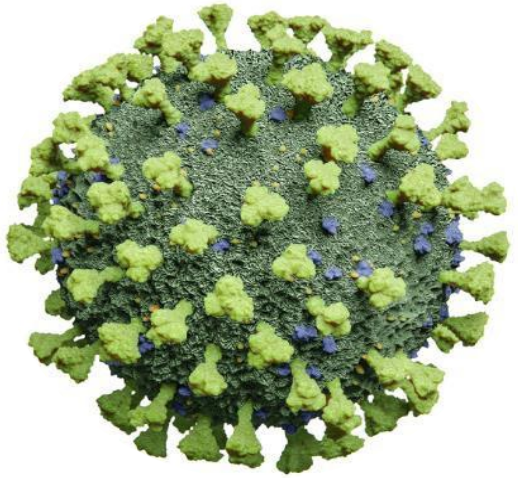
Metapneumovirus en todas las quinielas

Dr. Fernando González Romo
Servicio de Microbiología Clínica, Hospital Clínico San Carlos. Madrid
Profesor Asociado de Microbiología, Facultad de Medicina. UCM



Hospital Clínico San Carlos
SaludMadrid
Comunidad de Madrid

IdISSC INSTITUTO de INVESTIGACIÓN SANITARIA Hospital Clínico San Carlos

VNIVERSITAS COMPLVTENSIS MATRITENSIS

17 Jerez de la Frontera, 20 y 21 de marzo 2026
JORNADAS DE INMUNIZACIONES

aep Asociación Española de Pediatría
CAV Comité Asesor de Vacunas e Inmunizaciones

Metapneumovirus humano

"Conoce a tu enemigo y saldrás victorioso en mil batallas"

(Sun Tzu, siglo V a. C.)

"Las comparaciones son odiosas"

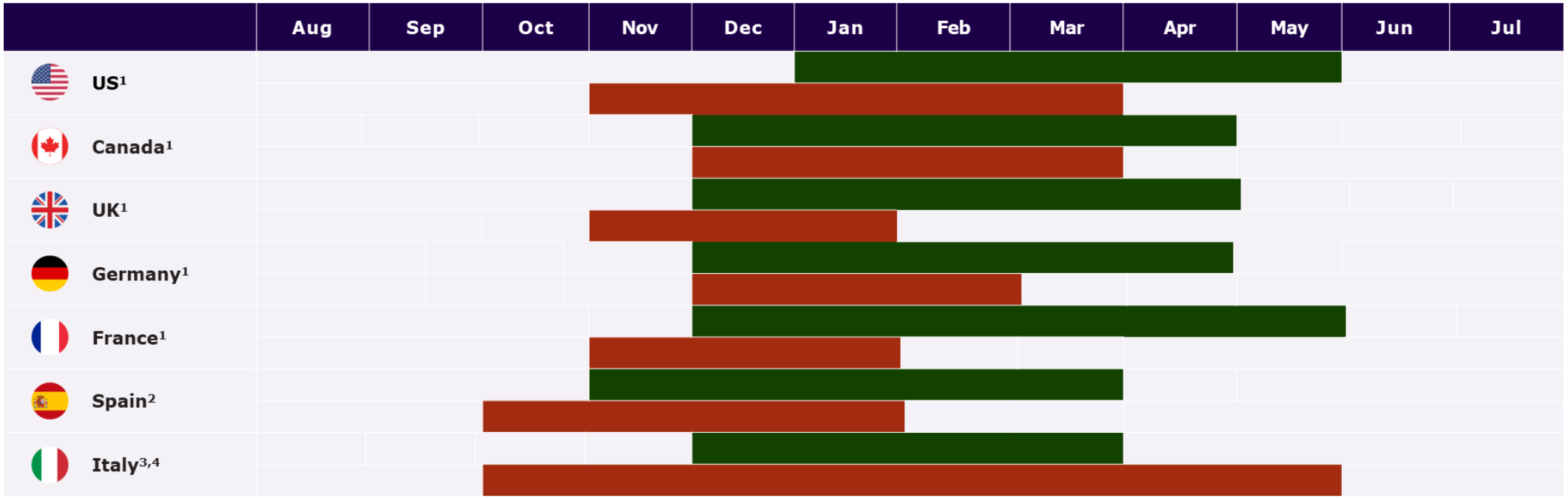
(Leon Festinger, 1954)

"Si algo funciona cópialo y, si puedes, mejóralo"

(Emilio Duró, 2013)

Estacionalidad

RSV hMPV



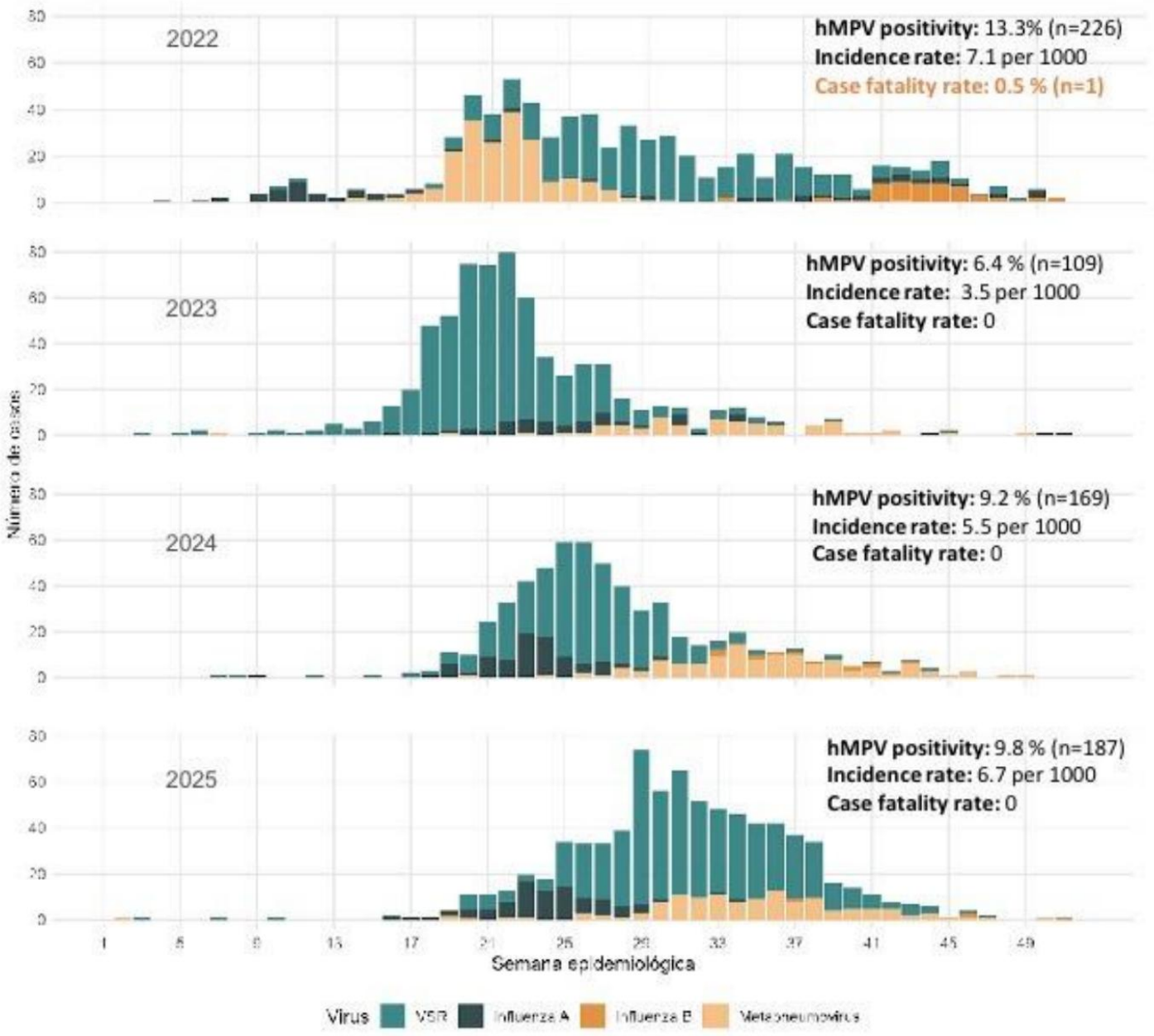
Correlation between weekly positive rate of human metapneumovirus and meteorological variables.

Meteorological variables	Univariate regression		Multivariate regression[a]	
	Coefficient	*P*	Coefficient	*P*
Temperature (°C)	-0.085	**0.016**	-0.013	0.813
Relative humidity (%)	0.047	0.054	-0.030	0.380
Rainfall (mm)	0.007	0.074	0.004	0.401
Sunshine duration (hour)	-0.067	**<0.001**	-0.070	**<0.001**
Atmosphere pressure (hPa)	0.008	0.268	0.006	0.376
Wind speed (m/s)	0.013	0.967	-0.261	0.449

Bold characters indicate statistically significant results.

1.Li Y, Nair H et al.. The Lancet Global Health 2019;7:e1031-e1045
2. Piñana M, et al. *J Clin Virol.* 2020;132:104590.
3. Obando-Pacheco P, et al. *J Infect Dis*. 2018;217(9):1356-1364.
4- Guido M, et al. *Virology.* 2011;417(1):64-70.
5. Ye H et al. Int J Infect Dis 2023; 137:40-47

Estacionalidad



HUMAN METAPNEUMOVIRUS (HMPV): A PREVALENT CAUSE OF PEDIATRIC ACUTE LOWER RESPIRATORY INFECTIONS IN THE POST-PANDEMIC PERIOD. A MULTICENTER STUDY IN ARGENTINA.

ReSViNET
RESPIRATORY SYNCYTIAL VIRUS FOUNDATION

P390

GENTILE, Angela[1]; JUAREZ, María del Valle[1]; GREGORIO, Gabriela[2]; GIOIOSA, Andres[2]; FERNANDEZ, Tatiana[2]; PEJITO, Natalia[1]; ZUZEL, Paula[1]; ENSINCK Gabriela[3]; LOBERTTI Silvina[3]; LOPEZ, Oscar[4]; LOPEZ, Leandro[4]; LUCION, María Florencia[1].

[1] "Dr Ricardo Gutiérrez" Children's Hospital, Buenos Aires City; [2] "Dr. Victor J. Vilela" Children's Hospital, Rosario; [3] "Dr. Fernando Barreyro" Children's Hospital, Posadas; [4] "Prof. Alejandro Posadas" National Hospital, Buenos Aires Province.

Periodo 2022-2025
Menores de 18 años
Hospitalizaciones por ITRI (n=7021)

Variable	hMPV	ORV	p value
Age (months)	10 (5–19)	10 (4–24)	0.755
Age < 2 years	545 (79.1%)	3569 (74.9%)	0.018
Male sex	395 (57.2%)	2611 (54.8%)	0.252
Comorbidities	403 (58.3%)	2737 (57.4%)	0.681
Symptom duration at admission (days)	3 (2–5)	3 (2–5)	0.081
Bronchiolitis at admission	380 (55.0%)	2577 (54.1%)	0.683
Viral coinfection	188 (27.2%)	965 (20.2%)	0.001
Oxygen therapy	668 (96.7%)	4494 (94.3%)	0.009
Duration of oxygen therapy (days)	5 (4–8)	5 (3–8)	0.751
Total length of hospitalization (days)	7 (5–10)	7 (5–10)	0.047
ICU admission	115 (16.6%)	792 (16.6%)	1.000
Mechanical ventilation	102 (14.8%)	642 (13.5%)	0.373
Length of stay in ICU (days)	10 (6–16)	9 (6–15)	0.353

Gravedad

hMPV burden in infants attending hospital emergency departments in Iberia from 2021 to 2024: The RHEDI Prospective Study

Ana Dacosta-Urbieta [1], Jacobo Pardo-Seco [1], Narmeen Mallah [1], Irene Rivero-Calle [1], Ricardo Suárez Camacho [1], Paula Vazquez López [3], Carlos Luaces Cubells [4], Pablo Ferrer González [5], Silvia Oliva Rodríguez Pastor [6], Pedro Flores [7], Teresa Bandeira [8], Fernanda Rodrigues [9], Mathieu Bangert [2], Rolf Kramer [2], Pierre Bourron [2], Leticia Platero [2], Catarina Gomes [2], Gema Barbeito [2], Alberto Gómez-Carballa [2], Carmen Rodriguez-Tenreiro Sánchez [1], Federico Martinón-Torres [1], RHEDI CONSORTIUM

[1]Grupo de Investigación en Genética, Vacunas, Infecciones y Pediatría (GENVIP), Hospital Clínico Universitario de Santiago de Compostela, Spain; [2] Sanofi Vaccines; [3]Hospital Gregorio Marañón. Madrid; [4]Hospital Sant Joan de Deu. Cataluña; [5]Hospital La Fe. Valencia; [6]Hospital Regional Universitario de Málaga. Andalucía; [7]CUF Descobertas Lisboa; [8]Hospital de Santa María Lisboa; [9]Hospital Pediatrico Coimbra

Prospectivo
Periodo 2021-2024
Menores de 5 años
Atención en Urgencias por ITR u otitis (n=1654)

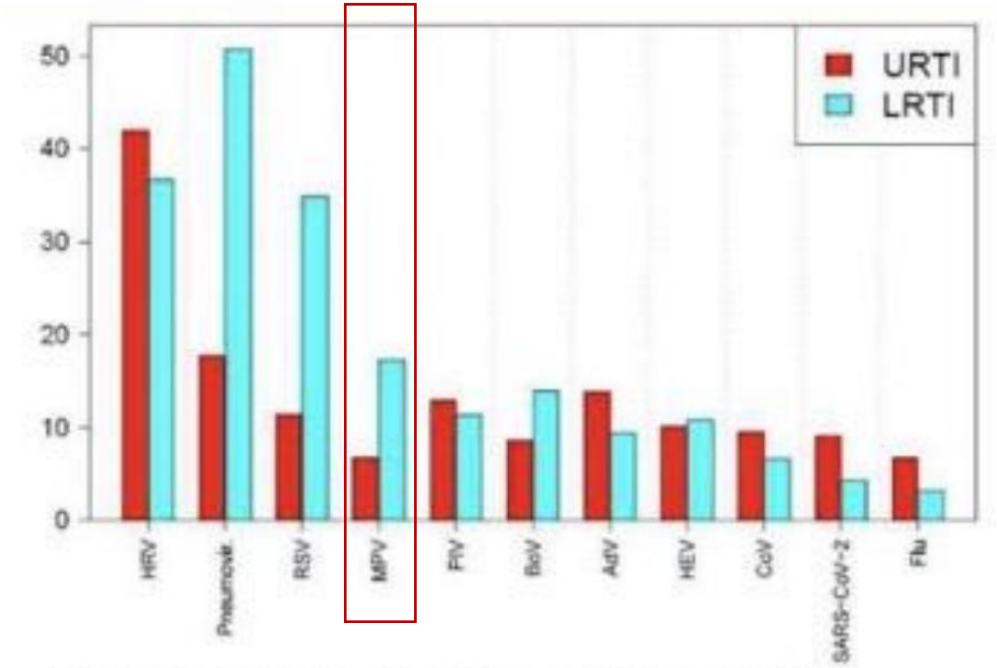
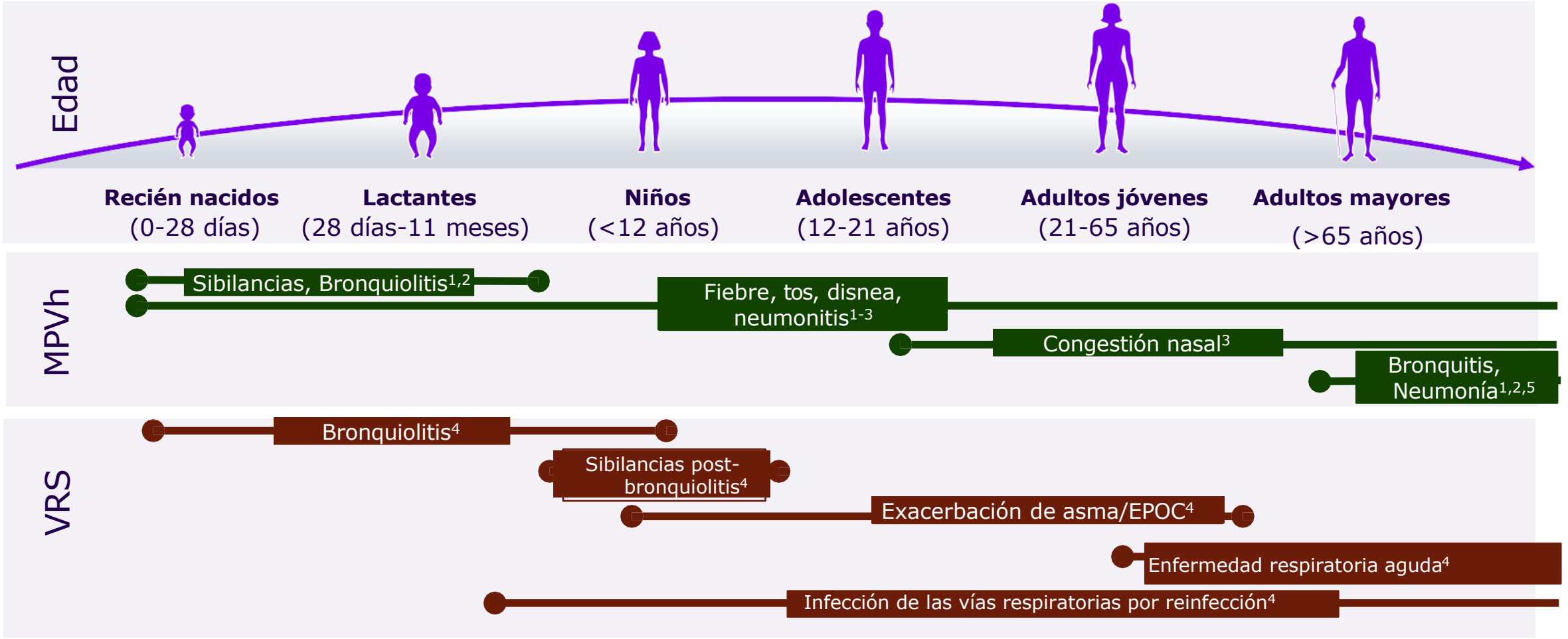


Figure 3: Positivity rate by type of infection (%)

Variable	hMPV	OVR	Valor de p
Bronquiolitis	46,3%	33,3%	<0,01
Sibilancias inducidas por virus	24,6%	14,5%	<0,01
Neumonía	10,3%	4,3%	<0,01
Tasa de hospitalización	34,5%	21,7%	<0,001
Estancia media (días)	10,3	4,7	<0,01
Necesidad de oxigenación	27,0%	13,1%	<0,001
Gravedad (escala ReSVinet)	5,5%	4,1%	<0,001

Espectro clínico



1. van den Hoogen BG, et al. *Pediatr Infect Dis J*. 2004;23(1 Suppl):S25-S32. **2.** Hamelin M-E, et al. *Clin Infect Dis*. 2004;38(7):983-990. **3.** Walsh EE, et al. *Arch Intern Med*. 2008;168(22):2489-2496. **4.** Openshaw PJM, et al. *Annu Rev Immunol*. 2017;35:501-532. **5**. Brochado O et al. Infect Dis Ther 2026; online 07 March

Carga

Infect Dis Ther
https://doi.org/10.1007/s40121-026-01317-4

Published online: 07 March 2026

ORIGINAL RESEARCH

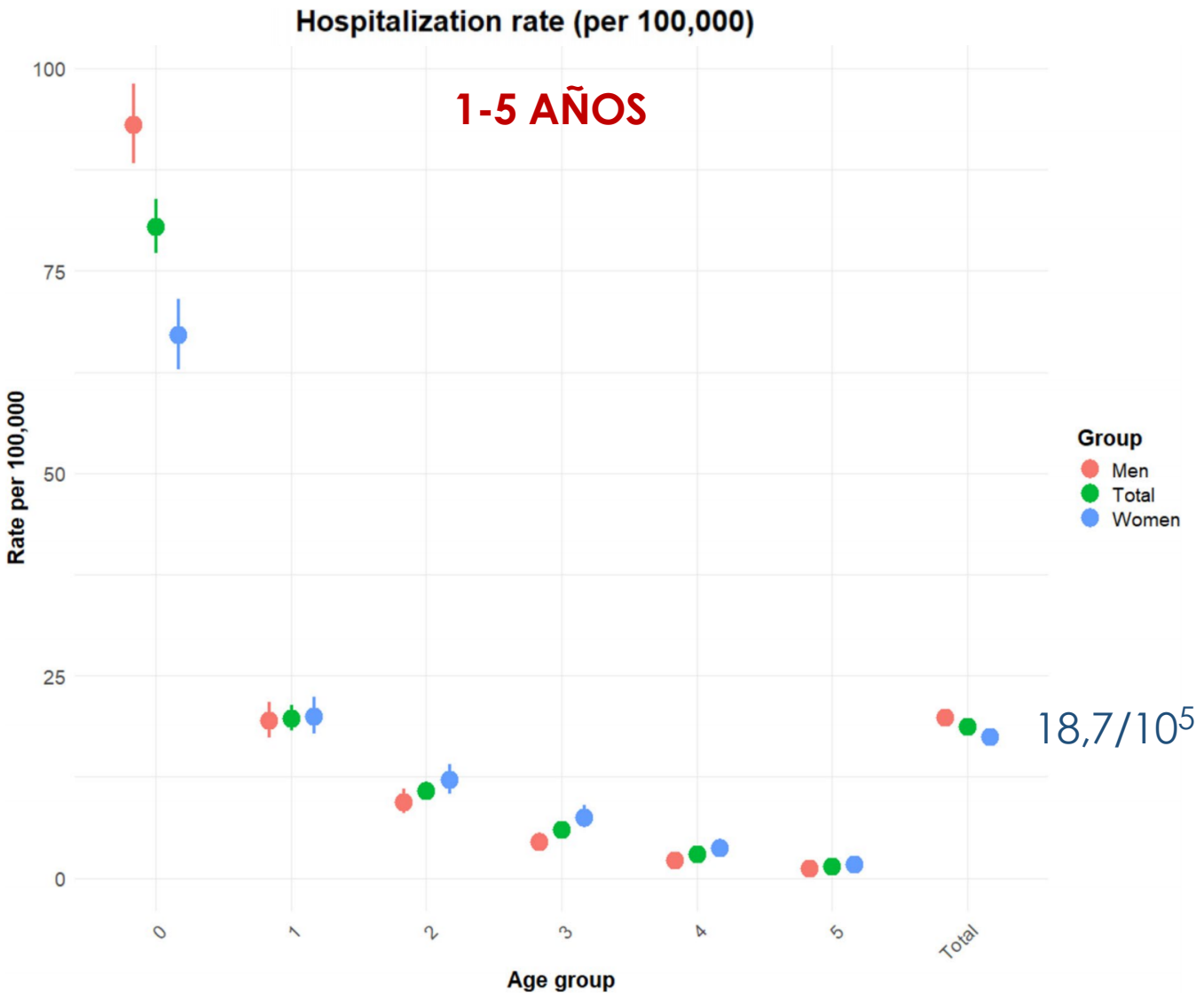
Epidemiological Burden and Hospitalization Trends of Human Metapneumovirus in Spain (2016–2023): A Retrospective Study

Oscar Brochado-Kith · Ruth Gil-Prieto · Angel Gil-de-Miguel

CMBD 2016-2023: 4824 hospitalizaciones

75% niños <6 años (18,7/10^5) Bronquiolitis

16% adultos >59 años (0,79/10^5) Neumonía



Brochado O et al. Infect Dis Ther 2026; online 07 March

Carga

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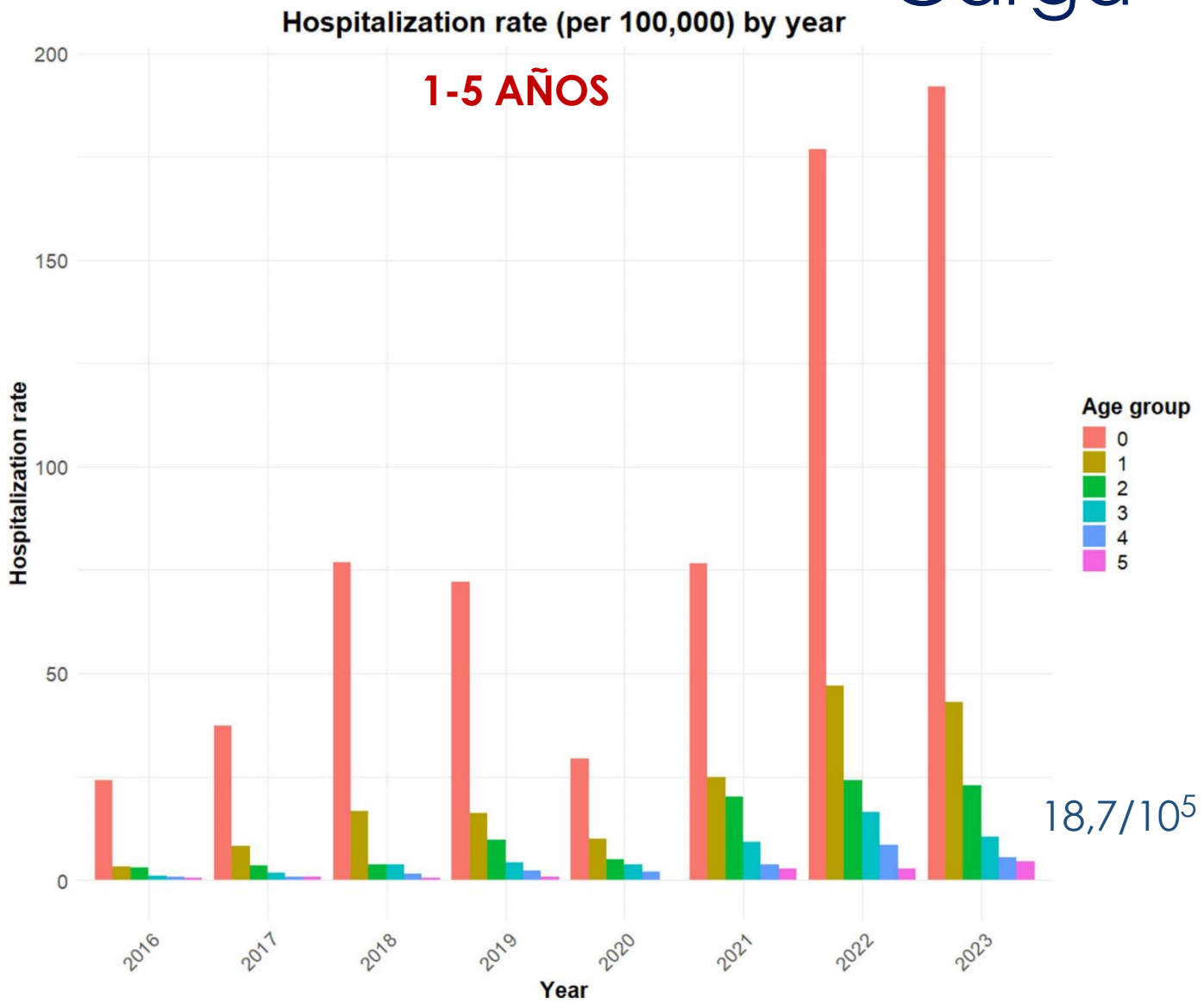
16% adultos >59 años (0,79/10^5) Neumonía

NIÑOS 1-5 AÑOS:

Estancia media: 5 días

Coste hospitalización: 3637,48€

Coste Total: 13 millones de euros



18,7/10^5

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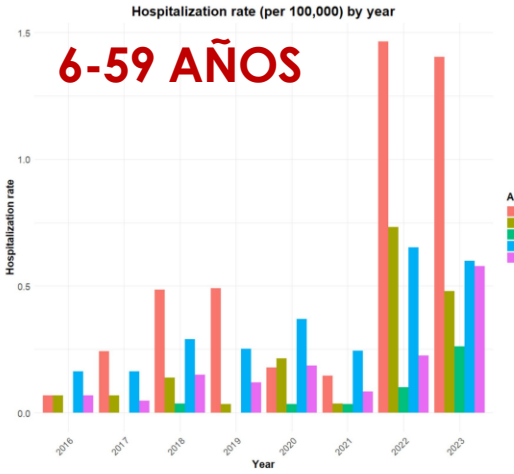
Carga

CMBD 2016-2023: 4824 hospitalizaciones

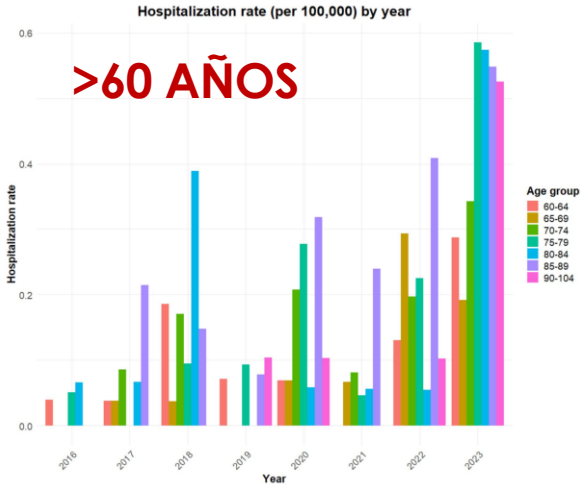
75% niños <6 años (18,7/10^5) Bronquiolitis

16% adultos >59 años (0,79/10^5) Neumonía

Fatality rate: 9,65%

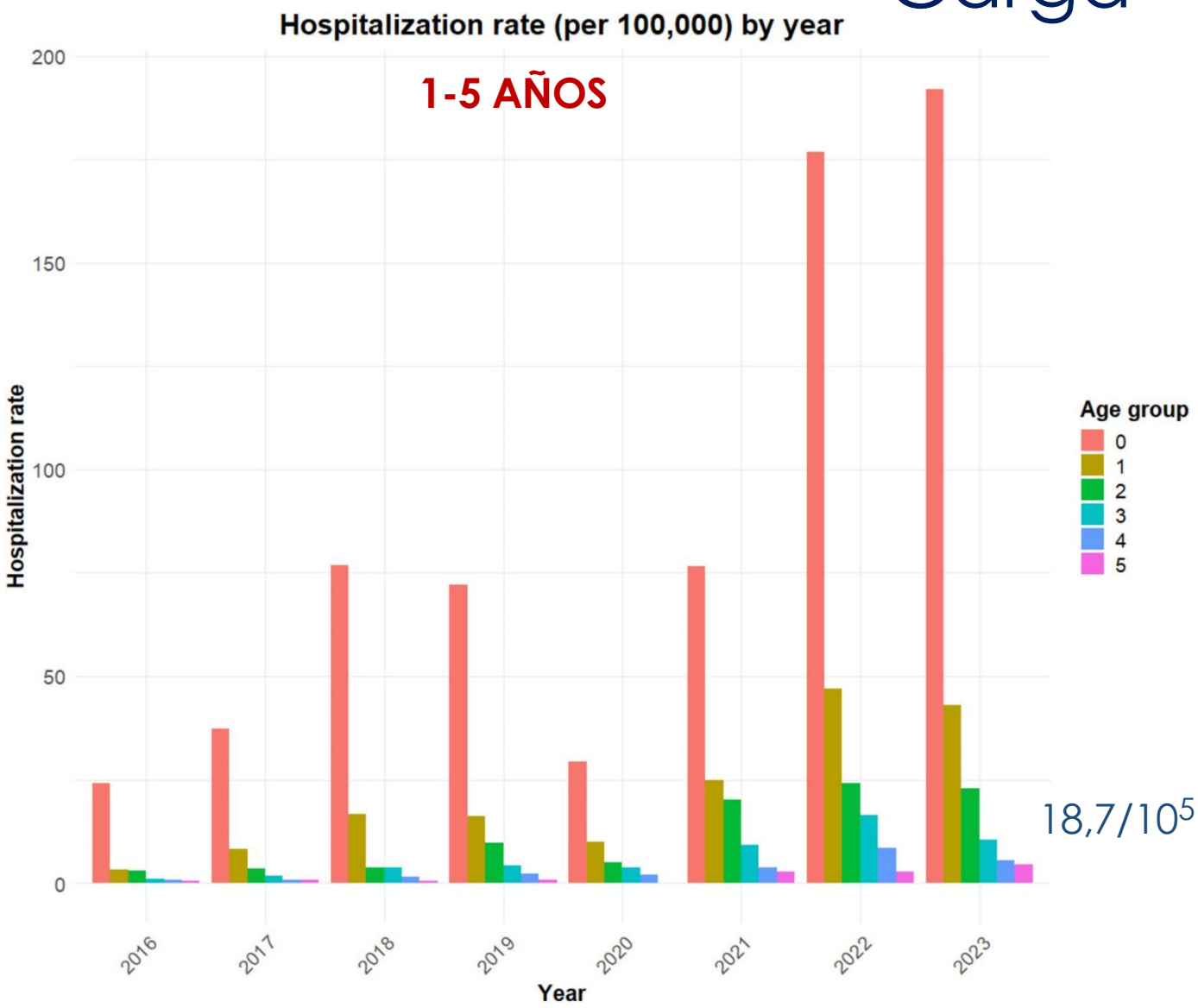


0,17/10^5



0,79/10^5

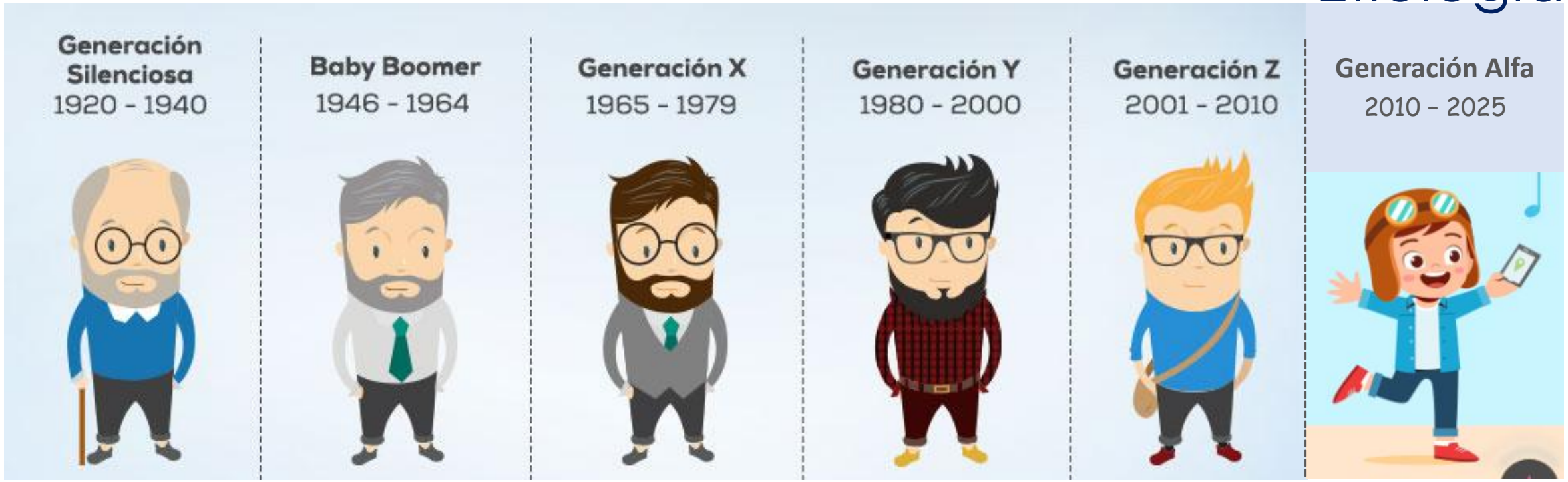
Fatality rate: 3,96%



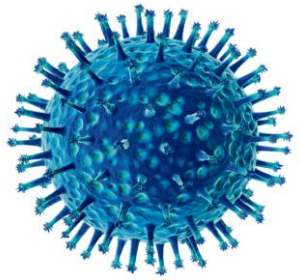
18,7/10^5

Brochado O et al. Infect Dis Ther 2026; online 07 March

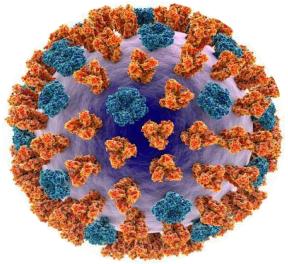
Etiología



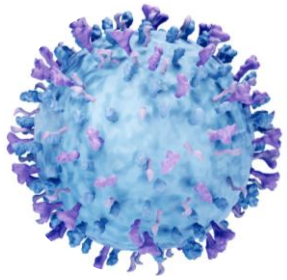
Gripe
1933



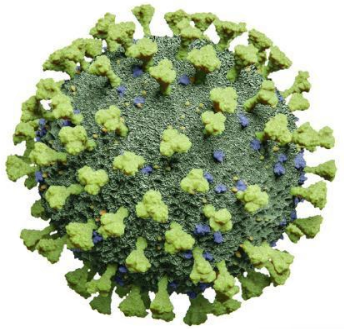
VRS
1957



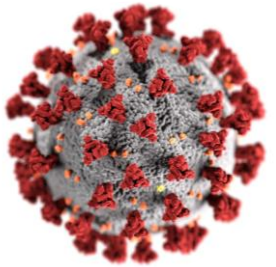
HCoV-229E
1966

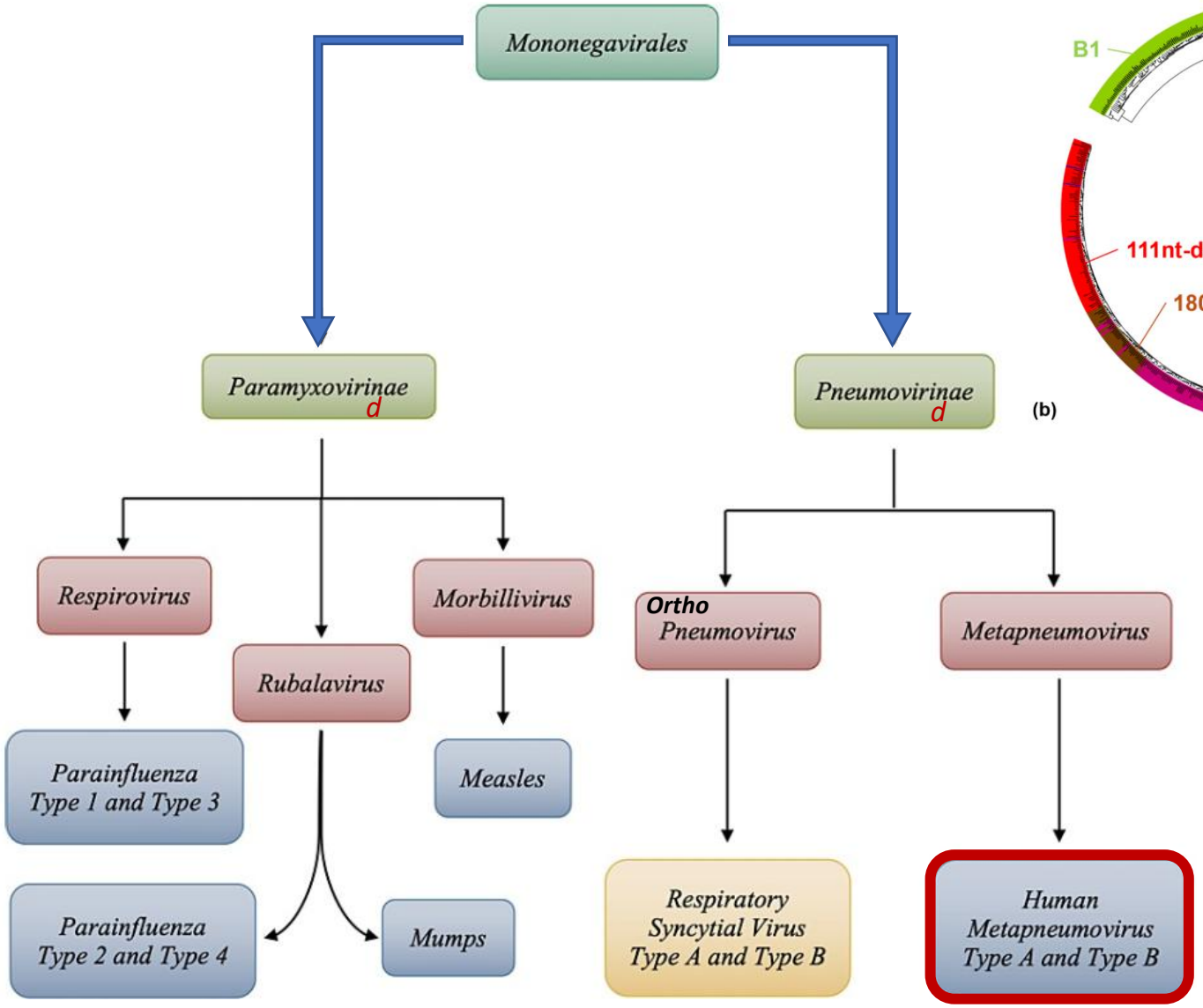


hMPV
2001

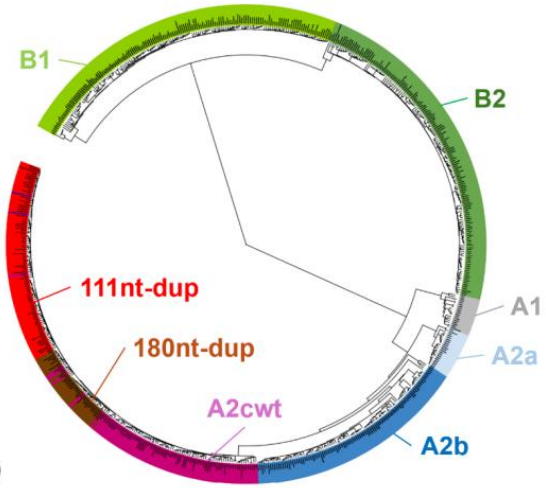


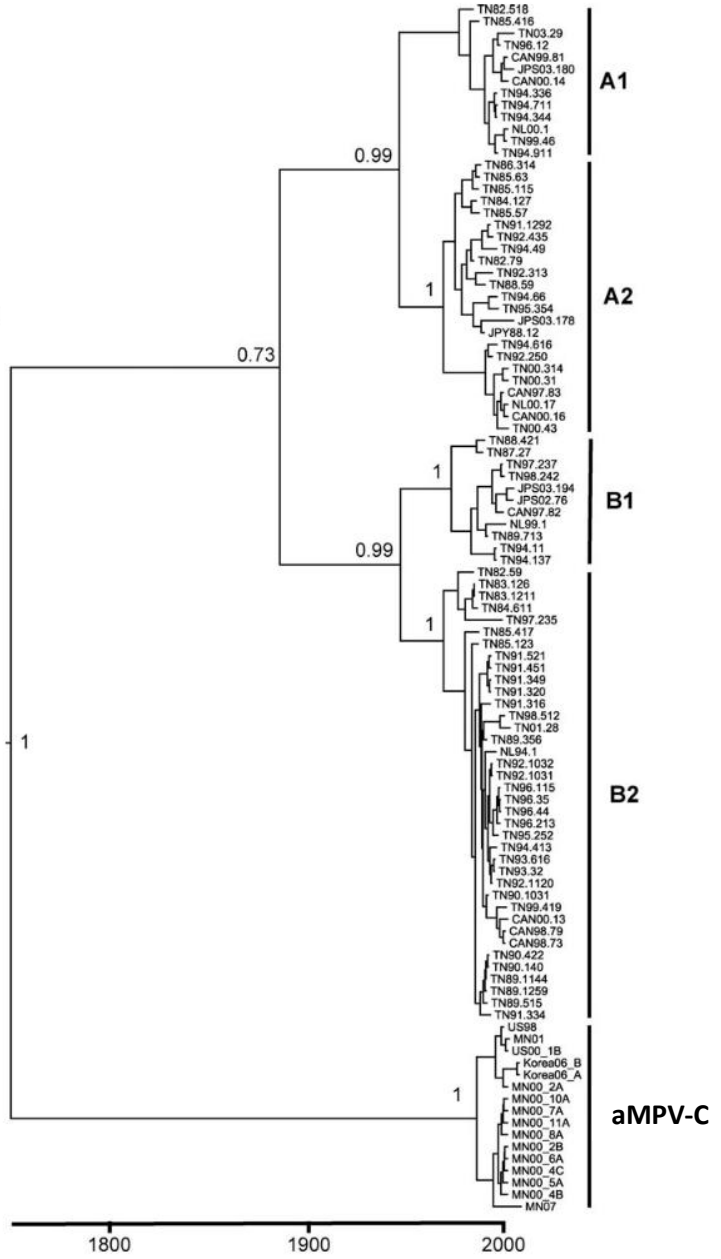
SARS-CoV2
2019





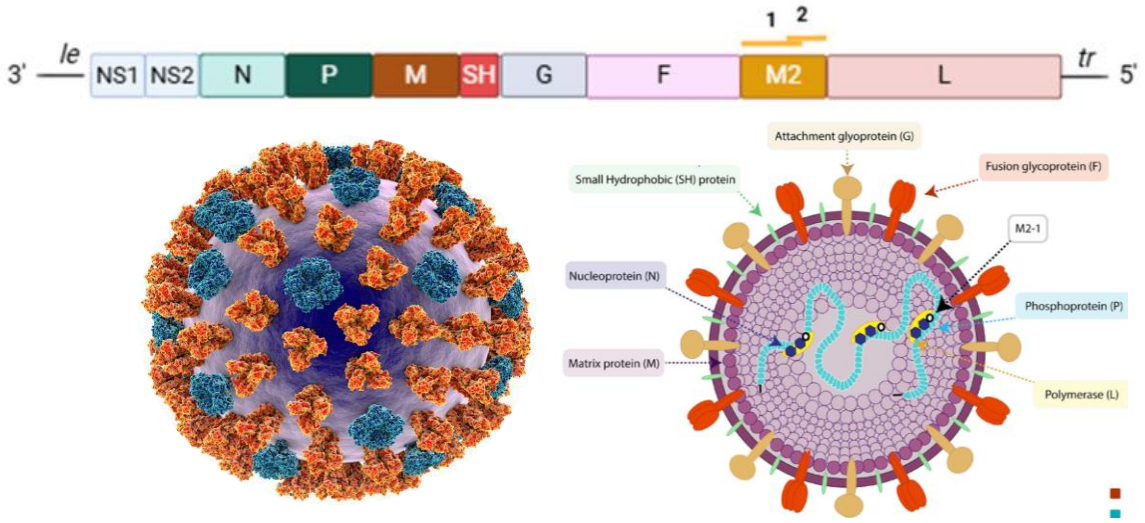
(b)





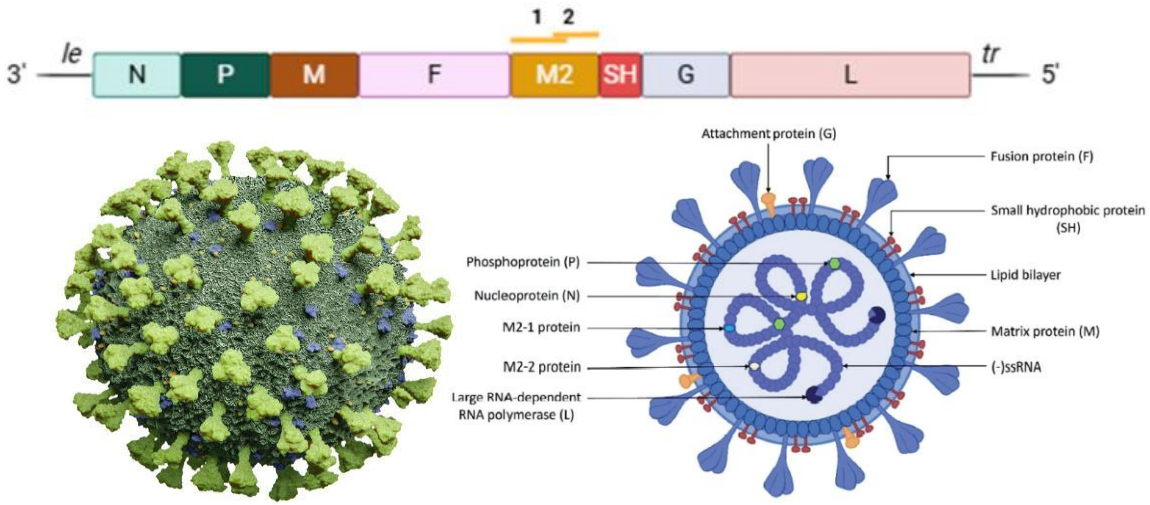
Chittiprol N, Kandi V, Pinnelli V, et al. (June 02, 2025) The Re-emergence of Human Metapneumovirus: Virus Classification, Characteristics, Mechanisms of Infection, Clinical Features, Diagnosis, Epidemiology, Prevention, and Treatment. Cureus 17(6): e85259

VRS

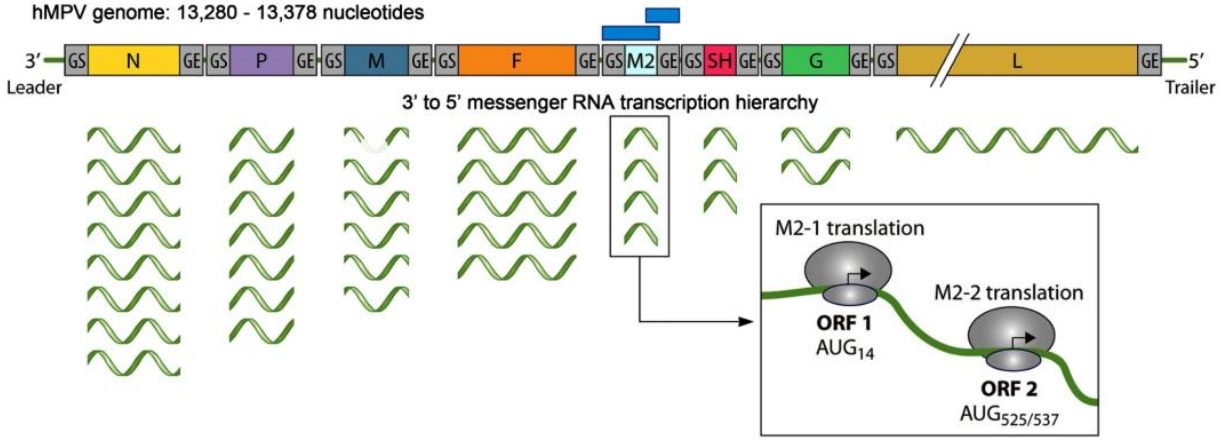


ARN monocatenario de sentido negativo de 15,2kb
Codifica 11 proteínas (Proteínas NS1 y NS2)

hMPV

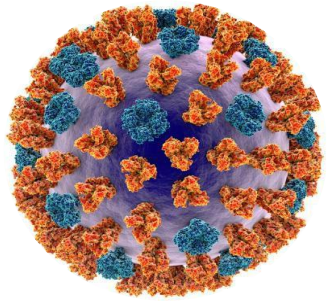


ARN monocatenario de sentido negativo de 13 kb
Codifica 9 proteínas



…y el orden de los genes es diferente al del VRS

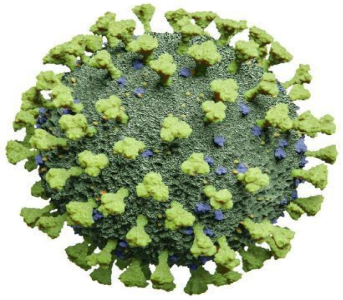
Twumasi S, et al. Reviews in Medical Virology 2025;35:e70043
Ríos Guzmán E, et al. Ther Adv Infect Dis 2022;9:1-21
van den Hoogen BG, et al. Virology 2002;295(1):119-132.
Kolli D, et al. Pathogen 2013;1;2(2):232-263

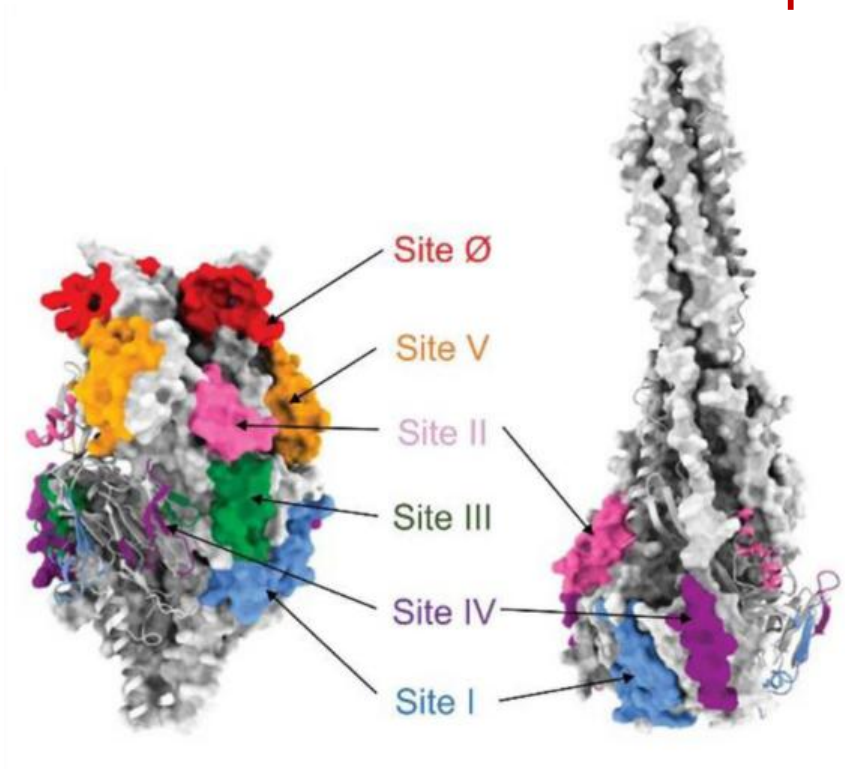


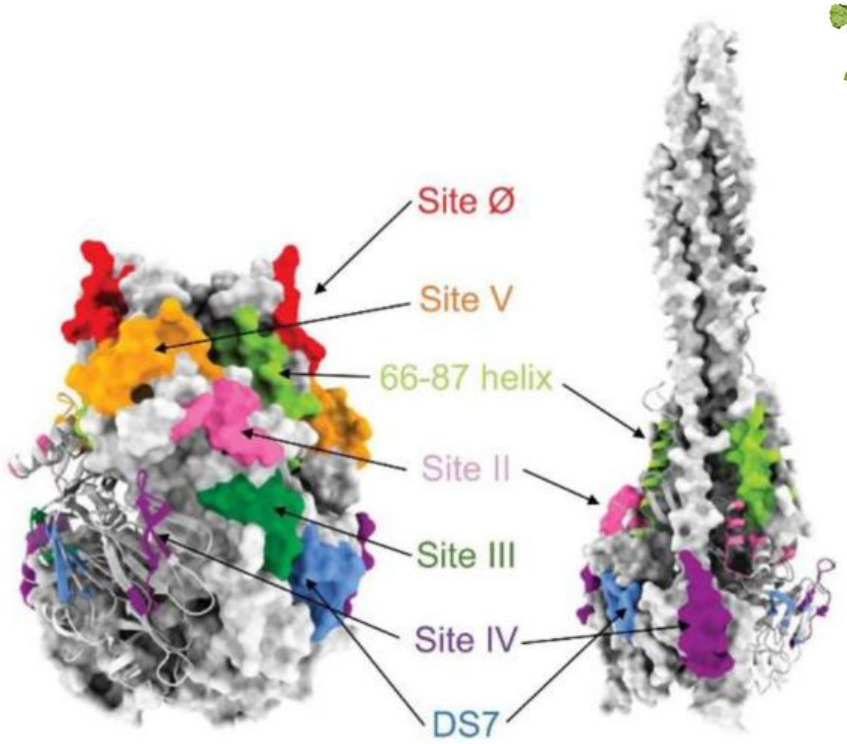
VRS

Glicoproteína F

hMPV







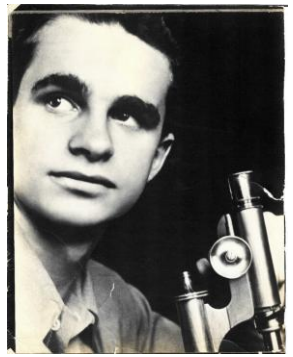
Principal determinante antigénico
Comparten 30% de identidad en la secuencia de aa
Forma pre y postfusión
Site Ø y V exclusivos de la forma prefusión

Muy conservada entre clados A y B
Doble función: Adhesión y Fusión
Genera nAb frente a formas pre y postfusión
Epítopo no presente en VRS: 66-87 hélix
Dianas más potentes para mAbs: Site IV, III y II

Miller RJ et al. Curr Opin Virol 2023;61:101337

Fracaso y abandono del ensayo clínico de la Vacuna VRS inactivada con formalina.

VRS 1968



Dr. R. Chanock

1956: Chimpanzee coryza agent (CCA)

been reported that naturally acquired serum antibody at levels of 1:32 to 1:64 do not provide effective protection against infection (1).

We have noted that the respiratory tract illnesses associated with RS virus infection in RS vaccinees were more severe than those associated with RS virus infection in the group of infants who received the parainfluenza Type 1 virus

TABLE 6. EVIDENCE FOR FAILURE OF VACCINE-INDUCED VIRUS INFECTION AND B

SESSION I • *Acute Respiratory Diseases*

vaccine. Four of five RS vaccinees who were infected with RS virus required hospitalization, whereas none of five parainfluenza Type 1 vaccinees infected with RS virus was admitted to the hospital. These observations raise the question of a paradoxical vaccine effect. Possibly RS vaccines of low potency in some way "sensitize" an individual or potentiate the host's response to natural RS infection. Such a phenomenon has been noted previously with rickettsial vaccines (8), trachoma vaccine (9), and *M. pneumoniae* vaccine (10).

Thus our findings indicate that it is possible

hMPV 2007

ELSEVIER

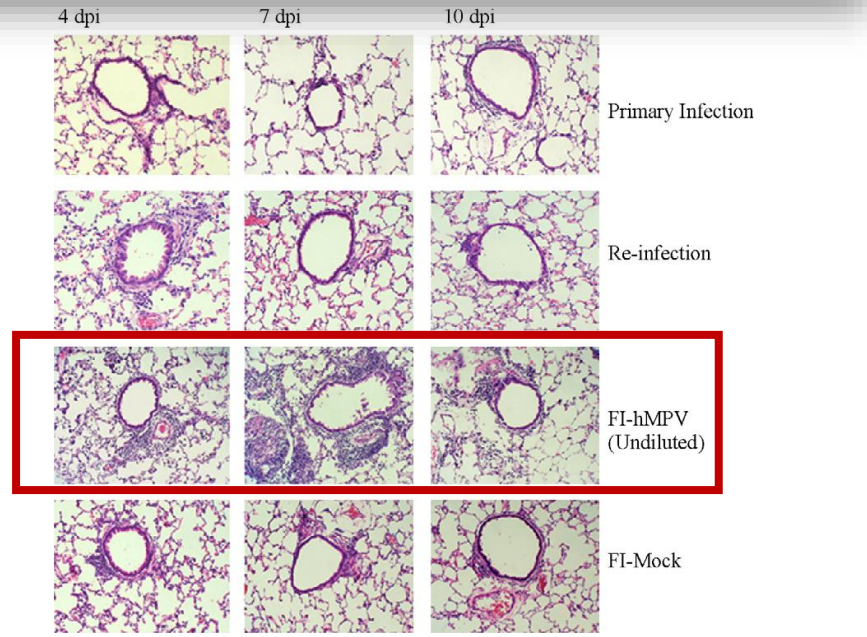
Available online at www.sciencedirect.com
ScienceDirect
Vaccine 25 (2007) 5034–5040

Vaccine
www.elsevier.com/locate/vaccine

Human metapneumovirus: Enhanced pulmonary disease in cotton rats immunized with formalin-inactivated virus vaccine and challenged

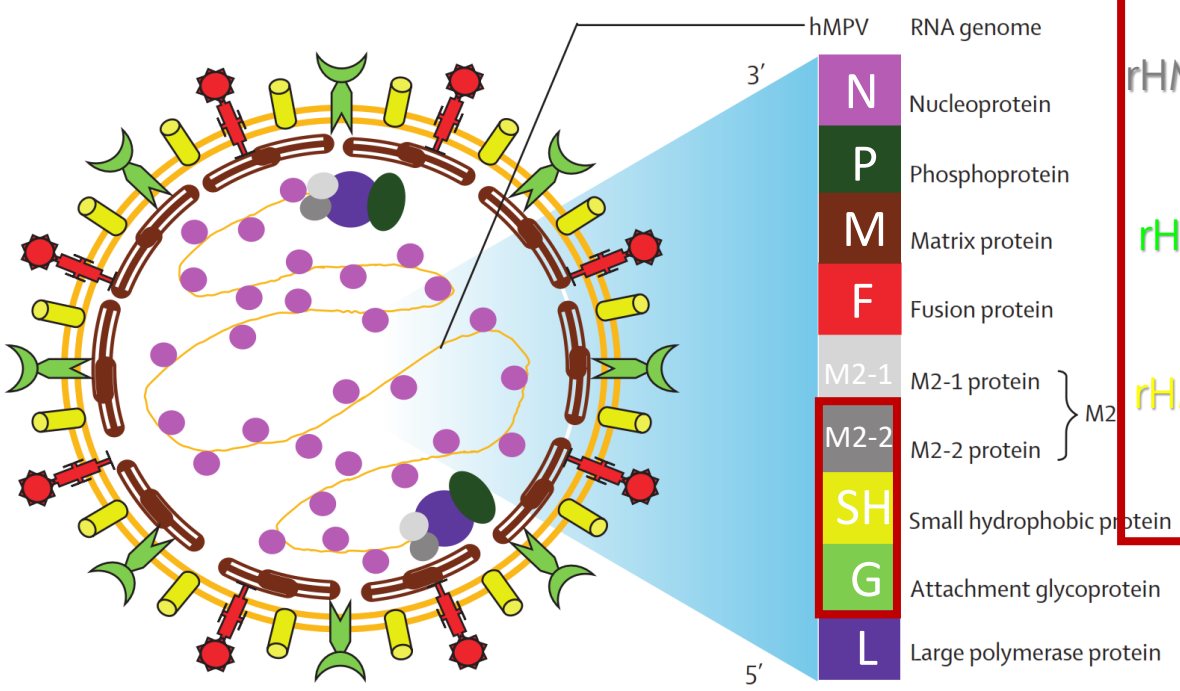
Kevin C. Yim [a,*], Rose P. Cragin [a], Marina S. Boukhvalova [a], Jorge C.G. Blanco [a], Marie-Ève Hamlin [b], Guy Boivin [b], David D. Porter [a], Gregory A. Prince [a]

[a] *Virion Systems, Inc., 9610 Medical Center Drive, Suite 100, Rockville, MD 20850, United States*
[b] *Research Center in Infectious Diseases of the Centre Hospitalier Universitaire de Quebec, and Laval University, Quebec City, Quebec, Canada*



Yim KC, et al. Vaccine 2007;25: 5034–5040

LAV: Delección molecular



hMPV

rHMPV-ΔG/SH

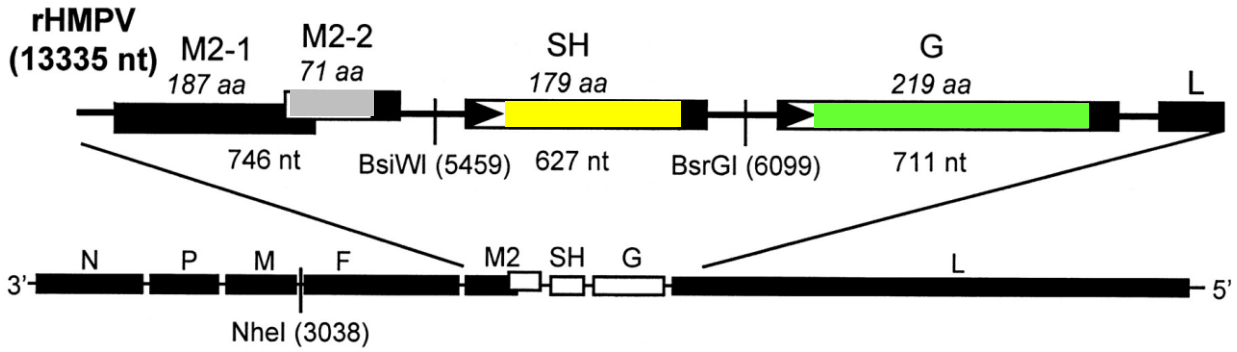
↓ replicación viral 600x

rHMPV-ΔM2-2 (13183 nt) — ↓ replicación viral 60x

rHMPV-ΔG (12475 nt) — ↓ replicación viral 40x

rHMPV-ΔSH (Metavac) (12695 nt) — Menor atenuación

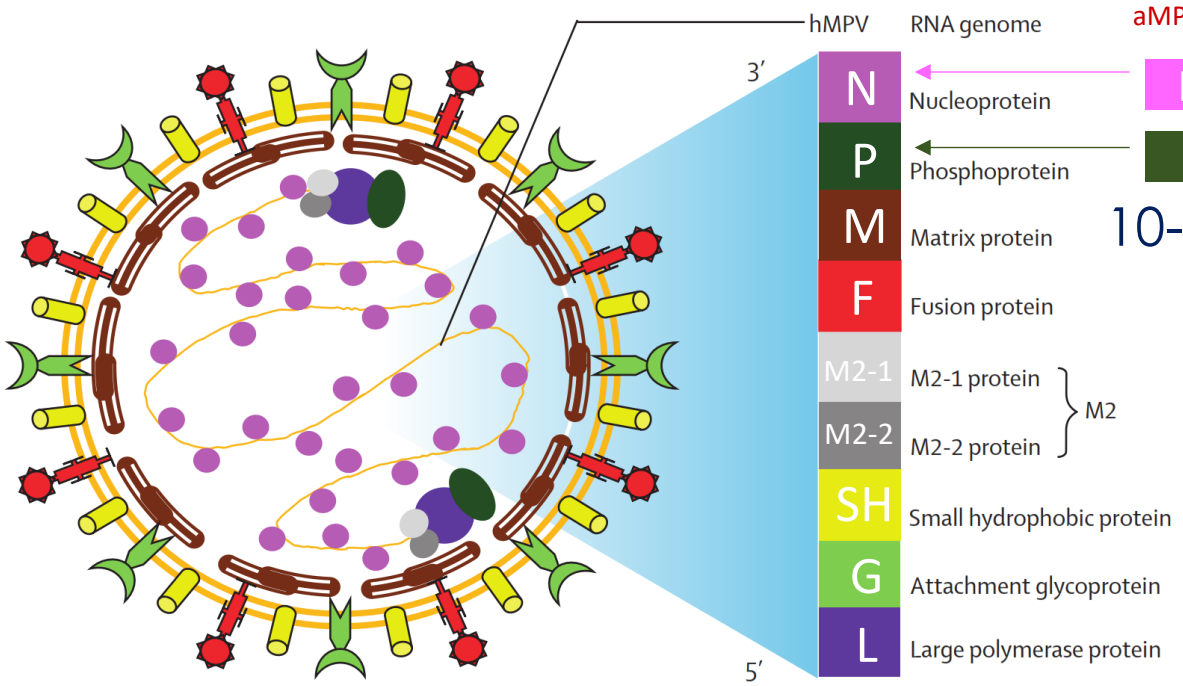
rHMPV (13335 nt)



Biacchesi S, et al. J Virol 2005;79:12608–12613

LAV: Delección molecular

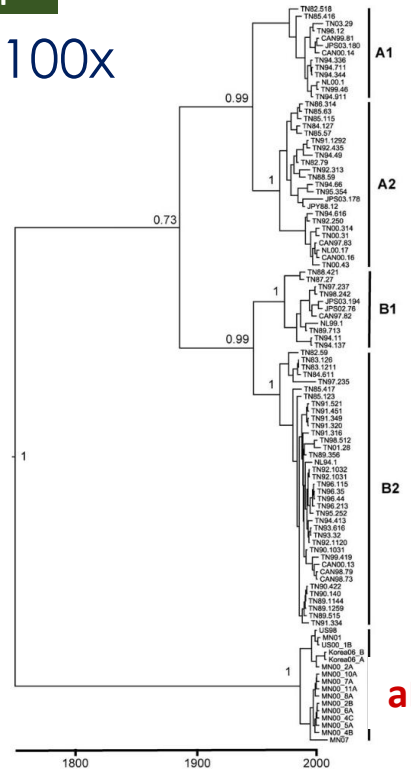
Recombinante



hMPV

aMPV

10-100x



rHMPV-Pa

1 dosis
Intranasal (gotas)

NIH National Institute of Allergy and Infectious Diseases

ABANDONADA

Fase 1 (NCT01255410)

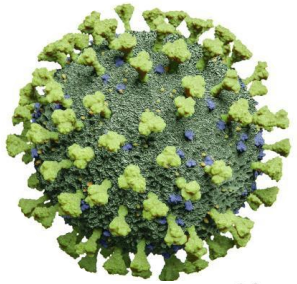
Adultos 18-49 años
Niños 12-59 m Seropositivos
Niños 6-59 m Seronegativos

Escasa inmunogenicidad en niños 6-59 m Seronegativos (Vacuna sobreatenuada)

aMPV-C

Karron R.A., et al. J Pediatr Infect Dis Soc 2018;7:86–89

hMPV

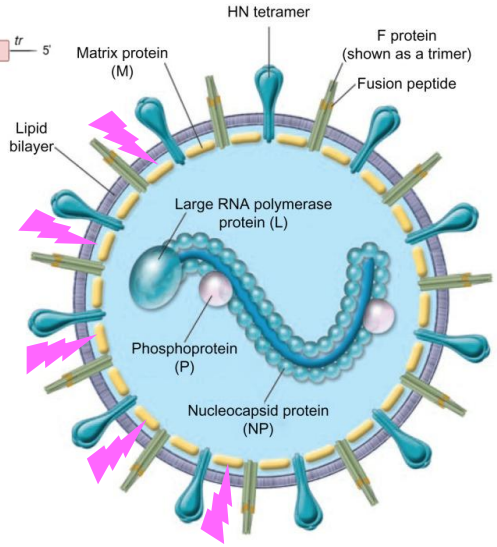


LAV: Delección molecular

Recombinante

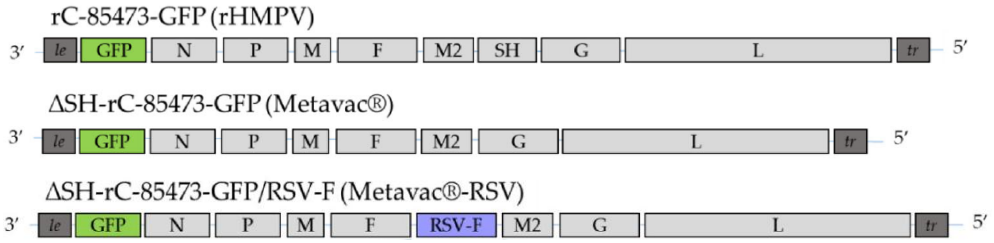
Recombinante de vectores (quiméricas)

F



rB/HPIV3

PIV5
Sendei virus
Newcastle disease virus
Adenovirus



rHMPV-ΔSH (Metavac)

B/HPIV3/HMPV-PreF-A
B/HPIV3/HMPV-PreF-B365

National Institute of Allergy and Infectious Diseases

1 dosis
Intranasal (spray)

Fase 1 (NCT06546423)

Niños 24-59 m Seropositivos HPIV3

Activo (01/06/2025)

Bien tolerada
Buena inmunogenicidad frente a ambos virus

Metavac-RSV/hMPV

Vaxxel Innovative Vaccines

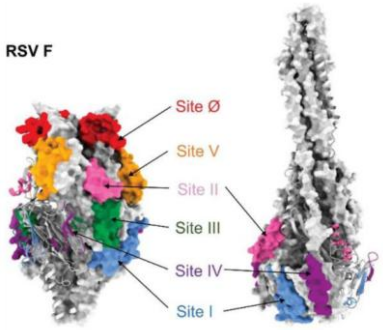
Intranasal. Preclínica (ratones)

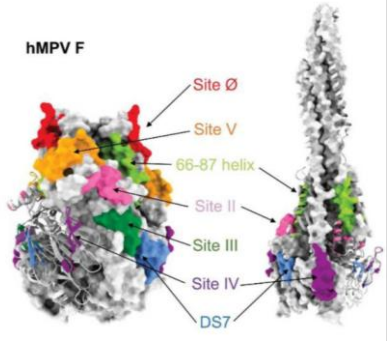
Fase 1 en Q3 2026

https://clinicaltrials.gov/study/NCT06546423
Ogonczyk-Makowska D, et al. npj Vaccines 2024;9:111

Fragmentos purificados solubles

Proteína Nativa



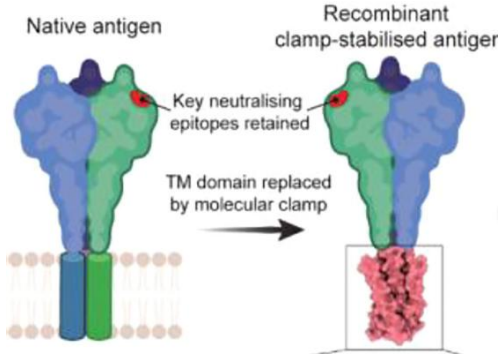


Estabilizar la Proteína F

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

Molecular Clamp:

Incorporación de un polipéptido de trimerización muy estable.



Resp. inmune fuerte y específica
Fácil producción
Aplicable a numerosos virus
Purificación sin liofilización

VXB-241 (VRS/hMPV)

sanofi

vicebio

Dosis líquida
Refrigerada (2-8ºC)
No adyuvada

Fase 1 (NCT06556147)

Adultos entre 18-40 y 60-83 años
1 dosis e impacto de booster 1 año

Activo (Fin 01/05/2027)

RSVVW'26:
Segura
Inmunógena
Dosis 120+120

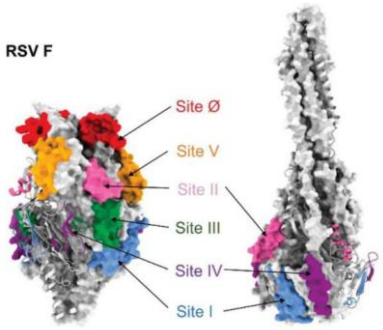
VXB-251 (VRS/hMPV/PIV3)

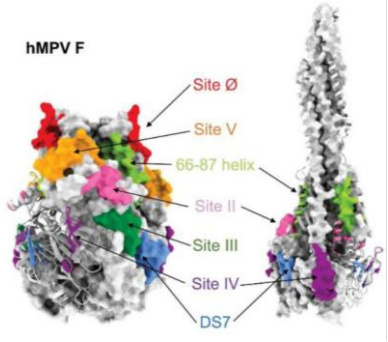
Fase 1 (NCT07295028)

Adultos entre 60-83 años; 1 dosis

Activo (Fin 24/04/2027)

RSVVW'26 Rome, Italy, 16-20 February 2026 Bakkers M.J.G., et al. Nat Commun 2024;15:6270 Young A, et al. Front. Immunol. 2022;13:963023. https://vicebio.com/technology/ https://clinicaltrials.gov/study/NCT06556147



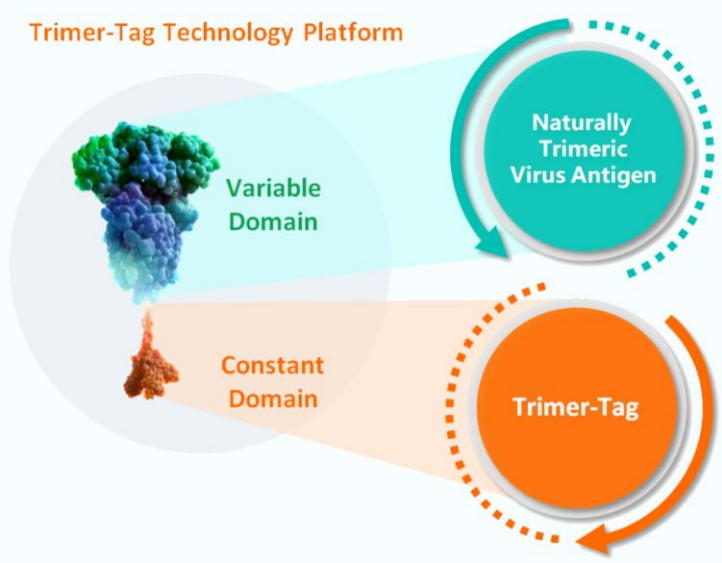


Estabilizar la Proteína F

Fragmentos purificados solubles

Proteína Nativa

CLOVER BIOPHARMACEUTICALS



SCB-1022 (VRS/hMPV)

SCB-1033 (VRS/ hMPV/PIV3)

Fase 1 (NCT06984094)

Adultos entre 60-85 años

Activo (Fin 30/06/2026)

↑ nAbs x6-8 VRS
↑ nAbs x6-9 hMPV
↑ nAbs x4 PIV3

Fase 2

Programado en Q2 2026

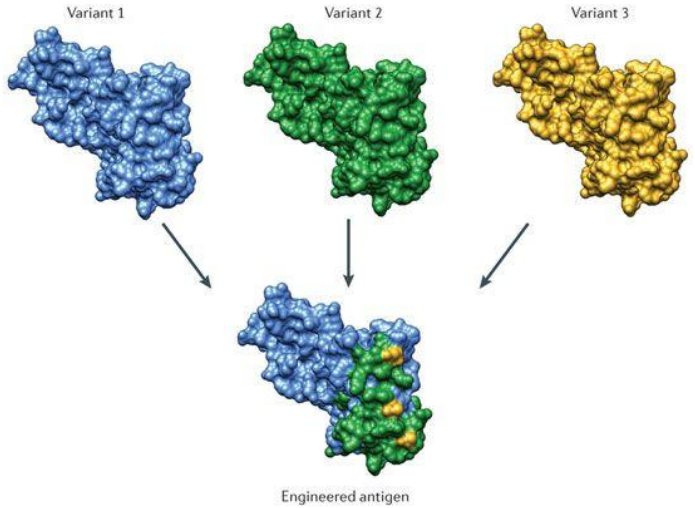
https://www.cloverbiopharma.com/science&technology/ourpipeline.html

https://clinicaltrials.gov/study/NCT06984094?term=NCT06984094&rank=1

Fragmentos purificados solubles

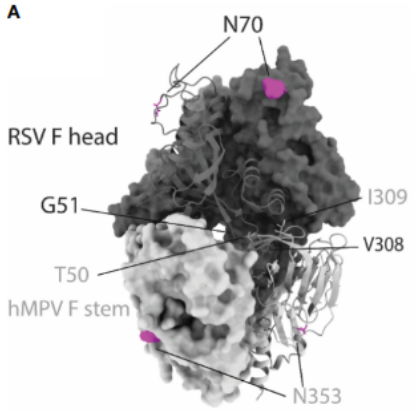
Proteína Nativa

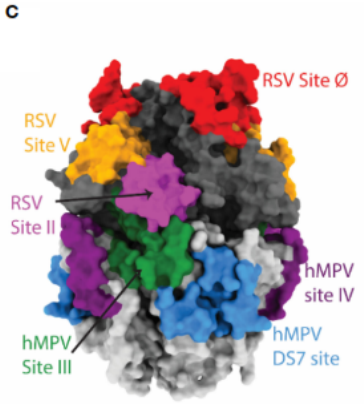
Proteína Química

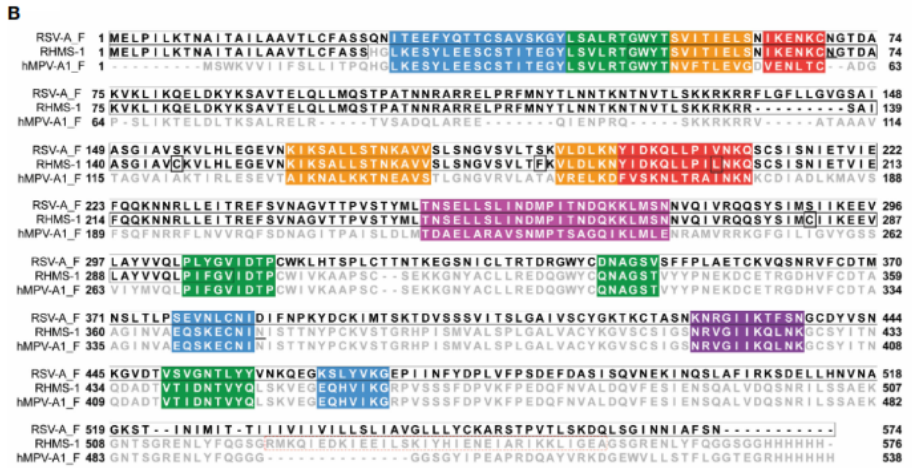


Meningococo B

Proteína de unión al Factor H







VRS/hMPV

RHMS-1

Tallo hMPV y cabeza VRS

F-410, F-411

hMPV con varios epítopos VRS

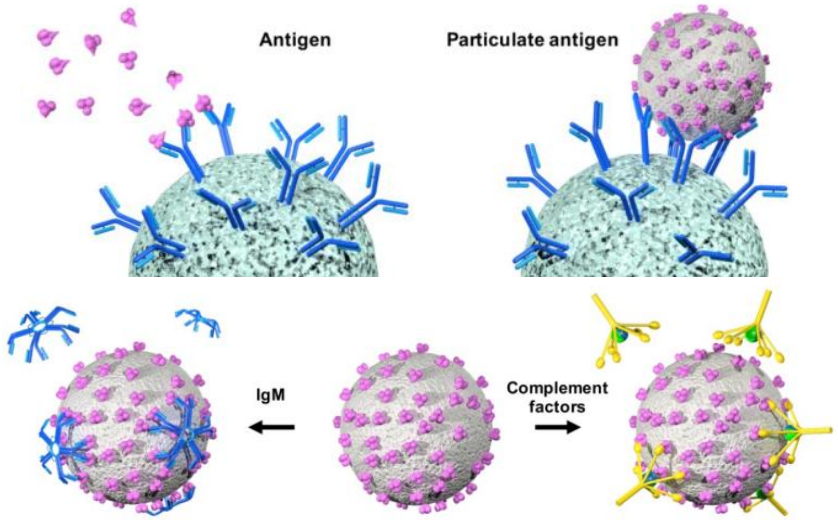
RPM-1

hMPV con un epítopo VRS

Huang J et al. Front Immunol 2022;13:941865

Fragmentos purificados solubles

VLP: Virus Like Particles



Bien tolerada
Fuerte respuesta a 28 días:
- VRS-A/VRS-B ↑ nAb x3-4
- hMPV-A/hMPV-B ↑ nAb x4-5

Niveles ≥ basales al año

IVX-A12

AstraZeneca

Fase 1 (NCT05664334)

Adultos entre 60-75 años, 1 dosis im

Completado (24/01/2024)

Fase 2 (NCT06481579)

Adultos ≥ 60 años, 1 dosis im

Completado (19/12/2024)

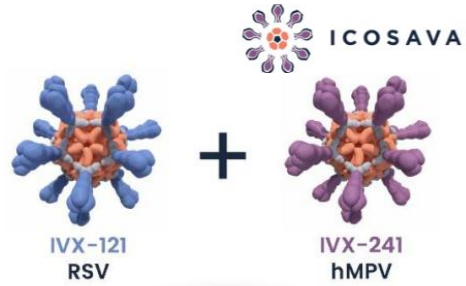
Fase 2a (NCT05903183)

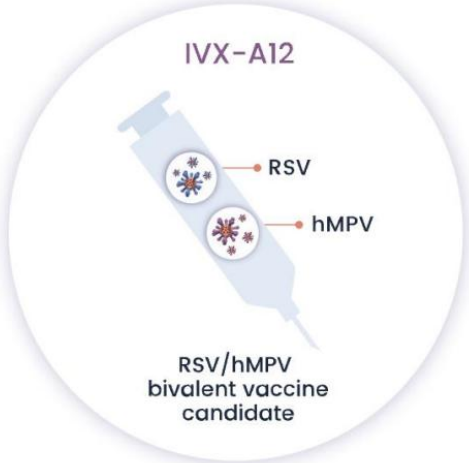
Adultos entre 60-85 años, 1dosis im

Completado (05/12/2025)

Fase 3

Preparado – Fast Track FDA





+/- M59

Shapiro C, et al. Open Forum Infectious Diseases 2025; 12(4):ofaf160
Shapiro C, et al. Open Forum Infectious Diseases 2025; 12(Supp 1):S466-S467
https://clinicaltrials.gov/study/NCT05664334
https://clinicaltrials.gov/study/NCT06481579
https://clinicaltrials.gov/study/NCT05903183

INACTIVADAS | ATENUADAS | SUBUNIDADES PROTEICAS | ÁCIDOS NUCLEICOS (ARNm)



mRNA-1365 (VRS/hMPV)

moderna

Fase 1 (NCT05743881) Niños entre 5-24 meses, 1 dosis im

PAUSADO FDA (JUL 2024)

Potenciales casos graves de RSV-LRTI en vacunados.
Menor inmunogenicidad tras Nirsevimab anterior.

mRNA-1653 (hMPV/PIV3)

Fase 1 (NCT03392389) Adultos entre 18-49 años, 2 dosis im

Completado (19/07/2019)

Fase 1b (NCT04144348) Adultos y Niños de 12-59 meses

Completado (20/12/2022)

Bien tolerada e inmunógena (↑ nAb) de ambos virus.
No necesaria una segunda dosis.

https://clinicaltrials.gov/study/NCT04144348
Schnyder Ghamloush S et al. Pediatrics 2024;153:e2023064748
August A, et al. Open Forum Infect Dis 2022;9:ofac206

https://clinicaltrials.gov/study/NCT06686654
https://clinicaltrials.gov/study/NCT06604767
Ma S, et al. Hum Vaccines Immunother 2023;19:2293300

SP0256 (VRS/hMPV)

sanofi

Fase 1 (NCT06237296) Adultos entre 18-49 años y ≥ 60 años

Completado (11/02/2025)

Fase 1 (NCT06583031) Adultos entre 60-75 años

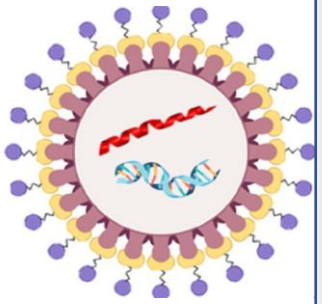
Completado (28/09/2025)

Fase 1/2a (NCT06134648) Adultos ≥ 60 años

Activo (Fin 10/03/2026)

Fase 1/2 (NCT06686654) Adultos ≥ 60 años

Activo (Fin 02/09/2027)



SP0291 (VRS/hMPV/PIV3)

Fase 1 (NCT06850051) Adultos entre 18-49 años (con TIV-HA)

Completado (31/12/2025)

Fase 1 (NCT06604767) Adultos ≥ 60 años

Activo (Fin 05/03/2026)

mRNA Multiepítopo

Incluir no solo genes de la proteína F sino también G, SH, M1, M2-1 o M2-2.
No generan nAb, pero favorecen citotoxicidad celular dependiente de Ac.

Metapneumovirus humano

CONCLUSIONES

Infrarreconocido, infraestimado e infradiagnosticado.

Potencial problema grave de salud pública.

Gran apoyo en plataformas vacunales conocidas.

La mayoría de candidatas son combinadas.

La mayoría en desarrollo orientadas a adultos.

Retos: Seguridad e inmunogenicidad.