VACCINES BEAT

# NAVIGATING THE FUTURE OF PANDEMIC PREPAREDNESS

Insights from Dr. Rajeev Venkayya on Global Vaccines, Innovation, and Collaboration

September
2025

ISSN 2997-2833

AHF
Americas Health Foundation

*"IMMUNIZATION IS A GLOBAL HEALTH AND DEVELOPMENT SUCCESS STORY SAVING MILLIONS OF LIVES EVERY YEAR"*

WORLD HEALTH ORGANIZATION

VACCINES BEAT

# Navigating the Future of Pandemic Preparedness

## Insights from Dr. Rajeev Venkayya on Global Vaccines, Innovation, and Collaboration

Dr. Rajeev Venkayya is a recognized global health leader with deep expertise in vaccines, pandemic preparedness, and biopharmaceutical innovation. He currently serves as a venture advisor and holds board positions with the and the Coalition for Epidemic Preparedness Innovations (CEPI), the International AIDS Vaccine Initiative (IAVI), and Global Health Innovative Technology Fund (GHIT).

Most recently, Dr. Venkayya was the CEO of Aerium Therapeutics, a biotechnology company focused on developing next-generation antibody therapies. Prior to that, he served as President of the Global Vaccine Business Unit at Takeda Pharmaceuticals, where he led a fully integrated organization spanning research and development, manufacturing, and commercialization. Under his leadership, Takeda advanced several key vaccine candidates targeting dengue, norovirus, and Zika (with support from the U.S. government), as well as a Sabin-strain inactivated polio vaccine funded by the Bill & Melinda Gates Foundation. Takeda's dengue vaccine is now licensed and distributed in dengue-endemic countries around the world.

# INDEX

# LETTER FROM EDITOR

LETTER FROM THE EDITORS. 15TH ISSUE, SEPTEMBER - 2025

In our *Coffee with an Expert* section, we had the distinct honor of speaking with Dr. Rajeev Venkayya, a global health leader with extensive expertise in vaccines, pandemic preparedness, and biopharmaceutical innovation. Dr. Venkayya currently serves as a venture advisor and sits on the boards of the Global Health Innovative Technology Fund (GHIT), the International AIDS Vaccine Initiative (IAVI), and the Coalition for Epidemic Preparedness Innovations (CEPI). Most recently, he was CEO of Aerium Therapeutics, a biotechnology company developing next-generation antibody therapies. Prior to that, he served as President of the Global Vaccine Business Unit at Takeda Pharmaceuticals, where he led a fully integrated organization spanning R&D, manufacturing, and commercialization. Under his leadership, Takeda advanced key vaccine candidates for dengue, norovirus, and Zika (with U.S. government support), as well as a Sabin-strain inactivated polio vaccine funded by the Bill & Melinda Gates Foundation. In our conversation, we explored the current and future challenges of CEPI's ambitious "100-Day Mission" to develop a vaccine against pathogen X in the event of a new pandemic. Dr. Venkayya outlined the critical steps of this initiative, highlighting the progress achieved so far and identifying the toughest hurdles—particularly for low- and middle-income countries (LMICs).

In this edition's *Editor's Corner*, we explore "Infectious Diseases, Cancer, and the Power of Vaccination," addressing not only pathogens known to directly cause cancer, but also those capable of triggering neoplastic processes.

Our *Best Practice* section presents a comprehensive overview of current rabies prevention strategies, covering both pre-exposure and post-exposure prophylaxis, with a focus on the latest simplified vaccination schedules.

Finally, in our *Guest Contributor* section, we are delighted to feature an insightful editorial by Dr. Eduardo Antonio Lara-Lopez, a highly renown pediatrician and pediatric pulmonologist, member of the Mexican Academy of Pediatrics, and CEO of the Medical Health Fraternity *Doctors United for Mexico*. In this piece, Dr. Lara-Lopez takes us on a journey through the history of immunization—from its origins to the challenges we face today.

As always, this issue features carefully curated and up-to-date information on the *'Latest Scientific Publications'* along with the most recent and important *'News and Alerts'*.

We hope you find this August issue both informative and engaging, and we look forward to continuing this shared commitment to advancing global health and building a healthier planet.

Enrique Chacon-Cruz, M.D., MSc
Chief Editor

## Dr. Enrique Chacon-Cruz

Enrique Chacon-Cruz, M.D., MSc, Mexican-born medical doctor with a degree from Guadalajara, Mexico, and further specializations in Pediatrics and Infectious Diseases from institutions in Mexico City and the USA (Eastern Virginia Medical School). He also holds a Master's degree in Vaccinology and Drug Development from the University of Siena, Italy.

He is an Overseas Fellow of the Royal Society of Medicine of the United Kingdom and a member of several international associations in Infectious Diseases. Currently, he is the CEO and Founder of "Think Vaccines" (Research, Education, and Consultancy for Vaccines and Vaccinology) based in Houston, Texas.

With over 140 research items published and/or presented at international meetings and more than 500 international lectures, all focused on vaccines, vaccination, clinical trials, and vaccine-preventable diseases. The latter conducted independently or in association with the Centers for Disease Control and Prevention (CDC), the University of California in San Diego, Eastern Virginia Medical School, and several other institutions.

Additionally, he is a member of the Mexican Committee for the Elimination of Measles, Rubella, and Congenital Rubella, and the Scientific Committee on Health Issues of the Mexican Government in Baja-California. He is also the former Director of the Mexican Active Surveillance Network for Bacterial Meningitis and the former Head of the Pediatric Infectious Diseases Department and the Research Department at the General Hospital of Tijuana, Baja-California, Mexico.

Coffee with the Expert

# NAVIGATING THE FUTURE OF PANDEMIC PREPAREDNESS

## Insights from Dr. Rajeev Venkayya on Global Vaccines, Innovation, and Collaboration

*Authors:*
*Enrique Chacon-Cruz, M.D., MSc*
*Felicitas Colombo, MPA*

Dr. Rajeev Venkayya is a recognized global health leader with deep expertise in vaccines, pandemic preparedness, and biopharmaceutical innovation. He currently serves as a venture advisor and holds board positions with the and the Coalition for Epidemic Preparedness Innovations (CEPI), the International AIDS Vaccine Initiative (IAVI), and Global Health Innovative Technology Fund (GHIT).

Most recently, Dr. Venkayya was the CEO of Aerium Therapeutics, a biotechnology company focused on developing next-generation antibody therapies. Prior to that, he served as President of the Global Vaccine Business Unit at Takeda Pharmaceuticals, where he led a fully integrated organization spanning research and development, manufacturing, and commercialization. Under his leadership, Takeda advanced several key vaccine candidates targeting dengue, norovirus, and Zika (with support from the U.S. government), as well as a Sabin-strain inactivated polio vaccine funded by the Bill & Melinda Gates Foundation. Takeda's dengue vaccine is now licensed and distributed in dengue-endemic countries around the world.

Earlier in his career, Dr. Venkayya served as Director of Vaccine Delivery at the Gates Foundation, where he oversaw global initiatives such as polio eradication and the introduction of new vaccines. He also served on the board of the Global Alliance for Vaccines and Immunization (Gavi) during this time.

In the public sector, Dr. Venkayya was appointed Special Assistant to the President and Senior Director for Biodefense at the White House, where he led the development and implementation of the U.S. *National Strategy for Pandemic Influenza*. He began his government service in 2002 as a White House Fellow and later advised the Director of the Centers for Disease Control and Prevention (CDC).

Dr. Venkayya began his professional journey in academic medicine as an Assistant Professor in the Division of Pulmonary and Critical Care Medicine at the University of California, San Francisco (UCSF). There, he co-directed the Medical Intensive Care Unit and led the High-Risk Asthma Clinic at San Francisco General Hospital.

He holds a medical degree from the Northeastern Ohio Universities College of Medicine through its six-year B.S./M.D. program and completed his residency in internal medicine at the University of Michigan, where he also served as Chief Medical Resident.

## Personal Journey and inspiration

Dr. Rajeev Venkayya didn't initially set out to pursue a career in medicine. In fact, it was his father who strongly encouraged him to explore the medical path. Over time, he discovered a passion for the clinical sciences, particularly the way they came together at the patient's bedside.

"I like the logic, the analytical process, the detective work that goes into clinical medicine. And I also really enjoyed physiology, which is what took me to pulmonary and critical care medicine as a specialty," he recalls, which ultimately led him to specialize in pulmonary and intensive care medicine.

He joined the White House Fellows Program in the early 2000s and then joined the White House as an advisor and later special assistant to the president for biodefense for four years, around the time when H5N1 was generating concern in Asia. President George Bush asked his office to develop a national strategy for influenza to support pandemic preparedness in the U.S., along with an emergency supplemental budget of $7 billion to support these efforts.

While he found clinical medicine deeply rewarding, he also felt a growing desire to expand his impact beyond individual patients. That ambition led him to join the White House Fellows Program in the early 2000s, which opened the door to a pivotal role in national biodefense.

He was later appointed Special Assistant to the President for Biodefense, a position he held for four years during a time when the threat of H5N1 avian influenza was rising in Asia. With a budget of approximately $7 billion, President George W. Bush tasked his office with developing a comprehensive national strategy for pandemic influenza to strengthen U.S. preparedness.

"A big part of that strategy was centered around vaccines, and particularly the importance of developing domestic vaccine manufacturing capacity so that you could very quickly go from detecting a pandemic threat to having enough vaccine for the U.S. population, primarily as a focus of the strategy, within six months of the start of the next pandemic," he explains.

At the core of the plan was the idea of layered containment measures, targeted public health strategies (not lockdowns), aimed at reducing virus transmission while minimizing disruptions to society and the economy. These very concepts would later prove crucial during the COVID-19 pandemic.

Following his time at the White House, Dr. Venkayya joined the Bill & Melinda Gates Foundation, where he led the Vaccine Delivery team and served on the Gavi board. His work in the public and philanthropic sectors eventually led him to the private sector, where he joined Takeda Pharmaceuticals with the mission to globalize its vaccine business. Over the next decade, he focused exclusively on the development of novel vaccines, including a groundbreaking dengue vaccine.

"That dengue vaccine was the first vaccine, I should say, that was indicated for use in all populations, whether previously exposed to dengue or not. And in fact, has now been licensed around the world and pre-qualified by the WHO," he notes.

Reflecting on his journey, Dr. Venkayya says young professionals shouldn't worry that early decisions will lock them into a specific career direction.

"It's natural for a person's motivations and life circumstances to evolve over time," he says, "and for their career to reflect that."

## CEPI's 100-day mission

According to Dr. Venkayya, one of the most significant achievements in public health, and in science more broadly, was the rapid development of vaccines for SARS-CoV-2 during the COVID-19 pandemic. In just 326 days from the start of vaccine development efforts, a safe and effective vaccine was authorized for general use. A remarkable milestone compared to historical timelines.

That speed, he notes, helped prevent an extraordinary number of deaths. It also revealed a powerful opportunity: to make vaccines available at scale much earlier in a pandemic, ultimately saving more lives, protecting economies, and improving equity in access to healthcare.

This vision is what underpins CEPI's "100-Day Mission", a global effort to develop vaccines against emerging infectious threats within just 100 days of identifying a new pathogen.

"One thing that we like to say at CEPI is that scarcity is the enemy of equity," he says. "If you don't have enough of something, then those who have the most resources are going to be the ones that take priority in receiving that essential commodity. In this case, vaccines."

Dr. Venkayya explains that CEPI's mission is twofold: first, to accelerate the development of vaccines for epidemic and pandemic threats; and second, to ensure those vaccines are distributed equitably across the globe. To achieve this, CEPI is not relying solely on mRNA platforms. They are also investing in other technologies, such as viral vector and recombinant protein-based vaccines, to diversify the portfolio and enhance global pandemic response capabilities.

He acknowledges a key challenge in this space: how to balance investment in potential, theoretical future threats against the pressing, immediate needs of today's health systems.

"It's a question with no easy answer," he says, recognizing the tension between preparedness and real-time public health demands.

## Vaccine library

Dr. Venkayya emphasizes the critical value of pre-existing prototype vaccines and detailed microorganism records in accelerating pandemic response. One area he sees as having significant potential in terms of speed and preparedness is the creation of a vaccine library, a repository of prototype vaccines developed from known virus families.

This involves studying specific pathogens in advance and asking a fundamental question: *What is the optimal antigen structure to include in a vaccine, regardless of the platform used?* The goal is to build a foundational body of knowledge that can be rapidly leveraged when a new pandemic threat arises.

In support of this vision, some colleagues at the NIH have proposed to CEPI the idea of building a vaccine library that includes prototype vaccines for each of the 26 known virus families. The intention is not to have a finished vaccine ready for every potential pathogen, but rather to have validated antigen designs and platform learnings that can significantly shorten the development timeline in a crisis.

Dr. Venkayya also highlights the importance of identifying immunologic correlates of protection- specific antibody levels or immune markers that are reliably associated with protection against infection. Having these markers in place allows developers to assess early on whether a vaccine candidate is likely to be effective. This can help prioritize and down select the most promising candidates, streamlining the decision-making process during the early stages of vaccine development.

"We almost certainly will not have the actual vaccine antigen identified before the pandemic. But we probably will have something close to it and learnings to draw from if we take, if we're successful with this approach," he explains.

Another benefit of establishing correlates of protection is to "provide a regulatory pathway for either emergency use authorization or licensure in the absence of a very long and large efficacy study," he notes, adding that strategies are central to CEPI's broader mission of enabling rapid, equitable responses to future pandemics.

## Library of adjuvants

Dr. Venkayya explains that CEPI has recently launched a library of adjuvants with the UK's Medicines and Healthcare products Regulatory Agency (MHRA), to enhance vaccine effectiveness and availability. Adjuvants are substances added to vaccines to boost the immune response, and they are particularly valuable when vaccine supplies are limited. One major advantage is that they can allow for smaller antigen doses per individual, stretching a fixed supply much further.

"A dose of adjuvant could potentially allow you to triple or quadruple, or more, the reach of a fixed supply of vaccine. So that benefit is obvious," he says.

Another potential benefit of adjuvants is the expansion of immune coverage. For viruses

like influenza or SARS-CoV-2 that continuously evolve, adjuvants may help generate immune responses that can recognize slightly different variants of the virus, even if the vaccine was designed for an earlier strain.

"And this kind of breadth, while it may not provide perfect protection against all illness caused by that slightly different virus, is likely to translate to a mortality benefit, so a reduction in severe illness, hospitalization, and death," he shares.

From a regulatory perspective, adjuvants introduce complexity, as they cannot be licensed on their own. Since different pairings may have different safety profiles, approval must come as part of a specific antigen-adjuvant combination.

"So that's one challenge. Another challenge is IP and ensuring that whatever adjuvant you have, you have the freedom to operate. You have the ability to use that adjuvant with an antigen without being constrained by patent protection," he continues.

To address this, CEPI's adjuvant library includes formulations with pre-negotiated terms or non-exclusive licenses that do not carry high royalties. This can be particularly helpful for vaccine developers who may not have the legal or financial resources to negotiate access.

With this model, developers, whether in biotech, academia, or industry, can test their antigens with a broad range of promising adjuvants, then select the most effective combinations to move forward in development.

"Having a library of adjuvants that many developers can access will be critically important, particularly in the area of recombinant vaccines and inactivated vaccines," he says.

## Pharmacoeconomics in vaccines

Pharmacoeconomics plays a key role in understanding the potential global impact of vaccine development, particularly in the context of initiatives like CEPI's 100-day mission. These analyses aim to estimate the value of accelerating vaccine availability, both in terms of health outcomes and broader economic benefits.

While some promising modeling has been done, Dr. Venkayya advises caution when interpreting the numbers.

"The economic impacts are both a combination of the tremendous value in averting deaths, but also in allowing communities to relax public health interventions that otherwise would impede economic activity," he explains.

Though no model can predict the future with certainty, retrospective assessments using reasonable assumptions suggest striking outcomes. One study, published in The Lancet Global Health, estimated that if the 100-day mission had been in place during the COVID-19 pandemic, it could have averted 8 million deaths. This would translate to approximately 14 trillion U.S. dollars in the economic value of lives saved, along with 1.5 trillion dollars in productivity gains or losses averted. Quite substantial.

"The sooner you can get people vaccinated, the more confident they can feel about going into public settings, into work, sending their children to school, and the sooner you can get back to life and business as usual, life as usual, with the community functioning as it is in peacetime as it were," he adds.

## Balance between private and public sectors

Dr. Venkayya explains that in situations involving large-scale threats to public health and society, it is unrealistic to expect the private sector to bear the full burden of risk. Companies are generally accountable to shareholders and must justify their investments with a reasonable expectation of return.

"If you do the math, it becomes very difficult to justify significant investments in say vaccine development when you don't know if you'll ever be able to sell a dose of that vaccine. And so, in these situations, it is the role of governments to share the financial risk," he asserts.

He adds that one of the essential roles of government is to 'socialize' certain types of risk. In the case of pandemics, this means using public resources to support research and development efforts that may or may not succeed. Governments have historically stepped in to fund interventions

with no guarantee of success, recognizing that the public good justifies the investment.

"So, you take two entities that are doing what they do best: governments in socializing the risk and supporting these efforts financially through what we would call 'push investments' and companies applying their people and infrastructure toward the problem to get to a shared goal, which is a safe and effective vaccine that works," he explains.

In addition to funding, governments can play a crucial role by ensuring clear regulatory pathways that uphold safety and efficacy standards while also facilitating faster approval processes where appropriate.

Transparency and management of conflicts of interest are also essential to maintaining public trust in the outcomes. Strong regulatory frameworks with proper checks and balances are needed to ensure that decisions are made in the public interest and are not unduly influenced.

## Room for improvement

International organizations with a significant role in public health are increasingly under scrutiny regarding their effectiveness. As a result, there is a growing focus on identifying areas for improvement as part of ongoing reform efforts to better fulfill their missions. Dr. Venkayya believes that one crucial factor for success is ensuring that the voices of all key stakeholders are included in the decision-making process.

"I think that CEPI has certainly taken a number of steps to ensure that its employee base is diverse and representative of the populations that it hopes to serve and support. Similarly, at the board level, we have a diverse range of stakeholders to support decision-making," he says.

A strong focus on impact is essential. Setting clear benchmarks within organizations and regularly measuring performance against them can drive progress. However, this is particularly challenging in the global health space because, unlike the private sector, there is little competition, so organizations do not face the same risk of losing relevance if they underperform. This makes it all the more important to continuously scrutinize performance.

"I do think having a constant 360 assessment of how you are performing across those different stakeholder perceptions is very, very important and it helps you to achieve the goal of being a high-performing organization," he emphasizes.

This reflection comes at a time of significant disruption in global health and vaccine delivery, largely due to changes in the United States that are affecting science and healthcare worldwide. These shifts occur at a moment when governments face increasing pressure to prioritize other areas over health.

"I think it's important to realize that no one country and no one person dictates what happens in health with vaccines. Science is global, it's universal, and scientific progress is going to continue around the globe," Dr. Venkayya notes. "And we also know that infectious diseases will continue to put pressure on us."

He remains hopeful, though, that any setbacks in vaccine coverage will serve as a reminder of how fortunate we are to have vaccines as a simple and effective solution.

"I would also ask those that are working in this space to think about how we can regain the trust of the public and policymakers where trust has been lost," he urges. "There's lots of work ahead on that front".

## News & Alerts

# MOST RELEVANT MONTHLY NEWS ON VACCINATION AND EMERGING DISEASES WITH BIBLIOGRAPHIC ALERTS

*A summary of the latest News & Alerts in the fields of vaccinology, vaccines, vaccination, and vaccine-preventable diseases. We curate the latest information on regulatory updates, emerging trends, breakthroughs in vaccine technology, vaccine safety and efficacy, global immunization developments and outbreak alerts, as a resource to keep our community informed.*

**Quezon City has recorded over 7,000 dengue cases from January to August this year.**
This is 151% higher compared to the same period last year, according to the city's chief epidemiologist.
***Published: August 24, 2025.***
https://newsinfo.inquirer.net/2099786/qc-records-over-7000-dengue-cases-from-january-to-august-2025/amp

**Dengue Academy: Dengue Data Dashboard.**
A dynamic, interactive platform that allows us to see both incidence and year-over-year % per country or region of Dengue by using The Global Burden of Disease Study.
https://www.dengueacademy.com/dengue-data-dashboard

**Chikungunya's global resurgence.**
*Lancet* 2025; 406: 900 – 901. Chikungunya is re-emerging worldwide, carrying an enormous potential to cause long-term disability through chronic arthritis and persistent joint pain. With the FDA's suspension of IXCHIQ—the live-attenuated chikungunya vaccine—many American travelers may now face heightened susceptibility to this rapidly spreading mosquito-borne disease. Without preventive vaccination, the risk of prolonged disability among exposed individuals becomes an urgent global and public health concern.
***Published: August 30, 2025.***
https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(25)01745-3/fulltext

**Zydus launches VaxiFluTM trivalent influenza vaccine for flu protection in India.**
Zydus Lifesciences Ltd on Tuesday said it has launched its trivalent influenza (flu) vaccine VaxiFlu, introduced in India for the first time in line with global recommendations of the WHO.
***Published: September 2, 2025.***
https://m.economictimes.com/industry/healthcare/biotech/pharmaceuticals/zydus-launches-vaxiflutm-trivalent-influenza-vaccine-for-flu-protection-in-india/amp_articleshow/123651600.cms

**Cholera Vaccination Recommended When Visiting Certain African Countries.**
The global cholera situation is worsening and presents a significant public health challenge in several regions monitored by the World Health Organization (WHO). As of late August 2025, cholera outbreaks are resurging in various countries, including some that had not reported significant case numbers in years. According to a recent WHO report, between January and August 17, 2025, there were a total of 409,222 cases of cholera and acute watery diarrhea, resulting in 4,738 deaths worldwide. Notably, six of the 31 affected countries reported case fatality rates exceeding 1%.
***Published: August 29, 2025.***
https://www.vax-before-travel.com/cholera-vaccination-recommended-when-visiting-certain-african-countries-2025-08-29

**Samoa dengue cases reach nearly 11,000, but cases drop compared to previous week.**
***Published: August 29, 2025.***
https://www.rnz.co.nz/international/pacific-news/571314/samoa-dengue-cases-reach-nearly-11-000-but-cases-drop-compared-to-previous-week

**Adult Immunization Board.**
The Adult Immunization Board (AIB) is established with the aim of *contributing to the reduction of mortality and morbidity from vaccine-preventable infections and diseases in European adults*. Our primary goal is to provide evidence-based guidance on fundamental technical and strategic issues, while monitoring the progress of adult immunization programs at European and (sub)national levels.
***Last accessed: September 10, 2025.***
https://www.adultimmunizationboard.org/

**Valneva Reports Further Positive Phase 2 Safety and Immunogenicity Results for Lyme Disease Vaccine Candidate.**
Great news, a most needed vaccine. Looking forwards to the indexed publication.
***Published: September 3, 2025.***
https://valneva.com/press-release/valneva-reports-further-positive-phase-2-safety-and-immunogenicity-results-for-lyme-disease-vaccine-candidate/

**Local (USA) Dengue Outbreak Centered on Cape Canaveral.**
While many public health leaders say the dengue virus has become endemic in Miami-Dade County, a county located 180 miles north along the east coast of Florida, near Cape Canaveral, may also be added to this discussion.
***Published: September 4, 2025.***
https://www.vax-before-travel.com/local-dengue-outbreak-centered-cape-canaveral-2025-09-04

**The 16th Ebola Virus Disease Outbreak in Bulape Health Zone, Kasai, Democratic Republic of the Congo: A new spillover event from an unknown reservoir host.**
The Democratic Republic of the Congo (DRC) is currently facing concurrent outbreaks including mpox, cholera and malaria (1-4). The Ministry of Public Health, DRC has declared the 16th Ebola Virus Disease (EVD) outbreak on 04 September 2025 after PCR confirmation of Ebola virus (EBOV), formely Zaïre ebolavirus, in patient's specimens from Bulape Heath Zone, in Kasai Province.
***Published: September 4, 2025.***
https://virological.org/t/the-16th-ebola-virus-disease-outbreak-in-bulape-health-zone-kasai-democratic-republic-of-the-congo-a-new-spillover-event-from-an-unknown-reservoir-host/1003

**Vietnam's quick policy reversal highlights challenges in vaccine financing.**
The analysis highlights that the decentralization led to significant procurement issues and a lack of funding in less-developed provinces, exacerbating socioeconomic disparities. Wealthier cities like Hanoi and Ho Chi Minh City were better able to secure vaccines, while under-resourced provinces in mountainous and delta regions struggled with vaccine shortages and procurement delays. This resulted in a drastic decrease in the national full immunization rate for children under one year.
***Published: August 25, 2025.***
https://immunizationeconomics.org/recent-activity/2025/8/28/vietnams-quick-policy-reversal-highlights-challenges-in-vaccine-financing/

**WHO chief says the mpox outbreak in Africa is no longer a global health emergency.**
The World Health Organization no longer considers the mpox outbreak in Africa to be an international health emergency, the U.N. agency›s director said Friday.
***Published: September 5, 2025.***
https://abcnews.go.com/amp/Health/wireStory/chief-mpox-outbreak-africa-longer-global-health-emergency-125292011

**Nepal: Amid cholera and dengue outbreak, JE cases spike.**
While the country is grappling with major public health crises, especially a cholera outbreak in Birgunj and dengue cases throughout the country, cases of Japanese Encephalitis (JE) and related deaths have shot up, according to the Ministry of Health and Population's Family Welfare Division's most recent situation report.
***Published: September 1, 2025.***
https://thehimalayantimes.com/ampArticle/1034161.

**CDC: Chagas Disease, an Endemic Disease in the United States.**
Chagas disease, caused by *Trypanosoma cruzi* parasites, is considered endemic to 21 countries in the Americas, excluding the United States. However, increasing evidence of *T. cruzi* parasites in the United States in triatomine insects, domestic animals, wildlife, and humans challenges that nonendemic label. Autochthonous human *T. cruzi* infections have been identified in 8 states: California, Arizona, Texas, Tennessee, Louisiana, Missouri, Mississippi, and Arkansas.
***Published: September 9, 2025.***
https://wwwnc.cdc.gov/eid/article/31/9/24-1700_article

**Spain Preceded the UK's Gonorrhoea Vaccination Program.**
Gonorrhoea infections reduced following MenB-4C vaccination.
***Published: September 9, 2025.***
https://www.vax-before-travel.com/spain-preceded-uks-gonorrhoea-vaccination-program-2025-09-09.

**Mosquito-borne viruses surge in a warming Europe.**
Chikungunya cases break records in France; West Nile virus appears near Rome.
***Published: September 3, 2025.***
https://www.science.org/content/article/mosquito-borne-viruses-surge-warming-europe#:~:text=This%20year's%20intense%20season%20for,vector%2Dborne%20and%20zoonotic%20diseases

**PAHO calls for stronger vaccination and surveillance in response to the spread of whooping cough resistance to antibiotics in the Americas.**
For Pertussis (whooping cough), one of the main challenges is that standard treatment relies on macrolide antibiotics, such as azithromycin, clarithromycin, and erythromycin. However, genetic mutations in the bacteria, particularly in the 23S rRNA gene, are reducing the effectiveness of these drugs, making it difficult to treat patients and prevent transmission in close contacts.
***Published: August 26, 2025.***
https://www.paho.org/en/news/26-8-2025-paho-calls-strengthened-vaccination-and-surveillance-amid-spread-antibiotic

**Suspected cases rise in DR Congo Ebola outbreak.**
***Published: September 9, 2025.***
https://www.cidrap.umn.edu/ebola/suspected-cases-rise-dr-congo-ebola-outbreak

**CDC's Travelers' Health: Yellow Fever in Colombia.**
An increased number of cases of Yellow Fever have been reported in Colombia.
***Published: September 2, 2025.***
https://wwwnc.cdc.gov/travel/notices/level2/yellow-fever-colombia

## Latest Relevant Publications

# LATEST PUBLISHED PAPERS AND COMMENTARIES FROM THE CHIEF EDITOR

*Latest impactful scientific publications that stand out for their potential bearing on healthcare. We introduce groundbreaking research findings, innovative treatment modalities, results from phase 1 to 3 vaccine clinical trials, or paradigm-shifting discoveries that redefine our understanding of infectious diseases and therapeutic approaches for all vaccine-preventable diseases.*

01

Bowen DH, Casciola L, Aimade W, Lindeburg E, Muhula SO, Osur J, Rakhshani NS, Fayomi SA, Johnson T, Holme M, Vangsgaard C; ReD Trust Group. **The Vaccine Trust Framework: mixed-method development of a to ol for understanding and quantifying trust in health systems and vaccines**. *Lancet Glob Health*. 2025 Sep;13(9):e1553-e1563.
**doi:** https://doi.org/10.1016/S2214-109X(25)00245-1 PMID:40845881.

**Editorial comment:** The Vaccine Trust Framework, developed through the synthesis of ethnographic research, encompasses four interconnected domains—health system promises, health system delivery, vaccine promise, and vaccine delivery—across 15 measurable dimensions. Survey data were obtained from 3,670 participants in Kenya and 3,734 in Pakistan. Findings showed that trust significantly influenced vaccine-related behaviors and intentions, with quantitative trust scores strongly associated with vaccination status across the studied vaccines. Regional variations in trust were evident within both Kenya and Pakistan, aligning closely with qualitative insights into local perceptions of vaccines and health systems. The Vaccine Trust Framework represents a validated and contextually grounded tool for measuring trust in vaccines and health systems in low-income and middle-income countries, with potential to guide targeted interventions and policy.

02

Quandelacy TM, Vincente-González MF, Grillet ME, Colomé-Hidalgo M, Herrera D, Torres Aponte JM, Marzán Rodríguez M, Adams LE, Paz-Bailey G, Rodriguez DM, Munayco C, Figueroa L, Masis R, Borbor-Cordova M, Ortiz-Prado E, Piaggio M, Rollock L, Barrenechea G, Carbajo A, Estallo EL, Dos Santos T, Robert MA, Rodriguez-Barraquer I, Lowe R, Stewart-Ibarra AM, Garcia-Carreras B, Cummings D, Johansson MA. **Synchronized dynamics of dengue across the Americas.** *Sci Transl Med*. 2025 Aug 20;17(812):eadq4326.
**doi:** https://doi.org/10.1126/scitranslmed.adq4326

**Editorial comment:** Dengue is a serious health concern in Latin America, which has experienced a surge in recent outbreaks. Quandelacy et al. used historical surveillance data going back decades to analyze seasonal and multiannual patterns of dengue incidence at a regional scale across a swathe of Latin America. The authors report that more than half of all provinces or islands studied had dengue outbreaks about every 12 months, with strong synchrony observed. In addition, increased dengue incidence was associated with strong seasonality of occurrence, and changes in temperature and precipitation (including El Niño weather patterns) often occurred months before changes in case incidence. This study provides a comprehensive view of regional dengue incidence across Latin America and could potentially aid forecasting or intervention efforts.

03

Kelvin AA, Baker PH, Ghosh S, Schultz-Cherry S, Langel SN. **Influenza infection of the mammary gland**. *J Virol.* 2025 Aug 12:e0194024.
**doi:** https://doi.org/10.1128/jvi.01940-24

**Editorial comment:** In this mini-review, the authors highlight pivotal studies demonstrating the replication of influenza and other viruses in the mammary gland, summarize recent findings from experimental and natural H5N1 clade 2.3.4.4b infections in dairy cattle and small animal models, and examine the broader One Health implications of the ongoing H5N1 outbreak. They also underscore the urgent need for interdisciplinary collaboration across human, animal, and environmental health sectors to mitigate the risks posed by influenza viruses with pandemic potential.

04

Talha B. **Chikungunya's global resurgence**. *Lancet 2025*; 406: 900 – 901.
**doi:** https://doi.org/10.1016/S0140-6736(25)01745-3

**Editorial comment:** Chikungunya is re-emerging worldwide, carrying an enormous potential to cause long-term disability through chronic arthritis and persistent joint pain. With the FDA's suspension of IXCHIQ—the live-attenuated chikungunya vaccine—many American travelers may now face heightened susceptibility to this rapidly spreading mosquito-borne disease. Without preventive vaccination, the risk of prolonged disability among exposed individuals becomes an urgent global and public health concern.

05

Surie D, Self WH, Yuengling KA, Lauring AS, Zhu Y, Safdar B, Ginde AA, Simon SJ, Peltan ID, Brown SM, Gaglani M, Ghamande S, Columbus C, Mohr NM, Gibbs KW, Hager DN, Prekker M, Gong MN, Mohamed A, Johnson NJ, Steingrub JS, Khan A, Duggal A, Gordon AJ, Qadir N, Chang SY, Mallow C, Felzer JR, Kwon JH, Exline MC, Vaughn IA, Ramesh M, Papalambros L, Mosier JM, Harris ES, Baughman A, Cornelison SA, Blair PW, Johnson CA, Lewis NM, Ellington S, Grijalva CG, Talbot HK, Casey JD, Halasa N, Chappell JD, Rutkowski RE, Ma KC, Dawood FS; Investigating Respiratory Viruses in the Acutely Ill (IVY) Network. **RSV Vaccine Effectiveness Against Hospitalization Among US Adults Aged 60 Years or Older During 2 Seasons**. *JAMA*. 2025 Aug 30:e2515896.
**doi:** https://doi.org/10.1001/jama.2025.15896

**Editorial comment:** In this US-CDC performed study, of 6958 adults aged 60 years or older, 821 (11.8%) were RSV cases and 6137 (88.2%) were controls. A total of 63 cases (7.7%) and 966 controls (15.7%) were vaccinated. Estimated vaccine effectiveness against RSV-associated hospitalization was 58% (95% CI, 45%-68%) during 2 seasons and 69% (95% CI, 52%-81%) for same-season vaccination. Respiratory syncytial virus vaccines prevented RSV-associated hospitalization during 2 seasons, although effectiveness was lower in patients with immunocompromise and cardiovascular disease.

06

Anderson CS, Hua C, Wang Z, Wang C, Jiang C, Liu R, Han R, Li Q, Shan S, Billot L, Macintyre CR, Patel A, Zhang H, Ma C, Dong J, Du X. **Influenza vaccination to improve outcomes for patients with acute heart failure (PANDA II): a multiregional, seasonal, hospital-based, cluster-randomised, controlled trial in China.** *Lancet.* 2025 Sep 6;406(10507):1020-1031.
**doi:** https://doi.org/10.1016/S0140-6736(25)01485-0

**Editorial comment:** In this Chinese study, 7,771 participants were enrolled across 164 hospitals during each winter season between Dec 3, 2021, and Feb 14, 2024. A total of 3,570 patients were assigned to the influenza vaccination group and 4,201 to the usual care (control) group. The primary outcome occurred in 1,378 (41.2%) of 3,342 patients in the vaccination group versus 1,843 (47.0%) of 3,919 patients in the control group (odds ratio [OR] 0.83, 95% CI 0.72–0.97; p=0.019), with consistent results in the sensitivity analysis. Serious adverse events were also significantly less frequent in the vaccination group (1,809 [52.5%] of 3,444) compared with the control group (2,426 [59.0%] of 4,110; OR 0.82, 95% CI 0.70–0.96; p=0.013). Interpretation: Influenza vaccination during hospital admission for acute heart failure significantly improves survival and reduces the risk of rehospitalization over the following 12 months.

07

Pancelli V, Clemens R, Bica MA, Costa Clemens SA. **Pandemic preparedness and response: a survey among experts from high- and low-middle-income countries about the 100 Days Mission. Front**. *Public Health*. 2025 Sep 4; 13.
**doi:** https://doi.org/10.3389/fpubh.2025.1617066

**Editorial comment:** This excellent publication reports on a descriptive cross-sectional study conducted through a semi-structured online survey distributed to 116 experts from both low- and middle-income countries (LMICs) and high-income countries (HICs). The overall response rate was 73.2% (85/116), including 74% (57/77) from HICs and 69.2% (27/39) from LMICs. Notably, experts from LMICs expressed greater confidence in the success of the 100 Days Mission (100DM) (51.9% [14/27]) compared with their HIC counterparts (26.3% [15/57]). Similarly, LMIC respondents were more likely to believe in the 100DM's potential to reduce inequalities (55.6% [15/27] vs. 33.3% [19/57]). Across both groups, nearly all respondents emphasized that political will and governance, along with sufficient and sustainable funding, are the most critical prerequisites for the success of the 100DM. This represents the first prospective survey assessing the feasibility of the 100DM with input from external stakeholders in both HICs and LMICs. Importantly, experts from LMICs were more optimistic about the 100DM's success compared with those from HICs.

08

Mues KE, Zhou CK, Gerber JE, van Hunsel F, Klein NP, Izurieta HS, Chen RT. **A review of methodologic & data considerations for vaccine safety surveillance in the wake of the COVID-19 pandemic.** *Vaccine*. 2025 Sep 5;64:127691.
**doi:** https://doi.org/10.1016/j.vaccine.2025.127691

**Editorial comment:** This review examines key lessons and mitigation strategies for COVID-19 vaccine safety surveillance, particularly in the context of a global pandemic marked by the rapid rollout of novel vaccines to large populations. It also addresses critical methodological considerations, including case definitions, risk window misclassification, time to signal detection, sample size requirements, establishing appropriate counterfactuals, and controlling for confounding.

09

Irving SA, Groom HC, Belongia EA, Crane B, Daley MF, Jackson LA, Kenigsberg TA, Kuckler L, Tseng HF, Williams JTB, Zerbo O, Naleway AL. **Differences in influenza vaccination coverage by race and ethnicity across age groups in the Vaccine Safety Datalink, 2017-18 through 2022-23 influenza seasons.** *Vaccine*. 2025 Sep 4;64:127667.
**doi:** https://doi.org/10.1016/j.vaccine.2025.127667

**Editorial comment:** In this study across eight Vaccine Safety Datalink health systems, the authors identified influenza vaccinations administered between August 1 and March 31 of each season from 2017–18 through 2022–23 using electronic health records linked to immunization registries. Crude vaccination coverage was calculated for five age groups (6 months–8 years, 9–17, 18–49, 50–64, and ≥65 years) by self-reported race and ethnicity. Across all seasons and age groups, coverage was consistently highest among non-Hispanic (NH) Asian individuals and lowest among NH Black individuals. In the 2022–23 season, the gap in coverage between NH Asian and NH Black individuals ranged from 15.1 percentage points (≥65 years) to 32.7 percentage points (6 months–8 years). These persistent disparities across age groups underscore the need for a deeper understanding of barriers to influenza vaccination.

10

Toniolo A, Chumakov K, Federico G, Maccari G, Genoni A, Saba A, Nauti A, Bono G, Molteni F, Monaco S. **Post-Polio Syndrome: Impact of Humoral Immune Deficiencies, Poliovirus Neutralizing Antibodies, Vitamin D Deficiency**. *Vaccines*. 2025; 13(9):939.
**doi:** https://doi.org/10.3390/vaccines13090939

**Editorial comment:** This study—limited to serum antibodies—highlights the complex relationship between immune status and long-term health in aging polio survivors. The results emphasize the need for potent poliovirus drugs and vaccines to help contain possible outbreaks but also—for poliomyelitis survivors—to avoid or mitigate the progression to PPS, the latest phase of this devastating disease.

11

Sokolovska L, Jansons J, Buonaguro FM, Isaguliants M. **Online Conference "Chronic Viral Infections and Cancer, Openings for Vaccines and Cure" VIRCAN2024, Monitoring the Progress.** *Vaccines*. 2025; 13(9):940.
**doi:** https://doi.org/10.3390/vaccines13090940

**Editorial comment:** The international online conference "VIRCAN2024: Chronic viral infections and cancer, openings for Vaccines and Cure" aimed to address the remaining issues, present the research carried out in this broad field, and prognose directions for its development. The conference covered oncogenicity mechanisms and new approaches in the development of treatments and vaccines. VIRCAN2024 was held on the platform of Riga Stradins University, Riga, Latvia. The conference was supported by the Latvian Science Council grant "Human papillomavirus genome associated correlates of disease progression and treatment response for cervical neoplasms and cancer", and the scientific journal *Vaccines* (MDPI). This report summarizes the lectures and presentations given at the conference.

12

Bhaliya K, Anwer M, Wei MQ. **Emerging Therapeutic Strategies for Lung Cancer: The Role of Immunotherapy and HPV-Targeted Cancer Vaccines.** *Vaccines*. 2025; 13(9):957.
**doi:** https://doi.org/10.3390/vaccines13090957

**Editorial comment:** Lung cancer remains the leading cause of cancer-related mortality worldwide, with non-small-cell lung cancer (NSCLC) accounting for the majority of cases. Despite advances in targeted therapies and immunotherapy, long-term survival outcomes remain suboptimal. This review examines current immunotherapeutic approaches, the evolving role of therapeutic cancer vaccines, and the emerging potential of human papillomavirus (HPV)-targeted interventions in lung cancer, particularly among non-smokers. Novel cancer vaccine platforms—including peptide-based, mRNA, DNA, dendritic cell, and bacterial ghost technologies—are being investigated as complementary strategies to boost antitumor immunity. In addition, growing evidence links high-risk HPV infection to lung cancer development, reinforcing the rationale for HPV-targeted vaccine strategies in this context.

13

Ong EZ, Yee JX, Koh CW, Ooi JS, Tham CYL, Chan KR, Kareko BW, Lyski ZL, Tricou V, Dean H, Braun R, Kalimuddin S, Low JG, Messer WB, Sharma M, Ooi EE. **Dengue virus infection reprograms baseline innate immune gene expression.** *Med*. 2025 Sep 1:100841.
**doi:** https://doi.org/10.1016/j.medj.2025.100841

**Editorial comment:** In this study, a whole-genome microarray was used to assess the host response to TAK-003, with bulk whole-blood RNA sequencing confirming baseline gene expression differences between seronegative and seropositive individuals. Interestingly, whereas a single DENV infection reprogrammed the expression of innate immune markers—including those linked to dengue pathogenesis and disease severity—vaccination did not induce similar innate immune reprogramming. These findings suggest that natural DENV infection leaves a lasting imprint on the innate immune system, which may influence both vaccine responsiveness and the risk of secondary dengue pathogenesis.

14

Silva Dirzo M, Castillo Bejarano JI, Casillas Casillas MC, Guadarrama Rivera L, Domínguez Barrera C, Sánchez Carrillo YH, Aragón Nogales R, Martínez Bustamante ME, Carmona Vargas AJ, Cisneros Saldaña D, Galán García E, Castro Perez A, Arias de la Garza E, Barrientos Martínez VA. **Unraveling the pertussis outbreak in Mexico: insights from a multicenter 2024-2025 STUDY.** *Pediatr Infect Dis J*. 2025 Sep 10.
**doi:** https://doi.org/10.1097/INF.0000000000004986

**Editorial comment:** In this study, authors analyzed 59 pediatric pertussis cases during Mexico's 2024-2025 outbreak. Mortality was 13.6%, with low maternal Tdap coverage (27.1%) and incomplete infant vaccination (16.9%). Mortality correlated with intensive care unit admission, intubation, leukocytosis and coronavirus codetection. Peak leukocyte count predicted mortality (P = 0.027; area under the curve = 0.79). Findings underscore the need for maternal immunization and early detection.

15

Cerqueira-Silva T, Cardim LL, Paixão E, Rossi M, Santos AC, Portela F de Souza A, Santos G, Barreto ML, Brickley EB, Pescarini JM. **Hospitalisation, mortality and years of life lost among chikungunya and dengue cases in Brazil: a nationwide cohort study, 2015-2024.** *Lancet Reg Health Am.* 2025 Jul 7;49:101177.
**doi:** https://doi.org/10.1016/j.lana.2025.101177

Editorial comment: In this Brazilian study, the authors analyzed nationwide de-identified records of chikungunya and dengue cases registered between January 1, 2015, and December 31, 2024. They estimated risk factors for hospitalization and in-hospital mortality using logistic regression and the Fine and Gray model, respectively. Years of life lost (YLL) and average YLL (aYLL) were also calculated, stratified by geographic region, sex, and race/ethnicity. Infants, older adults (≥70 years), males, and individuals with comorbidities were found to have an increased risk of severe disease. Importantly, historically marginalized populations—particularly those self-identifying as Black or Indigenous—experienced significantly greater YLL compared with the white population. These findings underscore that mitigating the impact of chikungunya and dengue requires addressing underlying health and social inequities.

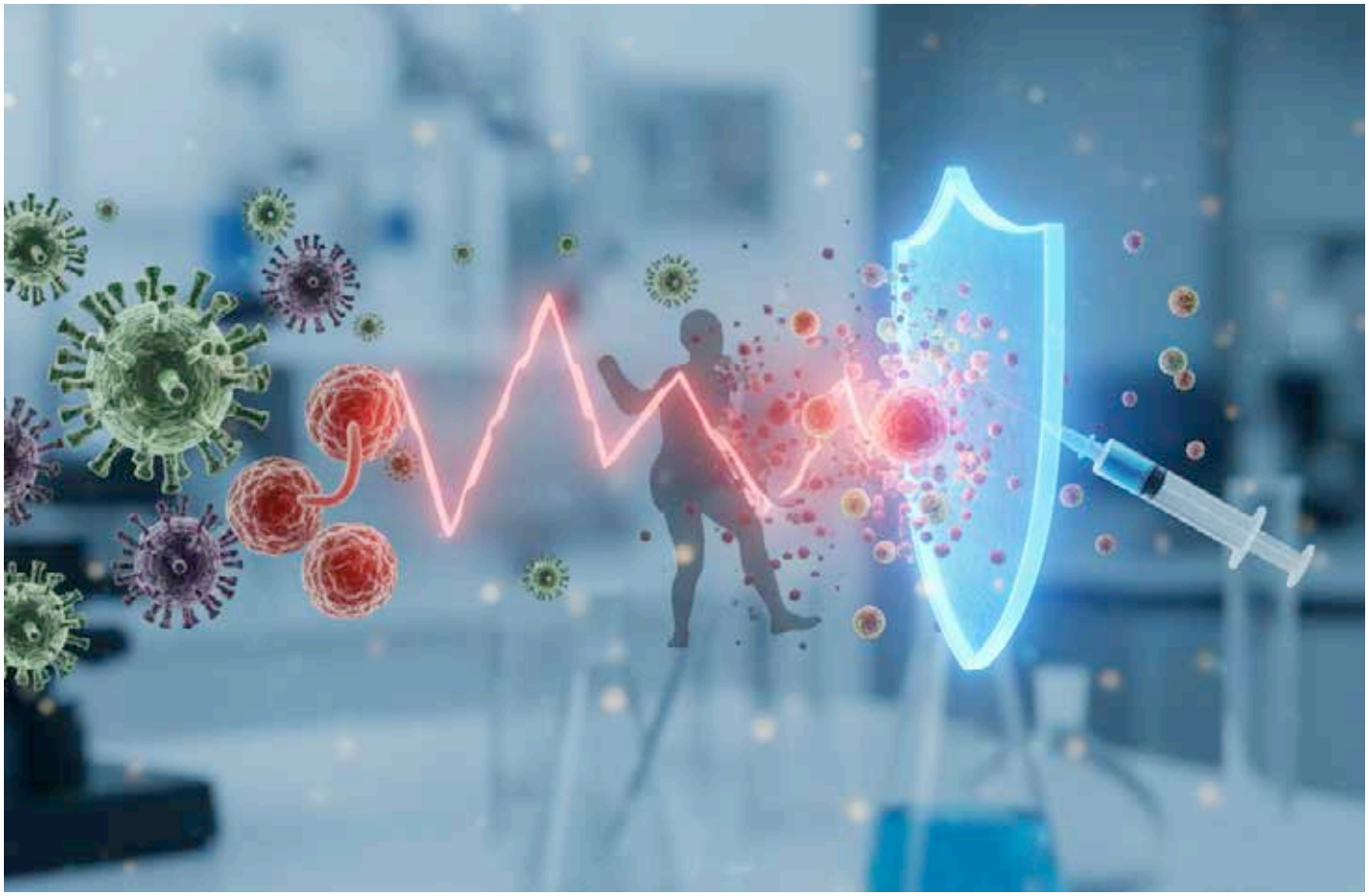
16

Schönfeld V, Rau C, Cai W, Wichmann O, Harder T. **The Incidence of RSV Infection Since the Introduction of Monoclonal Antibody Prophylaxis. An analysis of reported case data across Germany for the seasons 2023/24 and 2024/25.** *Dtsch Arztebl Int 2025*; 122: 472-3.
**doi:** https://doi.org/10.3238/arztebl.m2025.0111

**Editorial comment:** In this German study, the authors analyzed nationwide RSV notification data collected by the Robert Koch Institute for the 2023/24–2024/25 seasons, along with data from Saxony available since the 2015/16 season, stratified by age group and hospitalization status. Among infants (<1 year), RSV incidence decreased by 54%, from 2,291 cases per 100,000 infants (95% CI: 2,255–2,326) in 2023/24 to 1,045 per 100,000 (95% CI: 1,021–1,069) in 2024/25. In 1-year-olds, incidence declined from 1,146 per 100,000 (95% CI: 1,121–1,170) to 1,052 per 100,000 (95% CI: 1,029–1,075). These findings suggest that the introduction of RSV-monoclonal antibodies in Germany has been significantly associated with reduced RSV-related hospitalizations.

Editor's Corner

# INFECTIOUS DISEASES, CANCER, AND THE POWER OF VACCINATION



## Introduction

Scientific interest in the etiological links between infectious diseases and cancer has been steadily increasing for several reasons:

1. A growing number of neoplasms have been definitively associated with specific pathogens.
2. Research into the pathways leading to carcinogenesis has illuminated critical cellular processes.
3. Perhaps most importantly, cancers caused by infections are, in principle, preventable—either at the primary level by blocking infection (e.g. vaccination) or secondarily by interrupting the carcinogenic process. This rationale underpins two of the most impactful public health campaigns of recent decades: vaccination against hepatitis B virus and human papillomavirus.

Cancer remains as a pandemic, not only because of its immense burden in morbidity, mortality, and economic cost, but also due to the complexity of its evolution and the challenges in developing effective treatments. Its burden is

magnified by the fact that "cancer" encompasses a constellation of diseases, each with distinct pathogenic mechanisms and prognoses. Within this spectrum, cancers that arise directly from infectious processes hold particular significance for two reasons. First, unraveling how infections drive malignant transformation provides insights into fundamental cellular pathways of carcinogenesis. Indeed, viruses have been described as infectious agents capable of driving cellular transformation toward dysplasia, and anaplasia. Unlike many environmental risk factors, infections are discrete, traceable events, often with measurable burden, that can be systematically studied over time. Second, infection-related cancers are inherently preventable—whether through primary measures such as vaccination or through secondary approaches that target chronic infections before they progress to malignancy.

## Infectious agents as confirmed and/or potential contributors to cancer:

The list of infectious agents linked to carcinogenesis—whether definitively or speculatively—continues to expand, with additional neoplasms being associated with recognized oncogenic pathogens. A classic example is Epstein–Barr virus (EBV), which, beyond its established role in Burkitt's lymphoma is also etiologically implicated in other malignancies. Perhaps even more illustrative is its association with nasopharyngeal carcinoma, alongside the role of human papillomavirus (HPV).

Additionally, a retrospective cohort study conducted in Germany evaluated individuals vaccinated against HPV at age 8 years or older, who were propensity score–matched to unvaccinated controls. Outcomes included the incidence of malignancies in the head and neck, gastrointestinal, anogenital, neuronal, and hematologic systems, as well as all-cause mortality, assessed over 8- and 20-year follow-up periods. Kaplan–Meier survival analysis and hazard ratios (HRs) were applied. HPV vaccination was significantly associated with reduced risks of hypopharyngeal and laryngeal carcinomas (8-year HR: 0.19; 95% CI: 0.057–0.631; $p = 0.0025$; 20-year HR: 0.227; 95% CI: 0.067–0.764; $p = 0.0092$) and leukemia (8-year HR: 0.461; $p = 0.0035$; 20-year HR: 0.443; $p = 0.0019$). No significant protection was observed for rectal, anal, oral cavity, or prostate cancers. Importantly, all-cause mortality was reduced by nearly half among vaccinated individuals (8-year HR: 0.543; 20-year HR: 0.536; both $p < 0.0001$). Beyond epithelial malignancies, these findings indicate that HPV vaccination may confer systemic cancer protection, particularly in hematologic and possibly neuronal tissues. This suggests a broader biological impact of HPV vaccination than previously recognized and underscores the need for mechanistic studies to elucidate HPV's oncogenic pathways. If confirmed, these results could support the expansion of HPV vaccination strategies to broader indications and wider population coverage.

To date, only two viral vaccines are globally administered with the main purpose of decreasing cancer:

1. Hepatitis B: World Hepatitis Day has been celebrated on July 28 since 2010, a date chosen in honor of the birthday of Dr. Baruch Blumberg, winner of a Nobel Prize for discovering the hepatitis B virus and developing its diagnostic test and vaccine. Each year, this date reinforces the need to intensify national and international efforts to eliminate viral hepatitis. For 2025, the global campaign adopts the theme "Hepatitis: Let's break it down!" which calls on governments, civil society, and partners to dismantle financial, social, and systemic barriers, including stigma, that hinder access to hepatitis prevention, diagnosis, and treatment, as well as liver cancer prevention. The focus of the efforts coordinated by the World Health Organization (WHO) and the Pan American Health Organization (PAHO) is on simplifying, expanding, and integrating vaccination services, safe practices, harm reduction, testing, and treatment into national health systems. Estimates from the WHO indicate that in 2022, approximately 254 million people were living with hepatitis B and 50 million with hepatitis C, causing approximately 1.3 million deaths annually, many of them from cirrhosis and liver cancer. According to multilateral health agencies, it is possible to prevent 2.8 million deaths by 2030, but only if countries act now.

**Table 1. Pathogens with a definitive and possible or indirect role in cancer causation.**
(Taken from Pappas G. *Clin Microbiol Infect*. 2009 Nov;15(11):961–3.)

| Pathogen | Associated cancer | Yearly cases associated with |
|---|---|---|
| **Definite causes of cancer** | | |
| **Epstein–Barr virus** | Burkitt's lymphoma Nasopharyngeal cancer. Also implicated in gastric carcinoma. | 100,000 |
| **Helicobacter pylori** | Gastric cancer. Gastric mucosal-associated lymphoid tissue lymphoma. | 490,000 |
| **Hepatitis B virus** | Hepatocellular carcinoma. | 280,000 |
| **Hepatitis C virus** | Hepatocellular carcinoma. | 110,000 |
| **Human herpes virus-8** | Kaposi's sarcoma. Primary effusion lymphoma. Multicentric Castleman's disease. | 55,000 |
| **Human papilloma virus** | Cervical cancer. Anal cancer. Also implicated in vulvar, vaginal, penile cancer. Nasopharyngeal (head/neck) cancer. | 550,000 |
| **Human T-cell lymphotropic virus** | Acute T-cell leukemia. | 2,700 |
| **Opisthorchis viverrini** | Cholangiocarcinoma. | 800 |
| **Schistosoma haematobium** | Bladder cancer. | 9,000 |
| **Possible/indirect causes of cancer** | | |
| **Clonorchis sinensis / Opisthorchis felineus** | Cholangiocarcinoma. | — |
| **HIV** | Increased potential for lymphomas (including CNS); synergy-like action with HHV-8. Other lymphomas. | — |
| **Polyoma viruses – JCV** | Brain tumors. | — |
| **Polyoma viruses – BKV** | Brain tumors. | — |
| **Polyoma viruses – SV40** | Osteosarcoma, mesothelioma. | — |
| **Schistosoma japonicum** | Colorectal cancer, hepatocellular carcinoma. | — |

The elimination of hepatitis is within our reach, as well as decreasing significantly all hepatitis B-related hepatocarcinoma cases.

2. HPV: An American retrospective cohort study was conducted using a patient population selected from the TriNetX United States Collaborative Network. Patients 9-39 years old attending medical encounters where any vaccine was administered between 1/1/2010 and 12/31/2023 were divided into two cohorts: patients vaccinated for HPV at least five years prior and those no history of HPV vaccination. The results were impressive, vaccination vs. HPV significantly reduced not only cervical cancer in women, but also anal and head/neck cancer in both genders, as well as penile cancer in males.

shown in Table 2.

**Table 2. Effects of HPV vaccination on the development of HPV-related cancers: A retrospective analysis of a United States-based cohort.**
(Taken from Dekloe J, et al. J Clin Oncol 2024; 42: 10507-10507. Doi:10.1200/JCO.2024.42.16_suppl.10507)

| Patient Group | Outcome | HPV Vaccinated: Patients with Outcome | HPV Vaccinated: Total Patients | No HPV Vaccine: Patients with Outcome | No HPV Vaccine: Total Patients | Odds Ratio (Vaccinated vs. Unvaccinated) | P-value |
|---|---|---|---|---|---|---|---|
| **Male Patients** | Head and Neck Cancers | 21 | 760,467 | 48 | 760,054 | 0.44 (0.26–0.73) | 0.0016 |
| | Anal Cancer | Suppressed (n≤10) | 760,540 | Suppressed (n≤10) | 760,539 | – | – |
| | Penile Cancer | Suppressed (n≤10) | 760,540 | Suppressed (n≤10) | 760,539 | – | – |
| | All HPV-related Cancers | 26 | 760,435 | 57 | 760,036 | 0.46 (0.29–0.72) | 0.0010 |
| **Female Patients** | Head and Neck Cancers | 29 | 945,953 | 43 | 945,580 | 0.67 (0.42–1.10) | 0.10 |
| | Cervical Cancer | 70 | 945,690 | 99 | 945,900 | 0.71 (0.52–0.96) | 0.027 |
| | Anal Cancer | Suppressed (n≤10) | 896,586 | Suppressed (n≤10) | 896,589 | – | – |
| | Vulvar or Vaginal Cancer | 20 | 945,963 | 12 | 945,999 | 1.66 (0.81–3.41) | 0.16 |
| | All HPV-related Cancers | 109 | 945,584 | 149 | 945,441 | 0.73 (0.57-0.94) | 0.013 |

## Respiratory viruses and cancer risk:

Recent evidence suggests that respiratory viruses may play a role in triggering cancer, a finding that carries important implications for both improving vaccination coverage and accelerating research and development of new vaccines against these pathogens.

In a murine model, phenotypic transitions and cellular expansions were shown to be interleukin-6–dependent. The study demonstrated that dormant disseminated cancer cells (DCCs) impair lung T cell activation, while $CD4^+$ T cells promote pulmonary metastatic burden following influenza infection by suppressing $CD8^+$ T cell activation and cytotoxicity.

Crucially, these experimental findings are consistent with human observational data. Analyses of cancer survivors from the UK Biobank (all cancer types) and Flatiron Health (breast cancer) databases revealed that SARS-CoV-2 infection significantly increases the risk of cancer-related mortality and lung metastasis compared with uninfected cancer survivors.

Additionally, DeGregori and colleagues explored whether acute inflammation triggered by a respiratory infection could reactivate dormant cancer cells. To investigate this, they genetically engineered mice to develop breast tumors resembling those in humans and to harbor dormant tumor cells in other tissues, including the lungs. The animals were then infected with either SARS-CoV-2 or influenza. Within days, the dormant cancer cells in the lungs became highly active, proliferating and forming metastatic lesions. Interestingly, it wasn't the viruses themselves driving this process. The researchers identified a key immune molecule, interleukin-6 (IL-6), which amplifies the body's response to threats, as the main culprit. When they engineered mice to lack IL-6, the dormant cancer cells multiplied far more slowly. About two weeks after infection, the cells returned to a dormant state. These findings suggest that respiratory infections do not directly cause cancer. Instead, they can create conditions—through inflammation—that make it more likely for dormant cancer cells to reactivate in response to future threats, such as subsequent infections or genetic mutations.]

## Conclusions:

By linking a specific neoplasia to a particular infectious agent, researchers have highlighted a clear path for prevention: eliminating the initiating infection or its carcinogenic effects. This approach has naturally attracted significant scientific attention and underpins some of the most promising public health campaigns aimed at reducing both the incidence and mortality of various malignancies. A recent and notable example is HPV and the challenges and opportunities arising from the recent implementation of mass vaccination programs.

Furthermore, respiratory virus infections can promote the awakening and expansion of previously seeded dormant cancer cells.

All of this underscores the need for vaccinology to not only increase coverage for vaccines against hepatitis B, HPV, SARS-CoV-2, and influenza, but also to drive research into the links between infections and cancer. It highlights the importance of investing in both basic research on these associations and the development of new vaccines. Indeed, the field of vaccinology extends far beyond the control of infectious diseases alone.

Bibliography:
1. Dresden BP, Alcorn JF. Inflammation during viral infection can rouse dormant cancer cells. Nature. 2025 Jul 30. doi: 10.1038/d41586-025-02137-1.
2. Pappas G. Infectious causes of cancer: an evolving educational saga. Clin Microbiol Infect. 2009 Nov;15(11):961-3. doi: 10.1111/j.1469-0691.2009.03034.x.
3. Bireme/PAHO/WHO Bulletin: Global mobilization against viral hepatitis. Last accessed Sept 10, 2025. https://boletin.bireme.org/en/2025/07/31/july-28-global-mobilization-against-viral-hepatitis/.
4. Christian Seebauer, Mohamed Faluogy, Peter Sieg, Henning Olbrich, Ralf Ludwig. HPV vaccination and malignancy risks beyond cervical cancer: A retrospective global cohort study. Pharmacological Research. 2025; 218: 107851. https://doi.org/10.1016/j.phrs.2025.107851.
5. WHO: Immunizing against HPV. Last accessed Sept 10, 2025. https://www.who.int/activities/immunizing-against-hpv.
6. Chia SB, Johnson BJ, Hu J, Valença-Pereira F, Chadeau-Hyam M, Guntoro F, Montgomery H, Boorgula MP, Sreekanth V, Goodspeed A, Davenport B, De Dominici M, Zaberezhnyy V, Schleicher WE, Gao D, Cadar AN, Petriz-Otaño L, Papanicolaou M, Beheshti A, Baylin SB, Guarnieri JW, Wallace DC, Costello JC, Bartley JM, Morrison TE, Vermeulen R, Aguirre-Ghiso JA, Rincon M, DeGregori J. Respiratory viral infections awaken metastatic breast cancer cells in lungs. Nature. 2025 Jul 30. doi: 10.1038/s41586-025-09332-0.
7. Dekloe J, et al. Effects of HPV vaccination on the development of HPV-related cancers: A retrospective analysis of a United States-based cohort. J Clin Oncol 2024; 42 (Suppl 16): Abstract 10507. https://doi.org/10.1200/JCO.2024.42.16_suppl.10507.
8. WHO: Hepatitis B. Last accessed September 9, 2025. https://www.who.int/news-room/fact-sheets/detail/hepatitis-b.
9. Galluzzi L, Buqué A, Kepp O, Zitvogel L, Kroemer G. Immunogenic cell death in cancer and infectious disease. Nat Rev Immunol. 2017 Feb;17(2):97-111. doi: 10.1038/nri.2016.107.
10. Kimura M, Kothari S, Gohir W, Camargo JF, Husain S. MicroRNAs in infectious diseases: potential diagnostic biomarkers and therapeutic targets. Clin Microbiol Rev. 2023 Dec 20;36(4):e0001523. doi: 10.1128/cmr.00015-23.

Best Practice

# RABIES VACCINATION, SIMPLIFIED SCHEDULES


## Introduction

### Current Global Situation

- Rabies remains endemic in many regions, particularly across Africa, Asia, and parts of Latin America.
- According to the World Health Organization (WHO), an estimated 59,000 people die from rabies each year, with the majority of cases resulting from dog bites.

### Vaccination Efforts

- Vaccination of domestic animals—especially dogs—is the cornerstone of rabies prevention and control.
- Several countries have successfully implemented mass dog vaccination campaigns, demonstrating measurable reductions in human and animal rabies cases.

### Public Awareness and Education

- Public awareness initiatives play a critical role in educating communities about rabies prevention and the importance of timely vaccination.
- Health organizations continue to promote responsible pet ownership and emphasize the need for immediate medical evaluation after any potential exposure.

- Both pre-exposure prophylaxis (PrEP) for high-risk populations and post-exposure prophylaxis (PEP) following suspected rabies exposure are essential, life-saving interventions. PEP includes administration of human rabies immune globulin (HRIG), followed immediately by a complete course of rabies vaccination.

**Challenges**
- Limited availability and accessibility of PEP, particularly in rural and underserved areas, remain major obstacles to effective rabies control.
- Cultural beliefs, lack of awareness, and underreporting further hinder vaccination uptake and timely treatment.

**Future Outlook**
- Achieving global rabies elimination requires sustained collaboration, funding, and political commitment.
- The WHO has set the ambitious target of eliminating dog-mediated rabies by 2030, a goal dependent on expanded vaccination coverage, improved access to PEP, and strengthened public health initiatives.
- As new research and resources emerge, strategies will need to be adapted to ensure long-term success in rabies prevention and control.

## Pre-exposure prophylaxis (PrEP)

- PrEP vaccination is recommended for people who work directly with animals that could have rabies.
- Those who travel to parts of the world where rabies is common and access to medical care is limited also may consider pre-exposure prophylaxis.
- A two-dose PrEP schedule has replaced the three-dose PrEP schedule to protect people from rabies for up to three years.
- The minimum acceptable laboratory value (antibody titer) used to determine whether rabies vaccine booster doses are needed was revised and standardized.
- Many people for whom serial titers were recommended every two years now require only a one-time titer (and booster if below a certain level) OR a one-time booster.
- Risk categories have been redefined into five risk groups:

**Risk categories**

**Risk category 1**
People who work with live or concentrated rabies virus in laboratories

- 2 doses, days 0 and 7.
- Check titer every 6 months.

**Risk category 2**
People who frequently do at least one of the following: handle bats, have contact with bats, enter high-density bat environments like caves, or perform animal necropsies.

- 2 doses, days 0 and 7
- Check titer every 2 years

**Risk category 3**
People who interact with, or are at higher risk to interact, with mammals other than bats that could be rabid, for a period longer than three years after they receive PrEP.

This group includes:
- Most veterinarians, veterinary technicians, animal control officers, wildlife biologists, rehabilitators, trappers, and spelunkers (cave explorers).
- Certain travelers to regions outside of the United States where rabies in dogs is commonly found.

2 doses, days 0 and 7, plus:
- Either a one-time titer check after 1 year or up to 3 years following the first 2-dose vaccination.

Or
- 1-dose booster between 3 weeks and 3 years following the first vaccine in the 2-dose vaccination

**Risk category 4**
Same population as in risk category 3, but at a higher risk for ≤ three years after they receive PrEP.

- 2 doses, days 0 and 7

**Risk category 5**
General population
- No vaccination.

## Post-exposure prophylaxis (PEP)

**Key points**

- Rabies PEP includes wound care, human rabies immune globulin (HRIG), and a four-dose vaccine series.
- PEP recommendations differ for people depending on previous rabies vaccine status, and for those who are immunocompromised.
- Never administer the first vaccine dose in the same syringe or in the same anatomical site as HRIG.

**Clinical assessment for rabies post-exposure prophylaxis**

Following a potential rabies exposure, public health professionals should perform a risk assessment to determine if rabies PEP is needed.

The recommendations consist of:

- Wound care
- A dose of HRIG.
- Rabies vaccine given at the time of the first medical visit, and a dose of vaccine given again on days 3, 7, and 14 after the first dose.

Regardless of rabies risk, bite wounds can result in serious complications, including nerve or tendon lacerations and secondary bacterial infections. For many types of bite wounds, immediate and thorough irrigation—using clean water or a dilute povidone–iodine solution—significantly reduces the risk of infection.

Wound cleansing is also a critical step in rabies prevention. Experimental animal studies have demonstrated that meticulous wound cleansing alone, even in the absence of additional medical interventions such as vaccination, can substantially decrease the likelihood of rabies transmission.

Decisions regarding the use of antibiotics and primary wound closure should be made collaboratively with the patient, considering the type, location, and severity of the injury.

**Human rabies immune globulin (HRIG)**

People who have been previously vaccinated or are receiving PrEP for rabies should not HRIG.

HRIG is administered only once at the beginning of the PEP course. HRIG provides immediate antibodies until rabies vaccination provides immunogenicity.

HRIG should never be administered in the same syringe or in the same anatomical site as the first vaccine dose, however, subsequent doses of vaccine in the four-dose series can be administered in the same anatomic location where the HRIG dose was administered.

**Rabies vaccine**

-For people who have never been vaccinated against rabies, PEP should always include the administration of HRIG and rabies vaccine. The combination of HRIG and vaccine is recommended for both bite and non-bite exposures, regardless of the interval between exposure and initiation of treatment, so long as the patient is not showing signs consistent with rabies.

Administer 1.0 mL of Human Diploid Cell Rabies Vaccine (HDCV) or Purified Chick Embryo Cell Vaccine (PCECV) intramuscularly in the deltoid area (for children, anterolateral aspect of the thigh is acceptable).

Do not administer rabies vaccines in the gluteal area.

One injection each on days 0, 3, 7, and 14.

For those with immune disorders, administer a fifth dose on day 28.

-For people who have previously been vaccinated against rabies, PEP consists of two doses of vaccine three days apart.

HDCV or PCECV 1.0 mL, intramuscularly in the deltoid area (for children anterolateral aspect of the thigh is acceptable).

One each on days 0 and 3.

**Precautions and contraindications for rabies vaccination**

There are no known contraindications for rabies vaccination. Pregnancy is not a contraindication for rabies PEP, and exposure to rabies or a rabies diagnosis in the mother does not require pregnancy termination.

PEP is suitable for all age groups including infants and children.

For immunosuppressed or immunocompromised individuals, rabies PEP should be administered using a 5-dose vaccine regimen, which includes one dose of vaccine on days 0, 3, 7, 14, and 28. Help patients understand that their immune response may be inadequate.

Avoid immunosuppressive agents during rabies PEP unless essential for treating other conditions. Patients on immunosuppressive medications should consult with their healthcare providers about the possibility of delaying these treatments during PEP.

After completing the vaccine series, test the patient for rabies virus neutralizing antibody. The patient's physician and public health officials should guide further management.

**Vaccine administration – intradermal (ID) vs intramuscular (IM):**
As detailed in the guidance on PEP administration, WHO recommends moving from intramuscular to intradermal administration of human rabies vaccines.

Intradermal administration reduces the amount of necessary vaccine and number of doses, therefore reducing costs by 60–80%, without compromising safety or efficacy.

Fewer doses also promote patient compliance with the recommended regimen.

## WHO response

Rabies is included in WHO's 2021–2030 Roadmap for the global control of NTDs, which sets regional, progressive targets for the global strategic plan to end human deaths from dog-mediated rabies by 2030. This entails:

- Improving access to human rabies vaccines through the efforts of the WHO and its partners, Gavi, the Vaccine Alliance, which had included human rabies vaccines in its Vaccine Investment Strategy for 2021–2025. Despite pandemic-related delays, WHO now collaborates with Gavi to implement the program in 2024.
- Providing technical guidance to countries in developing and implementing their national rabies elimination plans, focusing on strengthening surveillance and reporting.
- Encouraging countries to build the capacity of their One Health workforce by using rabies elimination programs as a platform for multisectoral collaborations.
- Encouraging the use of United Against Rabies (UAR) multi-stakeholder forum, which was launched in collaboration with WHO, Food and Agriculture Organization (FAO) and World Organization for Animal Health (WOAH, formerly OIE), to advocate for action and investment in rabies control.

Bibliography:
1. WHO: Rabies. Accessed September 15, 2025. https://www.who.int/news-room/fact-sheets/detail/rabies?pubDate=20250814.
2. CDC: Rabies Pre-exposure Prophylaxis Guidance. Accessed September 15, 2025. https://www.cdc.gov/rabies/hcp/clinical-care/pre-exposure-prophylaxis.html.
3. CDC: Rabies Post-exposure Prophylaxis Guidance. Accessed September 15, 2025. https://www.cdc.gov/rabies/hcp/clinical-care/post-exposure-prophylaxis.html.
4. WHO: Neglected tropical diseases. Accessed September 16, 2025. https://www.who.int/news-room/questions-and-answers/item/neglected-tropical-diseases.
5. Gavi: Vaccine investment strategy. Accessed September 18, 2025. https://www.gavi.org/our-alliance/strategy/vaccine-investment-strategy-2024.
6. United Against Rabies. Accessed September 17, 2025. https://unitedagainstrabies.org/.
7. Gavi to boost access to rabies vaccines in over 50 countries. Published: June 15, 2024. Accessed September 12, 2025. https://www.ippmedia.com/the-guardian/news/local-news/read/gavi-to-boost-access-to-rabies-vaccines-in-over-50-countries-2024-06-15-045313.
8. WHO: Building collaborations and science capacity in Africa – Afrique One. Accessed September 16, 2025. https://www.who.int/news/item/11-01-2024-building-collaborations-and-science-capacity-in-africa--afrique-one.
9. Rabies vaccines: WHO position paper – April 2018. Accessed September 12, 2025. https://www.who.int/publications/i/item/who-wer9316.
10. Global Alliance for Rabies Control: World Rabies Day 2025: the time to act is now! Published: April 28, 2025. Accessed September 17, 2025.
11. Chen SJ, Rai CI, Wang SC, Chen YC. Infection and Prevention of Rabies Viruses. Microorganisms. 2025 Feb 9;13(2):380. doi: 10.3390/microorganisms13020380.
12. Chen Q, Cai L, Lv X, Liu S, Liu C, Liu J, Liu X, Yin W, Wang C, Zhu Z. Circulating Antibody's Role During Post-Exposure Prophylaxis, and Beyond for Rabies: A Review. Vaccines (Basel). 2025 Jul 21;13(7):775. doi: 10.3390/vaccines13070775.

Guest Contributors

# VACCINATION AS A PILLAR OF GLOBAL HEALTH: FROM SMALLPOX TO RE-EMERGING DISEASES

by **Eduardo Antonio Lara-Pérez, MD**. Pediatrician and Pediatric Pulmonologist. Mexican Academy of Pediatrics. Professor, CEO Medical Health Fraternity "Doctors United for Mexico"

## Introduction

The history of humanity is intrinsically linked to the struggle against infectious diseases. Over two centuries ago, the English physician Edward Jenner laid the foundations of modern immunology by observing that exposure to the cowpox virus conferred immunity against human smallpox, a devastating disease that caused millions of deaths annually. This innovation, described in his seminal 1798 work, **"An Inquiry into the Causes and Effects of the Variolae Vaccinae,"** marked the beginning of the vaccination era [1]. The success of mass vaccination campaigns driven by the World Health Organization (WHO) led to the global eradication of smallpox in 1980, an unprecedented milestone in medicine [2].

Throughout the 20th century, the development of vaccines for measles, polio, diphtheria, tetanus, and whooping cough, among others, has saved countless lives and drastically altered life expectancy [3]. However, complacency about the decline of diseases and the spread of misinformation have led to a drop in vaccination rates, resulting in the re-emergence of preventable diseases. More recently, the COVID-19 pandemic demonstrated the urgency of a rapid response, with a focus on new technologies like mRNA and viral vector vaccines, which were developed and distributed at an unprecedented speed [4].

This manuscript analyzes the trajectory of vaccination, from its historical roots to contemporary challenges, including the rise of new infectious threats and the influence of external factors like climate change.

We will review vaccines against COVID-19, chikungunya, human malaria, and respiratory syncytial virus (RSV) to illustrate the diversity of technologies and the complexities of their development. Finally, we argue that proactive prevention through immunization is crucial for global health, especially in a world where climate change accelerates the emergence of pathogens and the vulnerability of populations.

## 1. The Evolution of Immunization: From Empiricism to Biotechnology

### 1.1 The Legacy of Smallpox and the Concept of Immunity

Jenner's work demonstrated the principle of **protective immunity** induced by a similar but less virulent agent [1]. The success of this strategy was fundamental to the subsequent creation of attenuated vaccines, such as those for tuberculosis (BCG), oral polio (OPV), and measles, as well as inactivated vaccines like the injectable polio vaccine (IPV) [5]. These technologies enabled the creation of universal immunization programs, which have been crucial for public health.

### 1.2 The Response to New Threats: COVID-19 and mRNA Technology

The COVID-19 pandemic accelerated vaccine development on an unprecedented scale. **Messenger RNA (mRNA) vaccines**, such as those from Pfizer-BioNTech and Moderna, represent a significant technological breakthrough [6]. Instead of injecting a portion of the virus, these vaccines instruct the body's cells to produce the SARS-CoV-2 spike protein, triggering an immune response. The success of these vaccines has validated mRNA

technology for future pandemic responses.

## 2. Challenges in Vaccine Development for Recurrent and Emerging Diseases

### 2.1 Chikungunya and Malaria: The Influence of Climate Change

Chikungunya fever, transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes, has expanded its geographical reach, with recent outbreaks in non-endemic regions. The creation of a vaccine for this disease is challenging due to the need to protect against multiple virus genotypes [7].

Similarly, malaria, caused by the *Plasmodium* parasite, remains a leading cause of childhood morbidity and mortality worldwide. The development of the RTS,S (Mosquirix) vaccine represents a step forward, although its partial efficacy underscores the complexity of the immune response against parasites [8]. **Climate change** plays a crucial role in this context, as rising temperatures and altered rainfall patterns expand mosquito habitats, bringing these diseases to new populations [9].

### 2.2 The Vaccine against Respiratory Syncytial Virus (RSV)

RSV is a major cause of respiratory infections in infants and older adults. The recent approval of the first RSV vaccines marks a milestone in protecting vulnerable groups. The development of these vaccines was a long and complex process, partly due to the instability of the virus's F protein, which is the target of the immune response [10].

## 3. The Re-emergence of Preventable Diseases and the Importance of Herd Immunity

Despite the success of vaccines, incomplete vaccination has led to the re-emergence of diseases that were eradicated or nearly eradicated. The **re-emergence of measles** in Europe and the Americas, driven by misinformation and declining vaccination rates, is an alarming example [11]. **Herd immunity**, which protects unvaccinated individuals, is only effective if a high proportion of the population is immunized. When this proportion decreases, the chain of transmission is re-established, putting the most vulnerable at risk, including infants, immunocompromised individuals, and the elderly [12].

## Conclusions

Vaccination has proven to be the most powerful tool for disease prevention in medical history. However, we cannot take its benefits for granted. The COVID-19 pandemic, along with the re-emergence of diseases like measles and polio, has highlighted the importance of public education, epidemiological surveillance, and investment in research.

Furthermore, the interconnectedness of human health, the environment, and animal health (the **One Health** concept) is becoming increasingly evident. Climate change is not just an environmental threat; it is a driver of disease emergence and re-emergence, as it alters ecological niches and facilitates the spread of pathogens [9]. The response to these challenges requires a holistic approach that combines vaccine innovation with climate change adaptation and mitigation strategies. Investment in vaccine technologies, such as mRNA, and the development of new platforms for neglected pathogens are crucial. In conclusion, vaccination is more than just a medical intervention; it is a social responsibility and a fundamental pillar of global health that must be protected and promoted to ensure a healthier future for all.

References

[1] Jenner, E. (1798). An inquiry into the causes and effects of the variolae vaccinae, a disease discovered in some of the western counties of England, particularly Gloucestershire, and known by the name of the cow pox. London: Sampson Low.
[2] World Health Organization. (1980). The global eradication of smallpox: Final report of the Global Commission for the Certification of Smallpox Eradication. WHO.
[3] Plotkin, S. A., & Orenstein, W. A. (2014). Vaccines (6th ed.). Saunders.
[4] Sadoff, J., et al. (2021). Safety and Efficacy of the Ad26.COV2.S COVID-19 Vaccine. New England Journal of Medicine, 384(14), 1330–1341. https://doi.org/10.1056/NEJMoa2101544
[5] Centers for Disease Control and Prevention. (2021). Vaccine-preventable diseases. Retrieved from https://www.cdc.gov/vaccines/vpd/index.html
[6] Polack, F. P., et al. (2020). Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. New England Journal of Medicine, 383(27), 2603–2615. https://doi.org/10.1056/NEJMoa2034577
[7] Weaver, S. C., & Lecuit, M. (2015). Chikungunya Virus and the Global Spread of a Mosquito-Borne Disease. New England Journal of Medicine, 372(13), 1231–1239. https://doi.org/10.1056/NEJMra1406035
[8] Regnault, A., et al. (2018). The RTS,S/AS01 malaria vaccine and its impact on the burden of malaria in sub-Saharan Africa. Vaccine, 36(39), 5824–5833. https://doi.org/10.1016/j.vaccine.2018.08.019
[9] Intergovernmental Panel on Climate Change. (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability. Cambridge University Press.
[10] Papi, A., et al. (2023). Respiratory Syncytial Virus Prefusion F Protein Vaccine in Older Adults. New England Journal of Medicine, 388(7), 595–608. https://doi.org/10.1056/NEJMoa2212658
[11] World Health Organization. (2019). Measles outbreaks in Europe. Retrieved from https://www.who.int/emergencies/diseases/measles/outbreaks-europe
[12] Fine, P., Eames, K., & Heymann, D. L. (2011). "Herd immunity": A rough guide. Clinical Infectious Diseases, 52(7), 911–916. https://doi.org/10.1093/cid/cir075

VACCINES BEAT

## Who we are

At Vaccines Beat, we understand that vaccines and immunization have become a crucial topic of discussion at the center of any public health analysis. Therefore, timely, relevant, accessible, and well-curated information for all vaccine preventable diseases is key to advancing better health policies.

For this reason, a team of passionate vaccine professionals has created Vaccines Beat and each month diligently works to share with the healthcare ecosystem information, knowledge, and insights to improve global health.

## Vision

Vaccines Beat aims to become the beacon of insight in the public health ecosystem through its distinctive monthly newsletter. With an in-depth 360 perspective, carefully curated information and expert analysis, this novel platform fosters collaboration among a diverse global network of stakeholders.

## Mission

Vaccines Beat's main task is to inform through the review of the most recent developments in vaccines, immunization, and vaccine preventable diseases. Our mission extends to sharing best practices from successful initiatives worldwide while building bridges through editorial collaboration with regional and international stakeholders.

Vaccines Beat highlights the importance of information sharing & collaborative efforts within the public health community to boost vaccination campaigns, R&D, public policy, access, awareness, and equity.

Vaccines Beat encourages stakeholders to take action and promote sustainable commitment with continued support through multi-stakeholder synergies.



**ISSN: 2997-2833**



For any information required, please write to:
info@vaccinesbeat.org

Visit: https://vaccinesbeat.org

# SPONSORS




# PARTNERS