中国疾病预防控制中心
CHINESE CENTER FOR DISEASE CONTROL AND PREVENTION

中国科学院微生物研究所
INSTITUTE OF MICROBIOLOGY
CHINESE ACADEMY OF SCIENCES

广州实验室
Guangzhou Laboratory

Update of Emerging Infections: Taking Action for Pandemic Preparedness

George F Gao 高福

Post-COVID-19/后新冠时代

危机

Crisis Chance

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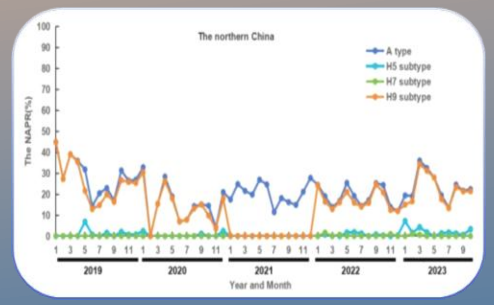
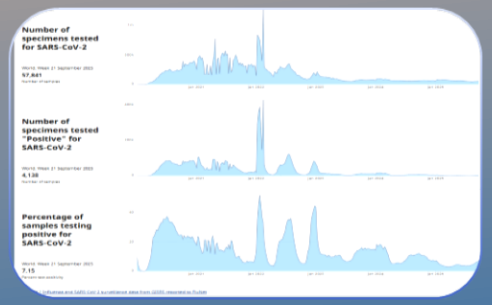
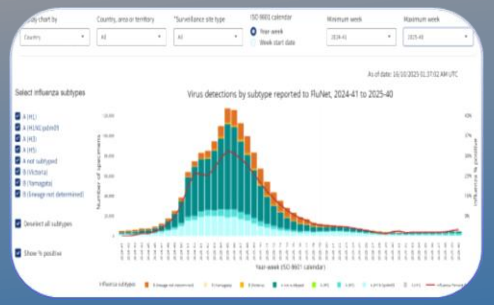
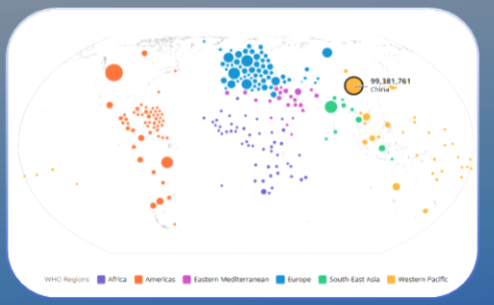
Behind the numbers lies a struggle between life and systems, and a coexistence of scientific rationality and humanistic care.

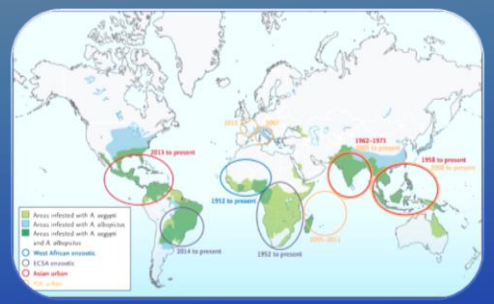
- A crisis never truly disappears; it merely questions the meaning of existence in a new form.
- And each of our follow-ups, every report, writes a footnote to this inquiry that belongs to our era.

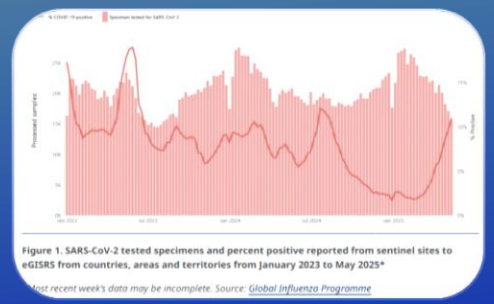












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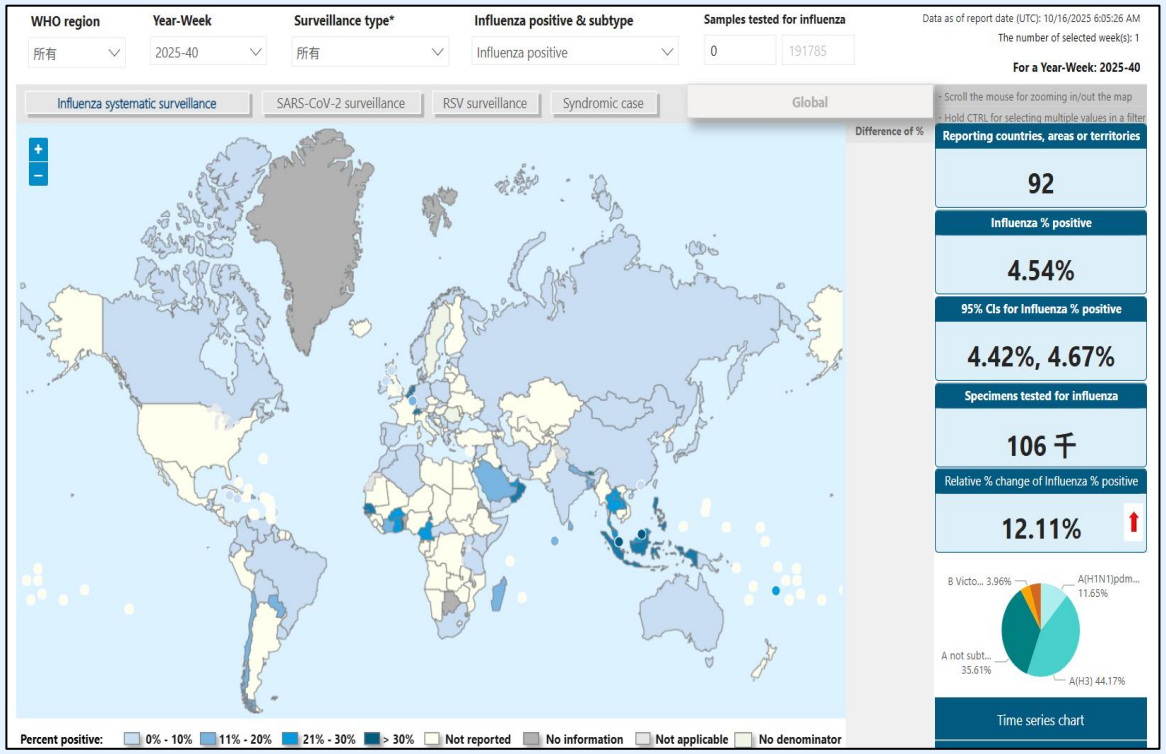
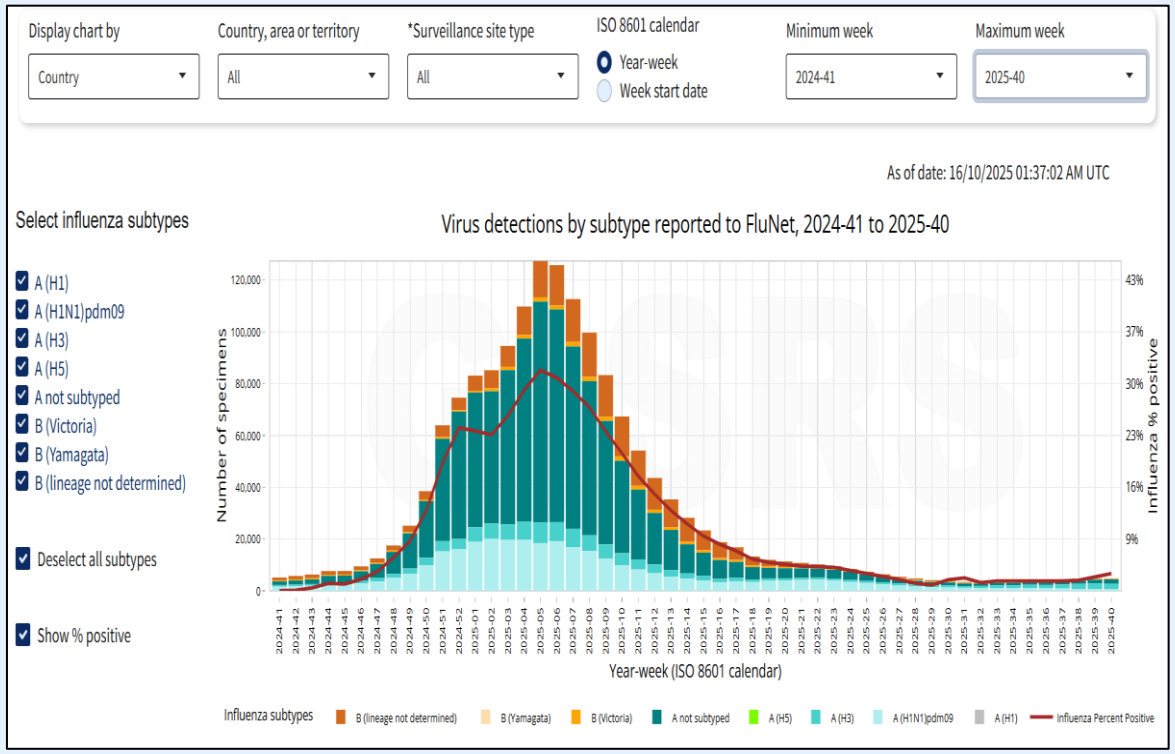
1.1 Influenza: Global Situation

Influenza Laboratory Surveillance (by WHO FluNet)

- The majority of countries currently **have low-level influenza activity**.
- Last week (2025-40w), data showed that only a few tropical countries had moderate to high levels of influenza activity. **The H3 is the main prevalent subtype.**





1.2 Influenza: China

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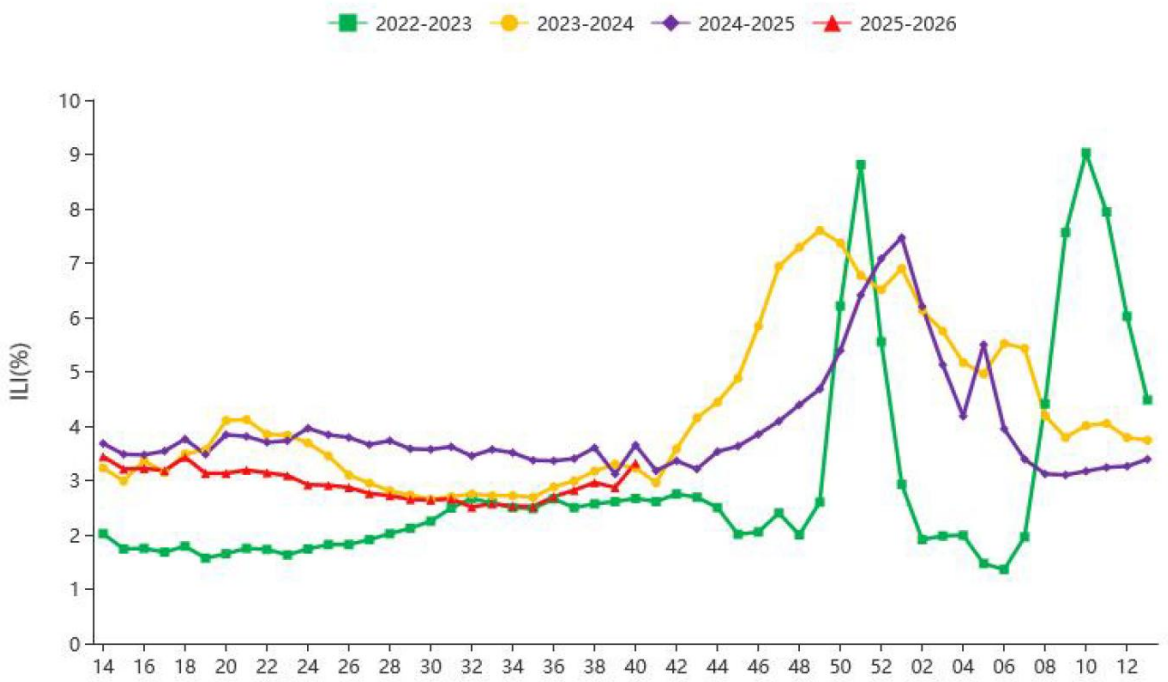
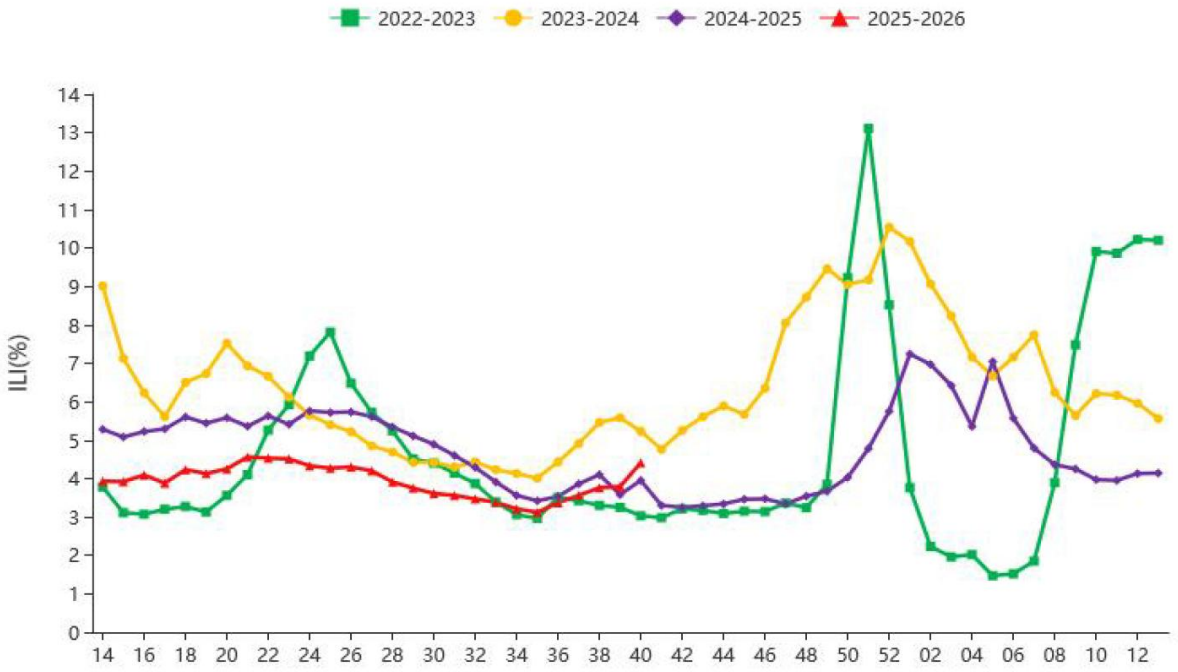
Influenza-like illness cases reported by sentinel hospitals in China from 2022 to 2026



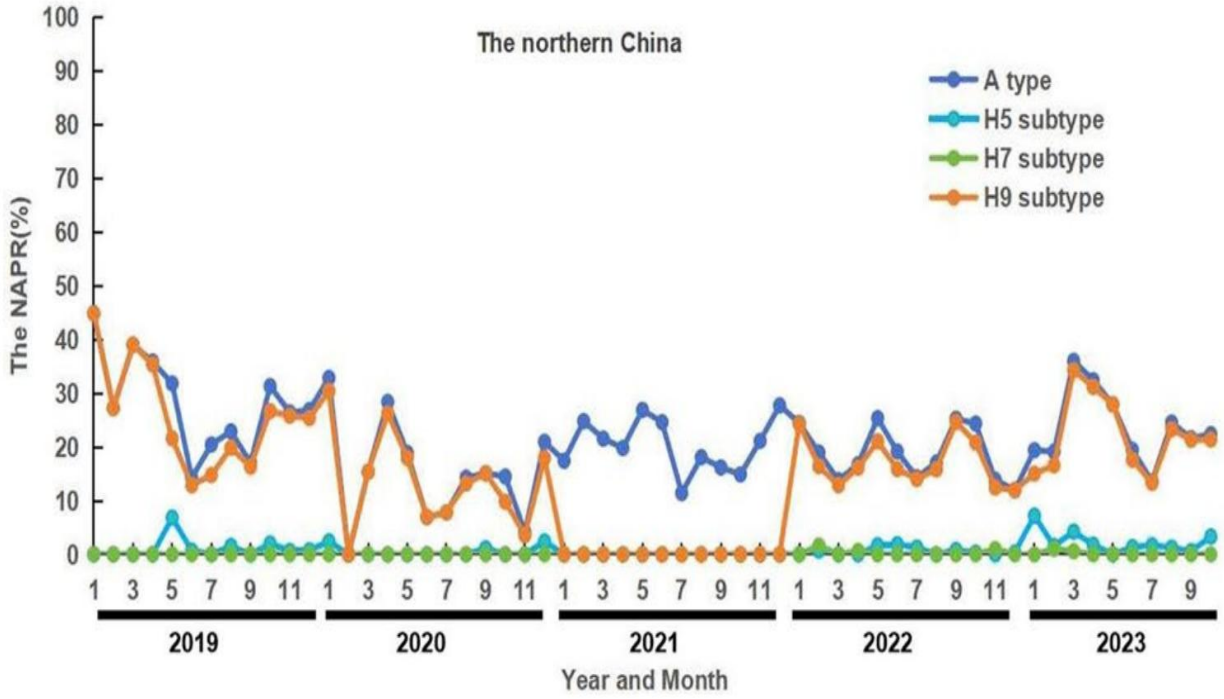


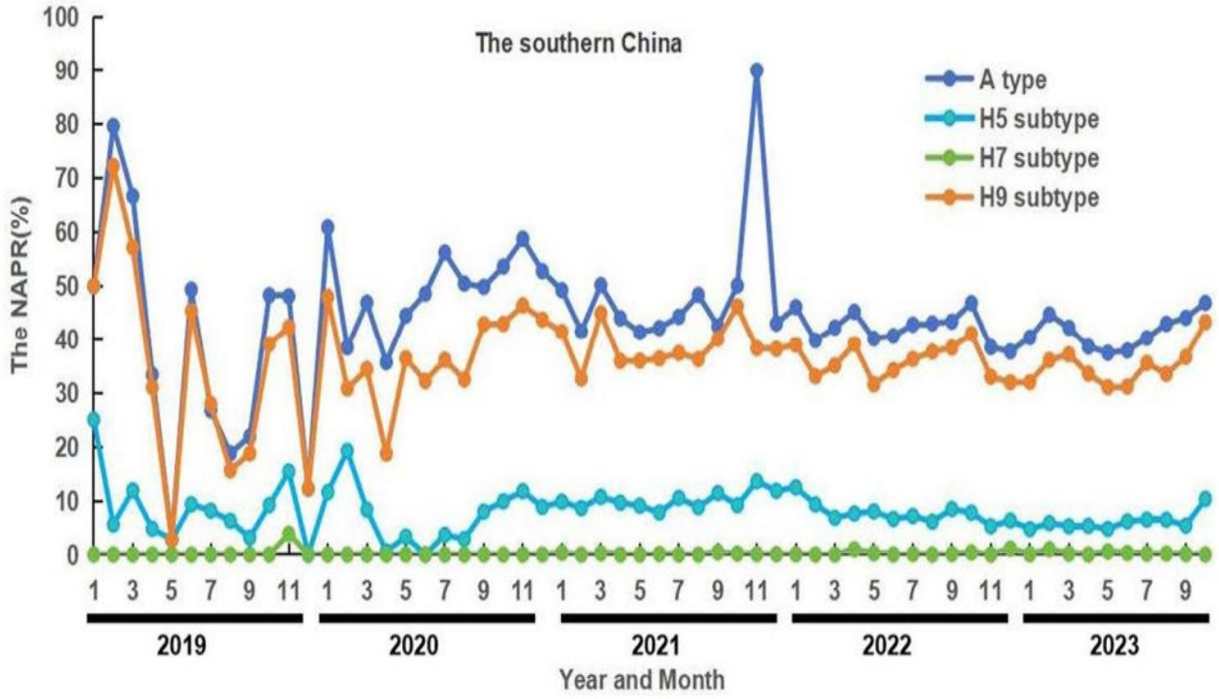
Source: Influenza Weekly Report

1.2 Influenza: China

The AIVs in the environment of China LPMs

- A total of 64,599 samples were collected from China live poultry market(LPM) and tested for influenza A virus, and nucleic acid tests were also carried out for the three subtypes **(H5, H7, and H9)**. The nucleic acid positive rate(NAPR) of the A type in the environment of LPMs nationwide was 36.15%, of which the **NAPR of the H9 subtype was the highest (29.74%),** the H5 subtype was 6.18%, and the H7 subtype was 0.30%.





[1]Bo, H., et al., Characterization of the avian influenza viruses distribution in the environment of live poultry market in China, 2019-2023. Infect Dis Poverty, 2025. 14(1): p. 36.

2.1 COVID-19: Global Situation

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Continued monitoring is essential.

Since mid-February 2025, global SARS-CoV-2 activity has been increasing(Figure 1).

- Data from sentinel sites
- **The test positivity rate reaching 11%**, levels that have not been observed since July 2024.
- This rise is primarily observed in countries in the Eastern Mediterranean, South-East Asia, and Western Pacific regions.

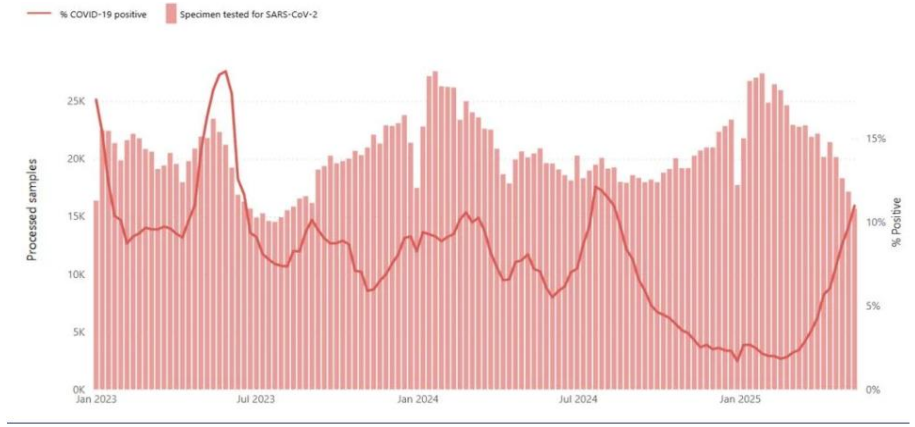

Figure 1. SARS-CoV-2 tested specimens and percent positive reported from sentinel sites to eGISRS from countries, areas and territories from January 2023 to May 2025*

**Most recent week's data may be incomplete. Source: Global Influenza Programme*

Since early 2025, global SARS-CoV-2 variant trends have slightly shifted (Figure 2).

- Circulation of LP.8.1 has been declining, and **reporting of NB.1.8.1, a Variant Under Monitoring (VUM), is increasing,** reaching 10.7% of global sequences reported as of mid-May.
- Recent increases in SARS-CoV-2 activity are broadly consistent with levels observed during the same period last year.
- However, there still lacks a clear seasonality in SARS-CoV-2 circulation, and surveillance is limited.

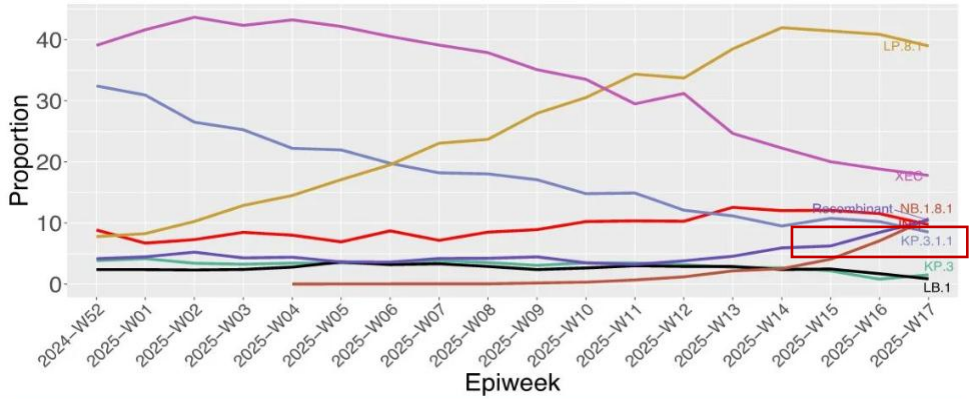

Figure 2. SARS-CoV-2 Variants of Interest and Variants Under Monitoring proportions from January 2025 to May 2025.

Source: GISAID and CoV-SPECTRUM

https://www.who.int/emergencies/disease-outbreak-news/item/2025-DON572

2.1 COVID-19: Global Situation

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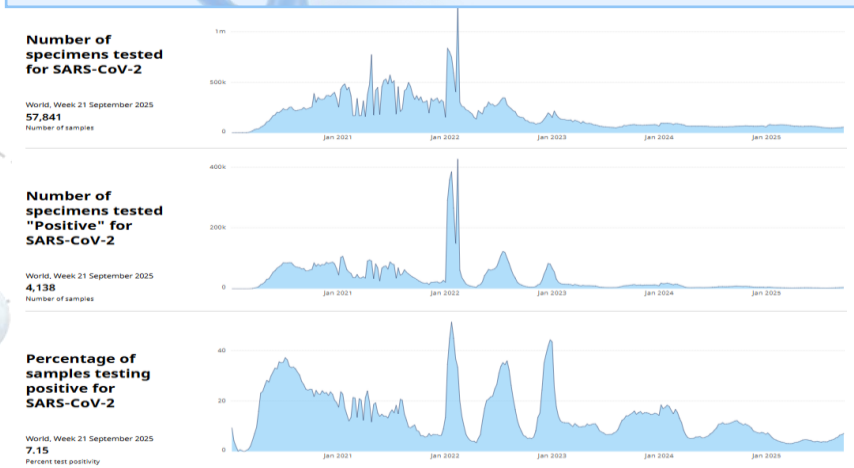
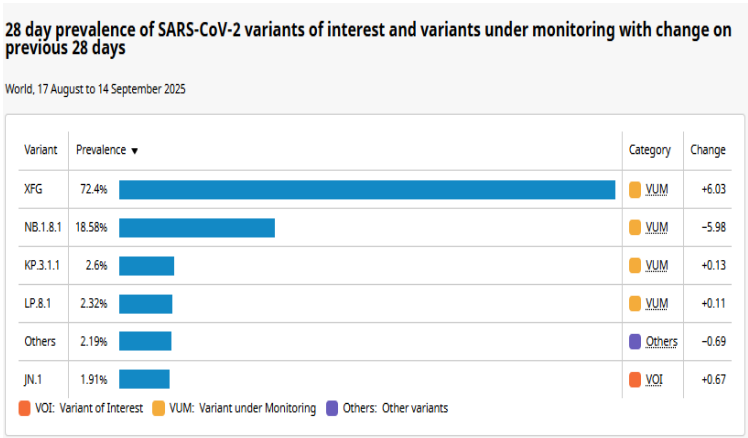
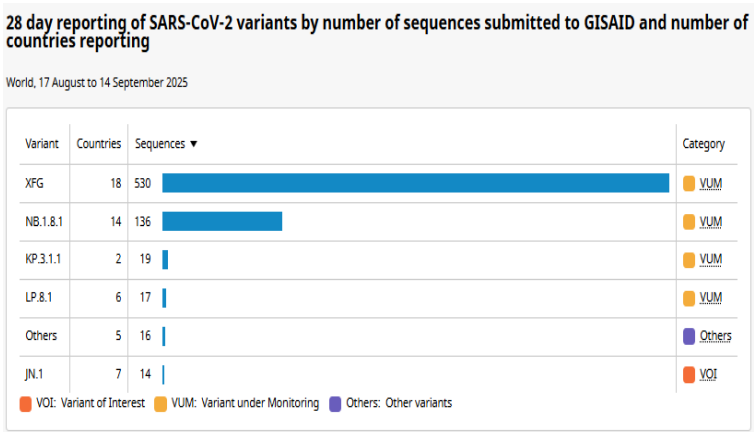
➢ **Monitoring of SARS-CoV-2 variants is still ongoing.**



SARS-CoV-2 PCR percent positivity



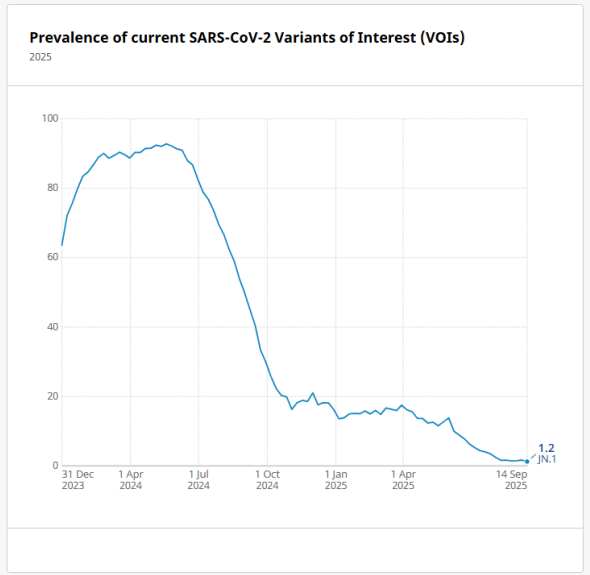


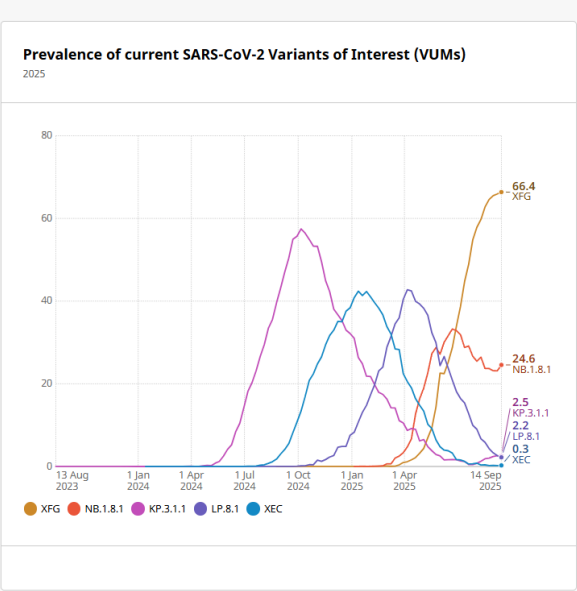
Global prevalence of SARS-CoV-2variants

Currently circulating COVID-19 Variants under Monitoring (VUMs) as of 4 September 2025

- Pango lineage
  - KP.3.1.1
  - XEC
  - LP.8.1
  - NB.1.8.1
  - XFG

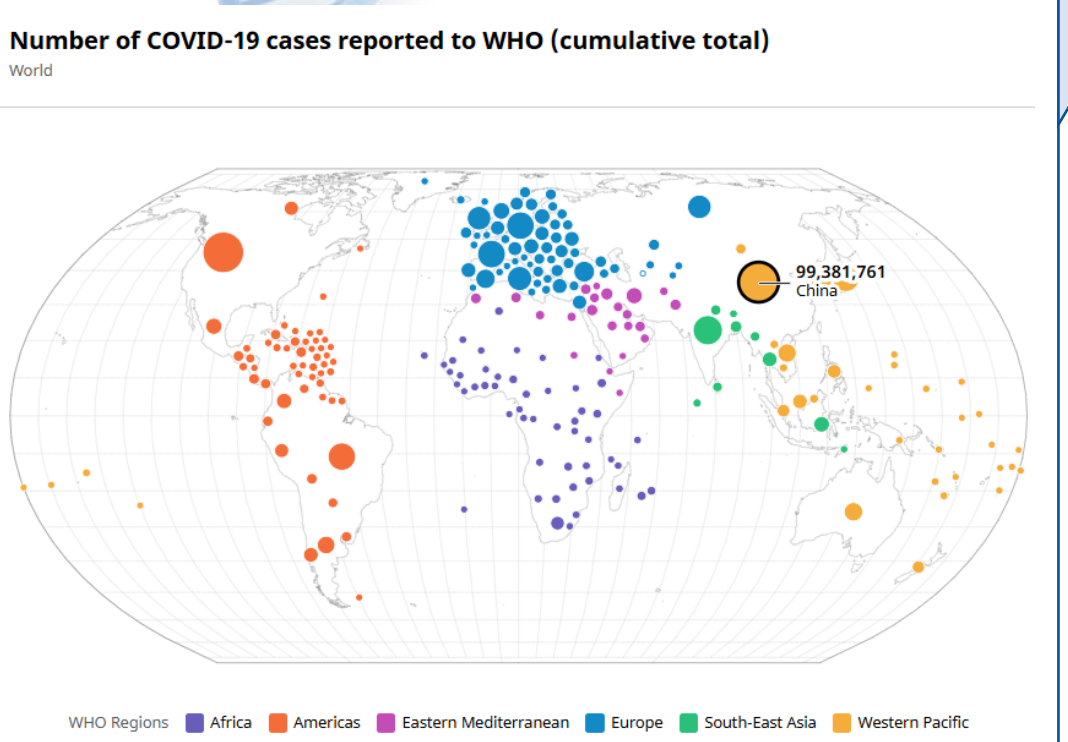
https://data.who.int/dashboards/covid19/circulation?m49=001&n=o





2.1 COVID-19: Global Situation

Number of COVID-19 cases reported to WHO

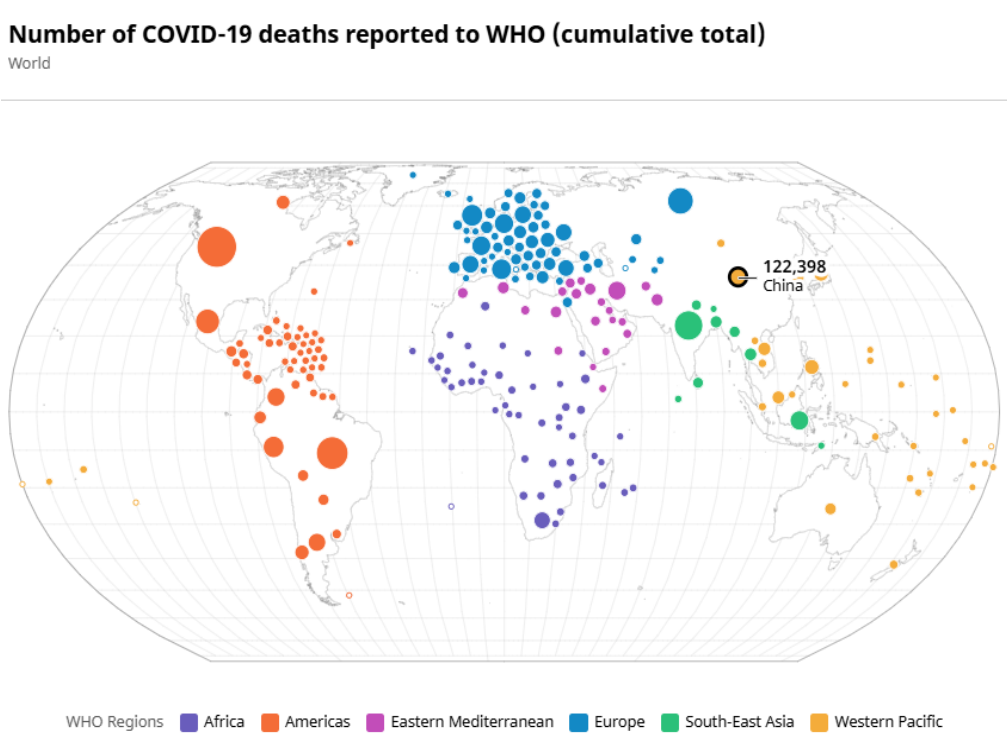


778,691,725 +35,787 increase on previous 7 days

Reported COVID-19 cases

World, 7 days to 21 September 2025

Number of COVID-19 deaths reported to WHO



7,102,530 +273 increase on previous 7 days

Reported COVID-19 deaths

World, 7 days to 21 September 2025

Source: World Health Organization

2.2 COVID-19: China

➢ The positive rate of SARS-CoV-2 and other coronavirus tests is on a downward trend.

Acute Respiratory Infectious Diseases

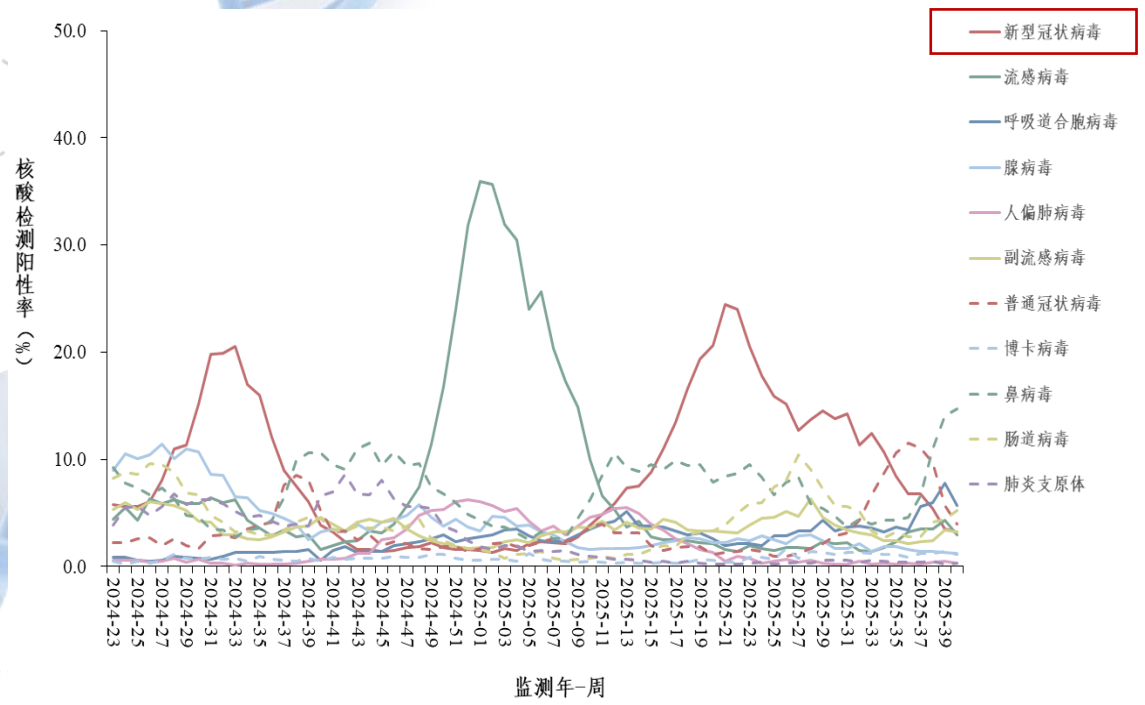


Figure 1

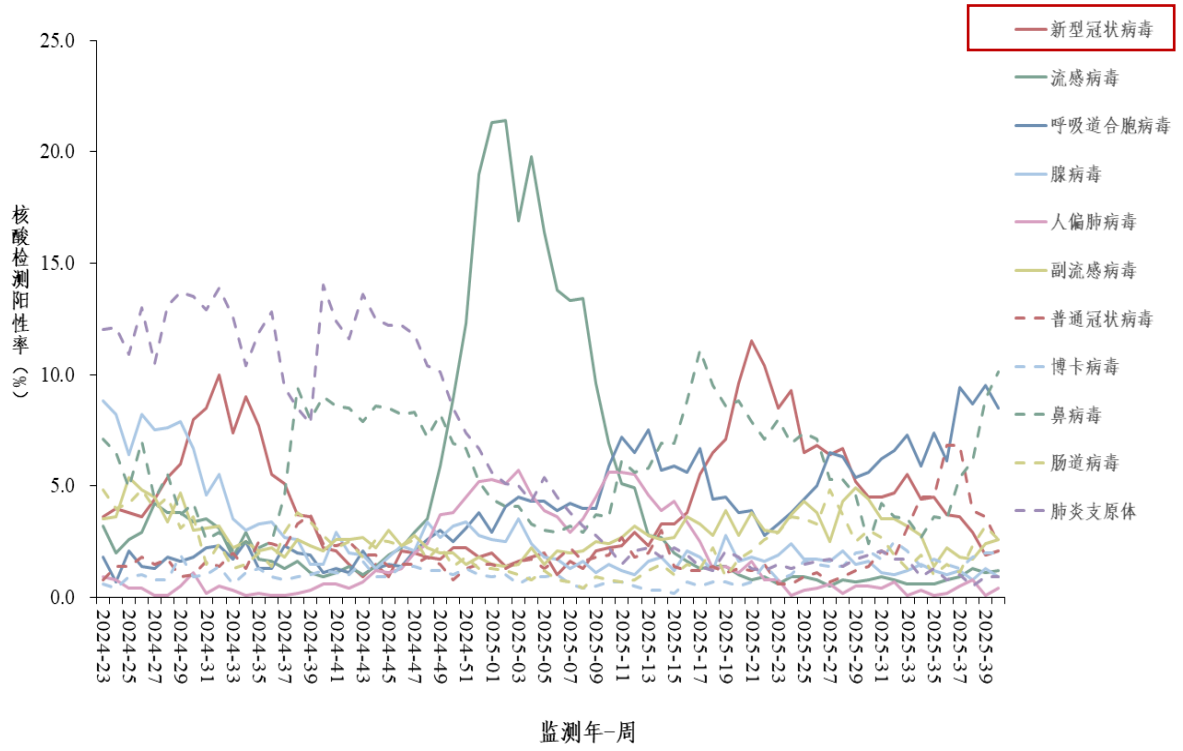


Figure 2

- Weekly trends in positive rates of nucleic acid testing for pathogens in respiratory samples from **outpatient emergency influenza-like cases** at sentinel hospitals, as of 40th week , China（Excluding Hong Kong, Macao and Taiwan）

- Weekly trends in positive rates of nucleic acid testing of respiratory samples for pathogens in **hospitalized cases of severe acute respiratory infections** in sentinel hospitals, as of 40th week , China（Excluding Hong Kong, Macao and Taiwan）

https://www.chinacdc.cn/jksj/jksj04_14275/202510/t20251009_312852.html

3.1 Monkey pox: Global Situation

01

A cumulative total of **38,600 confirmed** mpox cases, including 162 fatalities, have been reported globally from 92 countries in **2025**.

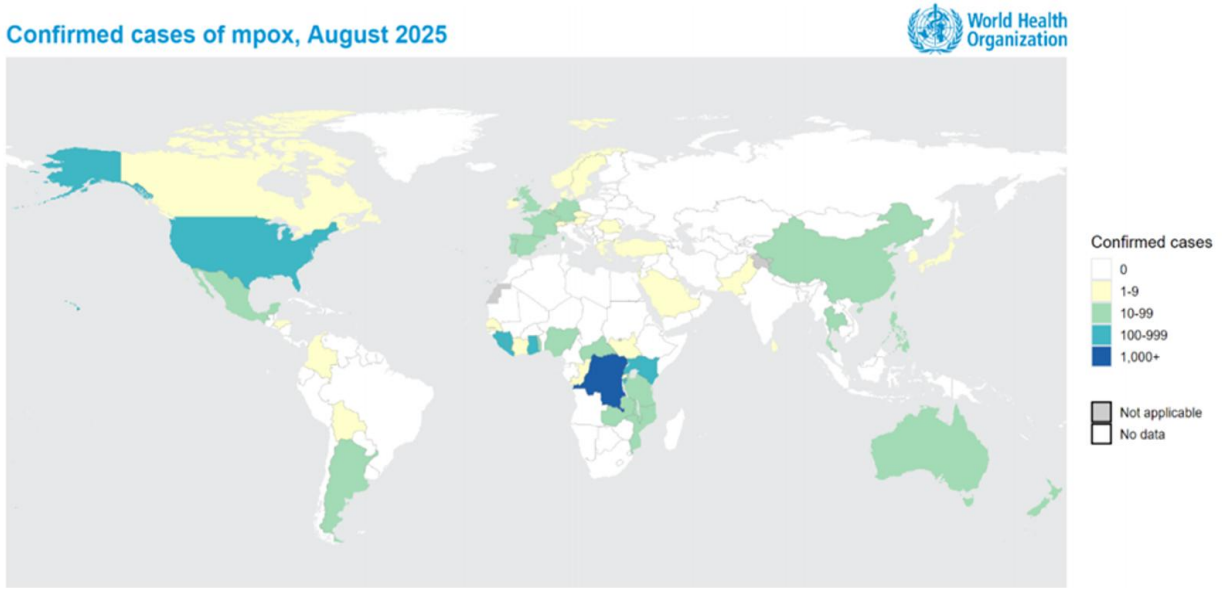
02

The global overall public **health risk was assessed to be at a moderate level**.

03

According to the determination made by the Director-General of WHO the multi-country outbreak of mpox **no longer constitutes a Public Health Emergency of International Concern**.

No.	Country	WHO region	New cases in the past month	Death cases in the past year	No.	Country	WHO region	New cases in the past month	Death cases in the past year
1	DRC	Africa	1174	45	19	Canada	America	4	0
2	Uganda	Africa	284	50	20	Spain	Europe	76	1
3	Burundi	Africa	163	1	21	German	Europe	22	0
4	Sierra Leone	Africa	226	56	22	France	Europe	20	0
5	Nigeria	Africa	71	4	23	Netherlands	Europe	7	0
6	Rwanda	Africa	3	0	24	Belgium	Europe	12	0
7	Ivory Coast	Africa	7	1	25	Ireland	Europe	4	0
8	CAR	Africa	12	3	26	Norway	Europe	2	0
9	Kenya	Africa	150	7	27	Austria	Europe	3	0
10	Liberia	Africa	252	0	28	Czech	Europe	1	0
11	Zambia	Africa	46	3	29	Sweden	Europe	3	0
12	Australia	Western Pacific	15	0	30	Greece	Europe	1	0
13	Japan	Western Pacific	2	0	31	Denmark	Europe	1	0
14	China	Western Pacific	84	0	32	Israel	Europe	9	0
15	Singapore	Western Pacific	3	0	33	Portugal	Europe	15	0
16	Vietnam	Western Pacific	0	1	34	Qatar	Europe	2	0
17	USA	America	165	0	35	Thailand	Southeast Asia	12	3
18	Mexico	America	70	4	36	Pakistan	Eastern Mediterranean	1	0



Source:WHO Global dengue surveillance dashboard

3.2 Monkey pox: Africa

01

- During the period from January 1 to September 14, **2025**, 25 countries in Africa have cumulatively reported **34,200 confirmed** mpox cases, including **158 fatalities**, resulting in **a case fatality rate of 0.5%.**

02

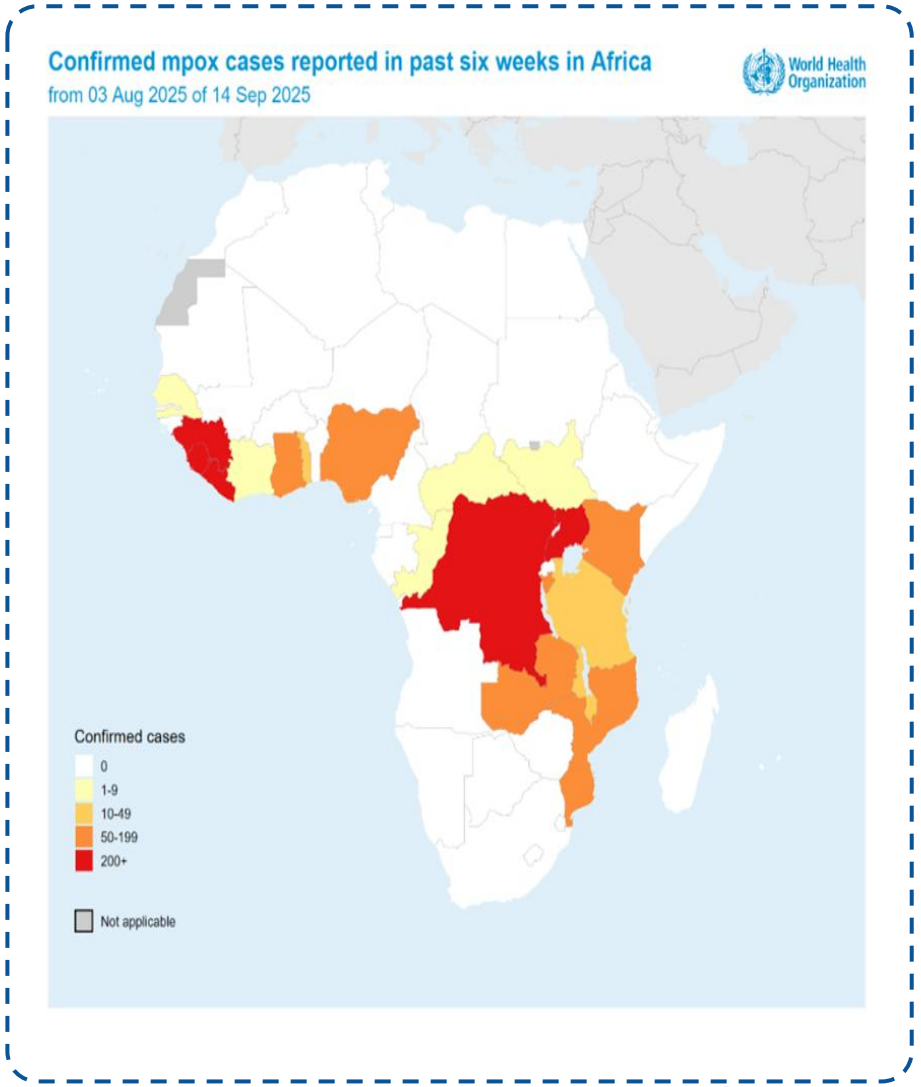
- **Overall,** the epidemic trend of confirmed mpox cases in the African region **continues to decline.**
- **Approximately 500 per week.**

03

- **High:** Democratic Republic of the Congo, Guinea, Liberia, and Ghana
- **Low:** Sierra Leone, Burundi, and Uganda

04

- **Genomic sequencing analysis indicates that the predominant circulating strain is the Mpox virus clade IIb.**



Source:WHO Global dengue surveillance dashboard

3.3 Monkey pox: China

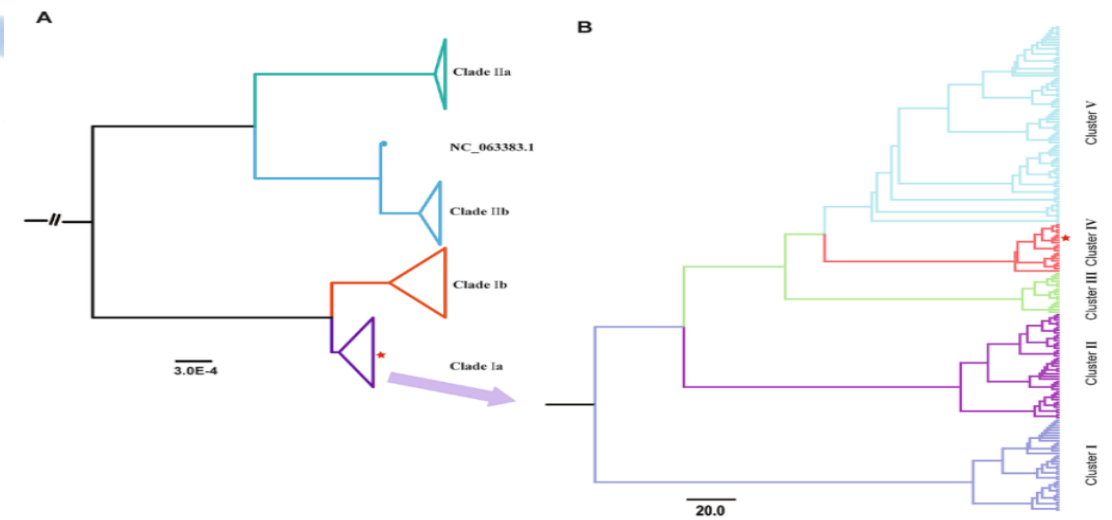
In 2025, the genomic diversity of the Mpox virus strains in China has drawn significant attention.

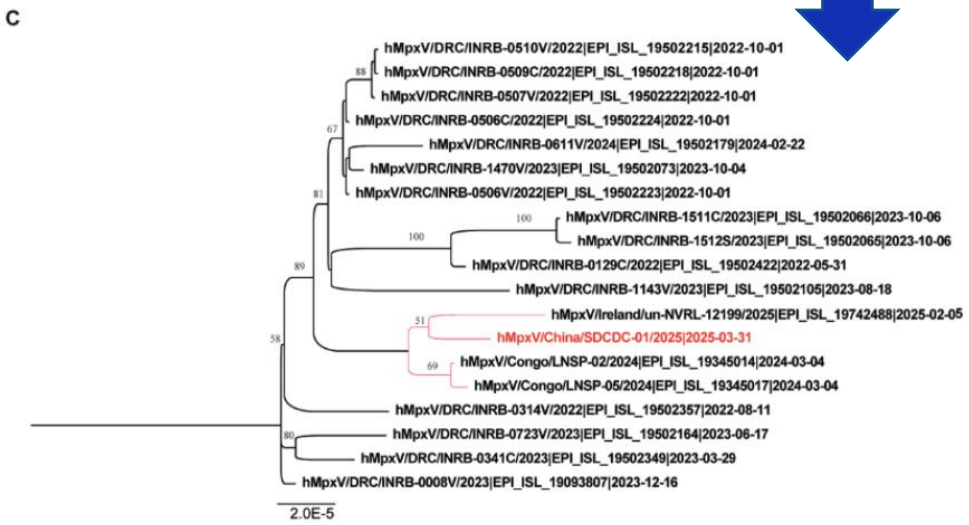
This year, **an MPXV strain was isolated from a returning traveler from the DRC to China.**

This marks the first documented importation of a clade Ia strain into China.

Phylogenetic analysis revealed that the virus sequence was closely related to MPVX clade Ia sequences.

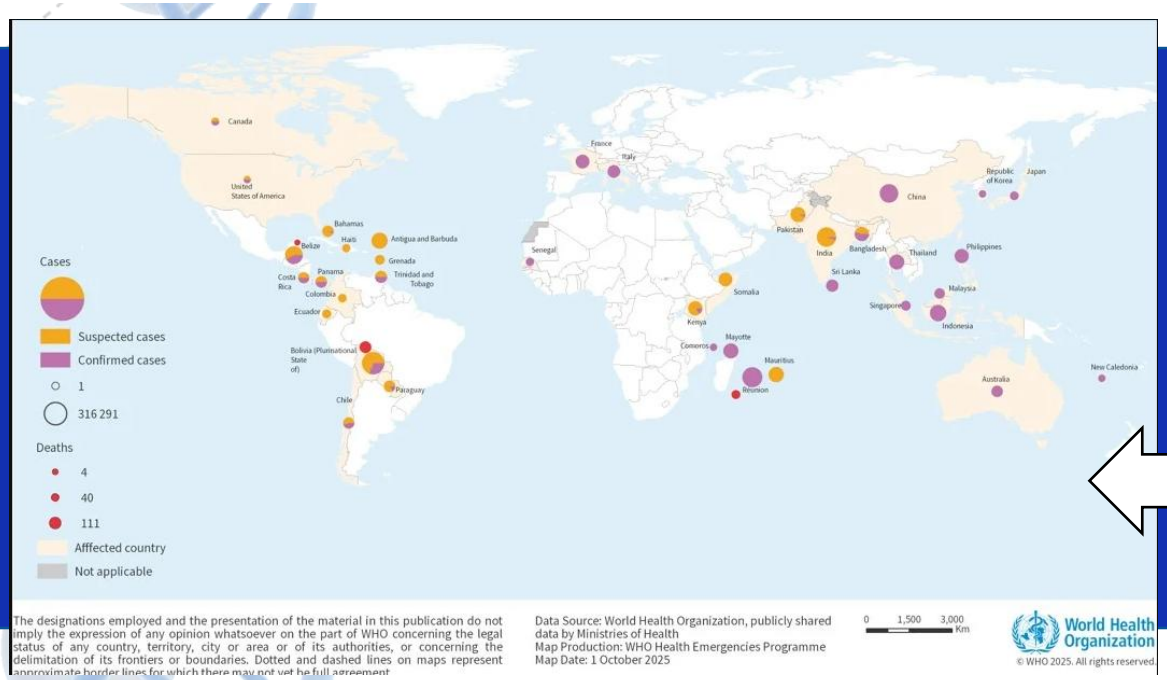
Evolutionary analysis based on partial Ia sequences from the GISAID database revealed that all genomes were divided into five clusters (I-V), with the genome of this case **belonging to Cluster IV.**





[5]Yin C, Li Y, Duan Q, et al. Genomic and phenotypic insights into the first imported monkeypox virus clade Ia isolate in China, 2025.

4.1 Chikungunya fever: Global Situation



- Globally as of December 2024, current or previous autochthonous transmission of CHIKV had been reported from **119 countries and territories across six WHO regions**.

Figure 1: Geographical distribution of CHIKV diseasecases as reported to WHO or Publicly shared by Ministries of Health from January to September 2025.

- Per available data from January to September 2025, **263 592 suspected** and **181 679 confirmed** CHIKV disease cases and **155 CHIKV disease-related deaths** have been reported globally.

Table 1: Number of suspected and confirmed CHIKV disease cases and deaths by region in 2025, as of September 2025.

Region	Suspected cases	Confirmed cases	Deaths	Source
African region	2 197	108	0	Country SITREPs/epi bulletins
Eastern Mediterranean Region	1 596	67		Country SITREPs/epi bulletins
European Region	-	56 456	40	ECDC[1], ARS Reunion[2] and ARS Mayotte[3]
Region of the Americas	228 591	100 329	115	PLISA[4], Epidemiological Alert: Chikungunya and Oropouche in the Americas Region, 28 August 2025[5], IHR NFP Cuba and Bolivia.
South- East Asia region	31 208	3 420	0	Bangladesh[6], India[7], Sri Lanka[8], Thailand[9]
Western Pacific Region	-	21 299	0	IHR reports and the official government website: China[10], Philippines[11], Singapore[12]
Total	**263 592**	**181 679**	**155**	

Source:World Health Organization (3 October 2025). Disease Outbreak News; Chikungunya virus disease- Global situation.

4.2 Chikungunya fever: China

01

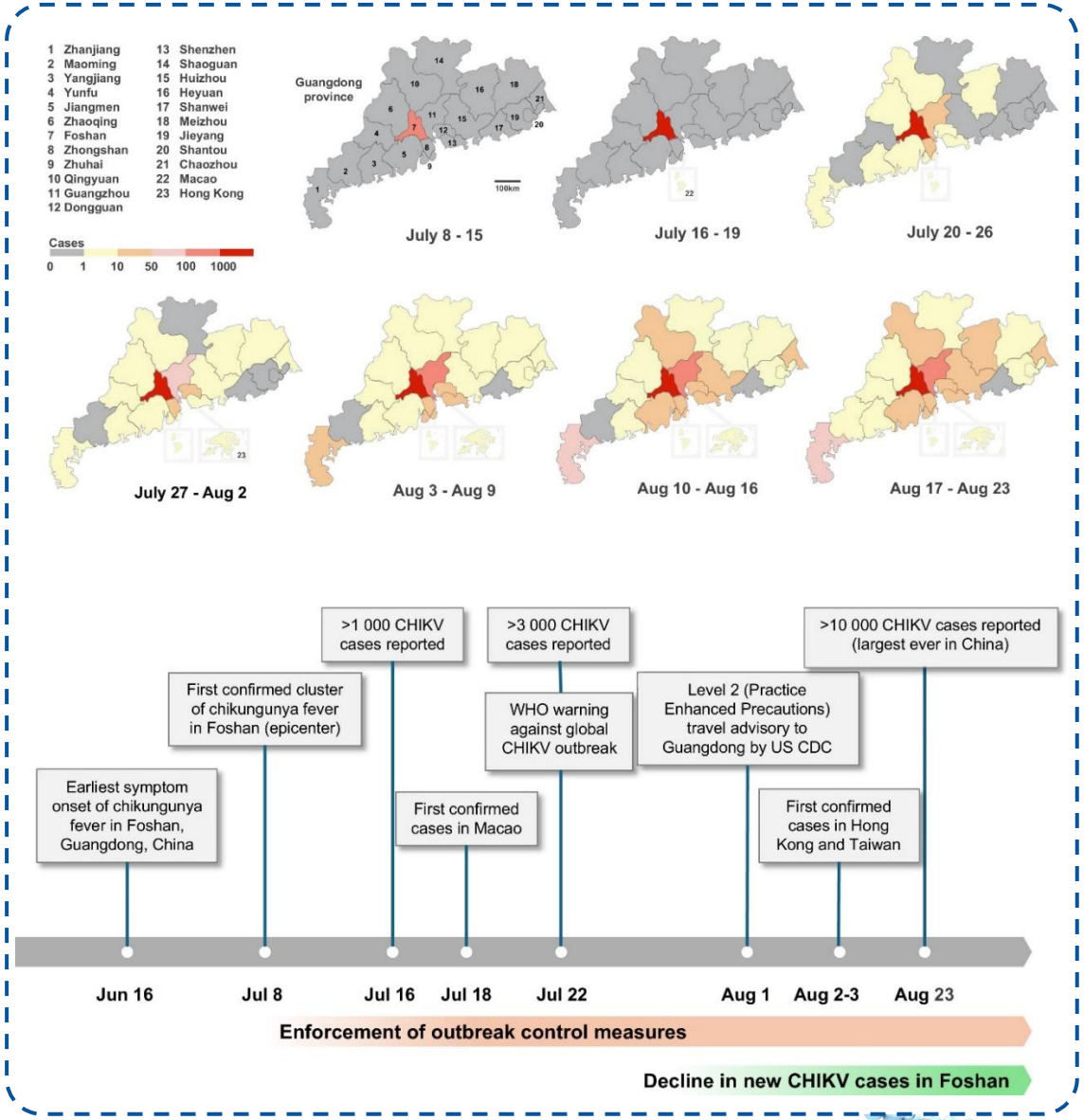
In China, chikungunya fever previously posed a relatively modest burden, with only a few outbreaks linked to imported cases between 2010 and 2019 in **Guangdong, Zhejiang, and Yunnan provinces.**

02

On July 8, 2025, the first locally acquired cases were confirmed in Foshan, Guangdong province, triggering the country's largest-ever CHIKV outbreak. **As of October 4th, there have been a total of 19,635 confirmed cases** (from September 28 to October 4, 3,181 new cases were reported).

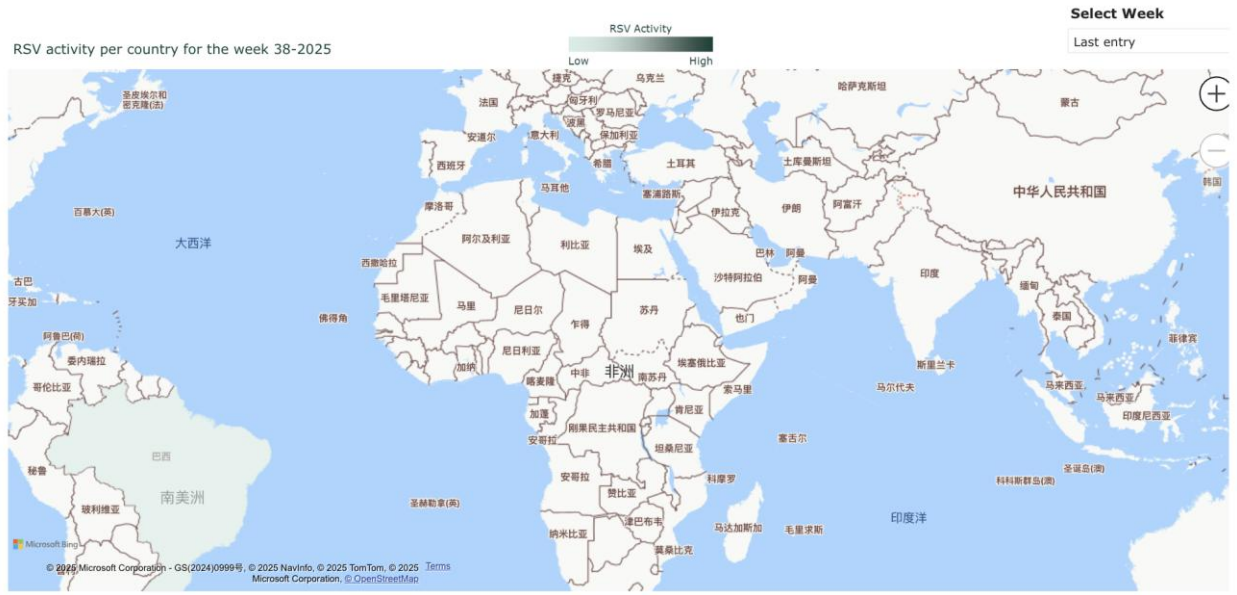
03

Additionally, during 1-21 September, **Guangxi Zhuang Autonomous Region reported 297 local and associated cases; Fujian Province reported 124 local and associated cases;** and some other provinces (such as Hunan, Sichuan, and Hainan provinces) also reported a few local cases.

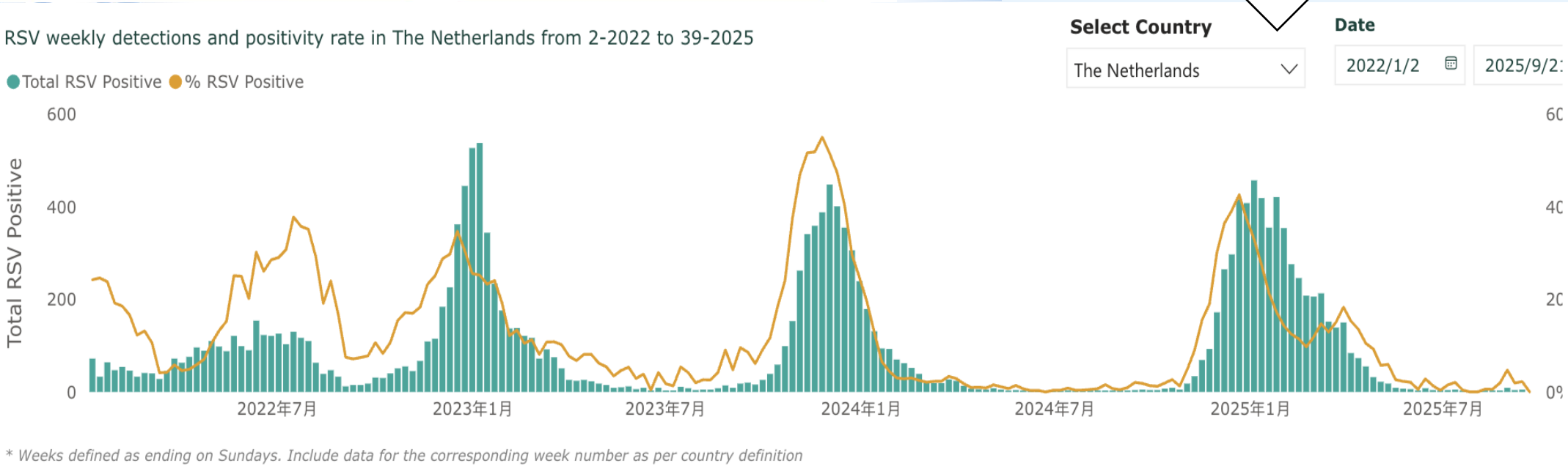


[2]Tee KK, Mu D, Xia X. Explosive Chikungunya Virus Outbreak in China. Int J Infect Dis. Published online September 26, 2025.

5.1 Other respiratory virus - RSV : Global Situation



- RSV exhibits seasonal patterns, typically reaching peak positivity rates during the **final weeks of each year and the first few weeks of the following year.**



** Weeks defined as ending on Sundays. Include data for the corresponding week number as per country definition*

https://resvinet.org/rsv-tools/rsv-dashboard/

5.2 Other respiratory virus - RSV : China

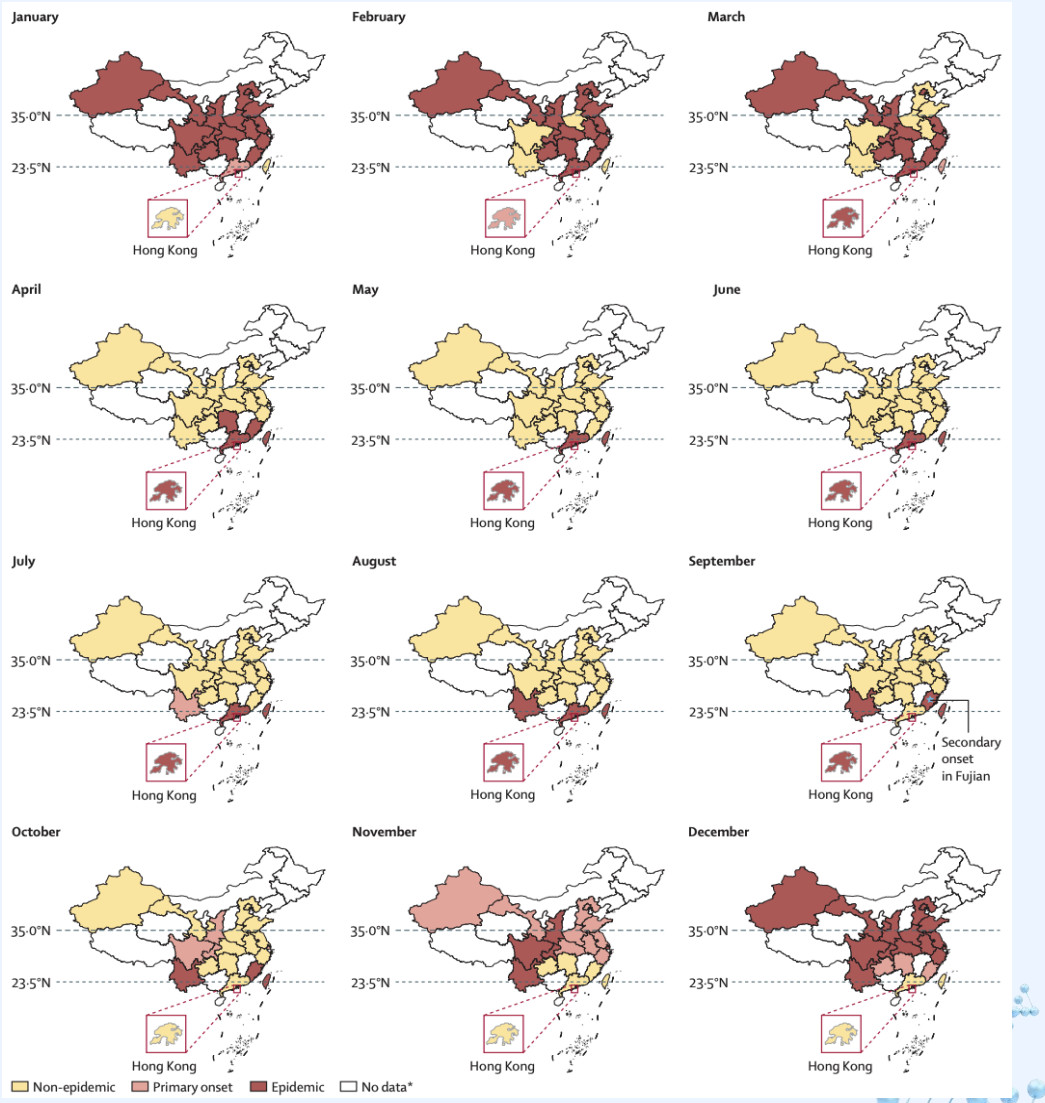
Continued monitoring is essential.

The distribution of RSV epidemic months varies significantly across provinces, yet certain patterns emerge.

- November to March, 15 out of 21 provinces (71%) experienced RSV outbreaks, with 14 provinces (67%) seeing their RSV season begin in October or November.
- Most provinces exhibit one RSV season annually, except Fujian, which has two epidemic seasons: Xiamen experiences two seasons, while Fuzhou has one.

Interannual and provincial variations:

- In provinces with distinct seasonal patterns, the interannual variation in the onset month of the RSV season was smaller, with an average absolute difference of 0.6 months (95% CI 0.4–0.9).
- In provinces without clear seasonal patterns, interannual variation was greater, with an average absolute difference reaching 1.4 months (0.8–2.0).



[3]Guo L, Deng S, Sun S, Wang X, Li Y. Respiratory syncytial virus seasonality, transmission zones, and implications for seasonal prevention strategy in China: a systematic analysis. Lancet Glob Health. 2024;12(6):e1005-e1016.

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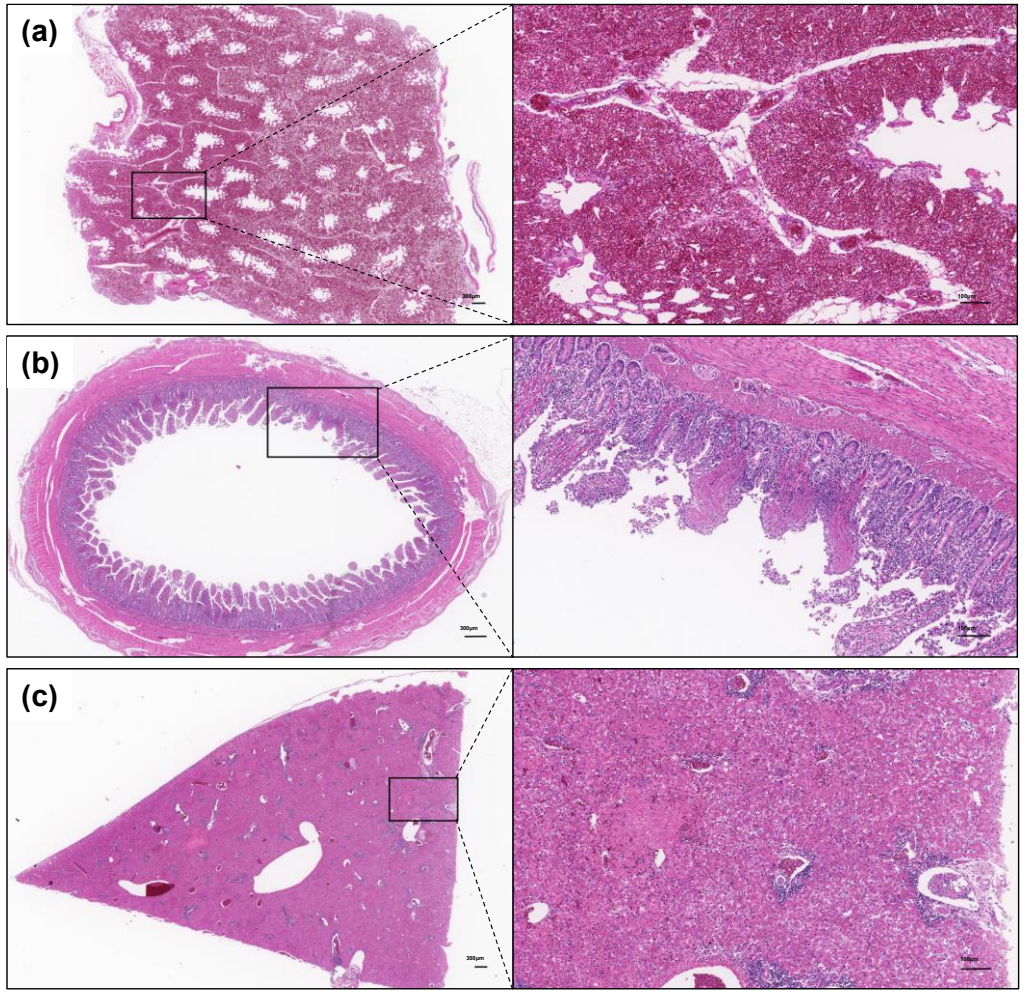
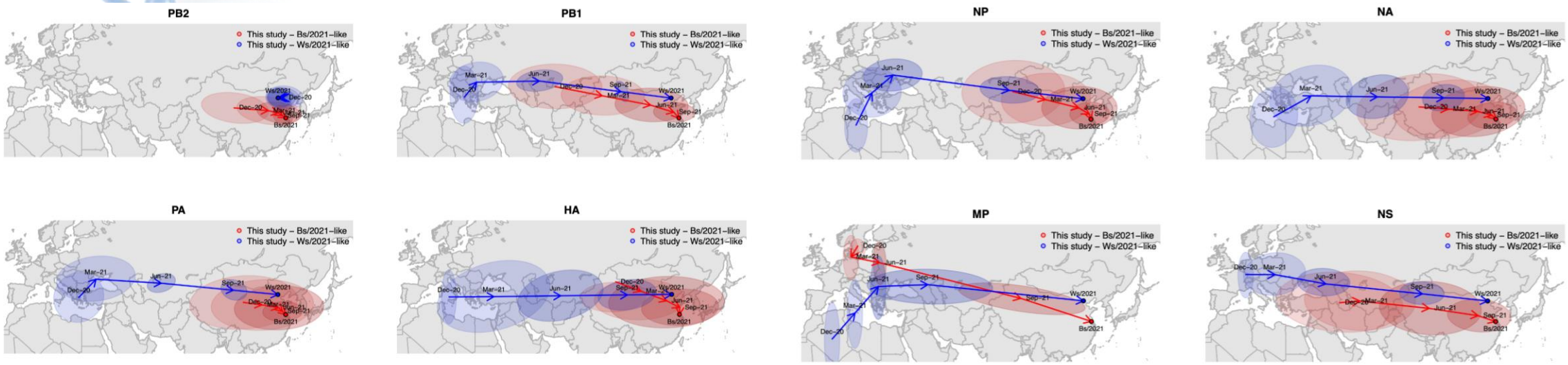
Two novel H5N1 HPAIVs invaded into China by wild birds



- In **November 2021**, we isolated **three H5N1 HPAIVs from two dead wild birds** in China:
  - One strain from a black swan in eastern China
  - Two strains from a whooper swan in northern China
- Pathology: these H5N1 are **highly pathogenic to wild birds**

(EID, 2023)



Spread patterns of the novel H5N1 HPAIVs

- **Two** H5N1 **reassortants spread to China** by bird migration **through various routes**;
- H5N1 viruses **experienced complicated reassortment during long-distance spread** via bird migration.

(EID, 2023)

H5N8 HA binds weakly to human α2-6 but strongly to avian α2-3 receptors


PUBLIC HEALTH

Emerging H5N8 avian influenza viruses

The global spread of H5N8 avian influenza viruses is a public health concern

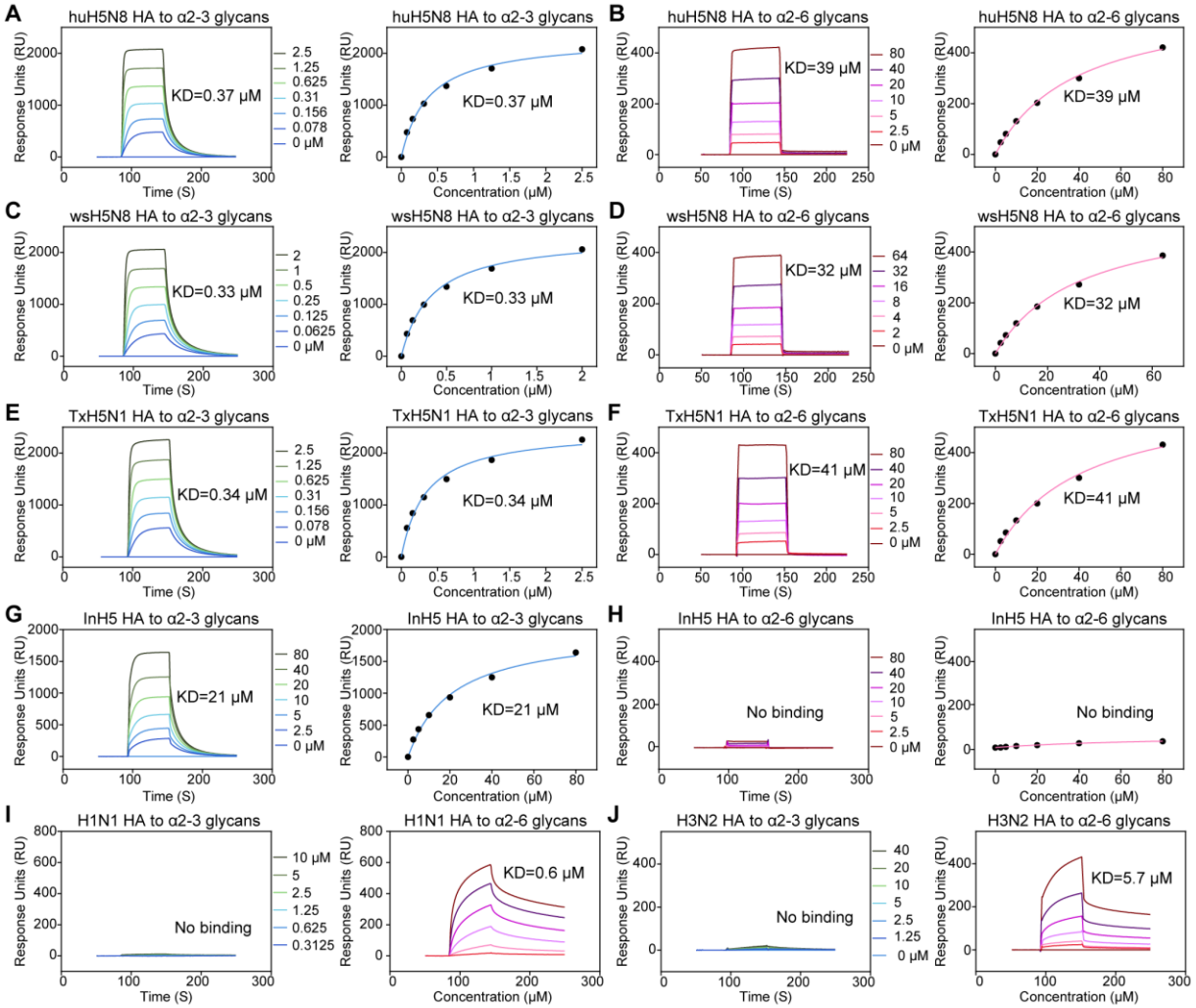
By Weifeng Shi[1,2] and George F. Gao[3,4] | and culling is often used to prevent further | vided into different s

INSIGHTS

PERSPECTIVES

Thousands of geese, ducks, and other birds were found dead from avian influenza virus on the west coast of Schleswig-Holstein, Germany, in November 2020.

We continue to examine the receptor-binding properties of the first human-isolated H5N8 strain (A/Astrakhan/3212/2020, huH5N8), together with the whooper swan infected H5N8 strain (A/whooper swan/Henan/CAS001-K/2020, wsH5N8).



Flu

中国疾病预防控制中心 CHINESE CENTER FOR DISEASE CONTROL AND PREVENTION

中国科学院微生物研究所 INSTITUTE OF MICROBIOLOGY CHINESE ACADEMY OF SCIENCES

广州实验室 Guangzhou Laboratory

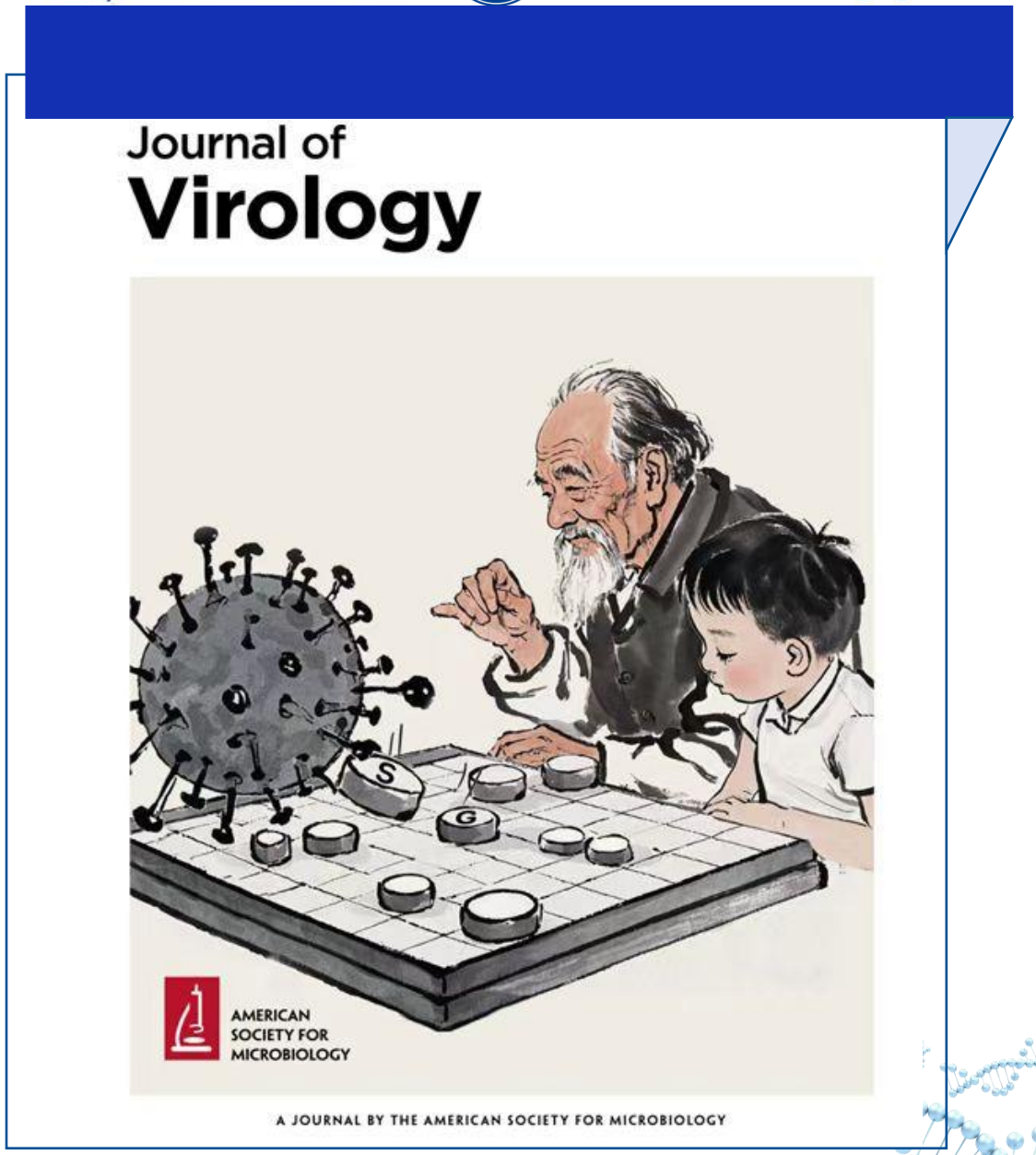
AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Virology

Virology | Full-Length Text

Structural basis of receptor-binding adaptation of human-infecting H3N8 influenza A virus

Tianjiao Hao,[1] Yufeng Xie,[2,3] Yan Chai,[3] Wei Zhang,[3] Di Zhang,[3,4] Jianxun Qi,[3] Yi Shi,[3] Hao Song,[5,6,7] George F. Gao[1,3]

- The human- infecting H3N8 hemagglutinin (HA) binds to both avian and human sialic acid receptors, but retains a stronger preference for avian receptors.
- The G228S mutation slightly enhances human receptor binding.
- Cryo-EM structures reveal that the G228S substitution facilitates weak hydrogen bonding with human receptors.



What we have seen are only the piece above the sea?

We still need:
Sustain and strengthen integrated surveillance and fundamental research

Discovery of SARS-CoV-2： Enabling the vaccines R&D

2nd Jan. 2020

Obtaining the RT-PCR results 3 hours after receiving the samples.

3rd Jan. 2020

Obtaining the full genome sequences of SARS-CoV-2

7th Jan. 2020

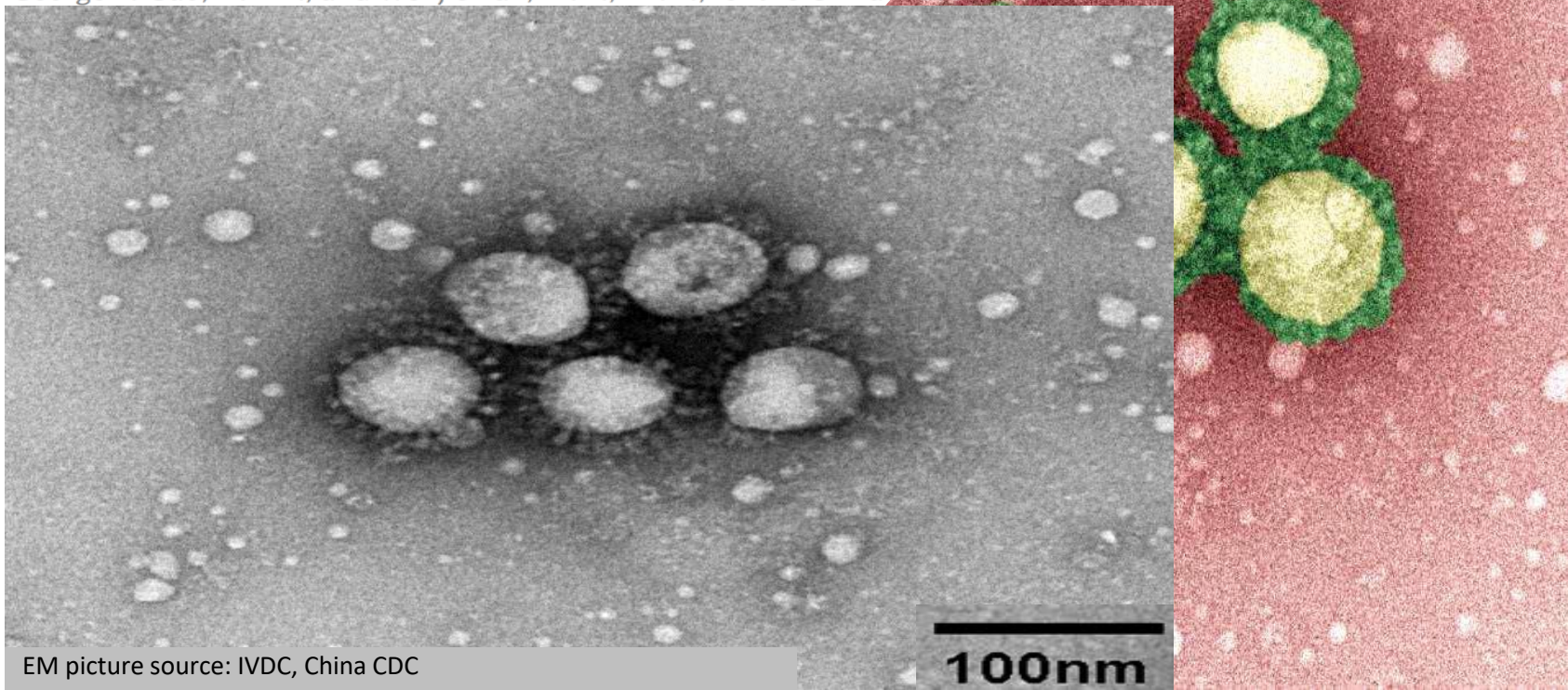
Isolation of SARS-CoV-2

The NEW ENGLAND JOURNAL of MEDICINE

BRIEF REPORT

A Novel Coronavirus from Patients with Pneumonia in China, 2019

Na Zhu, Ph.D., Dingyu Zhang, M.D., Wenling Wang, Ph.D., Xingwang Li, M.D., Bo Yang, M.S., Jingdong Song, Ph.D., Xiang Zhao, Ph.D., Baoying Huang, Ph.D., Weifeng Shi, Ph.D., Roujian Lu, M.D., Peihua Niu, Ph.D., Faxian Zhan, Ph.D., Xuejun Ma, Ph.D., Dayan Wang, Ph.D., Wenbo Xu, M.D., Guizhen Wu, M.D., George F. Gao, D.Phil., and Wenjie Tan, M.D., Ph.D., for the China Novel



EM picture source: IVDC, China CDC

CellPress

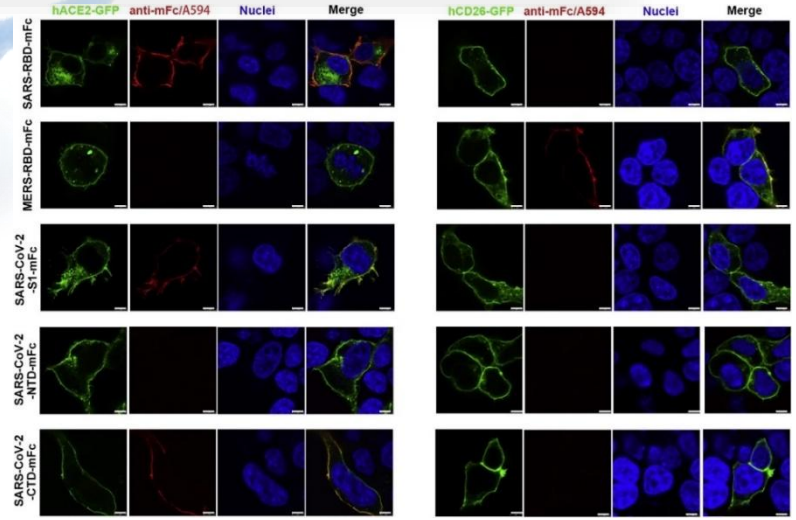
Cell

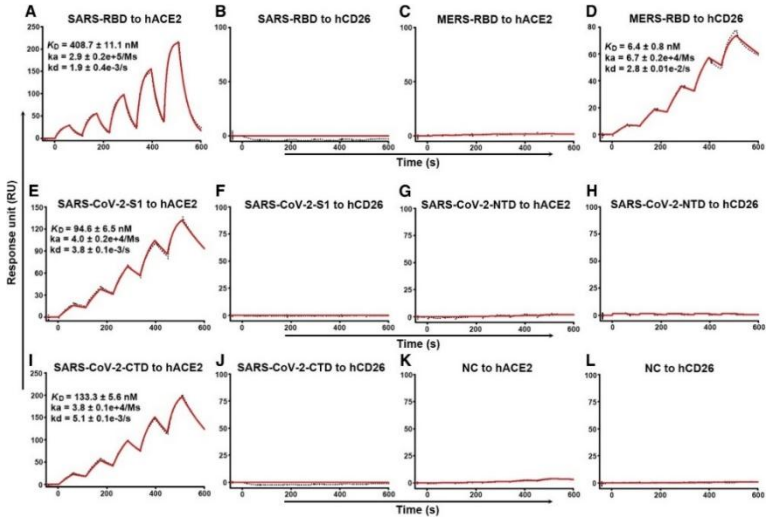
Article

Structural and Functional Basis of SARS-CoV-2 Entry by Using Human ACE2

Qihui Wang,[1,2,3,15] Yanfang Zhang,[3,4,5,15] Lili Wu,[1,4,15] Sheng Niu,[3,6,15] Chunli Song,[1,7,15] Zengyuan Zhang,[3,4] Guangwen Lu,[8] Chengpeng Qiao,[1] Yu Hu,[3,9] Kwok-Yung Yuen,[10,11] Qisheng Wang,[12] Huan Zhou,[12] Jinghua Yan,[1,2,3,7,13,*] and Jianxun Qi[3,14,16,*]

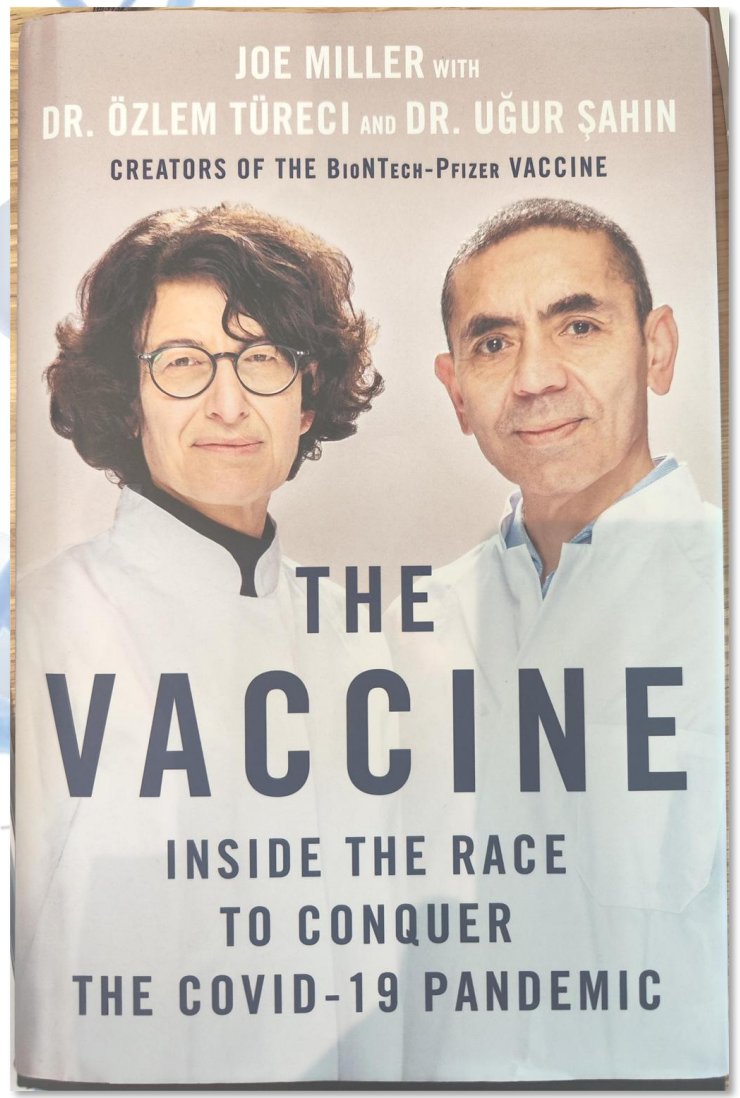
hACE2 is the receptor of SARS-CoV-2





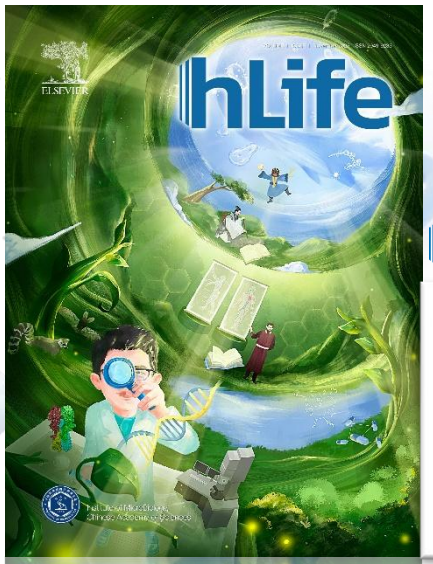
- COVID-19 virus CTD functions as RBD to interact with hACE2
- SPR analysis shows the binding affinity between COVID-19 virus RBD and hACE2 is 4-fold stronger than that between SARS-CoV RBD and hACE2

Prof. George Fu Gao's work



the assailant forces its way into healthy cells.

Among the RBD backers were some scientific heavyweights, notably George Fu Gao, the head of the Chinese Center for Disease Control and Prevention—an Oxford- and Harvard-educated immunologist. Gao and Graham were old friends and had been discussing their varied approaches for weeks. While the American believed his design—using a stabilized full spike—was still the better one, he had gently tried to convince Uğur to build an RBD-focused vaccine instead. "I was trying to help out George Gao," he says. Moderna was going with the full spike, and he reasoned it would be good for the world if someone else tried the alternative option, just in case it proved superior. Little did he know that BioNTech would be covering all the bases itself.



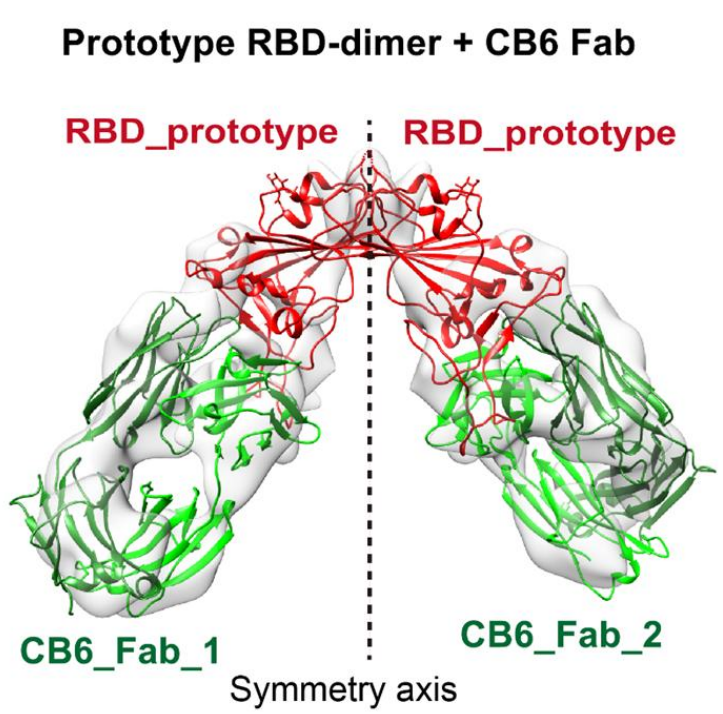
hLife Science supports healthier happier & harmonious life

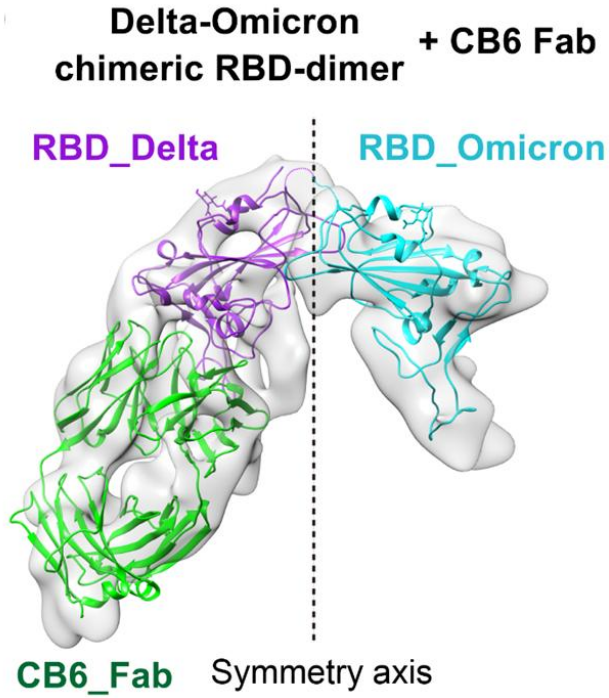
Cooperation and innovation: An interview with Minister Ibrokhim Y. Abdurakhmonov and Professor Jinghua Cao

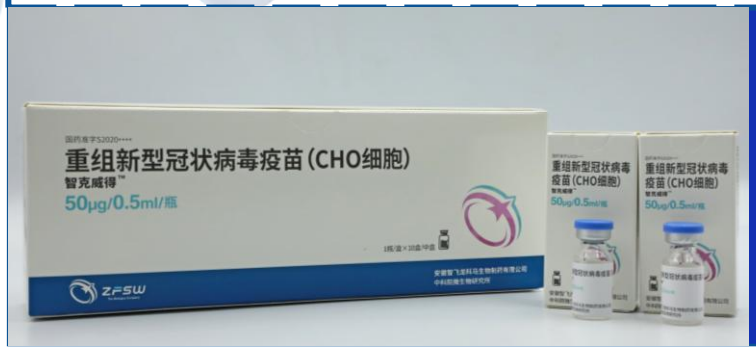
Qun Yan[1,*], Ibrokhim Yulchievich Abdurakhmonov[2,*], Jinghua Cao[3,*]

The unified help of our Uzbekistan people who volunteered themselves, as well as government support, resulted in the successful completion of the phase III clinical trial, which led to the emergency use authorization (EUA) of the vaccine in Uzbekistan and its local production [3,4,8,9]. As a result, 22 million Uzbekistan residents over the age of 18 were vaccinated against COVID-19, out of which 14 million adults (about 66% of all vaccinated people) received the ZF-UZ-VAC2001 (also known as Zifivax; China–Uzbekistan) in the country [3,4,10]. According to statistics, this vaccine saved many lives in Uzbekistan, and I guess it also helped reduce the death rate due to COVID-19 in China.

Structure of RBD-heterodimer







- Approximately symmetric structure
- Fully exposed epitopes

Eli-Lilly and Junshi collaboration

- On December 3, 2021, Eli Lilly announced that the FDA expanded the EUA of the combination therapy of etesevimab (JS016) and bamlanivimab, and it has obtained EUA in 17 countries.
- This therapy was the first neutralizing antibody therapy covering people under the age of 12 years, which can provide the treatment and prevention options for COVID-19 for high-risk people of all ages.

中国疾病预防控制中心 CHINESE CENTER FOR DISEASE CONTROL AND PREVENTION
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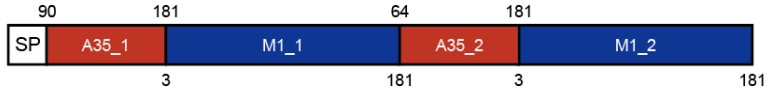
广州实验室 Guangzhou Laboratory

Rational Design of an immune “DAM”against Mpox



nature immunology

Article

https://doi.org/10.1038/s41590-023-01715-7

Rational design of a ‘two-in-one’ immunogen DAM drives potent immune response against monkeypox virus

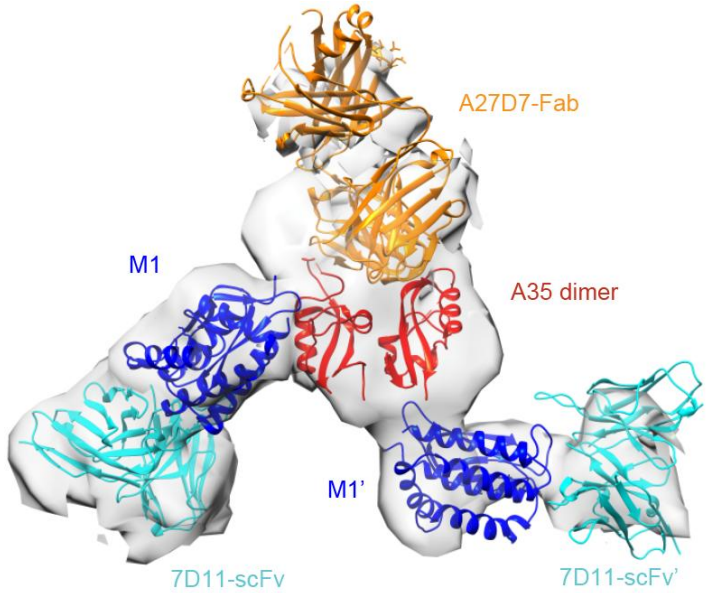
Received: 20 April 2023

Accepted: 17 November 2023

Published online: 05 January 2024

Check for updates

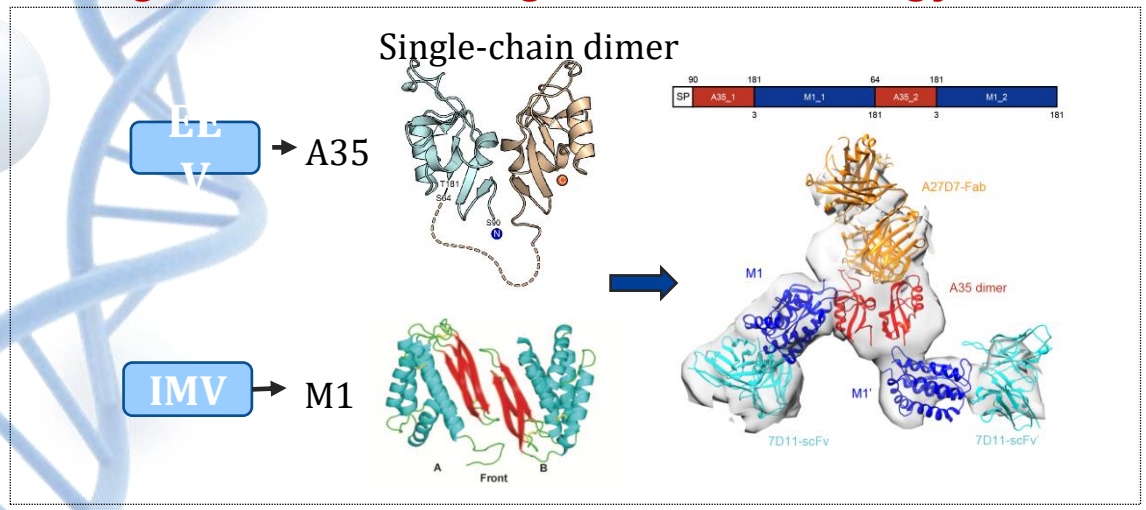
Han Wang[1,2,3,15] ✉, Peng Yin[2,15], Tingting Zheng[3,15], Lanju Qin[4,15], Shihua Li[3,15], Pu Han[3], Xiao Qu[3], Jun Wen[5], Haoyi Ding[6], Jiahao Wu[6,7], Tianxiang Kong[8], Zhengrong Gao[9,10], Songtao Hu[11], Xin Zhao[3], Xiangyu Cao[4], Min Fang[3], Jianxun Qi[3], Jianzhong Jeff Xi[1], Kai Duan[12], Xiaoming Yang[13], Zhuobing Zhang[5], Qihui Wang[3] ✉, Wenjie Tan[14] ✉ & George Fu Gao[3] ✉

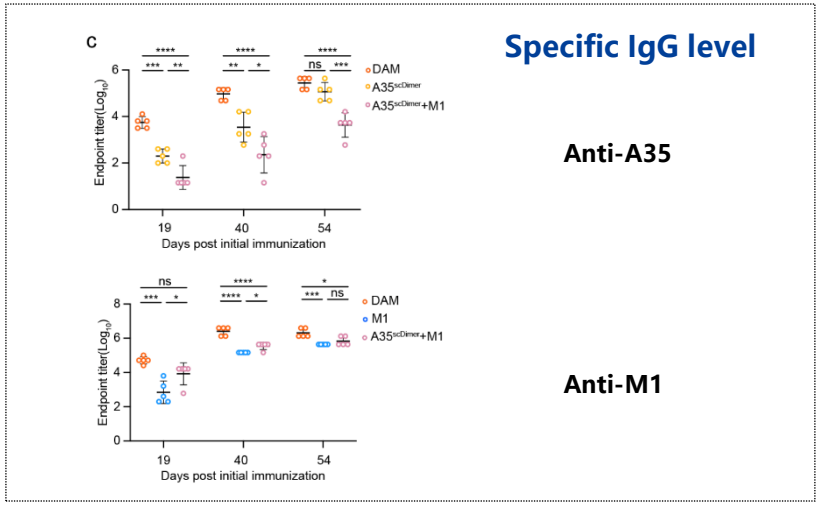


DAM
(Double A35s and M1s)

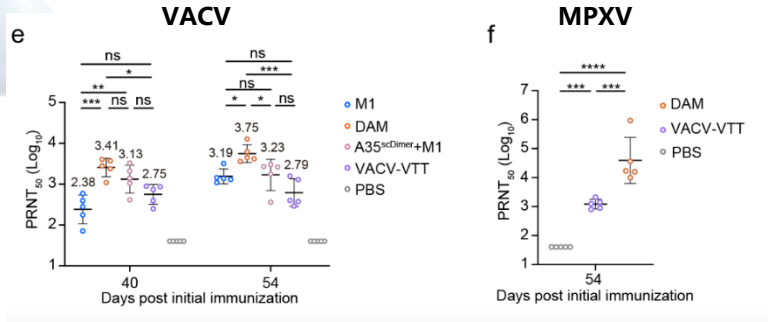
Rational Design of a "two-in-one" mpox vaccine: Building a DAM

- **Structure-guided multi-antigen fusion strategy**



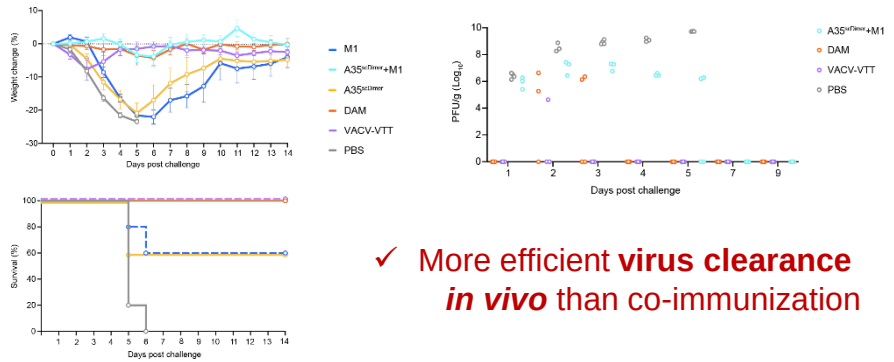


Neutralizing antibody level



✓ **28** times higher than live virus vaccination

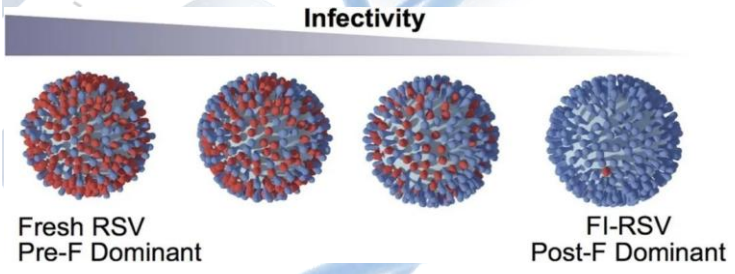
Protection of DAM against lethal VACV infection



✓ More efficient **virus clearance** ***in vivo*** than co-immunization

Wang et al., Nature Immunology, 2024

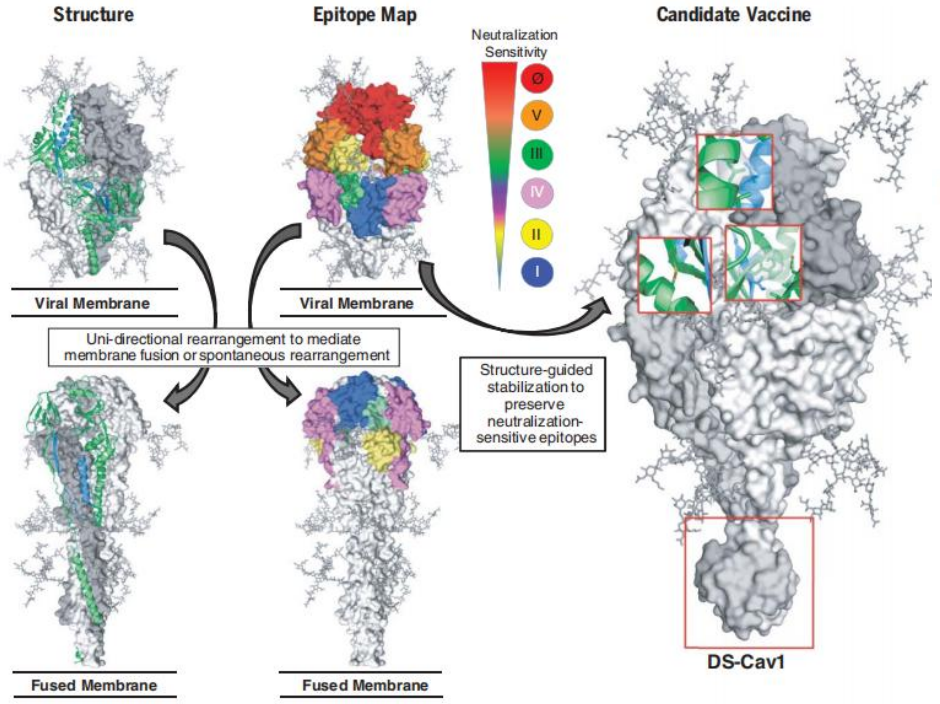
Development of RSV vaccines



FI-RSV Vaccine-Enhanced Disease

Vaccine	n	Infected (%)	Hospitalized (%)*	Deaths**
FI- RSV	31	20 (65)	16 (80)	2
FI-PIV-1	40	21 (53)	1 (5)	0

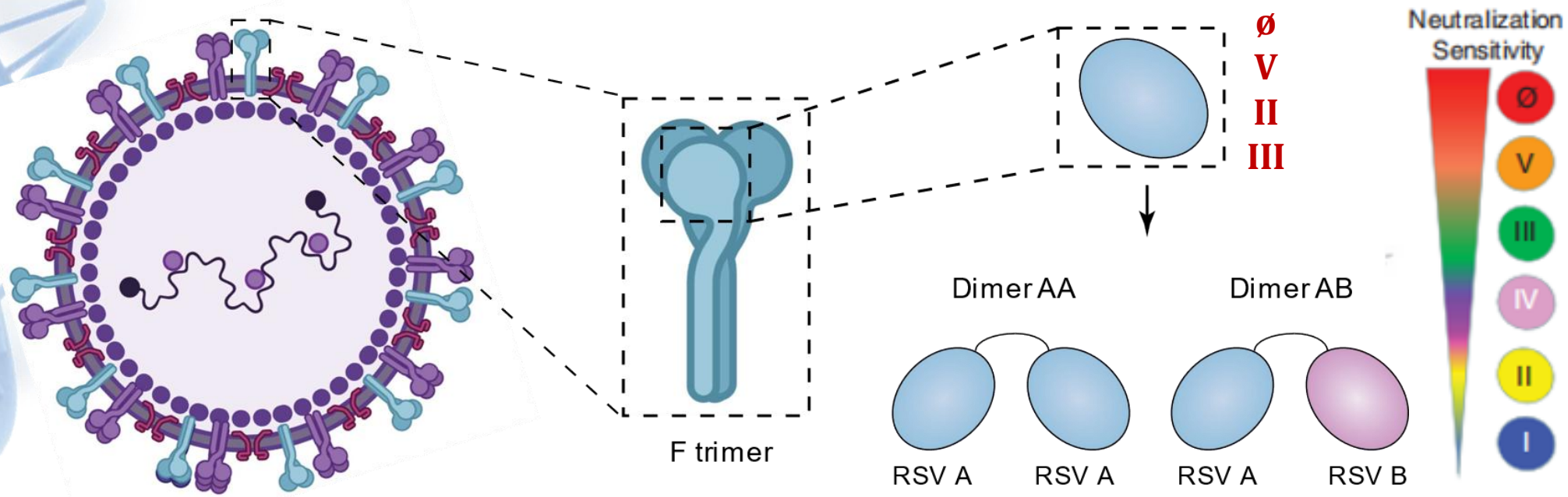
Kim et al. Am J Epidemiol, 1969;89:422.



Crank et al., Science 365, 505–509 (2019)

- 1966-1969：RSV vaccine development began in the 1960s, when formalin inactivated RSV (FI-RSV) vaccine developed by Pfizer induced vaccine-enhanced disease (VED) in children and eventually caused the death of two children；
- A long time later: Novavax's nanoparticle RSV vaccine failed twice in Phase III; In 2019, the emergence of the DS-CAV1 pre-fusion structure changed the status quo；
- 2023: GSK and Pfizer have been licensed by FDA for adults ages 60 and older or Pregnant women.

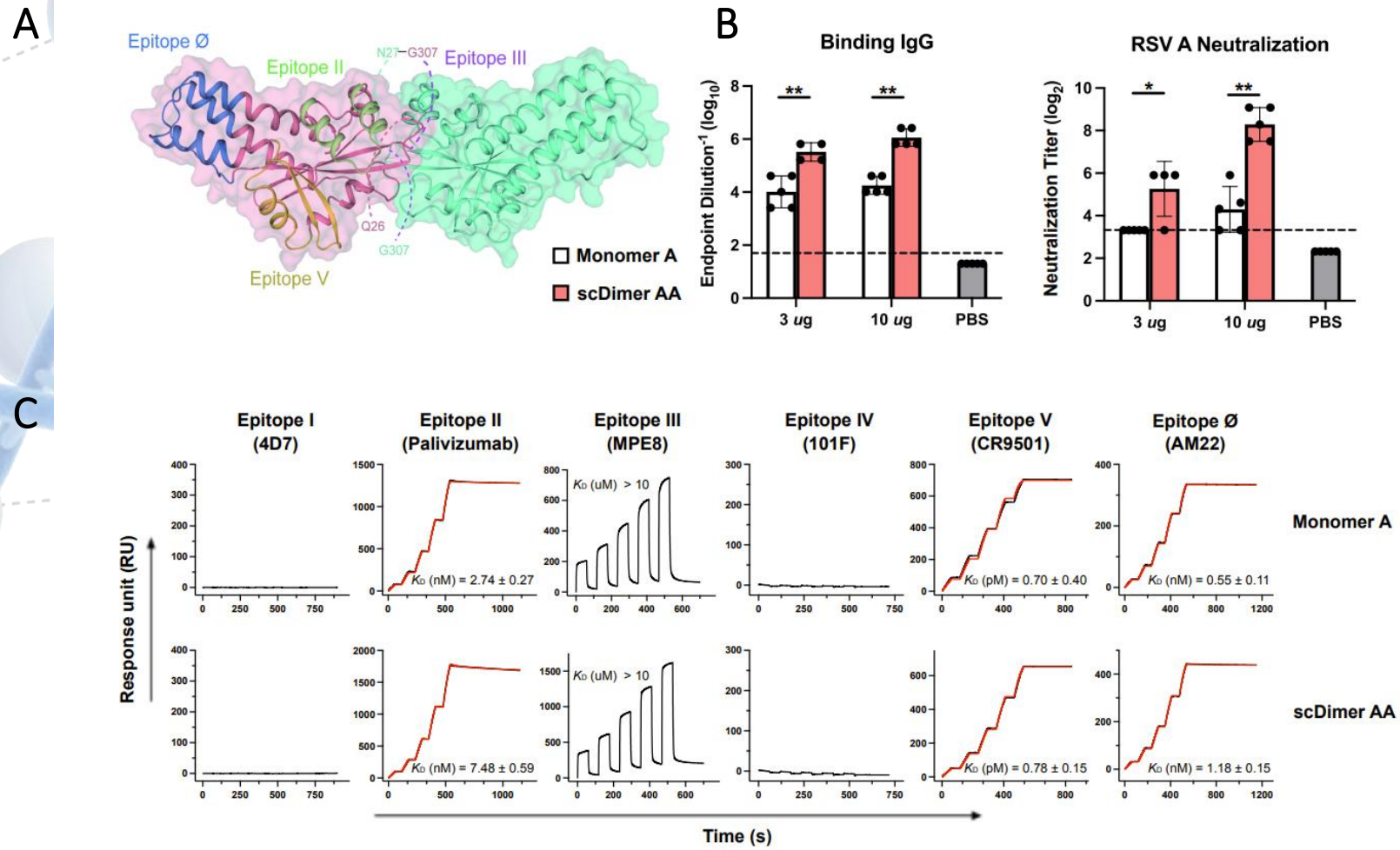
Rational design to keep epitope Ø and V as an intact dimer: the most potent neutralizing epitopes



- Novel design to keep **F 100% in pre-F state: the epitopes ø, V and II were kept, and epitope III was partly retained; the Epitopes I and IV, on the other hand were deleted.**
- The pre-F specific subunits were further tandem linked to obtain an **intact dimer** (single chain dimer, scDimer AA) to increase its immunogenicity.
- **The chimeric design of single chain Dimer AB (scDimer AB)** will potentially increase the protective spectrum of vaccines.

eBioMedicine. 2025 Aug

Rational design to keep epitope Ø and V as an intact dimer and the dimer displayed increased antigenecity than the monomer

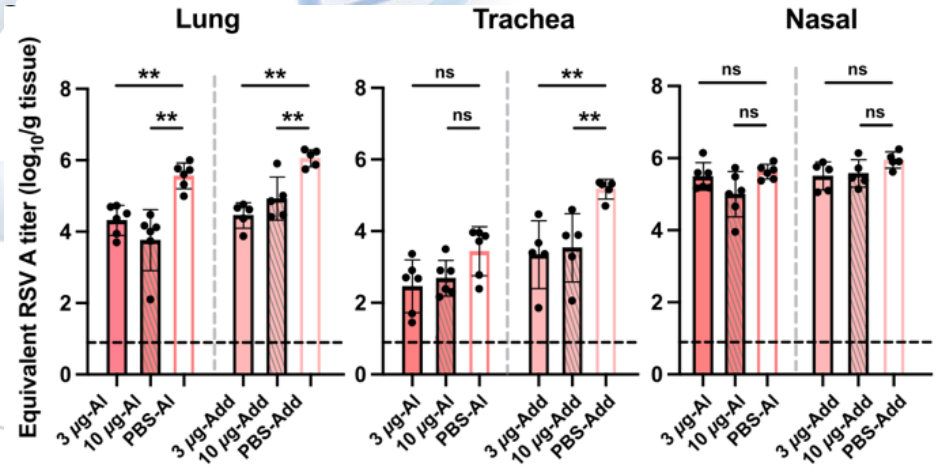


- The 2.6 Å resolution crystal structure revealed the epitopes II, V and ø fully exposed on the surface of scDimer AA.
- The binding antibodies produced by monomers are **100** times lower than those produced by scDimers, and the neutralizing antibodies are **10-20** times lower than those produced by scDimers.
- The preF epitope (ø and V) were retained with the scDimer AA by SPR assay

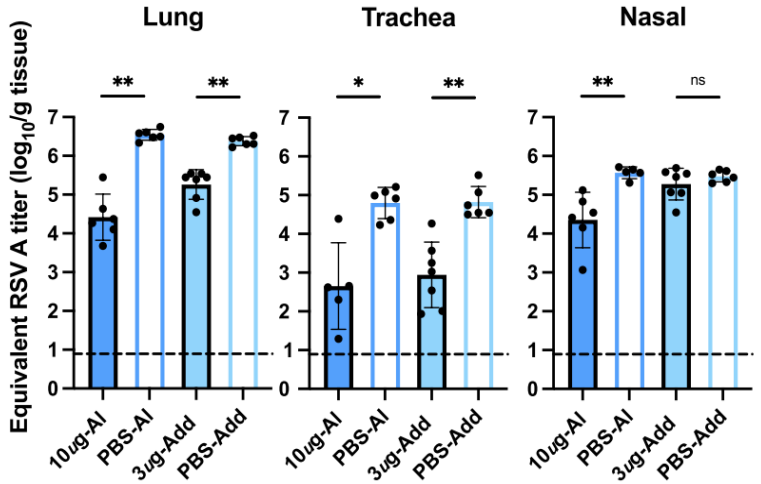
eBioMedicine. 2025 Aug

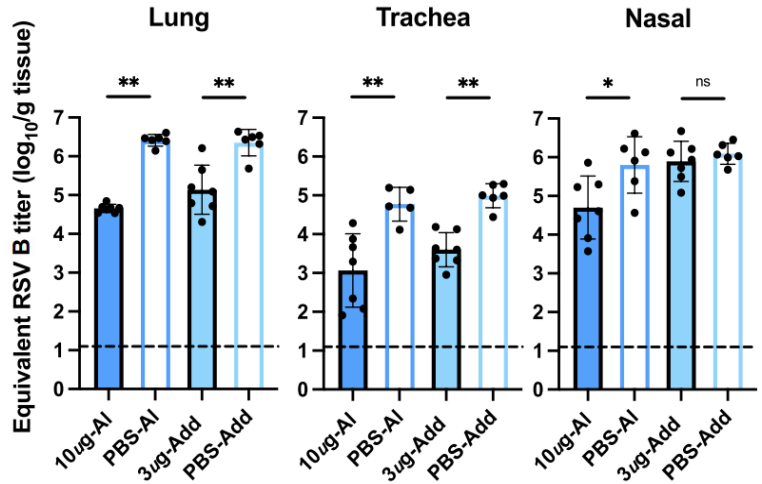
The Immunoprotective Efficacy of RSV Vaccine

- scDimerAA

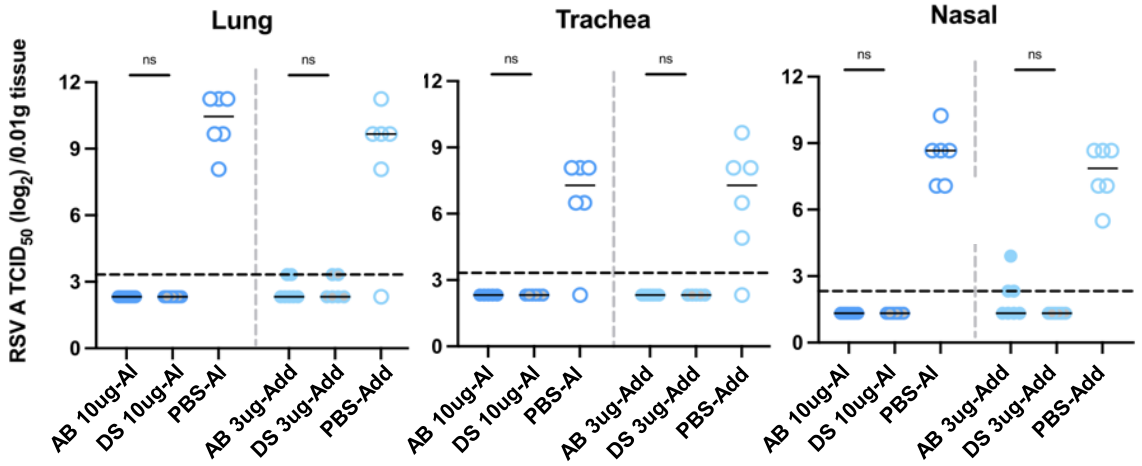


- scDimerAB

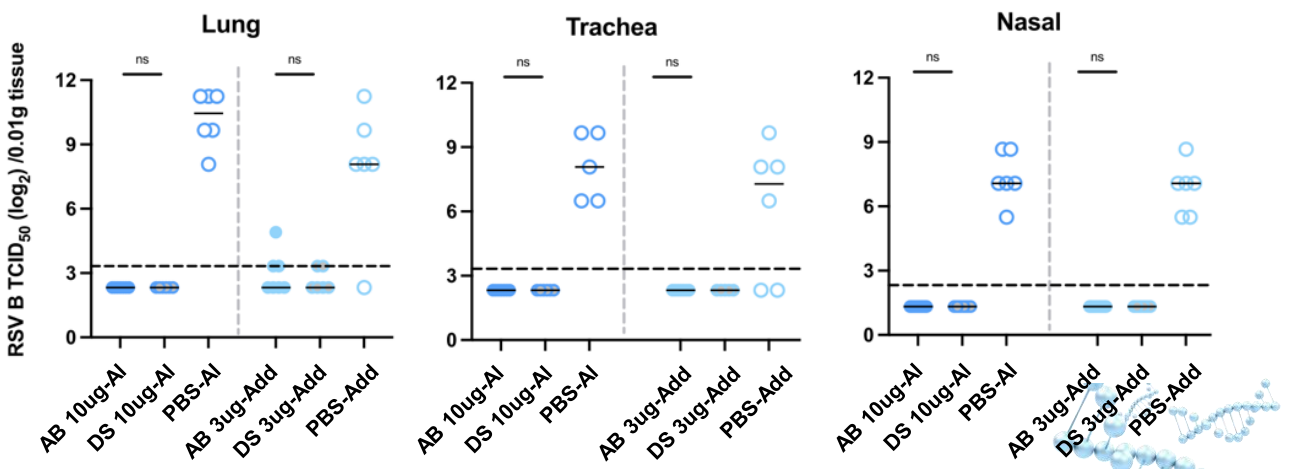




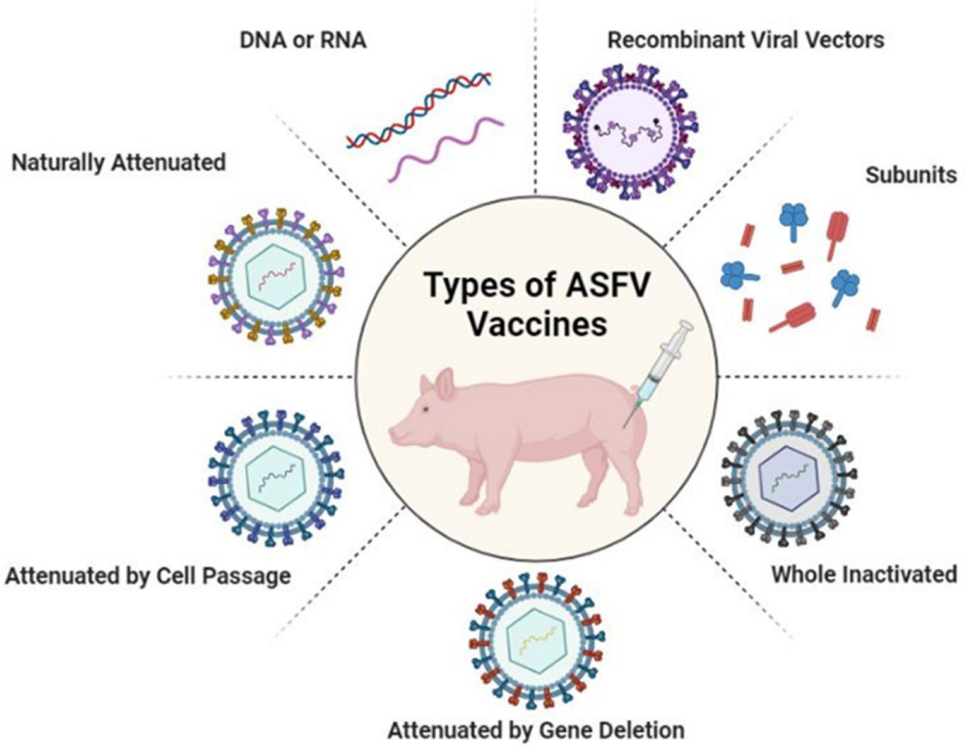
- RSV A



- RSV B



African Swine Fever Live Attenuated Vaccine



2022

生产企业	商品名	毒株	培养细胞	使用范围	保护期	临床试验启动	试验规模
Navetco	NAVET-ASFVAC	ASFV-G-ΔI177L	外周血淋巴细胞	8 到 10 周龄	2 次免疫保护 6 个月	2022 年 6 月	60 万头份
AVAC	AVAC ASF LIVE	ASFV-G-ΔMGF	猪巨噬细胞	4 周龄以上	1 次免疫保护 4 个月	2022 年 7 月	60 万头份
Dabaco	/	ASFV-G-ΔI177L/ΔLVR	猪上皮细胞系	/	/	/	/

Navetco ΔI177L

2023

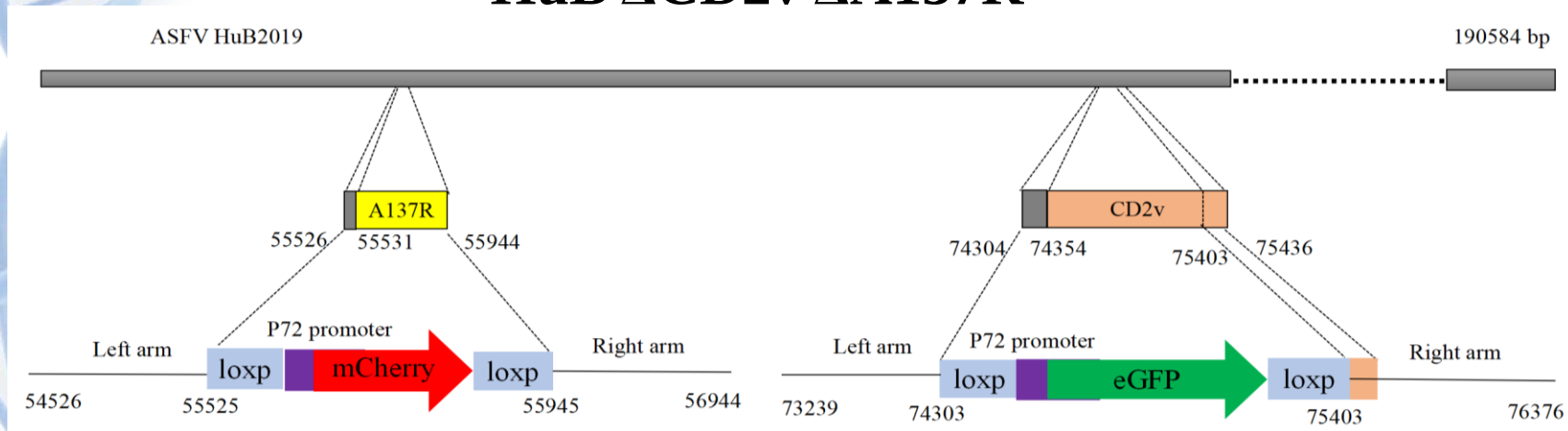
July 24, the MARD officially approved the commercial use of ASF vaccine in the Vietnam

October, Partners from five nations including Indonesia, the Philippines, Malaysia, Myanmar, and India have signed contracts to purchase ASF vaccines

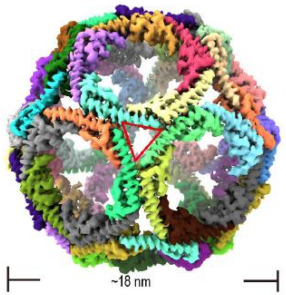
Antibodies can't fully neutralise infection and the mechanism of virus neutralisation remains uncertain

Construction and Identification of ASFV Double Gene Knockout Attenuated Strain

HuB ΔCD2v ΔA137R

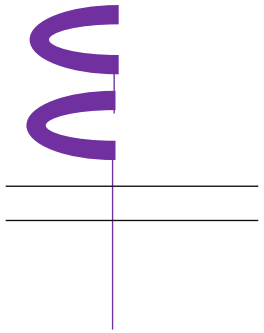


A137R



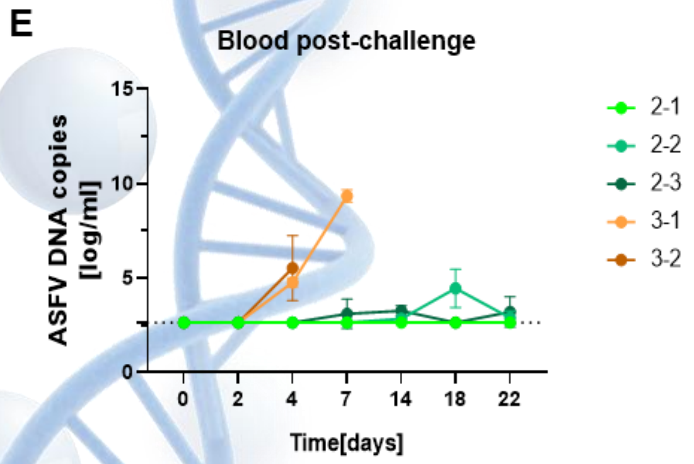
- Inhibiting type I interferon secretion, thereby suppressing the host's immune response and enhancing the escape ability.
- Knocking out this gene can weaken the virulence of the parental strain.

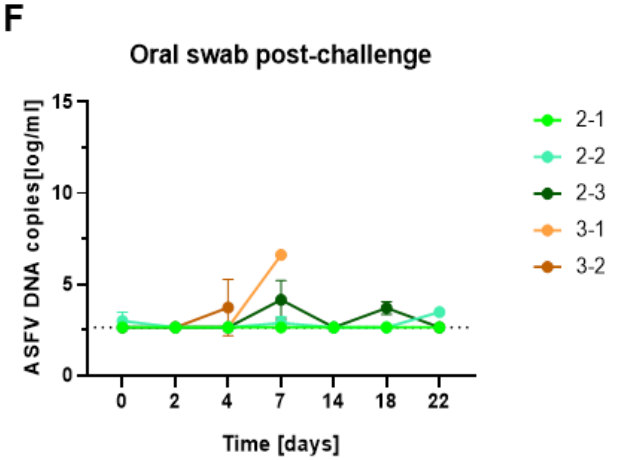
CD2v

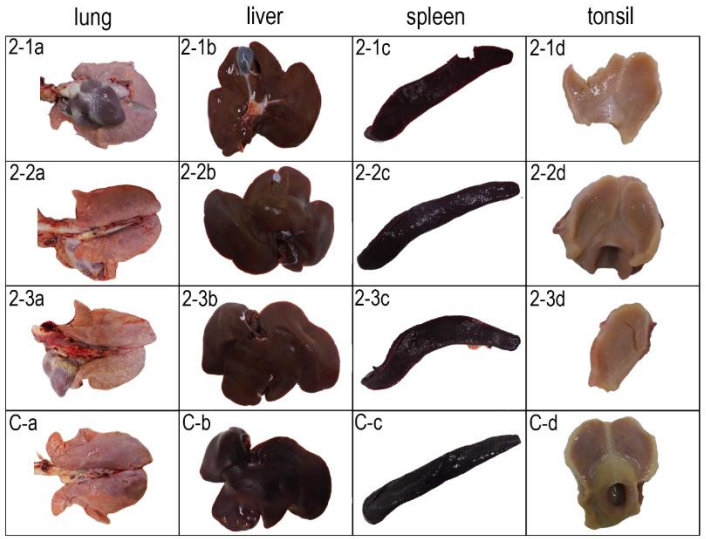


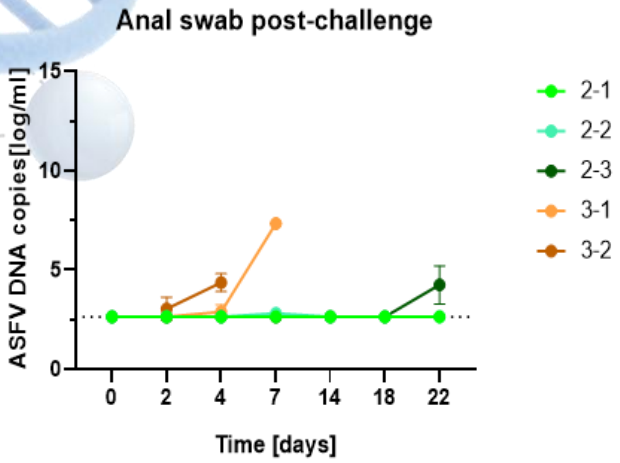
- The function of blood cell adhesion, which can cause red blood cells to adhere to the surface of virus-infected cells, facilitating their spread within the host body;
- Have an immunomodulatory effect, inhibiting the proliferation of lymphocytes;

The Double Deletion Strain Exhibits Immunoprotective Efficacy

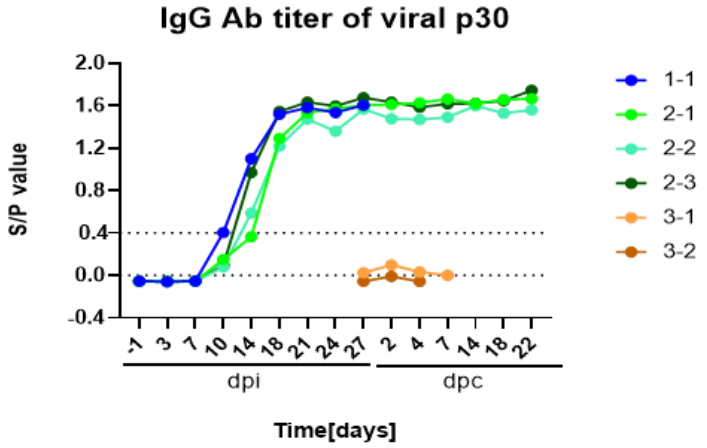


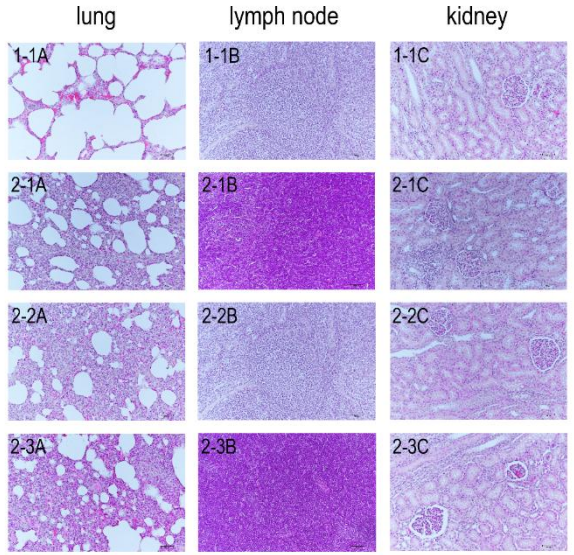






H ELISA results of ASFV p30 specific antibody pre and post challenge





CONTENT

01 Update of emerging infections

02 Actions and Researches

03 Perspectives

中国疾病预防控制中心
CHINESE CENTER FOR DISEASE CONTROL AND PREVENTION

中国科学院微生物研究所
INSTITUTE OF MICROBIOLOGY
CHINESE ACADEMY OF SCIENCES

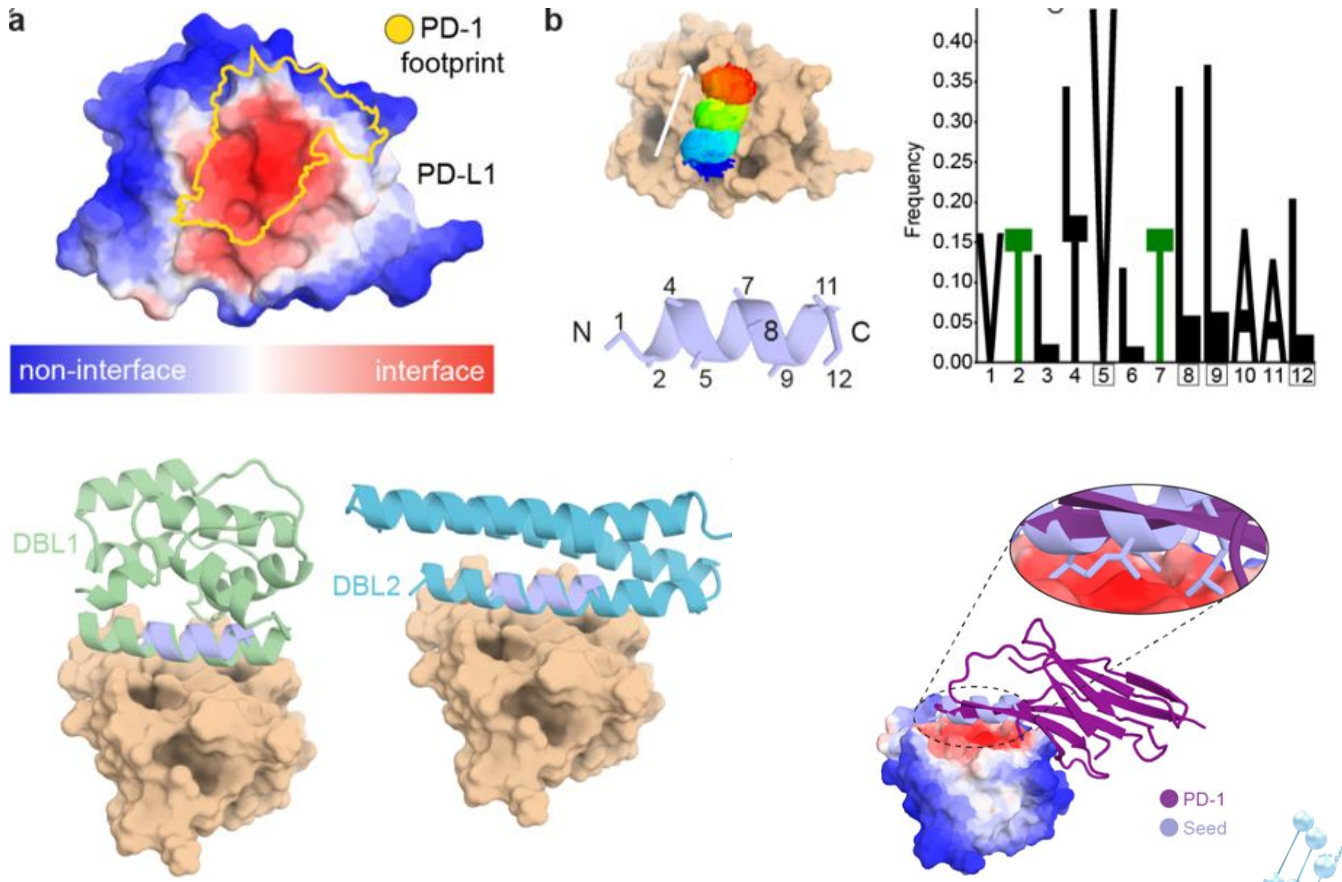
广州实验室
Guangzhou Laboratory

2024 Nobel Prize

David Baker

de novo Design of PD-L1 Binding Protein

Bruno Correia
Laboratory of Protein Design & Immunoengineering, EPFL
University of Geneva, Switzerland



Nature, 2023, 617 (7959): 176-184.

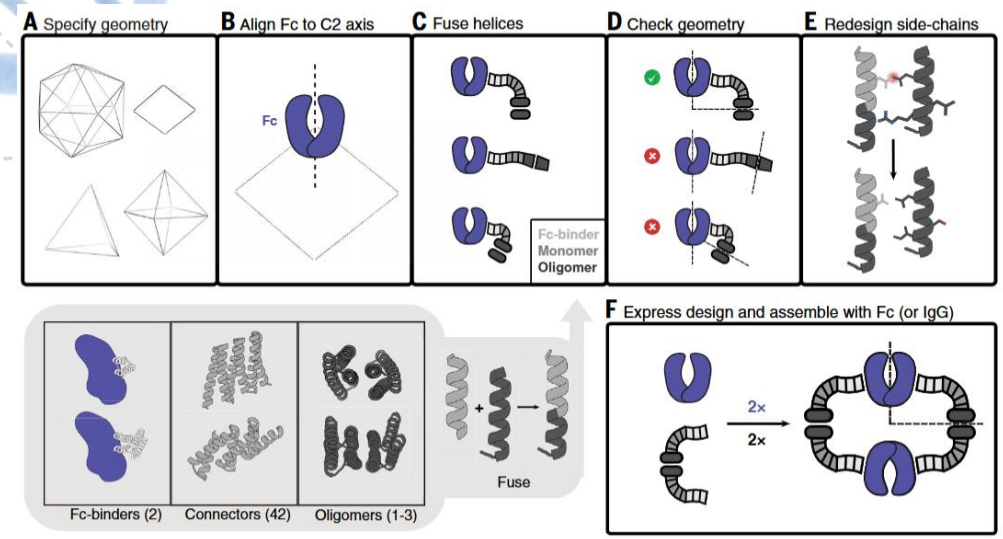
Designed proteins assemble antibodies intomodular nanocages

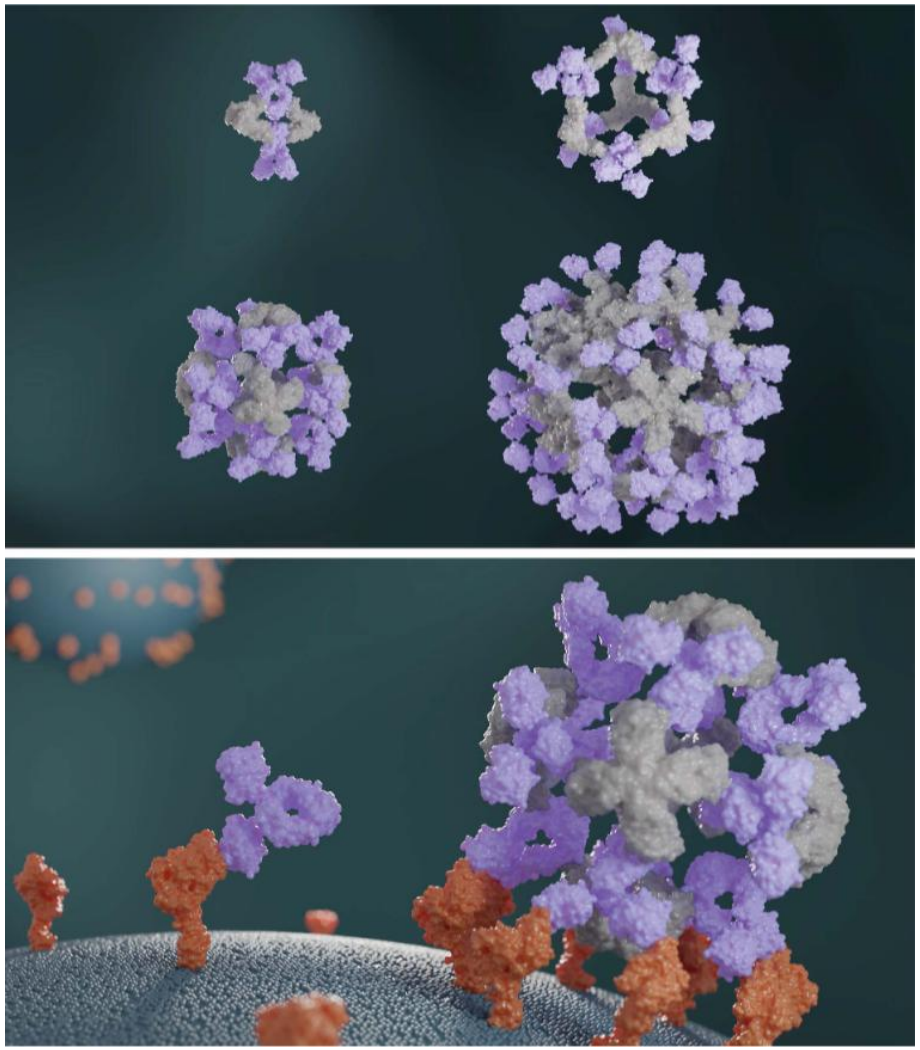
RESEARCH ARTICLE SUMMARY

PROTEIN DESIGN

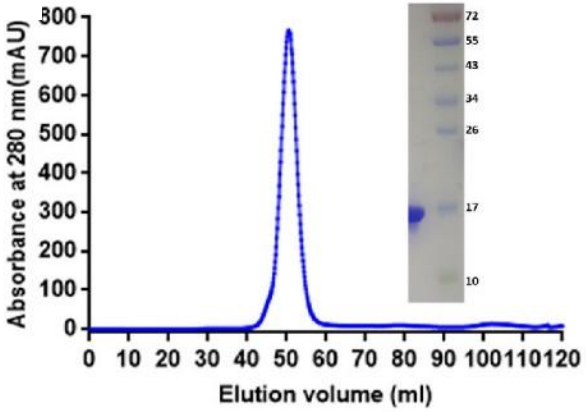
Designed proteins assemble antibodies into modular nanocages

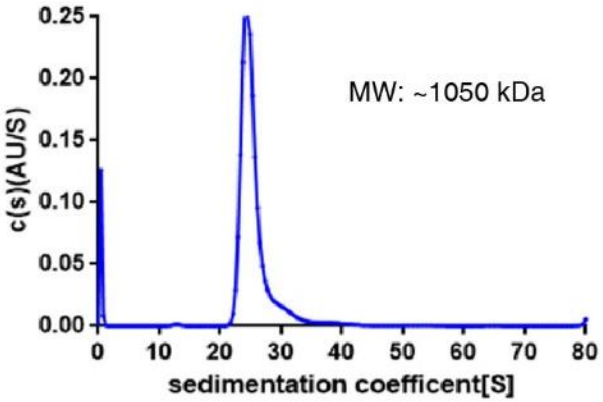
Robby Divine, Ha V. Dang, George Ueda, Jorge A. Fallas, Ivan Vulovic, William Sheffler, Shally Saini, Yan Ting Zhao, Infencia Xavier Raj, Peter A. Morawski, Madeleine F. Jennewein, Leah J. Homad, Yu-Hsin Wan, Marti R. Tooley, Franziska Seeger, Ali Etemadi, Mitchell L. Fahning, James Lazarovits, Alex Roederer, Alexandra C. Walls, Lance Stewart, Mohammadali Mazloomi, Neil P. King, Daniel J. Campbell, Andrew T. McGuire, Leonidas Stamatatos, Hannele Ruohola-Baker, Julie Mathieu, David Veesler, David Baker*

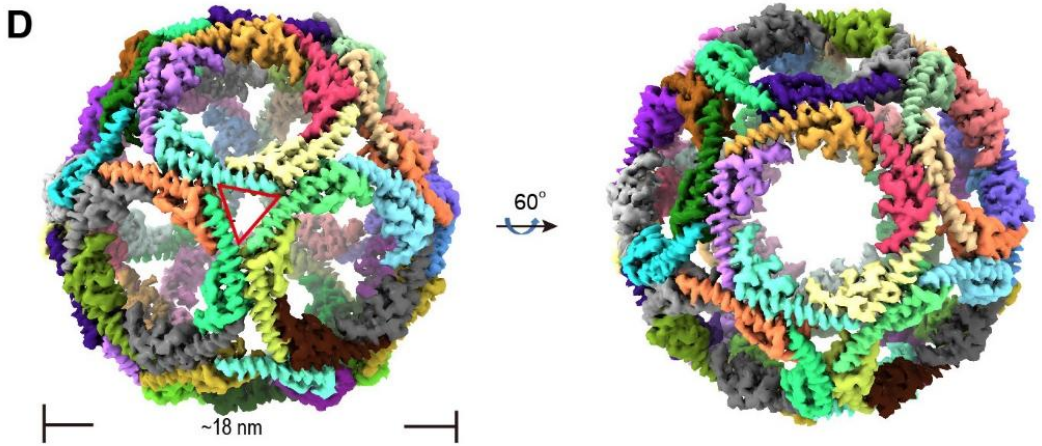


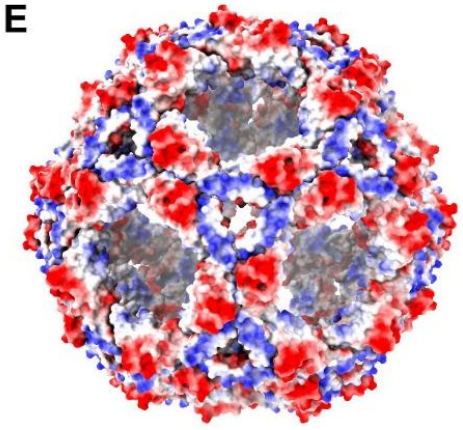


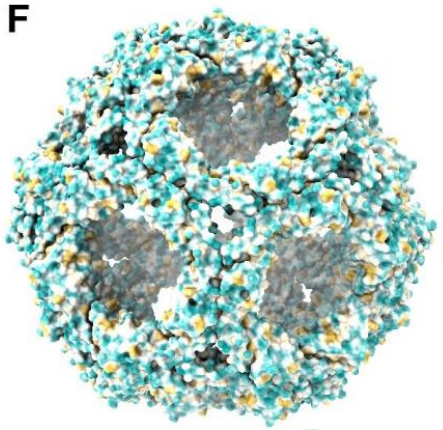
ASFV A137R Can Form a Sixty-Unit Pseudo-Cage Structure







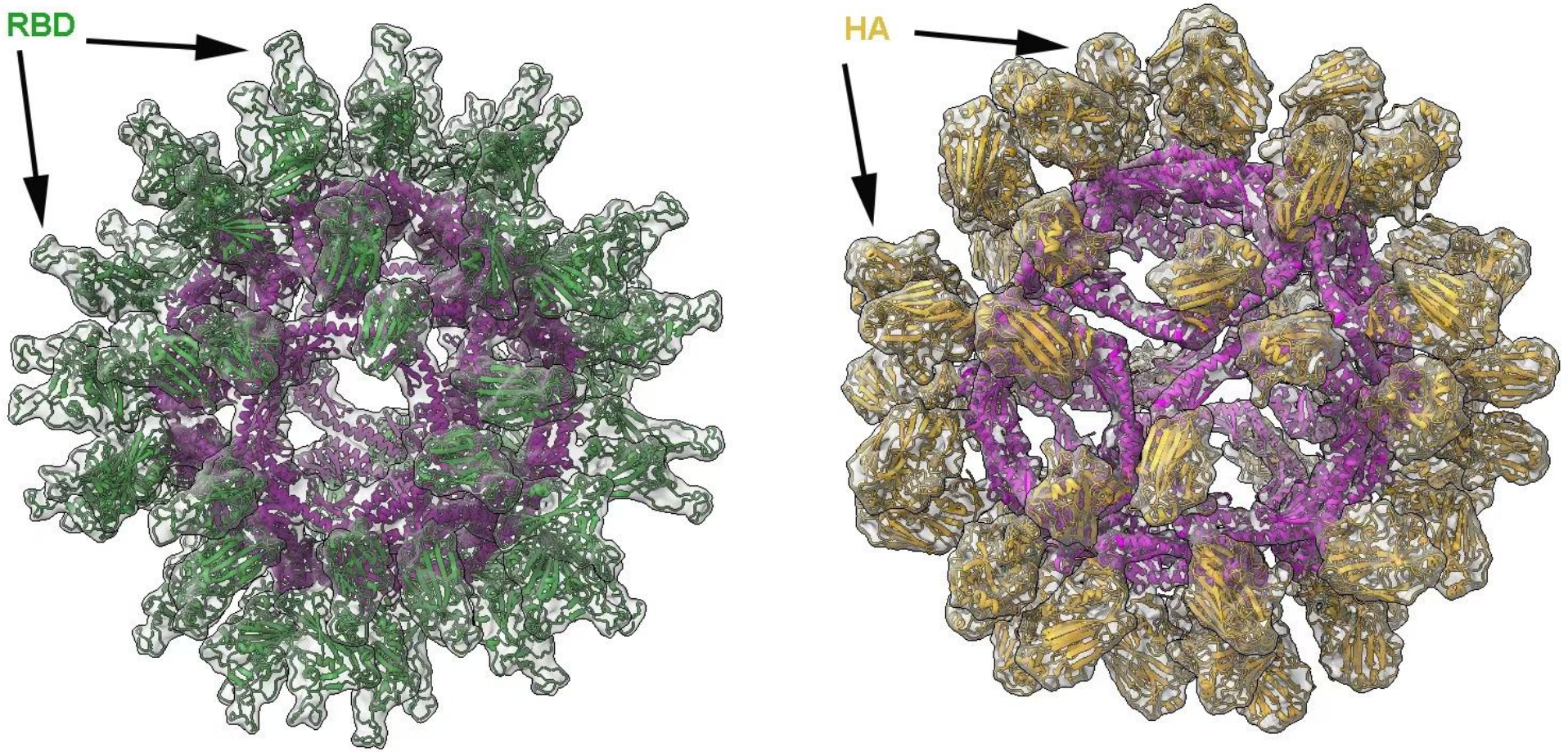




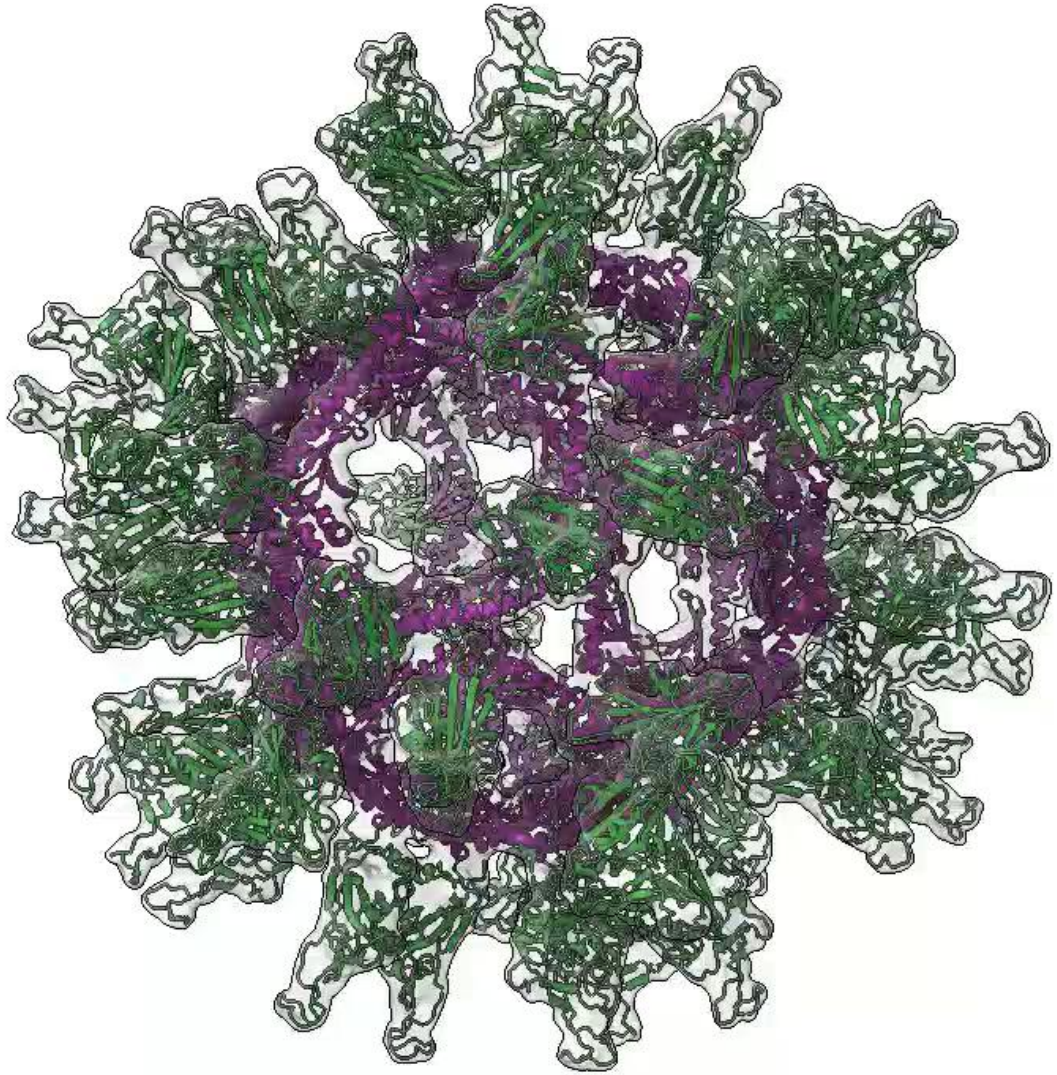
- A137R can self-assemble into a high-molecular-weight protein of 1050 kDa; Cryo-EM structures show it can assemble into an icosahedral shape.

JVI，2024

RBD and HA head can be displayed on A137R nanocage

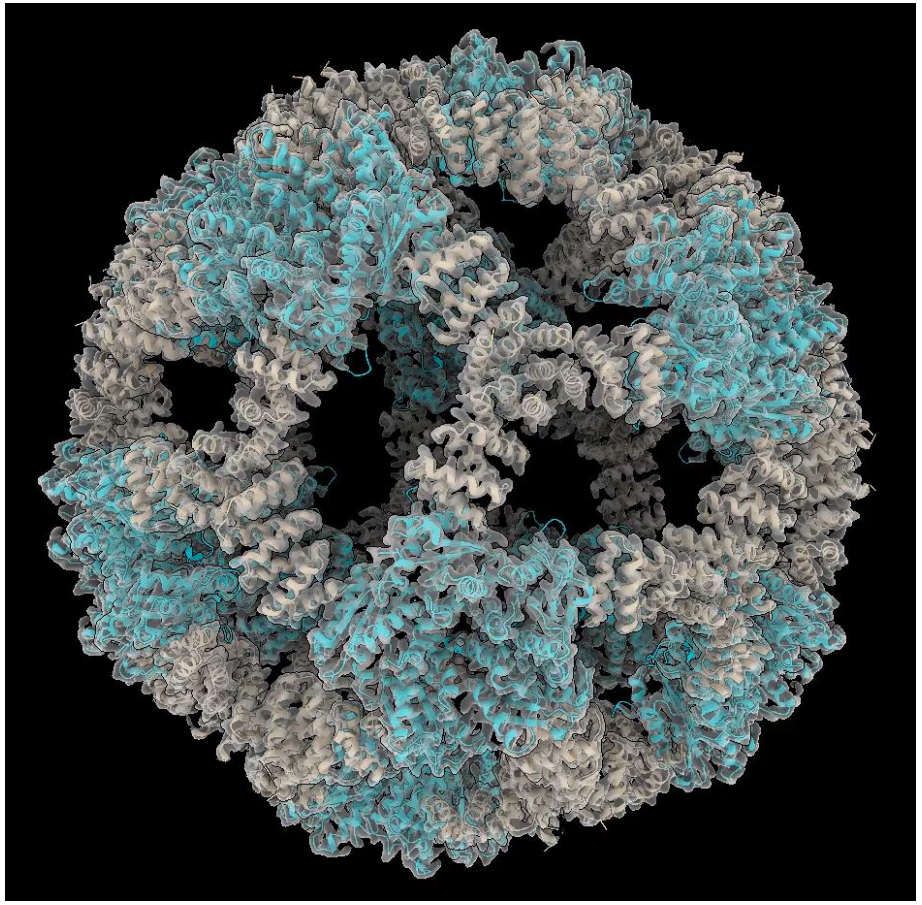


- By linking RBD and HA head to the surface of SC-A137R, electron microscopy analysis reveals that the proteins are displayed on the surface of the A137R cage structure.



de novo Design of Protein Cage

AI Design and Self-assembling



Cryo-EM Validation

中国疾病预防控制中心 CHINESE CENTER FOR DISEASE CONTROL AND PREVENTION

中国科学院微生物研究所 INSTITUTE OF MICROBIOLOGY CHINESE ACADEMY OF SCIENCES

广州实验室 Guangzhou Laboratory

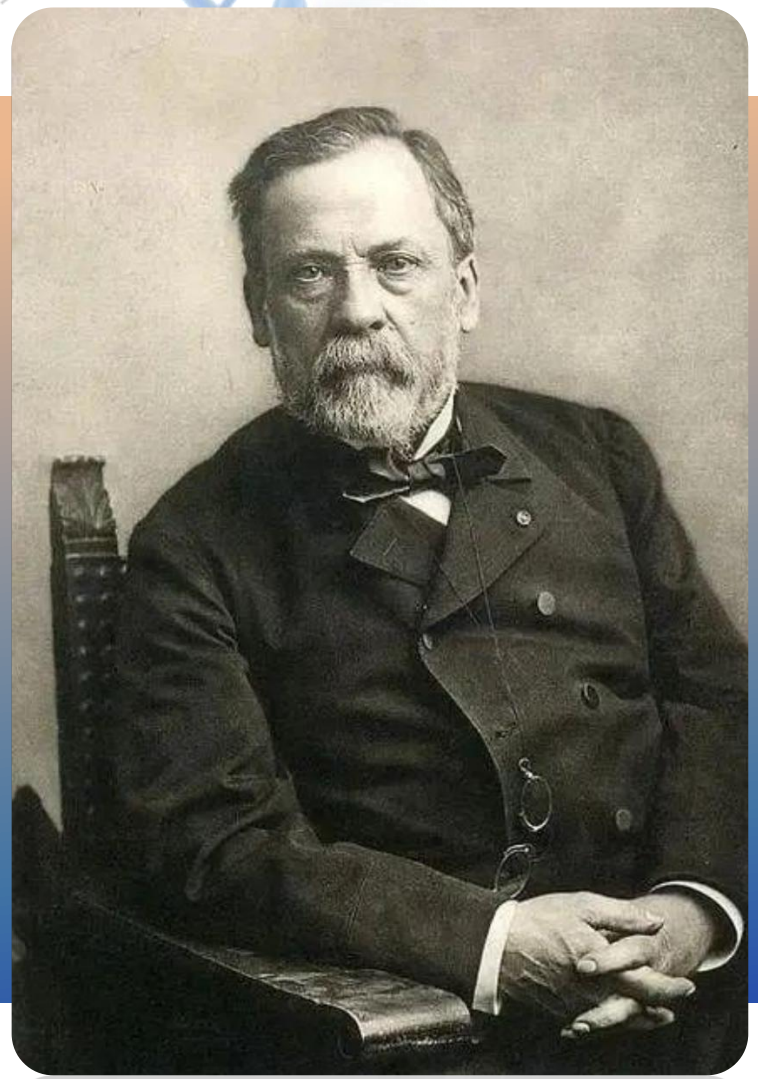
Infodemic 信息流行病
Infodemiology 信息流行病学
Inforus 信息病毒

Perspectives

China CDC Weekly

Infodemiology: The Science Studying Infodemic and Inforus

George F. Gao[1,2,3,#]



We cannot foresee where the next storm will arise, but we can choose to light the lighthouse before the storm comes. **As Pasteur said, 'Chance favors the prepared mind.'** When facing situation update of emerging infections, true wisdom does not lie in conquering, but in reverence, observation, and relentless inquiry.

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CHINESE ACADEMY OF SCIENCES

广州实验室
Guangzhou Laboratory

谢谢！

Thank you

George F Gao 高福