# Vaccine prevention for existing and emerging viral threats

## Viruses in May
## Blue Mountains 18 May 2018

Prof Kristine Macartney
Director, NCIRS

www.ncirs.edu.au
https://www.apprise.org.au/

## The old, the new and the emerging……

- The big picture
- EIDs
- New vaccines

- JE
- Dengue
- Zika
- Ebola

(Zoster, Flu, HPV if time)

Not today….

- Many others…..

# HEALTH IN THE SDG ERA


World Health Organization

WWW.WHO.INT/SDGS

SUSTAINABLE DEVELOPMENT GOALS

**Table 1 | Interface between SDGs and the risk of emerging infectious diseases**

| Goals for the control of infectious disease | Relevant SDG(s) |
|---|---|
| Reduce human contact with pathogens found in conditions of poor sanitation (rodent- and vector-borne diseases), alternative food sources (bushmeat hunting), untreated water (parasites and bacteria) and altered-pathogen reservoirs resulting from climate change or deforestation. | 1, No poverty; 2, Zero hunger; 6, Clean water and sanitation; 13, Climate action; 14, Life below water; 15, Life on land |
| Reduce pathogen exposure and disease severity via better understanding of how infectious diseases are transmitted, lowering resistance to seeking care and knowing the value of medical interventions such as vaccination. | 3, Good health and well-being; 4, Quality education |
| Reduce the spread of sexually transmitted viruses, such as HIV and HPV, for which young women have the highest risk of acquisition. | 5, Gender equality |
| Reduce exposure to mosquitoes and other transmission vectors by improving and maintaining general infrastructure and living conditions (reduce standing water, protect indoor spaces with screens); build capacity for surveillance and early diagnosis in low- and middle-income countries and maintain public health systems and access to medical care to contain outbreaks and prevent pandemics. | 7, Affordable and clean energy; 9, Industry, innovation and infrastructure; 10, Reduced inequalities; 11, Sustainable cities and communities; 12, Responsible consumption and production; 16, Peace, justice and strong institutions; 17, Partnership for the goals |
| Reduce pathogen transmission from high-risk occupations related to the hunting or selling of wild animals in mixed-species marketplaces and diminish the prevalence of commercial sex work and crowded living conditions that provide avenues for the transmission of some viruses. | 8, Decent work and economic growth |

The goals detailed at left are related to specific goals (right) among the 17 UN SDGs[3]. HPV, human papillomavirus.

Emerging viral diseases from a vaccinology perspective: preparing for the next pandemic
Barney S. Graham * and Nancy J. Sullivan* Nature Immunology https://doi.org/10.1038/s41590-017-0007-9

**Table 2 | Families of viruses known to cause human infection**

| Family | Prototypic virus(es) | Licensed vaccine(s) |
|---|---|---|
| Paramyxoviridae[a] | Measles virus, mumps virus, Nipah virus[d,e] | Live-attenuated |
| Togaviridae[a] | Rubella virus | Live-attenuated |
| Reoviridae[a] | Rotavirus | Live-attenuated |
| Orthomyxoviridae[a] | Influenza virus A and B | Live-attenuated, whole-inactivated |
| Adenoviridae[a] | Adenovirus 4 and 7 | Live-attenuated |
| Rhabdoviridae[a] | Rabies virus | Live-attenuated |
| Picornaviridae[a] | Poliovirus 1, 2 and 3; hepatitis A virus | Live-attenuated, whole-inactivated |
| Papillomaviridae[a] | HPV 6, 11, 16 and 18 | VLP |
| Poxviridae[a] | Variola virus | Live-attenuated |
| Hepadnaviridae[a] | Hepatitis B virus | VLP |
| Herpesviridae[a] | Varicella virus | Live-attenuated |
| Flaviviridae[a] | Yellow fever virus; TBE; JE; Dengue virus | Live-attenuated, whole-inactivated, live-chimeric |
| Hepeviridae[a] | Hepatitis E virus | VLP (China) |
| Pneumoviridae[b] | RSV; metapneumovirus | |
| Filoviridae[b] | Ebola virus[e]; Marburg virus[e] | |
| Retroviridae[b] | HIV-1 | |
| Coronaviridae[b] | SARS[e]; MERS[d,e] | |
| Parvoviridae[b] | B19 virus; bocavirus | |
| Caliciviridae[b] | Norovirus | |
| Polyomaviridae[c] | JC virus; BK virus | |
| Arenaviridae[c] | Lassa virus[d], Machupo virus | |
| Bunyaviridae[c] | Hantavirus; Rift Valley virus[e] | |
| Astroviridae[c] | Astrovirus | |

TBE, tick-borne encephalitis; JE, Japanese encephalitis; RSV, respiratory syncytial virus; MERS, Middle Eastern respiratory syndrome. [a]Families with at least one representative licensed vaccine. [b]Viruses with active vaccine research. [c]Viruses with minimal vaccine research activity. [d]Viruses selected by the Coalition for Epidemic Preparedness and Innovation for vaccine-development support. [e]Viruses of concern listed by the WHO, plus Crimean Congo hemorrhagic fever under Bunyaviruses (Table 3).

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**Table 3 | Other viruses of concern**

| Family | Subfamily, strain or serotype |
|---|---|
| Paramyxoviridae | Hendra virus, Cedar virus, PIV1–PIV3 |
| Togaviridae-alphaviridae | Chikungunya virus, Western equine encephalitis virus, Eastern equine encephalitis virus, Venezuelan equine encephalitis virus, Mayaro virus, Ross River virus, Barmah Forest virus, O'nyong'nyong virus, Semliki Forest virus, Getah virus, Sindbis virus |
| Reoviridae | New rotaviruses, Banna virus, Nelson Bay orthoreoviruses |
| Orthomyxoviridae | Multiple subtypes of influenza A virus, Dhori virus, Thogoto virus, Bourbon virus |
| Adenoviridae | Adenovirus 14 or 81 or other serotypes |
| Rhabdoviridae | VSV |
| Picornaviridae | EV71, EV-D68, rhinoviruses, Ljungan virus |
| Papillomaviridae | Other HPV serotypes |
| Poxviridae | Monkeypox virus |
| Herpesviridae | CMV, EBV, HSV-1, HSV-2, HHV-6, HHV-7, HHV-8 |
| Flaviviridae | HCV, Zika virus, St. Louis encephalitis virus, West Nile virus, Powassan virus, Omsk hemorrhagic fever virus, Murray Valley encephalitis virus, Rocio encephalitis virus, Kyasanur forest virus, Alkhurma virus, Russian spring and summer encephalitis virus, Central European tick-borne encephalitis virus, Wesselsbron virus, Bussuquara virus, Cacipacore virus, Ilheus virus, Iguape virus, Usutu virus |
| Bunyaviridae | Crimean Congo hemorrhagic fever virus, California encephalitis virus, Batai virus, Bhanja virus, Dobrava-Belgrade virus, Erve virus, Puumala virus, Seoul virus, Tahyna virus, severe fever with thrombocytopenia syndrome virus, La Crosse encephalitis virus, Cache Valley virus, Jamestown Canyon virus, snowshoe hare virus, Heartland virus, Oropouche virus |
| Arenaviridae | Junin virus, Guanarito virus, Chapare virus, Sabia virus, Flexal virus, lymphocytic choriomeningitis virus, Lujo virus |
| Polyomaviridae | SV40, Merkel cell virus |
| Arteriviridae[a] | Simian hemorrhagic fever virus |

Viruses of concern not included among the prototypic viruses in Table 2. PIV, *parainfluenza virus*; EV, enterovirus; CMV, cytomegalovirus; EBV, Epstein-Barr virus; HSV, herpes simplex virus; HHV, human herpesvirus; HCV, hepatitis C virus; SV, simian virus. [a]Not yet reported to infect humans.

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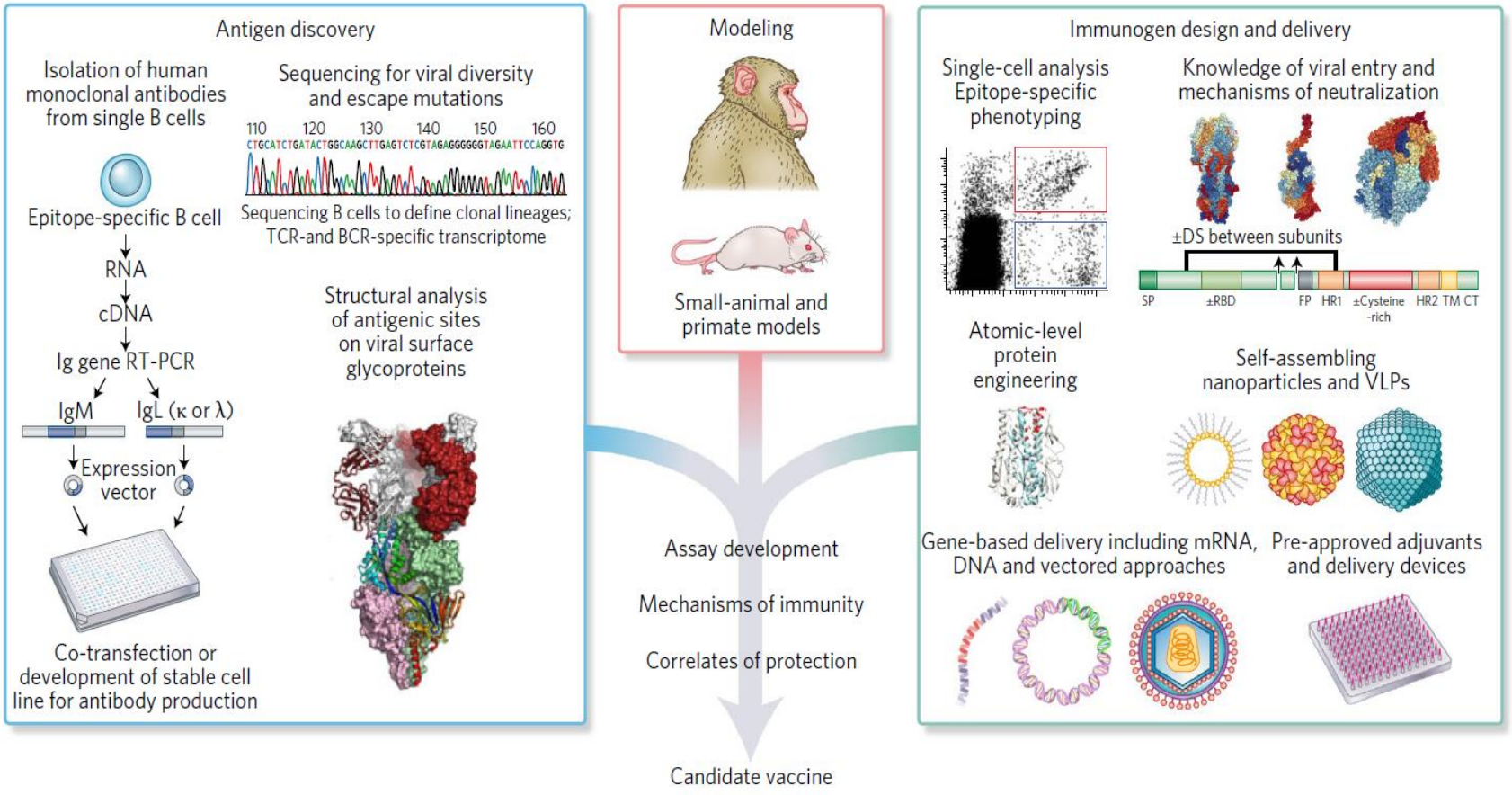


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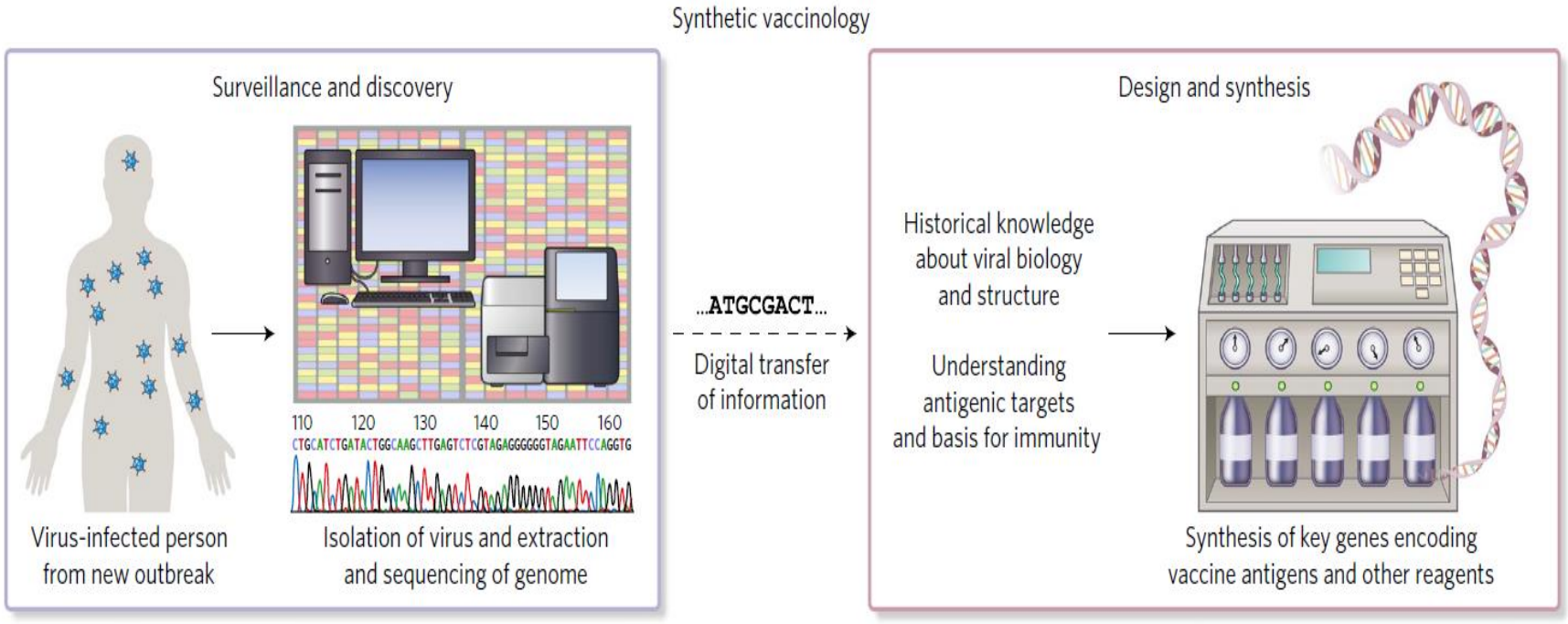
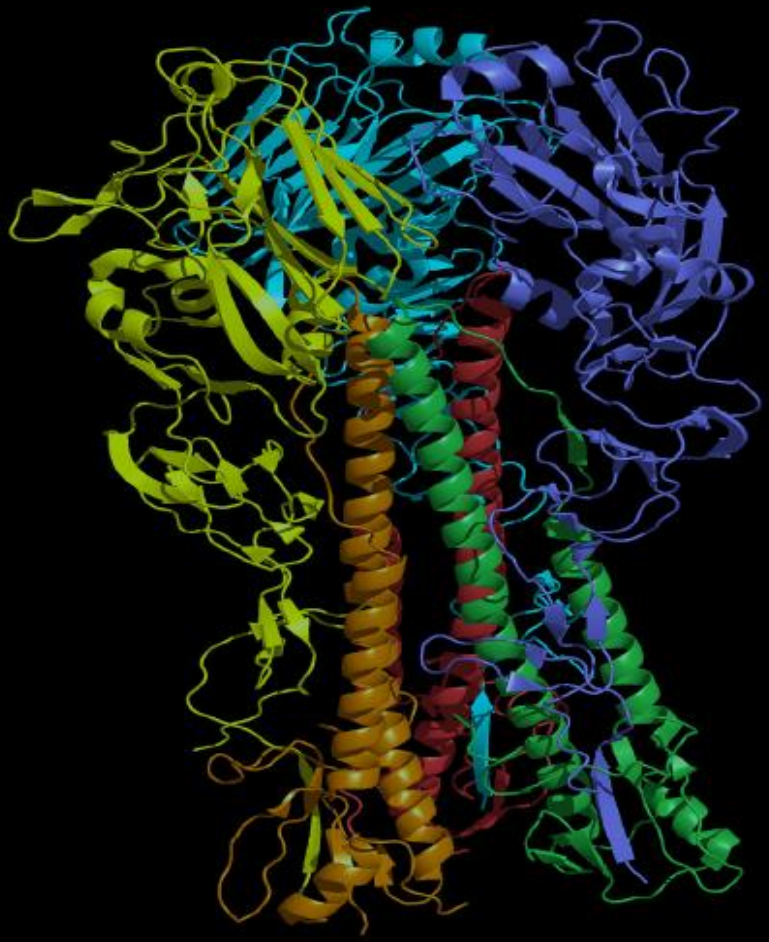



- Traditional live-attenuated or whole-inactivated vaccine approaches / classical methods likely not be rapid enough to respond to a pandemic crisis
- Focus of developing EID vaccines based on newer gene-based antigen-delivery technologies, some of which have not yet been licensed for use humans.

Emerging viral diseases from a vaccinology perspective: preparing for the next pandemic
Barney S. Graham * and Nancy J. Sullivan* Nature Immunology https://doi.org/10.1038/s41590-017-0007-9



# Stalking new vaccines:

## Methods that target the stems of viral proteins could put universal vaccines within reach

By Carrie Arnold

# We want to stop future epidemics by developing new vaccines for a safer world

Coalition for Epidemic Preparedness Innovations

CEPI
New vaccines
for a safer world

https://youtu.be/jGMw9BCZeIg

## Top Emerging Pathogens Likely to Cause Severe Outbreaks in the Near Future.*

**Diseases to be urgently addressed under the WHO Research and Development Blueprint**

Crimean Congo hemorrhagic fever virus
Filovirus diseases (Ebola and Marburg)
Highly pathogenic emerging coronaviruses relevant to humans (Middle East respiratory syndrome coronavirus [MERS-CoV], severe acute respiratory syndrome coronavirus [SARS-CoV])
Lassa fever virus
Nipah virus
Rift Valley fever virus
Any new severe infectious disease

**Serious diseases necessitating further action as soon as possible**

Chikungunya
Severe fever with thrombocytopenia syndrome
Congenital abnormalities and other neurologic complications associated with Zika virus

**New Vaccines against Epidemic Infectious Diseases**

John-Arne Røttingen, M.D., Ph.D., Dimitrios Gouglas, M.Sc., Mark Feinberg, M.D., Ph.D., Stanley Plotkin, M.D., Krishnaswamy V. Raghavan, Ph.D., Andrew Witty, B.A., Ruxandra Draghia-Akli, M.D., Ph.D., Paul Stoffels, M.D., and Peter Piot, M.D., Ph.D.

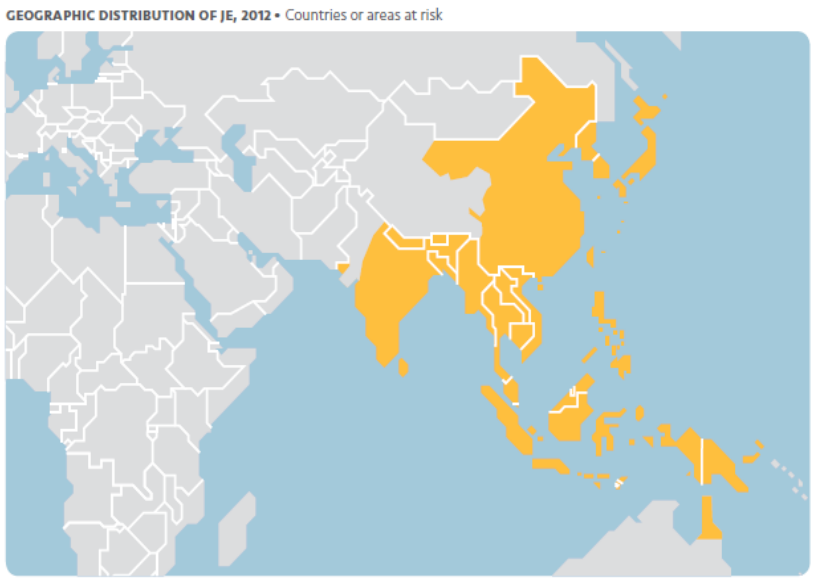
n engl j med 376;7 nejm.org February 16, 2017

'HO Vaccine Pipeline Tracker

http://www.who.int/immunization/research/vaccine_pipeline_tracker_spreadsheet/en/

Overview | HIV | Malaria | TB | Dengue | RSV | Rotavirus | Other Enterics | Zika | Lassa, MERS, Nipah | EbolaMarburg | Pneumo | Drop Downs | Template

| Clinical Trial Information | | | | | | | Results Reporting Information | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phase | Study Start date | Primary Completion Date (anticipated or actual) (see notes) | Completion Date (anticipated or actual) (see notes) | Age | Sample Size, Enrollment | Location | Results Reporting Status | Interim Publication Type | Interim Publication Date | Interim Publication Link | Full Publication Type | Full Publication Date | Full Publication Link / PMID |
| 1 | 2016-07-01 | 2017-11-01 | 2017-12-01 | Adult | 40 | United States of America \| Canada | Interim results reported | Peer-reviewed publication or journal | 2017-10-04 | 28976850 | | | |
| 1 | 2016-08-01 | 2017-06-01 | 2018-05-01 | Adult | 160 | Puerto Rico | Results not yet reported | | | | | | |
| 1 | 2017-02-09 | 2019-12-31 | 2019-12-31 | Adult | 60 | United States of America | Results not yet reported | | | | | | |
| 1 | 2017-04-04 | 2017-07-01 | 2017-08-01 | Adult | 48 | Austria | Results not yet reported | | | | | | |
| 2 | 2016-12-01 | 2017-11-01 | 2018-09-01 | Adult | 90 | United States of America | Results not yet reported | | | | | | |
| 1 | 2016-07-11 | 2017-12-29 | 2018-12-28 | Adult | 120 | United States of America | Results reported in peer-reviewed journal | | | | Peer-reviewed publication or journal | 2017-12-04 | 29217376 |
| 1 | 2016-12-08 | 2018-12-28 | 2018-12-28 | Adult | 50 | United States of America | Results reported in peer-reviewed journal | | | | Peer-reviewed publication or journal | 2017-12-04 | 29217376 |
| 2 | 2017-03-29 | 2020-01-01 | 2020-01-01 | Child \| Adult | 2500 | United States of America \| Puerto Rico | Results not yet reported | | | | | | |
| 1 | 2016-11-01 | 2019-02-01 | 2019-02-01 | Adult | 75 | United States of America | Results reported in peer-reviewed journal | | | | Peer-reviewed publication or journal | 2017-12-04 | 29217375 |
| 1 | 2016-10-14 | 2018-01-15 | 2018-02-05 | Adult | 90 | United States of America | Results reported in peer-reviewed journal | | | | Peer-reviewed publication or journal | 2017-12-04 | 29217375 |
| 1 | 2016-10-01 | 2017-11-01 | 2018-02-01 | Adult | 48 | United States of America | Results reported in peer-reviewed journal | | | | Peer-reviewed publication or journal | 2017-12-04 | 29217375 |
| 1 | 2017-02-24 | 2019-07-18 | 2020-01-15 | Adult | 90 | Puerto Rico | Results not yet reported | | | | | | |
| 1 | 2017-11-15 | 2018-06-25 | 2019-05-23 | Adult | 240 | United States of America \| Puerto Rico | Results not yet reported | | | | | | |
| 1 | 2018-02-24 | 2018-05-31 | 2018-09-30 | Adult | 67 | United States of America | Results not yet reported | | | | | | |




*PATH/Thet Htoo*

A young girl in Shan State, Myanmar, proudly displays her freshly inked finger—proof she received the Japanese encephalitis vaccine. Immunization campaigns began in November and conclude this week, followed by routine immunization in 2018. PATH provided technical assistance to Myanmar to introduce the vaccine, which reached an estimated 14.5 million children.

# JE VACCINE

# JE and vaccines

- Leading cause of viral encephalitis in Asia
  - ~3 billion people, including 700 million children, at risk
  - An estimated 70,000 clinical cases
  - Up to 20,000 deaths each year, mostly < 15 years
- 1 in 300 infections results in symptomatic illness.
- Illness can progress to encephalitis – 30% fatality rate
- 3 JE vaccines prequalified by the WHO:
  - CD-JEV (also known as SA 14-14-2), a live attenuated vaccine (Chengdu Institute of Biological Products, India);
  - JE-CV, a live recombinant JE vaccine (Government Pharmaceutical Organization-Merieuk Biological Products Co., Ltd, Thailand).; and
  - JEEV, an inactivated, Vero cell-derived JE vaccine manufactured by Biological E, India.

Australia: live attenuated recombinant JE vaccine (Imojev, Sanofi and inactivated vaccine (JEspect – Valneva Scotland Ltd/CSL )

**Navigating vaccine introduction:**
a guide for decision-makers

## About this guide:

Japanese encephalitis (JE), a viral infection of the brain, is transmitted to humans by mosquitoes. It begins like the flu and can progress to a brain infection, killing up to 30 percent of its victims and leaving up to half of its survivors with permanent brain damage such as memory loss, impaired cognition, paralysis, seizures, the inability to speak, and other mental disorders. Providing lifelong care for survivors is a significant financial strain on families and on government health care systems. There is no treatment to cure JE. Vaccination is the only reliable way to prevent infection.

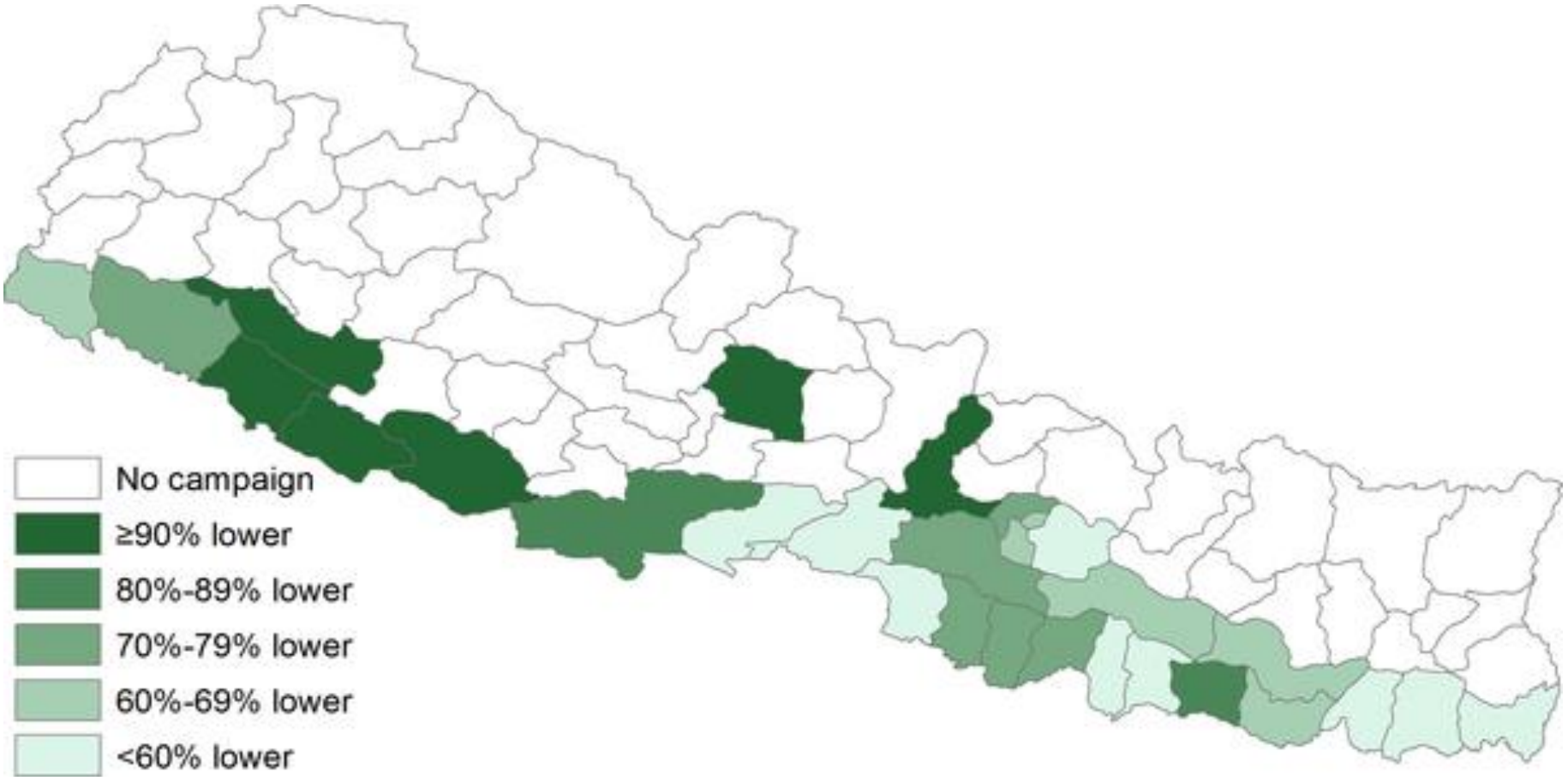
This guide is designed to help country decision-makers understand the evidence around JE vaccine introduction, the potential benefits, how to incorporate JE vaccines into their country's immunization program, and how to monitor and evaluate the vaccines after introduction. It consists of six modules, including:

1. **Does my country need JE vaccine?**
2. **Is JE vaccination cost effective?**
3. **Which JE vaccine should my country use?**
4. **How should my country introduce JE vaccine?**
5. **Can my country afford a JE vaccination program?**
6. **Is my country's JE vaccination program working?**

The modules are intended to help address some of the common challenges countries often face and provide practical tools needed to make informed decisions about JE vaccine introduction, expansion, and sustainability.

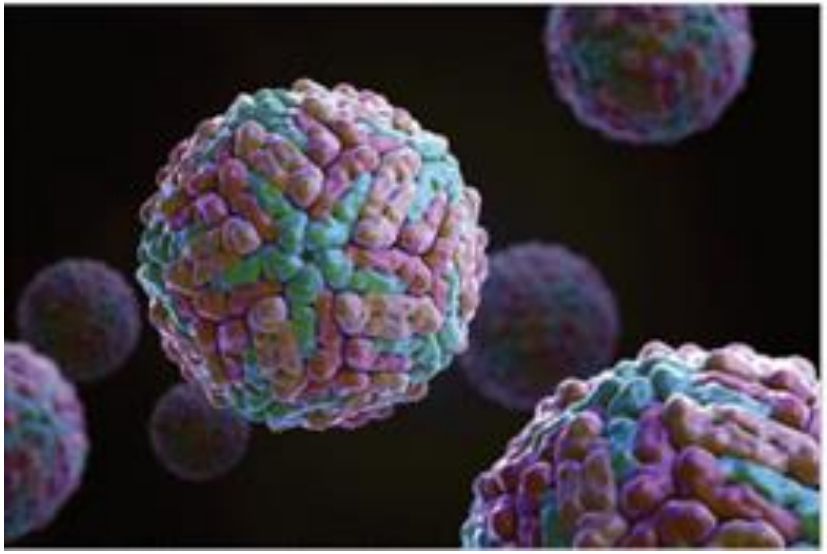
PATH

**Fig 1. Percent difference in expected and observed incidence of Japanese encephalitis following vaccination campaign, by district, Nepal.**




Upreti SR, Lindsey NP, Bohara R, Choudhary GR, Shakya S, et al. (2017) Updated estimation of the impact of a Japanese encephalitis immunization program with live, attenuated SA 14-14-2 vaccine in Nepal. PLOS Neglected Tropical Diseases 11(9): e0005866. https://doi.org/10.1371/journal.pntd.0005866

http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0005866



# DENGUE VACCINE

# Antibody-dependent enhancement (ADE)

- At a specific concentration, heterotypic antibodies bind but do not neutralize virions of the subsequent infecting DENV type.
- These virus-immune complexes are recognized by Fcγ receptors that facilitate virus entry and replication in target immune cells.
- Initiates an immune cascade - results in vascular leak and severe dengue disease

REPORTS | EPIDEMIOLOGY

## Antibody-dependent enhancement of severe dengue disease in humans

Leah C. Katzelnick[1], Lionel Gresh[2], M. Elizabeth Halloran[3,4], Juan Carlos Mercado[5], Guillermina Kuan[6], Aubree Gordon[7], An…
+ See all authors and affiliations

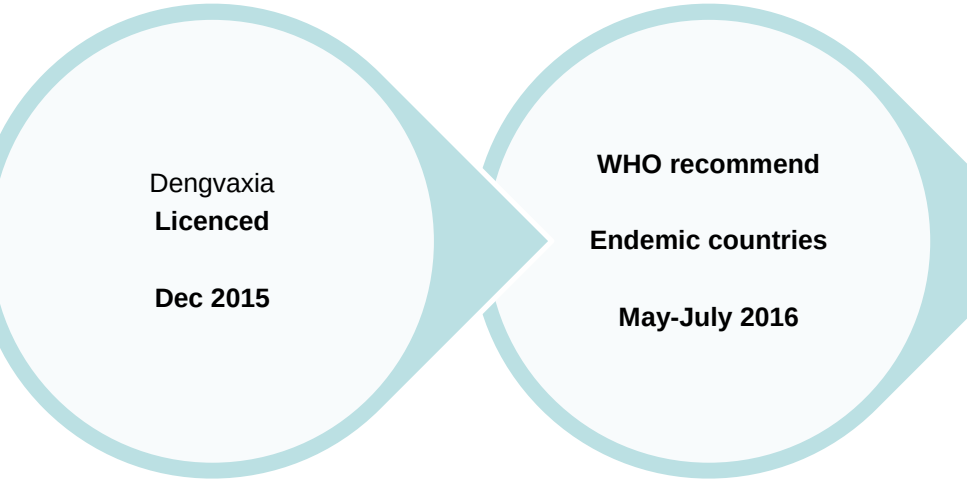
*Science* 02 Nov 2017:
eaan6836
DOI: 10.1126/science.aan6836

# Dengue vaccine
# CYD-TDV (Dengvaxia,Sanofi Pasteur)

- Live recombinant tetravalent dengue vaccine
- 3-dose series on a 0/6/12 month schedule
- 9-45 years of age living in endemic areas
- now licensed in 20 countries.

- Two large Phase 3 trials involving over 30,000 participants aged 2 to 16 years included:
  - VE confirmed dengue, over a 25-months in 9-16 y/o was 65.6%
  - reduced severe dengue by 93% and hosp dengue by 82%.
  - an increased risk of hospitalized dengue was seen in the 2 to 5-y/o in Year 3 of follow-up.
  - Need for more studies identified

- Studies used newly developed NS1-based antibody assay applied to blood samples taken 13 months after vaccination to retrospectively infer dengue serostatus at time of first vaccination



## Dengvaxia

## New analyses from the long-term safety follow-up:

In the first 25 months after the first dose of vaccine.

- VE confirmed dengue in baseline seropositive participants ≥9 years of age: 76% (95%CI: 63.9, to 84.0),
- VE lower in baseline seronegative participants: 38.8% (95%CI: –0.9 to 62.9%)
- There is an increased risk of hospitalized and severe dengue in seronegative individuals starting about 30 months after the first dose.
- In areas of 70% dengue seroprevalence, over a 5-year follow-up,
  - for every 4 severe cases prevented in seropositive, there would be one excess severe case in seronegative per 1,000 vaccinees;
  - for every 13 hospitalizations prevented in seropositive vaccinees, there would be 1 excess hospitalization in seronegative vaccinees per 1,000 vaccinees.

https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(17)30752-1/fulltext

MANILA BULLETIN

The Nation's Leading Newspaper

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Thursday, May 17, 2018 36° MNL

NEWS | OPINIONS | BUSINESS | ENTERTAINMENT | SPORTS | LIFESTYLE | TECHNOLOGY | FAITH | OFFBEAT | SPECIAL | JOBS | BOOKING | SHOP

# WHO rules on dengue vaccine

**Testing recommended before Dengvaxia is used on any individual**

532 SHARES

Share it!

Updated April 21, 2018, 6:51 AM

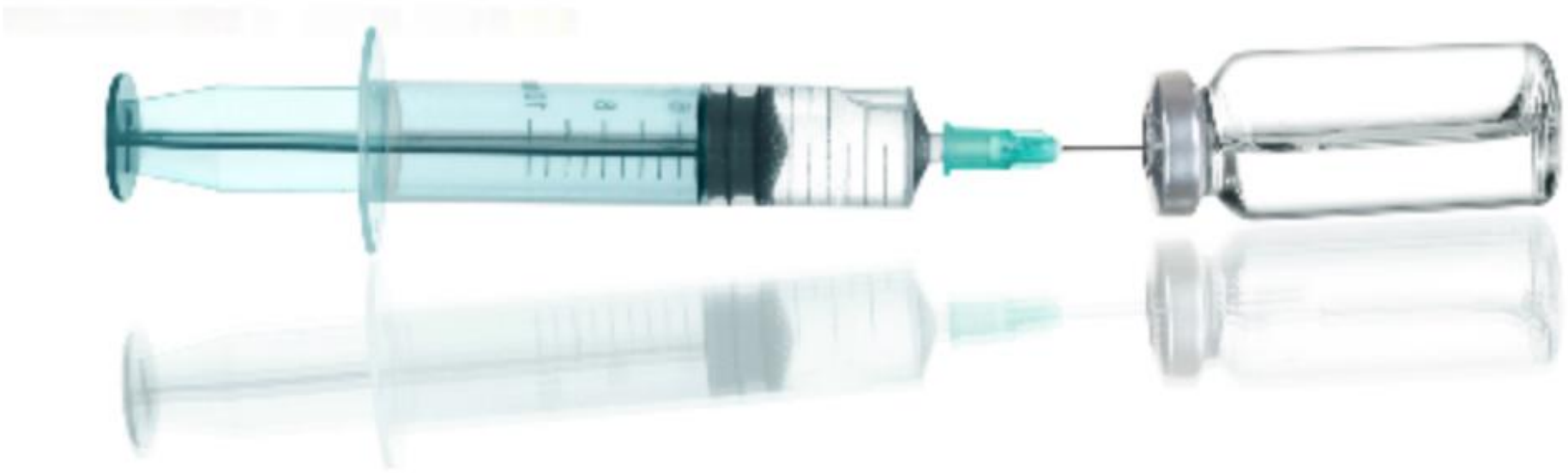
*By Reuters*

Paris/Chicago – The World Health Organization (WHO) said on Thursday Sanofi's vaccine against dengue should only be used after testing on individuals to assess whether they have ever been exposed to the infection.

ABS-CBN NEWS


http://news.abs-cbn.com/focus/multimedia/slideshow/12/08/17/timeline-the-philippines-dengue-vaccine-program

# WHO advises Dengvaxia be used only in people previously infected with dengue



13 DECEMBER 2017 - Following a consultation of the Global Advisory Committee on Vaccine Safety, the World Health Organization (WHO) finds that the dengue vaccine CYD-TDV, sold under the brand name Dengvaxia, prevents disease in the majority of vaccine recipients but it should not be administered to people who have not previously been infected with dengue virus.

# ZIKA VACCINE

# Development of vaccines against Zika virus

Gregory A Poland, Richard B Kennedy, Inna G Ovsyannikova, Ricardo Palacios, Paulo Lee Ho, Jorge Kalil

Zika virus is an emerging pathogen of substantial public health concern to human beings. Although most infections are asymptomatic or present with benign, self-limited symptoms, a small percentage of patients have complications, such as congenital anomalies in the developing fetus of pregnant women infected with the virus and neurological complications (eg, Guillain-Barré syndrome). To date, there is no vaccine, antiviral drug, or other modality available to

*Lancet Infect Dis* 2017
Published Online
January 25, 2018
http://dx.doi.org/10.1016/

## *Panel*: Key challenges for Zika virus vaccination

- Antibody-mediated immune enhancement of dengue virus infection needs to be avoided
- The vaccine should be able to elicit protective immunity, regardless of previous exposure to dengue virus
- The vaccine needs to be safe for vulnerable populations, including pre-pubescent children, pregnant women, and men and women of childbearing age
- Protective immunity should be transferred to the developing fetus and newborn child
- Vaccination should not cause neurological side-effects, especially given the link between Zika virus and Guillain-Barré syndrome
- To date, there is not an established correlate of protection
- The vaccine should protect healthy adults, young children, pregnant women, and unborn fetuses—who could all require a different level of immunity
- Clinical efficacy is very difficult to assess when 80% of infections are asymptomatic

| | Status | Type of vaccine |
|---|---|---|
| Inovio | In phase 1 clinical trials | DNA vaccine |
| National Institutes of Health | In phase 1 clinical trials | DNA vaccine; live vesicular stomatitis virus recombinant (early R&D); live attenuated Zika virus (early R&D) |
| Walter Reed Army Institute of Research and Sanofi Pasteur | In phase 1 clinical trials | Whole, purified, inactivated virus |
| Butantan Institute | In phase 1 clinical trials; early stage research | Live, dengue virus-vectored vaccine expressing precursor membrane and envelope proteins; purified inactivated virus |
| Bharat | Preclinical animal studies | Purified inactivated virus; virus-like particle expressing polyprotein |
| NewLink Genetics | Preclinical animal studies | Purified inactivated virus |
| PaxVax | Preclinical animal studies | Purified inactivated virus |
| Novavax | Preclinical animal studies | Protein nanoparticle vaccine |
| Replikins | Preclinical animal studies | Synthetic peptide vaccine |
| Pharos Biologicals | Preclinical animal studies | DNA vaccine |
| Bio-Manguinhos | Early stage research | Purified inactivated virus; yellow fever 17DD chimera; virus-like particle; DNA |
| US Centers for Disease Control and Prevention | Early stage research | Virus-like particle expressing Zika virus DNA; live adenovirus recombinant |
| CureVac | Early stage research | Thermostable mRNA-based vaccine |
| Geovax | Early stage research | Live modified vaccinia ankara recombinant |
| GlaxoSmithKline | Early stage research | Self-amplifying mRNA platform; whole, inactivated virus |
| Hawaii Biotech | Early stage research | Alhydrogel and recombinant protein |
| Oxford University | Early stage research | Live adenovirus recombinant |
| Protein Sciences | Early stage research | Recombinant envelope protein |
| Sanofi | Early stage research | Yellow fever 17D chimera |
| Sementis | Early stage research | Live poxvirus recombinant |
| Themis Bioscience | Early stage research | Live measles recombinant |
| Valneva | Early stage research | Purified inactivated virus |
| Mayo Clinic Vaccine Research Group | Early stage research | Naturally processed and HLA-presented Zika virus peptides packaged with biodegradable nanoparticles |
| Moderna | Early stage research | Lipid nanoparticle-delivered mRNA |
| Emergent Biosolutions | Early stage research | Inactivated, whole virus |
| Institut Pasteur of Shanghai | Early stage research | Recombinant subunit virus-like particle |
| Takeda | Early stage research | Alum adjuvanted, inactivated whole virus |
| Jenner Institute | Early stage research | Simian adenovirus vector |
| VBI Vaccines | Early stage research | Virus-like particle containing envelope and non-structural 1 proteins |
| Vaxart | Early stage research | Recombinant oral vaccine |

R&D=research and development.

***Table:*** **Zika vaccines in development**

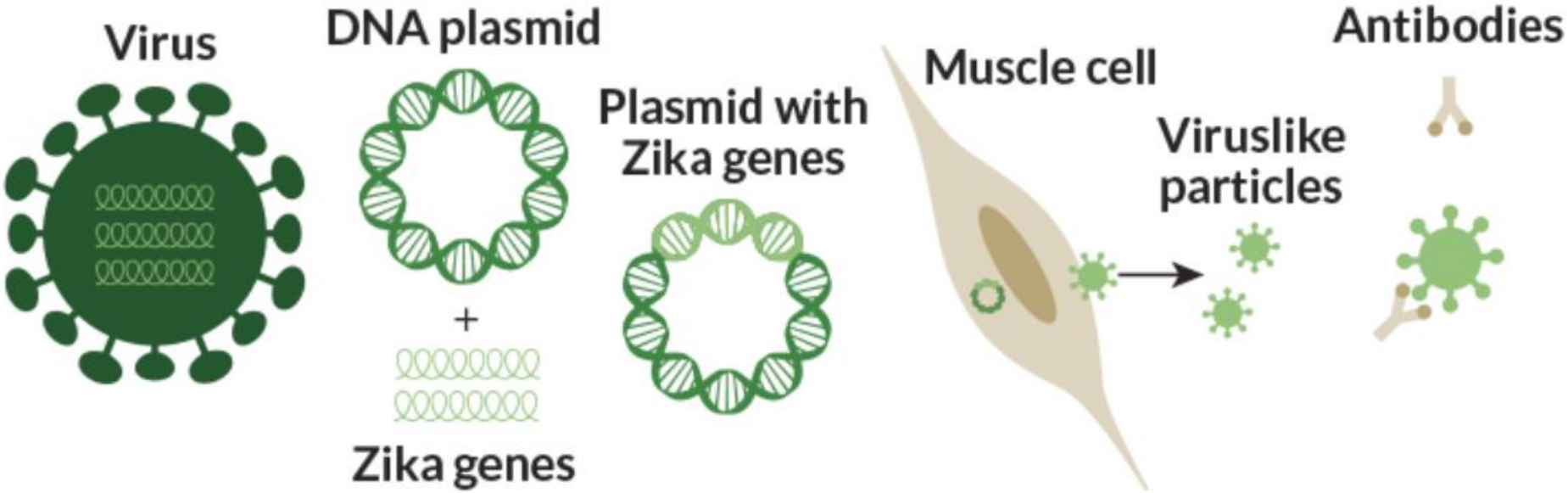
NEWS RELEASES

Friday, March 31, 2017

# Phase 2 Zika vaccine trial begins in U.S., Central and South America

*Study will evaluate NIH's experimental DNA vaccine.*

- at least 2,400 healthy men and non-pregnant women ages 15-35 years.
- part A (Houston, Miami and San Juan)
- two additional sites in San Juan, two sites in Costa Rica, and one site each in Peru, Brazil, Panama and Mexico.




`Zika hope`

a small circular piece of DNA called a plasmid into which scientists have inserted genes that encode two proteins found on the surface of the Zika virus. Once injected into muscle, the proteins assemble into particles that mimic the Zika virus and trigger the body's immune system to respond

– NIAID website Q and A

Health care workers at Bikoro hospital in the Democratic Republic of the Congo get sprayed with disinfectant after leaving a quarantined Ebola treatment unit. JOHN BOMPENGO/DEMOCRATIC REPUBLIC OF THE CONGO MINISTRY OF PUBLIC HEALTH

## Hoping to head off an epidemic, Congo turns to experimental Ebola vaccine

By Jon Cohen | May. 15, 2018 , 3:30 PM



# EBOLA VACCINES

THE LANCET



Articles

# Efficacy and effectiveness of an rVSV-vectored vaccine in preventing Ebola virus disease: final results from the Guinea ring vaccination, open-label, cluster-randomised trial (Ebola Ça Suffit!)

Dr Ana Maria Henao-Restrepo, MD, Anton Camacho, PhD, Prof Ira M Longini, PhD, Conall H Watson, MFPH, Prof W John Edmunds, PhD, Prof Matthias Egger, PhD, Miles W Carroll, PhD, Natalie E Dean, PhD, Ibrahima Diatta, MSc, Moussa Doumbia, MD, Bertrand Draguez, MD, Sophie Duraffour, PhD, Godwin Enwere, FWACP, Rebecca Grais, PhD, Stephan Gunther, MD, Pierre-Stéphane Gsell, PhD, Stefanie Hossmann, MSc, Sara Viksmoen Watle, MD, Prof Mandy Kader Kondé,

Show all authors

Published: 22 December 2016

Open Access PlumX Metrics

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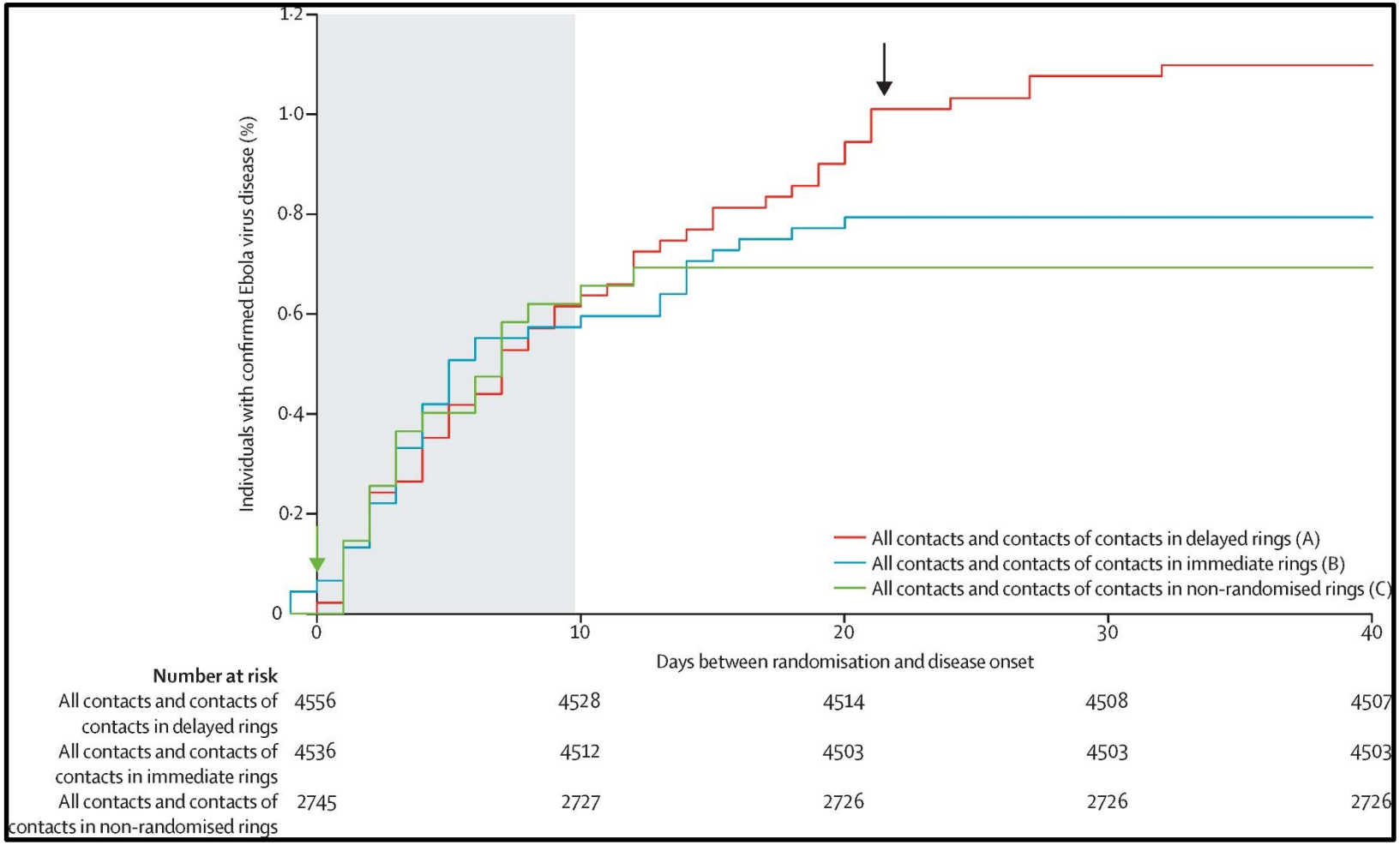
**Kaplan-Meier plots for all confirmed cases of Ebola virus disease among all contacts and contacts of contacts in immediate, delayed, and non-randomised clusters**




| Number at risk | | | | | |
|---|---|---|---|---|---|
| All contacts and contacts of contacts in delayed rings | 4556 | 4528 | 4514 | 4508 | 4507 |
| All contacts and contacts of contacts in immediate rings | 4536 | 4512 | 4503 | 4503 | 4503 |
| All contacts and contacts of contacts in non-randomised rings | 2745 | 2727 | 2726 | 2726 | 2726 |

NEWS / DEMOCRATIC REPUBLIC OF CONGO

# First doses of new Ebola vaccine reach DRC amid outbreak

*Although still not licensed, the virus vaccine was effective during limited trials in West Africa from 2014 to 2016.*

11 hours ago


http

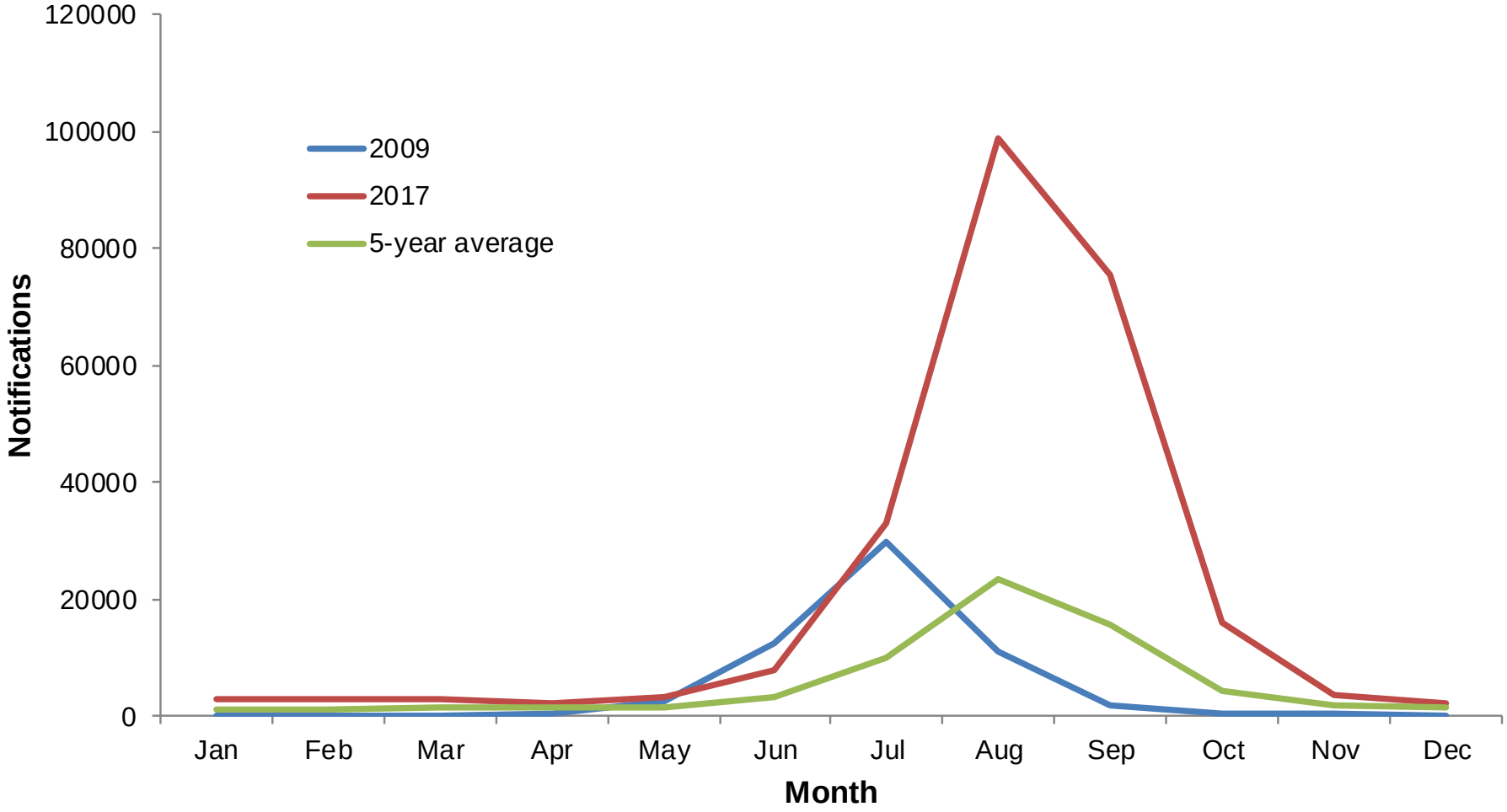
# Thank you, Questions?

# Extra slides

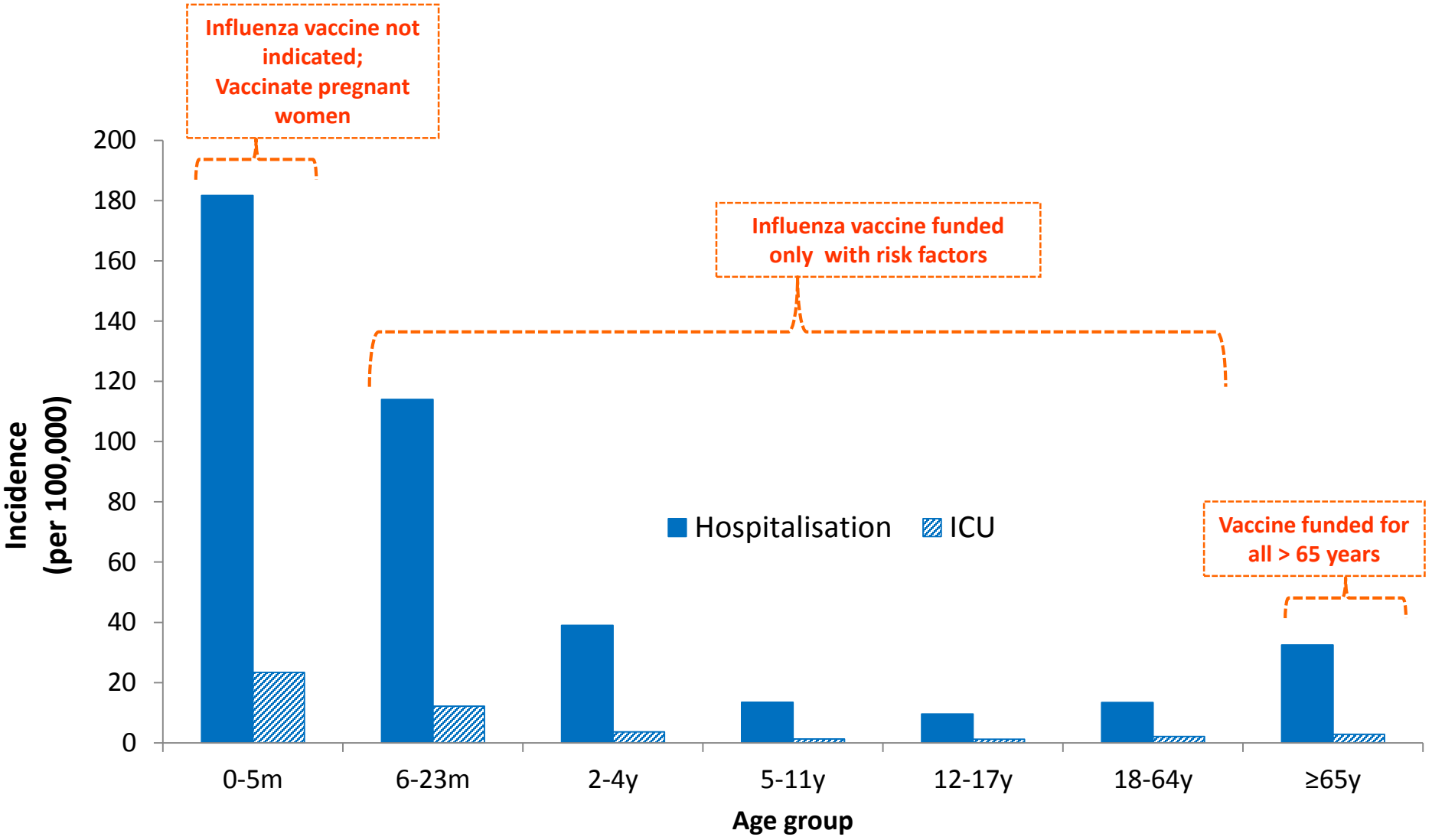

NDC 58160-823-11
Rx only
NOTICE: One vial of lyophilized powder and one vial of liquid suspension MUST BE COMBINED BEFORE USE
Zoster Vaccine Recombinant, Adjuvanted
SHINGRIX
Contents (10 doses of SHINGR
10 Vials containing Lyophilized gE
omponent
10 Vials containing Adjuvant Susp
mponent
After reconstitution, a single dos
is 0.5 r
1 + 2
For 50 Years of
Ol
NDC 58160-828-03
NOT TO BE USED ALONE
SHINGRIX
NDC 58160-829-03
NOT TO BE USED ALONE

# FLU VACCINE

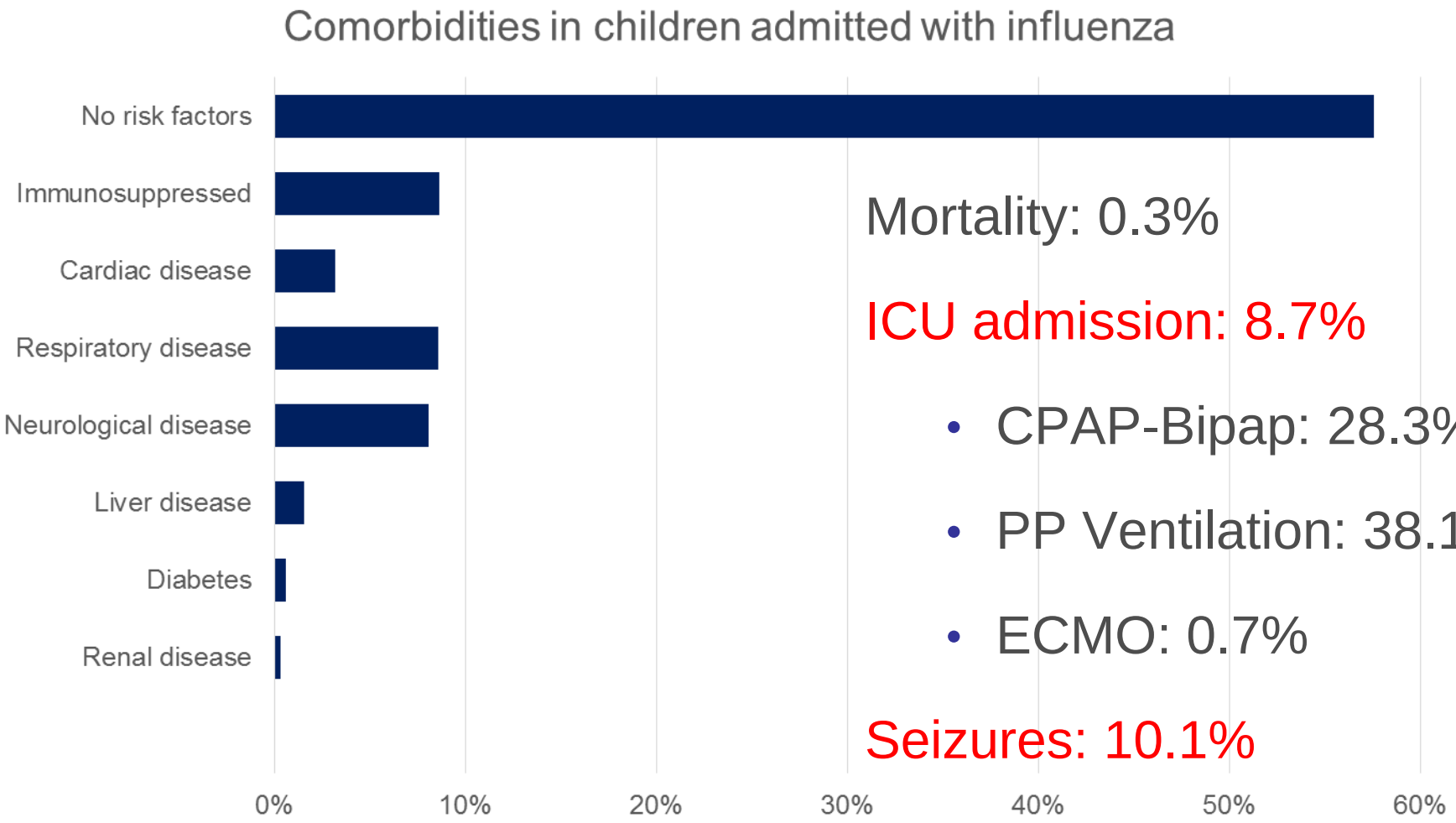
# More testing and more flu: national influenza notifications by month and year



# ICD-coded hospitalisation for influenza 2002–2013
# Highest rates in young children



## Most flu- hospitalised children previously well.
## FluCAN – PAEDS (sentinel hospitals www.paeds.edu.au)




Mortality: 0.3%

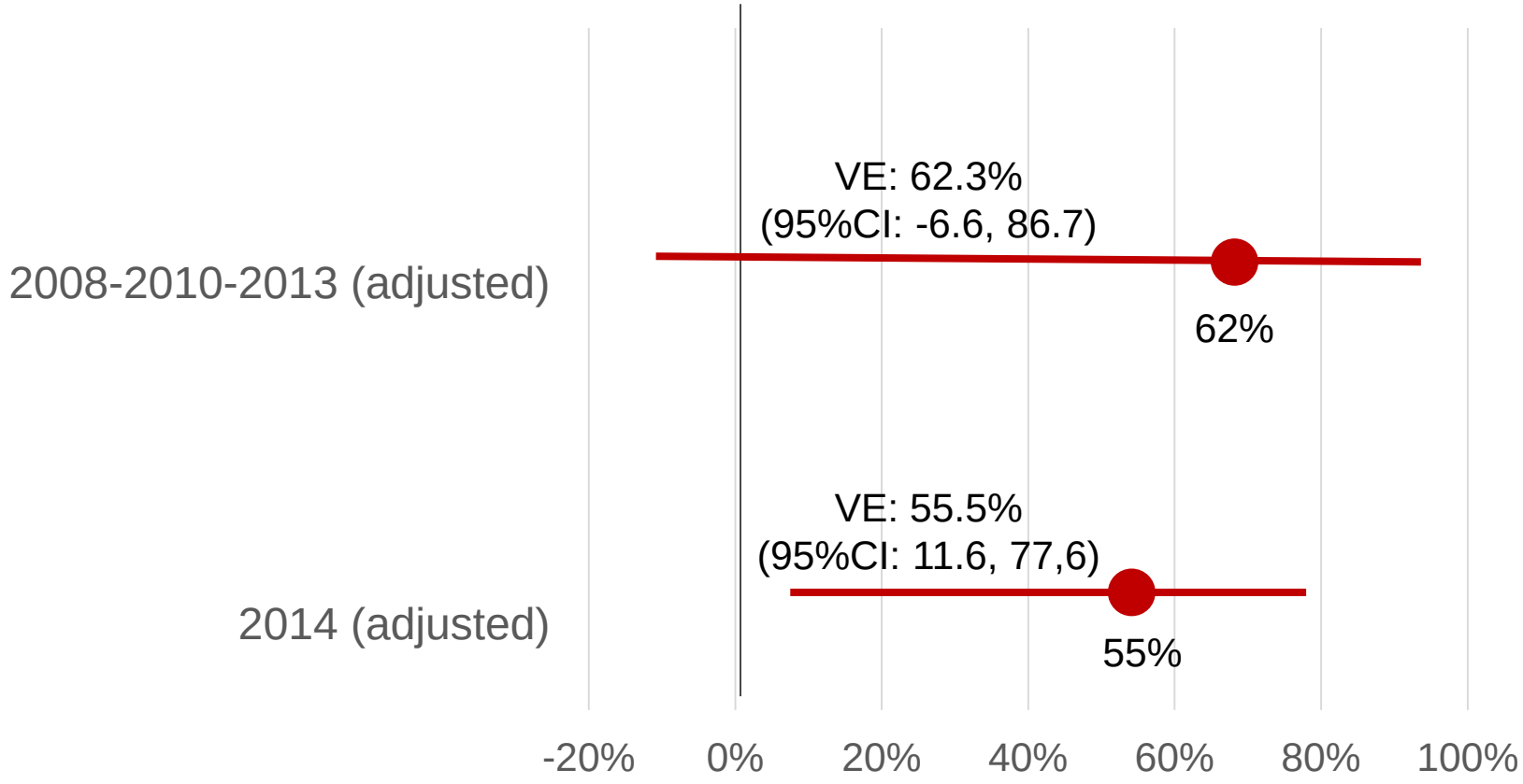
ICU admission: 8.7%

- CPAP-Bipap: 28.3%
- PP Ventilation: 38.1%
- ECMO: 0.7%

Seizures: 10.1%

Children aged <16 years

# Vaccine as effective in children as in healthy adults




Children aged <16 years

Blyth CC et al, Vaccine 2015; Blyth CC et al; Eurosurveillance 2016

# Free flu jab for NSW kids under five this winter

Published 23rd January, 2018



Children between six months and five years old will be eligible for free flu jabs this year, under an influenza vaccination program to be offered by the NSW Government.

Premier Gladys Berejiklian announced today that the NSW Government is investing $3.5 million for the vaccination program, following last year's severe flu season.

"NSW, like the rest of the country, was subjected to a horror flu season last year. The program will target more than 400,000 children and ensure better protection for them and the wider community," Ms Berejiklian said.

# 2018 influenza vaccine presentations and eligibility under the National Immunisation Program

NSW GOVERNMENT

## 65 YEARS AND OVER (only)

### Fluzone High Dose®

- Trivalent vaccine
- 4 times dose of influenza A(H1N1), A(H3N2) and B-Yamagata strains
- All persons aged 65 years and over


### Fluad®

- Trivalent vaccine
- Influenza A(H1N1), A(H3N2) and B-Yamagata strains with MF59 adjuvant
- All persons aged 65 years and over


- Give two doses one month apart for children aged 3 to less than 9 years if first year of receiving flu vaccine

3 years of age

## 18 – 64 YEARS

### Afluria Quad®

- Adults 18 to 64 years of age with medical risk factors predisposing to severe influenza
- Aboriginal adults 18 to 64 years of age

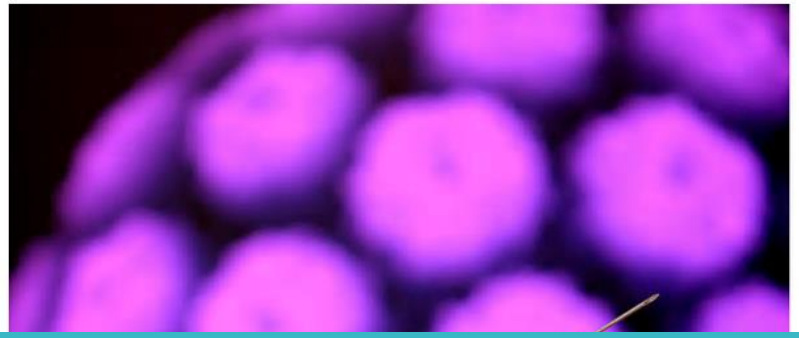
- Pregnant women
- Do not use for persons less than 18 years of age

# HPV VACCINE

# Australia could become first country to eradicate cervical cancer

**Free vaccine program in schools leads to big drop in rates, although they remain high in the developing world**

● **Ian Frazer: Eliminating cervical cancer globally is within reach**



# Human papillomavirus vaccine

## Gardasil®9–Clinical advice for GPs

To support the introduction of *Gardasil®9* in a two-dose schedule under the school-based National Immunisation Program (NIP) from January 2018

**HPV** Vaccine

**From January 2018, the 9-valent HPV vaccine Gardasil®9 (two-dose schedule) will replace the 4-valent HPV vaccine Gardasil® (three-dose schedule), on the National Immunisation Program (NIP).**

**The HPV vaccine is primarily delivered through school-based programs to adolescent females and males in years 7 or 8 (aged approximately 12 to 13 years) depending on your State or Territory as part of the NIP. You may see patients presenting in your clinic to receive missed school doses or seeking further information about HPV vaccination.**

# New HPV vaccine program changes

*Gardasil®9*

- includes HPV types in *Gardasil®* (6, 11, 16 and 18)
- plus five more oncogenic types (31, 33, 45, 52 and 58)

- The two doses of *Gardasil®9* are recommended at an interval of between 6 to 12 months apart (if started before 15$^{th}$ birthday)

- A three-dose schedule only recommended for those starting course at age ≥15 years and any age who have major immunocompromise