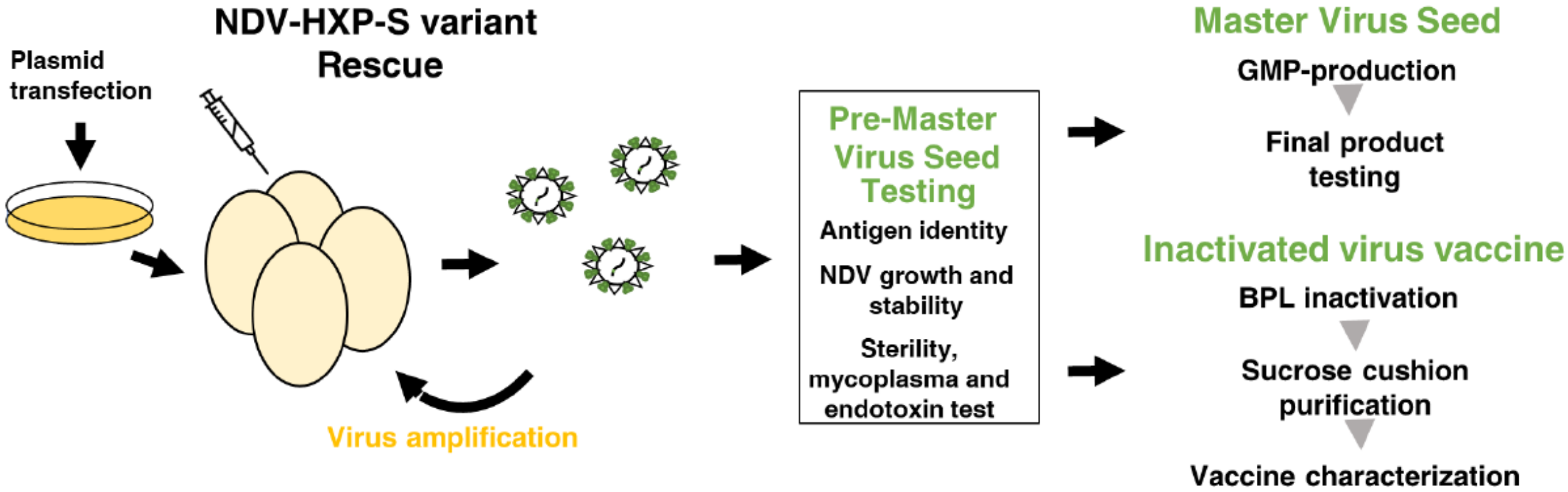
¿Otras vacunas?

Respuesta humoral al refuerzo con vacuna frente a la cepa Wurhan *vs* vacuna de proteína S específica frente a ómicron



Gagne M, et al. Cell. In press

Trivalent NDV-HXP-S vaccine protects against phylogenetically distant SARS-CoV-2 variants of concern in mice

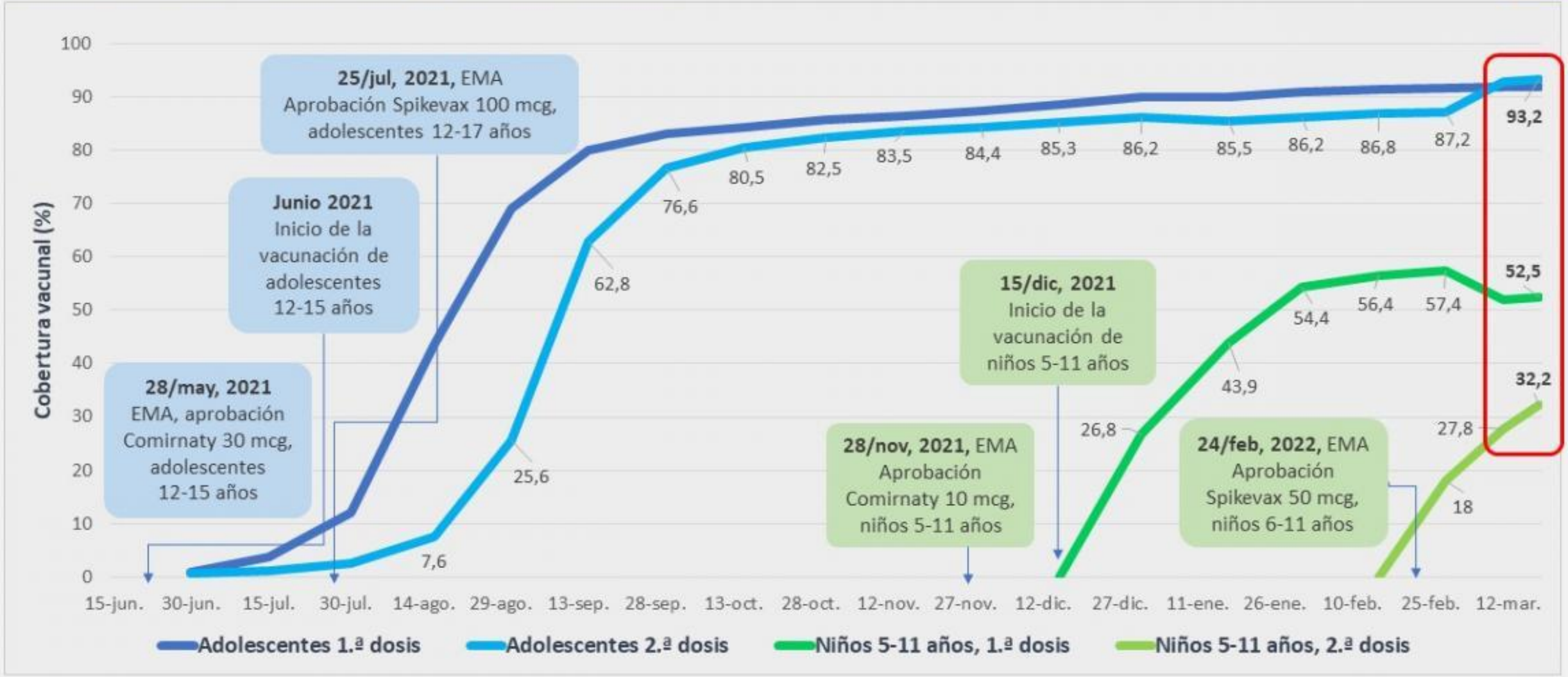


González-Domínguez I, ar al bioRxiv preprint doi: https://doi.org/10.1101/2022.03.21.48524

Evolución de la vacunación frente a la covid en España

Adolescentes y niños con una o dos dosis

Datos del Ministerio de Sanidad, 18 de marzo de 2022



Medical News & Perspectives

Why Parents Still Hesitate to Vaccinate Their Children Against COVID-19

Melissa Suran, PhD, MSJ

As of early December, more than 2.3 million children aged 5 to 11 years had developed COVID-19 and 209 had died. Although a vaccine that's 90.7% effective in preventing the illness was authorized for younger kids in late October, these figures apparently aren't convincing enough to persuade many parents to vaccinate their children.

According to a recent survey by the Kaiser Family Foundation (KFF), only 27% of parents of 5- to 11-year-olds are keen to immunize their children against COVID-19, whereas 30% said they definitely won't vaccinate their children. One-third of parents said they'll "wait and see" before deciding how to proceed. Pediatrician Paul

Multimedia

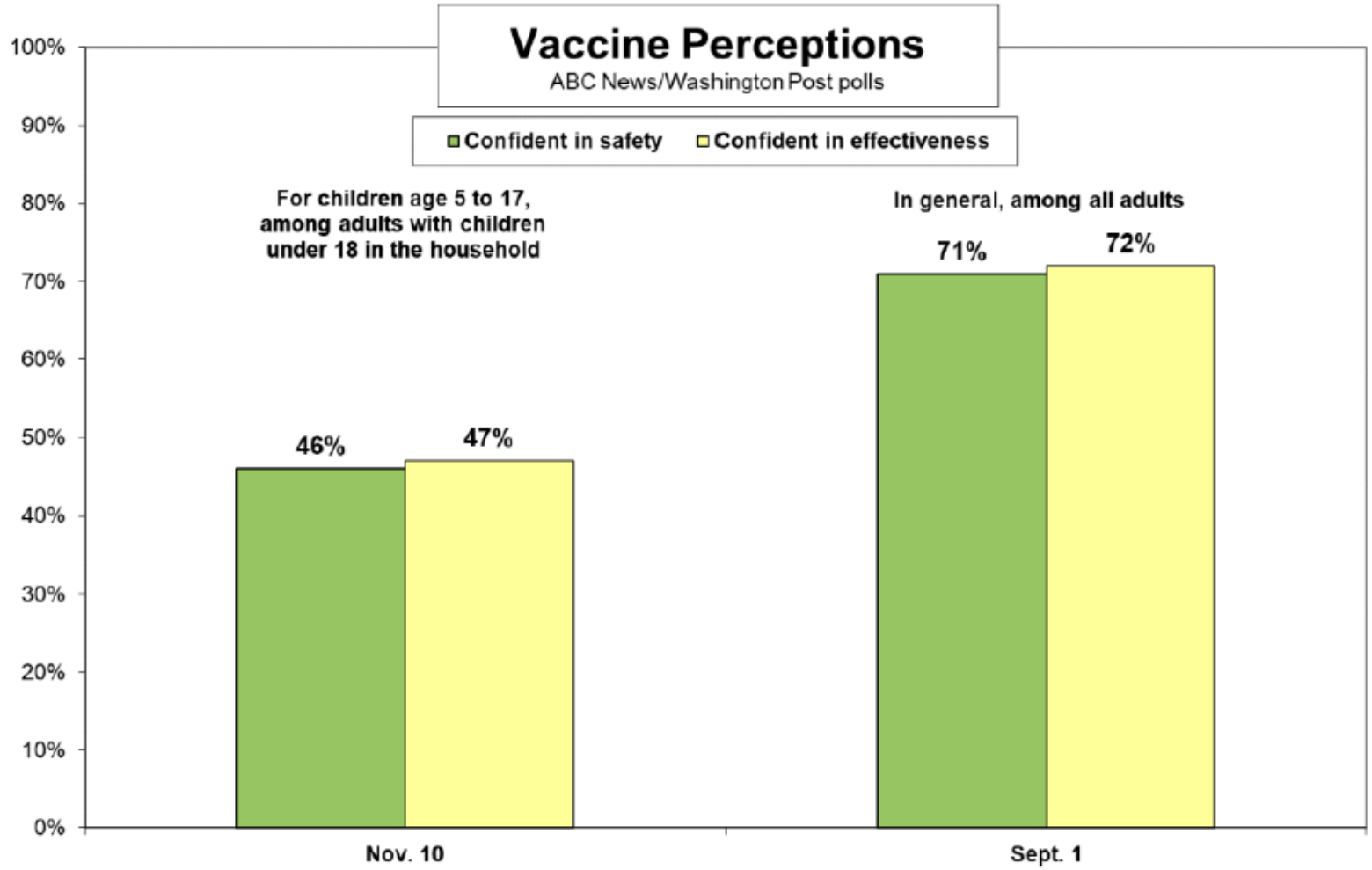
iStock.com/Ivan Pantic

Razones aducidas para no vacunar

- Vacunas demasiado nuevas
- Vacuna experimental
- Efectos potenciales a largo plazo
- Enfermedad benigna en niños
- Más efectos secundarios por la vacunación que por la enfermedad

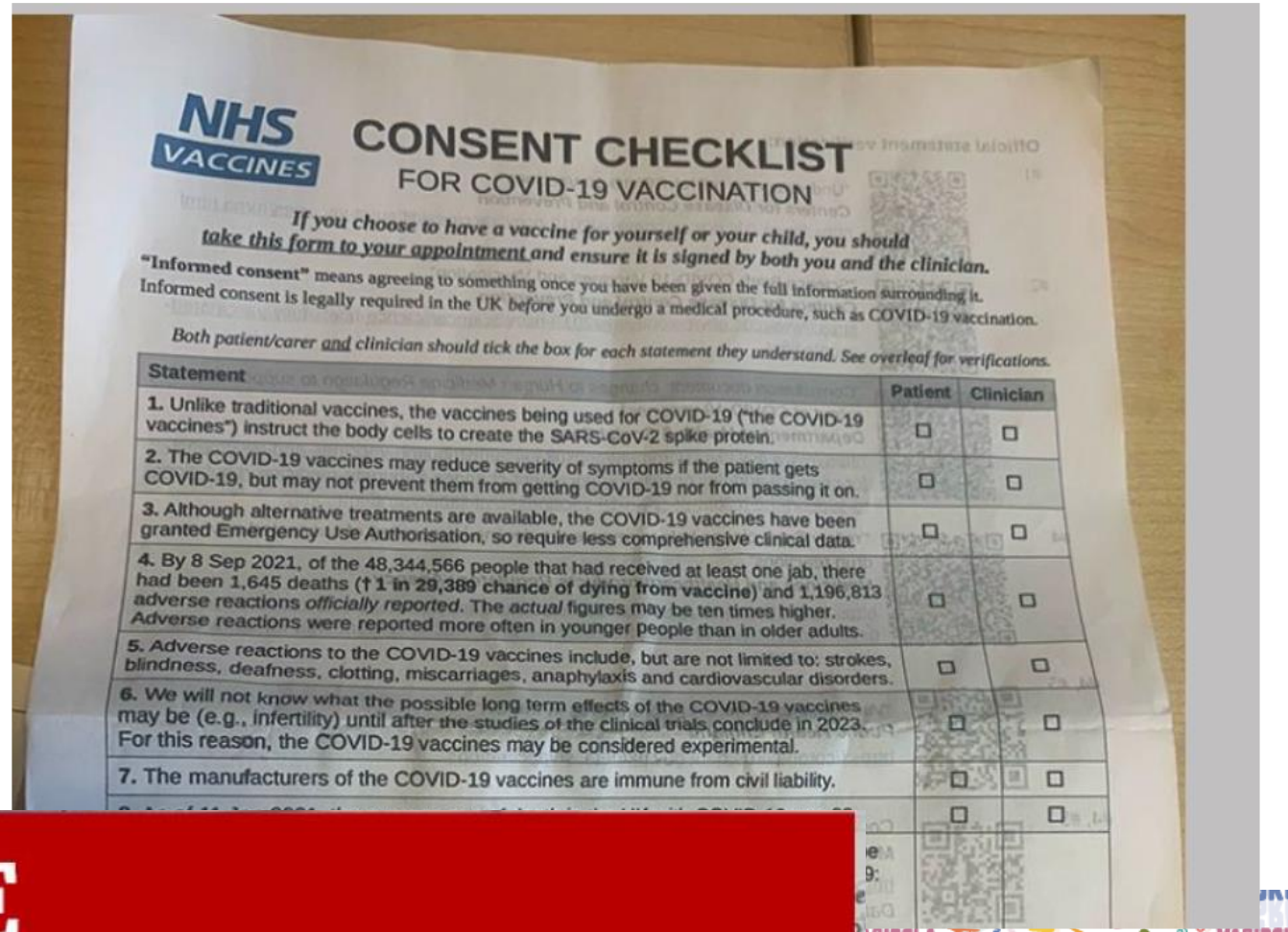
ABC NEWS/WASHINGTON POST POLL: Child Vaccines
EMBARGOED FOR RELEASE AFTER 6:00 a.m. Monday, Nov. 15, 2021

Doubts on Safety, Efficacy in Children Underlie Parents' Vaccine Hesitancy




GOVERNMENT IS LYING TO YOU
SAY NO TO THE
COVID VACCINE
SAV THE CHILDREN
MP
9870
U 3 3
4082
MP
U 3 3


FAKE NEWS



NHS VACCINES

CONSENT CHECKLIST
FOR COVID-19 VACCINATION

If you choose to have a vaccine for yourself or your child, you should take this form to your appointment and ensure it is signed by both you and the clinician.

"Informed consent" means agreeing to something once you have been given the full information surrounding it. Informed consent is legally required in the UK before you undergo a medical procedure, such as COVID-19 vaccination.

Both patient/carer and clinician should tick the box for each statement they understand. See overleaf for verifications.

Statement	Patient	Clinician
1. Unlike traditional vaccines, the vaccines being used for COVID-19 ("the COVID-19 vaccines") instruct the body cells to create the SARS-CoV-2 spike protein.	☐	☐
2. The COVID-19 vaccines may reduce severity of symptoms if the patient gets COVID-19, but may not prevent them from getting COVID-19 nor from passing it on.	☐	☐
3. Although alternative treatments are available, the COVID-19 vaccines have been granted Emergency Use Authorisation, so require less comprehensive clinical data.	☐	☐
4. By 8 Sep 2021, of the 48,344,566 people that had received at least one jab, there had been 1,645 deaths (**↑ 1 in 29,389 chance of dying from vaccine**) and 1,196,813 adverse reactions *officially reported*. The *actual* figures may be ten times higher. Adverse reactions were reported more often in younger people than in older adults.	☐	☐
5. Adverse reactions to the COVID-19 vaccines include, but are not limited to: strokes, blindness, deafness, clotting, miscarriages, anaphylaxis and cardiovascular disorders.	☐	☐
6. We will not know what the possible long term effects of the COVID-19 vaccines may be (e.g., infertility) until after the studies of the clinical trials conclude in 2023. For this reason, the COVID-19 vaccines may be considered experimental.	☐	☐
7. The manufacturers of the COVID-19 vaccines are immune from civil liability.	☐	☐
	☐	☐

• FAKE

CORONAVIRUS COVID-19

Más de la mitad de las ‘fake news’ sobre Covid, vienen de las redes sociales

— Muchas de ellas parten de personajes ‘influyentes’

Report of young child collapsing after COVID jab appears to be fake news

Julia Driscoll

Local News

Revealed: anti-vaccine TikTok videos being viewed by children as young as nine

Covid misinformation remains on site for months adding to concern over impact of social media on young people

Conclusiones

- ¿Infecciones endémicas o estacionales a lo largo de todo el año?
- Las vacunas actuales frente a ómicron son poco efectivas frente a infección (especialmente en niños) pero muy efectivas frente a enfermedad grave (también en niños)
- Un escenario de vacunación anual, complicará la inmunización de los niños
- Es necesario combatir la falsa información sobre las vacunas
- Nuevas vacunas que complementen a las actuales

Muchas gracias