

COUNTERING EMERGING INFECTIOUS DISEASE THREATS

AN ARMY ACCELERATED RESPONSE TO ZIKA

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WRAIR

Walter Reed Army
Institute of Research

Soldier Health • World Health

Building on Decades of Experience to Pivot toward Public Health Emergencies



MRMC (WRAIR & USAMRIID) has been able to leverage longstanding capabilities to respond quickly to emerging infectious disease outbreaks:

- Subject Matter Expertise
- Basic/Translational Science
- Manufacturing
- Broad Network of International Sites
- Clinical Trial Infrastructure
- Partnerships
 - Government, Academia, Industry

**# of Virus
Species**

**# of Virus
Families**

200

40

150

30

100

20

50

10

1920

1940

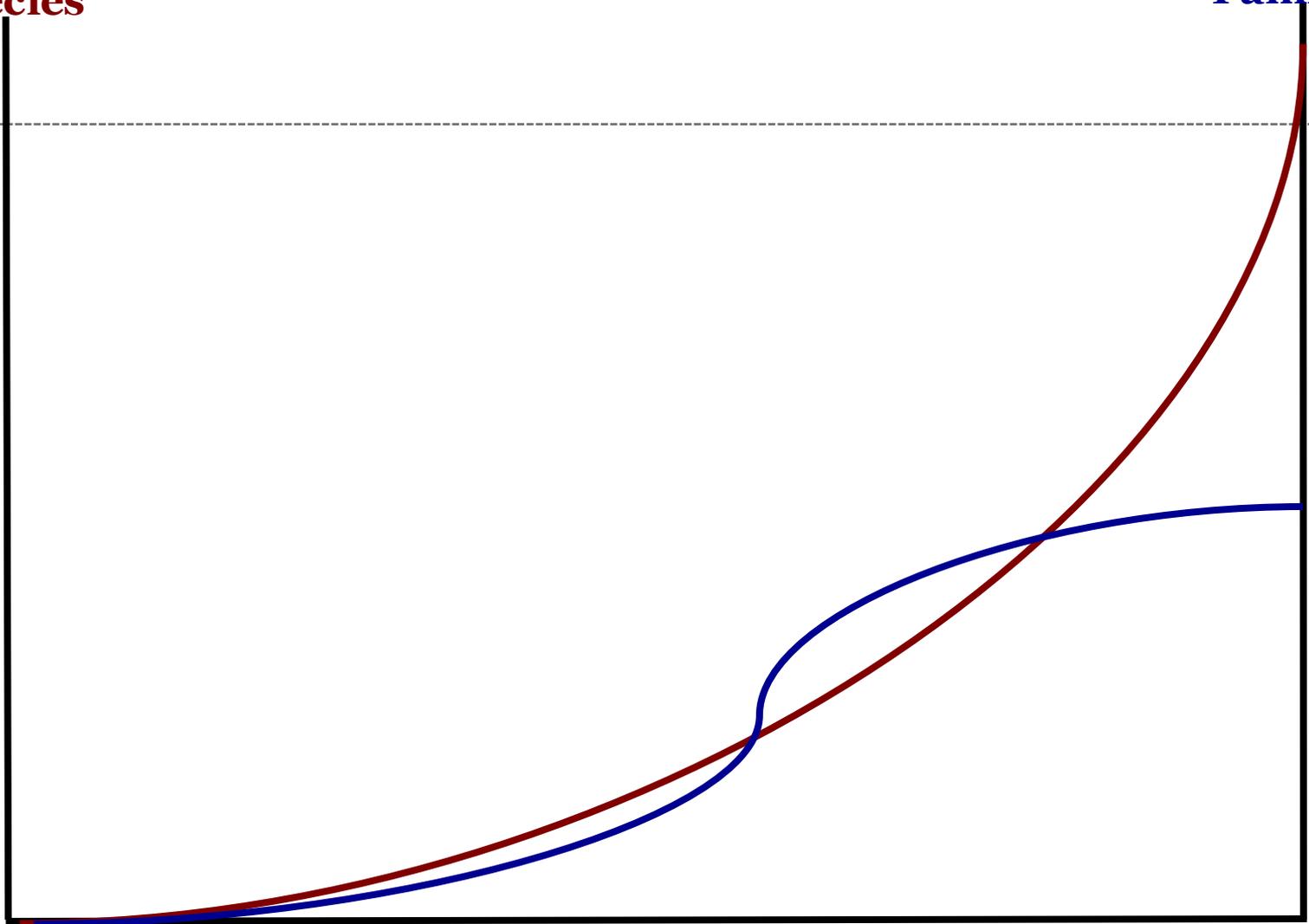
1960

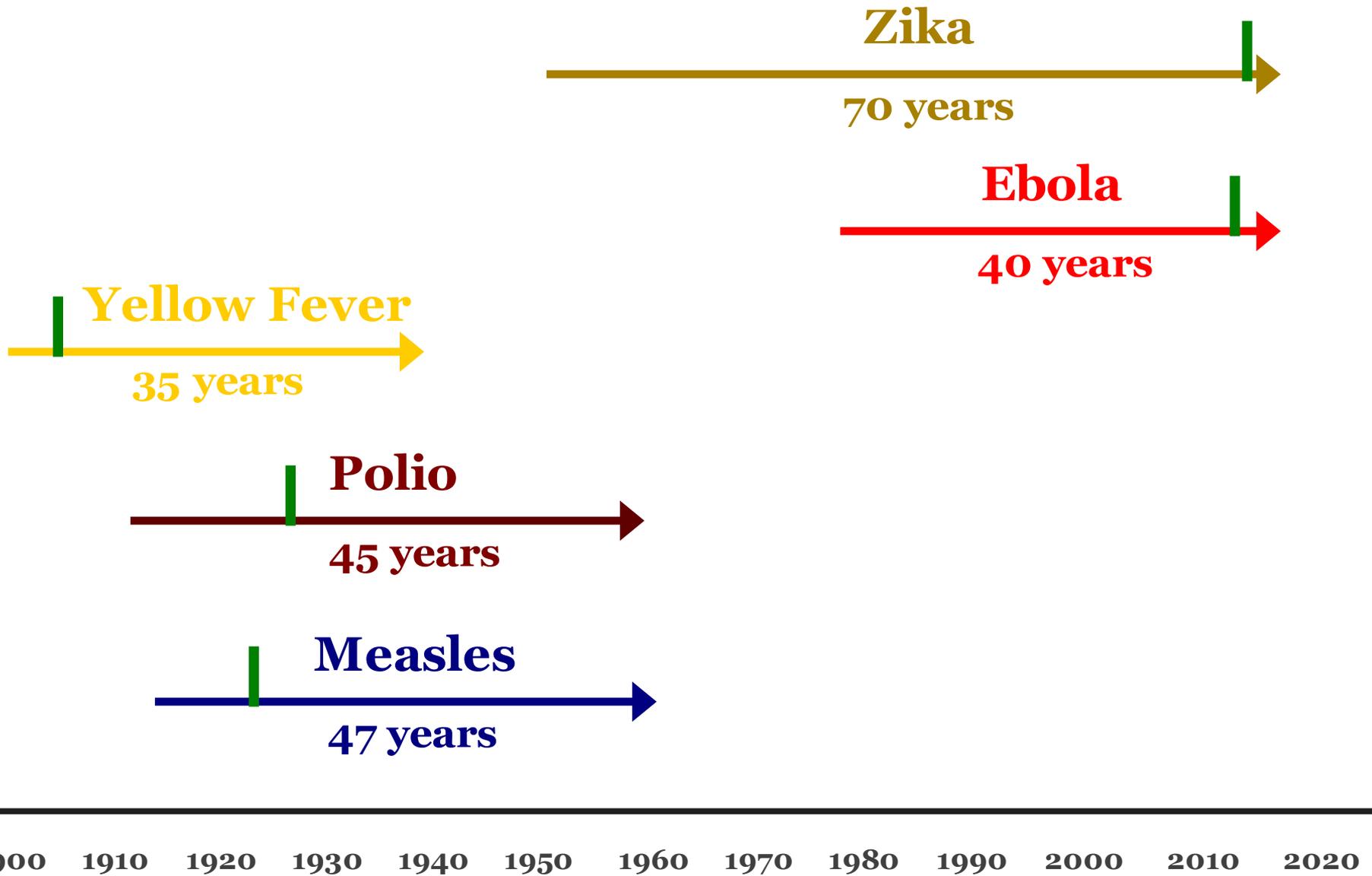
1980

2000

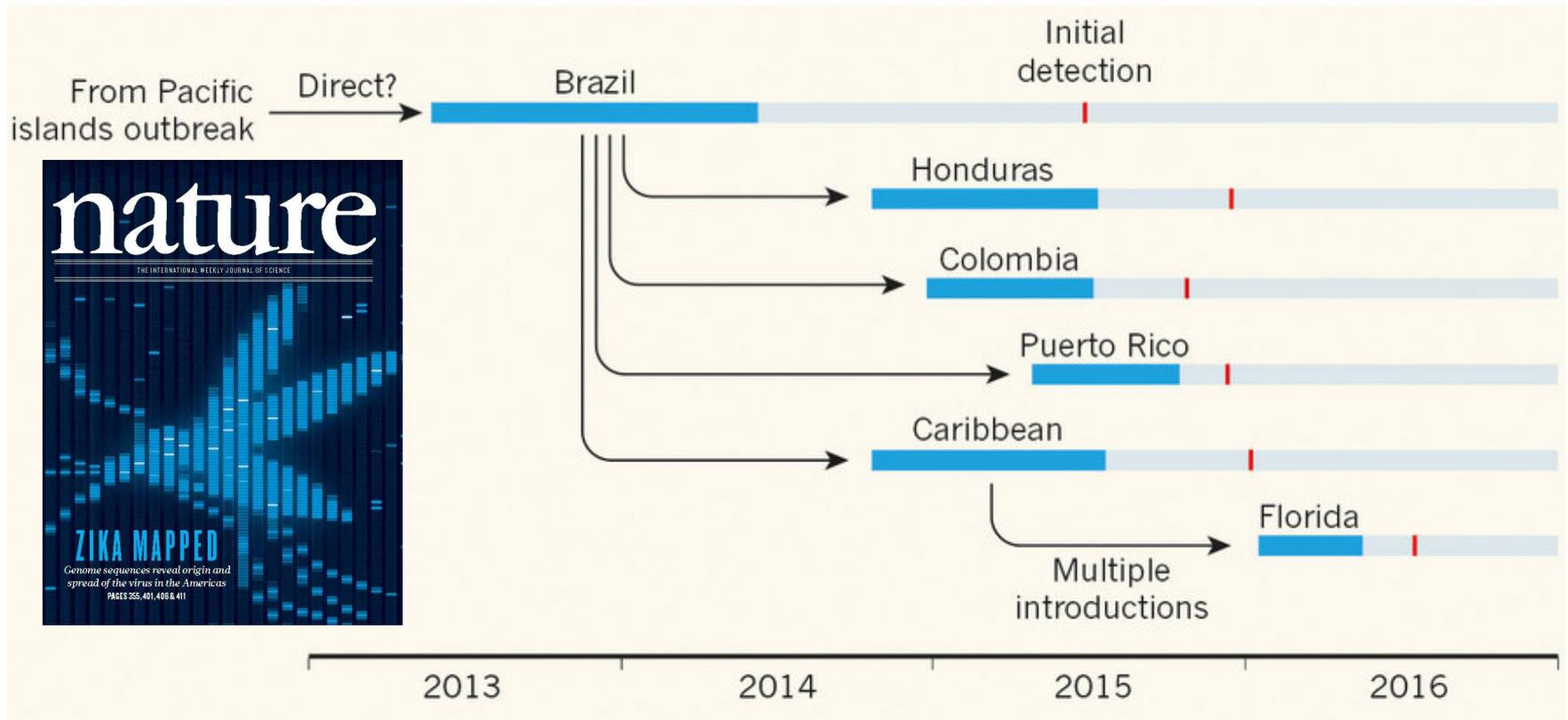
2020

Year





Introduction of Zika to the West



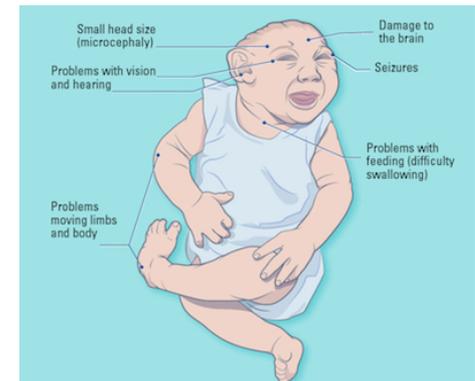
Clinical Manifestations

TRANSACTIONS OF THE ROYAL SOCIETY OF
TROPICAL MEDICINE AND HYGIENE.
Vol. 58. No. 4. July, 1964.

ZIKA VIRUS INFECTION IN MAN

- 1) A strain of Zika virus was isolated from an adult male.
- 2) The clinical picture of the infection was that of a mild febrile illness of short duration accompanied by a generalized maculopapular rash.
- 3) A rise in antibody to Zika virus was demonstrated.

- Only 20% of infections are symptomatic
- Also characterized by:
 - Non-purulent conjunctivitis
 - Diffuse myalgia
 - Polyarticular arthralgia
- Neurologic manifestations
 - Guillan-Barre Syndrome (~1/4000)
 - Encephalitis, Cerebritis
 - Congenital Zika Syndrome



Zika Vaccine (ZPIV)

Rapid Countermeasure Development

2015

NOVEMBER
First case of
Zika in USA



2016

FEBRUARY
WRAIR starts
production of Zika
vaccine, ZPIV



JUNE
ZPIV provides
100% protection
in mice



JULY
License technology
to Sanofi Pasteur to
scale-up production



AUGUST
ZPIV provides
100% protection in
rhesus monkeys



NOVEMBER
Human Phase I
clinical studies
begin with ZPIV



Early Zika Detection

Biosurveillance in South East Asia aided vaccine design

Proven Vaccine Platform

Successfully developed licensed vaccine for Japanese Encephalitis, another flavivirus

In-house Capabilities

Developed and produced > 1,500 doses for clinical testing

Phase I Clinical Trials of ZPIV

First vaccination at WRAIR: 09 November 2016



WRAIR
Silver Spring, MD
Previous flavivirus immunity



**Saint Louis University (SLU) Center for
Vaccine Development**

Dose optimization

Harvard BIDMC
Boston, MA

Accelerated schedule

SLU Center for Vaccine Development
Puerto Rico

Natural flavivirus immunity

NIH Vaccine Research Center
Bethesda, MD

DNA vaccine prime, ZPIV boost

In 9 months, WRAIR went from vaccine concept to clinical testing

Animal Model Development



RESEARCH ARTICLE

Impact of prior flavivirus immunity on Zika virus infection in rhesus macaques

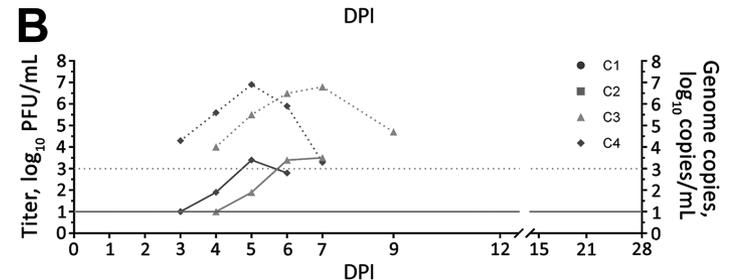
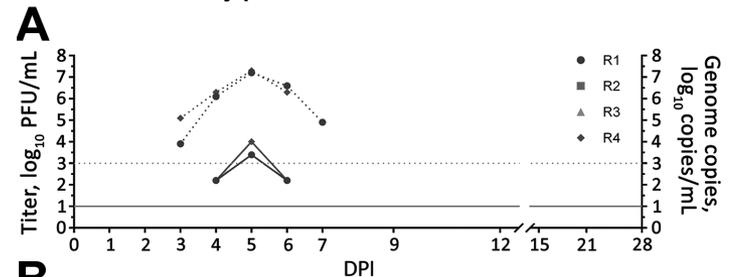
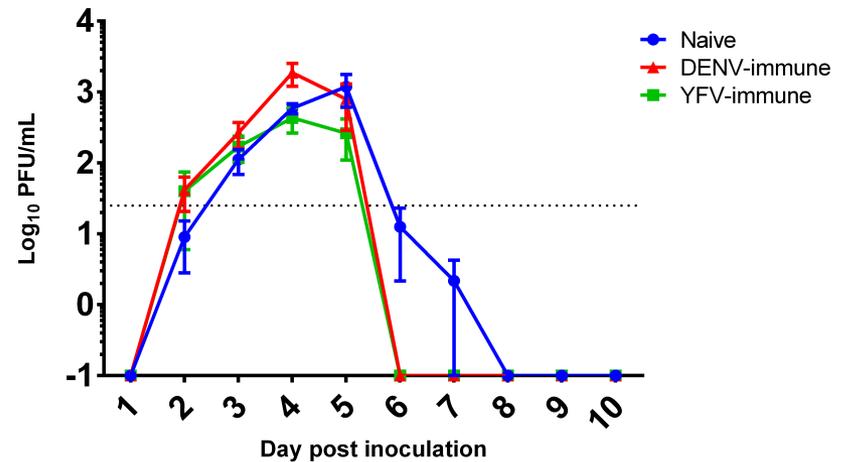
Michael K. McCracken¹, Gregory D. Gromowski¹, Heather L. Friberg¹, Xiaoxu Lin¹, Peter Abbink², Rafael De La Barrera³, Kenneth H. Eckles³, Lindsey S. Garver⁴, Michael Boyd², David Jetton², Dan H. Barouch², Matthew C. Wise⁵, Bridget S. Lewis⁵, Jeffrey R. Currier¹, Kayvon Modjarrad^{6,7}, Mark Milazzo^{6,7}, Michelle Liu^{6,7}, Anna B. Mullins⁵, J. Robert Putnak¹, Nelson L. Michael⁷, Richard G. Jarman^{1*}, Stephen J. Thomas^{8*}



High Infection Rates for Adult Macaques after Intravaginal or Intrarectal Inoculation with Zika Virus

Andrew D. Haddow, Aysegül Nalca, Franco D. Rossi, Lynn J. Miller, Michael R. Wiley, Unai Perez-Sautu, Samuel C. Washington, Sarah L. Norris, Suzanne E. Wollen-Roberts, Joshua D. Shamblyn, Adrienne E. Kimmel, Holly A. Bloomfield, Stephanie M. Valdez, Thomas R. Sprague, Lucia M. Principe, Stephanie A. Bellanca, Stephanie S. Cinkovich, Luis Lugo-Roman, Lisa H. Cazares, William D. Pratt, Gustavo F. Palacios, Sina Bavari, M. Louise Pitt, Farooq Nasar

Viral load (Viremia)



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