



Scientific Symposium in Honor of Dennis L. Kasper, M.D.


Emerging and Re-emerging Infectious Diseases: From AIDS to Zika

Anthony S. Fauci, M.D.
 Director
 National Institute of Allergy and Infectious Diseases
 National Institutes of Health
 June 2, 2018


January 13, 2017

White House Holds Disaster-Response Exercise with Trump Officials



AS Fauci/NIAID

The NIH Record

U.S. Department of Health and Human Services | November 20, 1984 | Vol. XXXVI, No. 24 | National Institutes of Health

Dr. Anthony Fauci, Expert on Immunity and AIDS, Named Director of Nat'l. Institute of Allergy and Infectious Diseases

Dr. Anthony S. Fauci has been named Director of the National Institute of Allergy and Infectious Diseases, effective Nov. 2. NIAID conducts and supports research to better understand the causes of allergic, immunologic and infectious diseases, and to develop better means of preventing, diagnosing and treating such illnesses.

Dr. Fauci, 43, an internationally renowned expert on the immune system, has been chief of NIAID's Laboratory of Immunoregulation since 1980 and deputy clinical director of the Institute since 1977.

"I am extremely pleased that Dr. Fauci will take over the leadership of this important institute," HHS Secretary Margaret M. Heckler said in announcing the appointment. "His unique background, particularly in the fields of immunology and infectious diseases, will be of key importance in maintaining and accelerating our momentum in these crucial areas."



Dr. Fauci is internationally renowned for his expertise on the immune system.

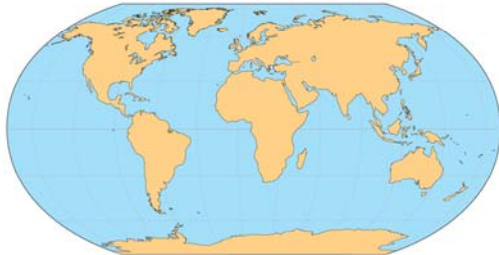
AS Fauci/NIAID

Testimony before the House Appropriations Subcommittee for NIH - 1980s




AS Fauci/NIAID

Global Examples of Emerging and Re-Emerging Infectious Diseases




AS Fauci/NIAID

- Newly emerging
- Re-emerging/resurging
- "Deliberately emerging"

January 2018

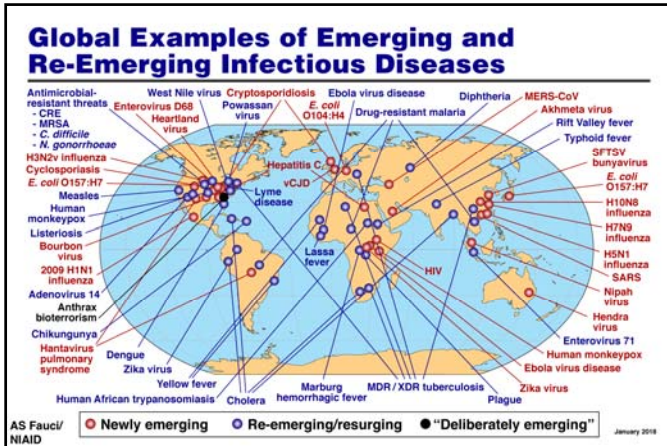
Global Examples of Emerging and Re-Emerging Infectious Diseases



AS Fauci/NIAID

- Newly emerging
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January 2018



Five Administrations and Emerging Infectious Diseases

Ronald W. Reagan 1981-1989	George H.W. Bush 1989-1993
William J. Clinton 1993-2001	George W. Bush 2001-2009
Barack H. Obama 2009-2017	

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HIV/AIDS

Ronald W. Reagan
1981-1989

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CENTERS FOR DISEASE CONTROL

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

June 5, 1981

Pneumocystis Pneumonia - Los Angeles

July 3, 1981

Kaposi's Sarcoma and Pneumocystis Pneumonia Among Homosexual Men - New York City and California

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1 June 1982 Volume 96 Number 6

Annals of Internal Medicine

Published Twice Monthly by the American College of Physicians

The Syndrome of Kaposi's Sarcoma and Opportunistic Infections: An Epidemiologically Restricted Disorder of Immunoregulation

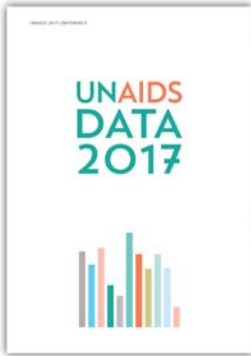
Anthony S. Fauci, M.D.

"...because we do not know the cause of this syndrome, any assumption that the syndrome will remain restricted to a particular segment of our society is truly an assumption without scientific basis."

AS Fauci/NIAID

AS Fauci/NIAID

UNAIDS Global AIDS Update, 2017



- In 2016:
 - 36.7 million living with HIV
 - 1.8 million infected with HIV
 - 1.0 million deaths from AIDS-related illnesses
- Since start of the pandemic
 - 76.1 million infected with HIV
 - 35.0 million deaths from AIDS-related illnesses

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■ HIV/AIDS

George H. W. Bush
1989-1993

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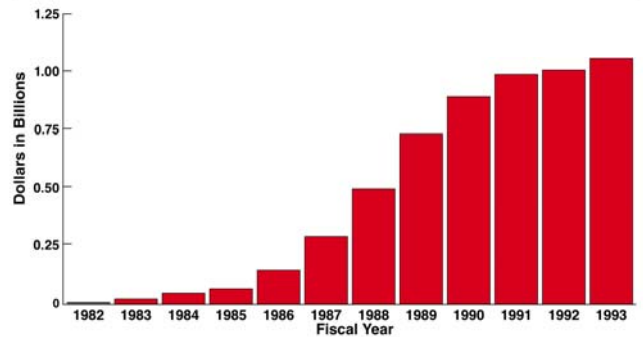


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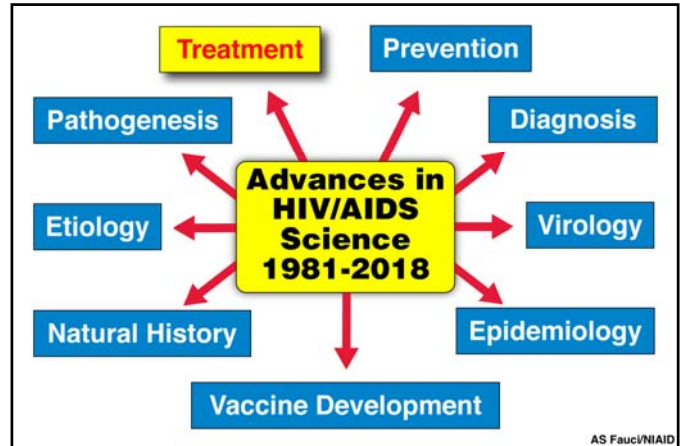
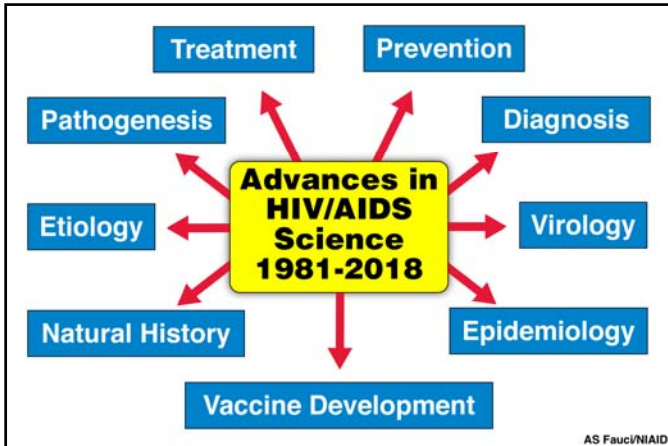


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NIH HIV/AIDS Research Funding, FY 1982 to FY 1993



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Rounds at NIH Clinical Center, Early 1980s - AIDS Patient

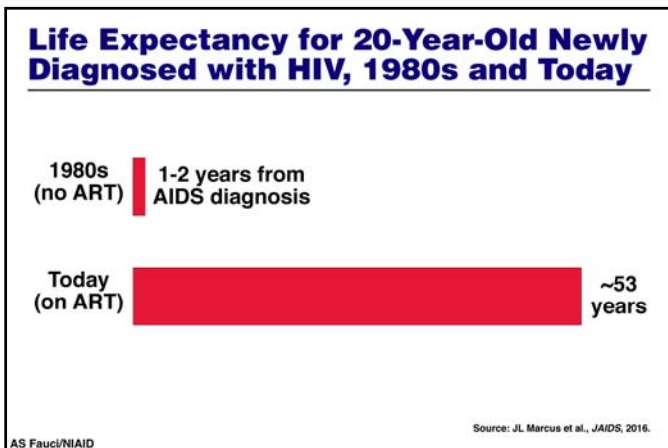
■ Median survival of AIDS patients: ~8-15 months

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FDA-Approved Antiretroviral Drugs

NRTIs ■ 7 multi-drug combinations ■ Abacavir ■ Didanosine ■ Emtricitabine ■ Lamivudine ■ Stavudine ■ Tenofovir (TDF, TAF) ■ Zidovudine	Pharmacokinetic Enhancers ■ Cobicistat ■ Ritonavir	Multi-Class Combinations ■ Atripla ■ Biktarvy ■ Complera ■ Genvoya ■ Juluca ■ Odefsey ■ Stribild ■ Symfi Lo ■ Triumeq
NNRTIs ■ Delavirdine ■ Efavirenz ■ Etravirine ■ Nevirapine ■ Rilpivirine	PIs ■ Atazanavir ■ Darunavir ■ Fosamprenavir ■ Indinavir ■ Lopinavir/Ritonavir ■ Nelfinavir ■ Ritonavir ■ Saquinavir ■ Tipranavir	Fusion Inhibitor ■ Enfuvirtide
Integrase Inhibitors ■ Bictegravir ■ Dolutegravir ■ Elvitegravir ■ Raltegravir	Post-Attachment Inhibitor ■ Ibalizumab	Entry Inhibitor ■ Maraviroc

AS Fauci/NIAID Source: AIDSinfo.nih.gov, April 2018

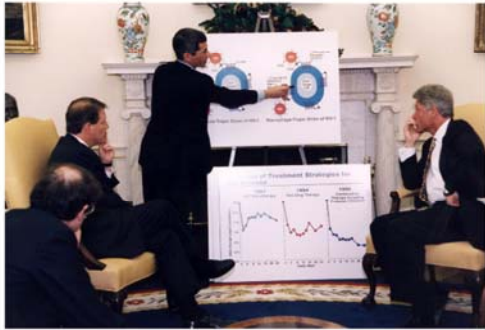


William J. Clinton 1993-2001

- HIV/AIDS
- West Nile Virus
- H5N1 Influenza
- Antimicrobial Resistance

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Meeting at the White House to Discuss AIDS Research, Dec. 3, 1996



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Commencement Address by President Clinton at Morgan State University, Baltimore, May 18, 1997

"If America commits to find an AIDS vaccine and we enlist others in our cause, we will do it... **Today I'm pleased to announce the National Institutes of Health will establish a new AIDS vaccine research center dedicated to this crusade.**"



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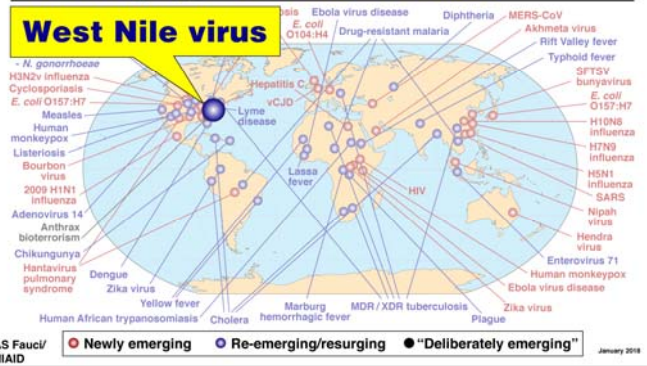
VRC Research: From HIV to Zika



- HIV
- West Nile virus
- Chikungunya
- Ebola/Marburg
- Influenza
- Malaria
- MERS-CoV
- RSV
- Tuberculosis
- Venezuelan, Eastern, and Western equine encephalitis viruses
- Zika

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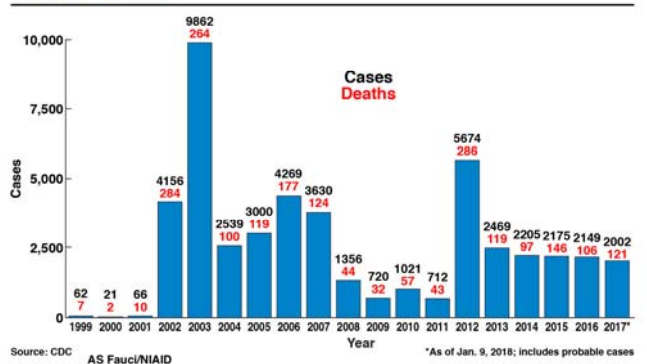
Global Examples of Emerging and Re-Emerging Infectious Diseases



Global Distribution of West Nile Virus, 1999



U.S. West Nile Virus Cases & Deaths, 1999-2017




Volume 203
Issue 10
May 15, 2011

The Journal of Infectious Diseases

A West Nile Virus DNA Vaccine Utilizing a Modified Promoter Induces Neutralizing Antibody in Younger and Older Healthy Adults in a Phase I Clinical Trial

JE Ledgerwood, BS Graham et al. for the VRC 303 Study Team

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- HIV/AIDS
- Anthrax
- H5N1 Influenza
- SARS

George W. Bush
2001-2009

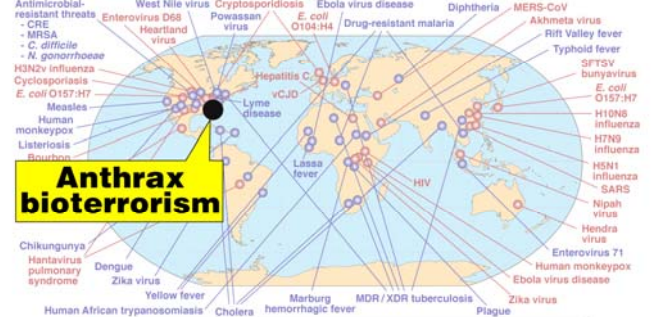
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Juxtaposition of Events of September 11, 2001 and the Deliberate Release of Anthrax



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Global Examples of Emerging and Re-Emerging Infectious Diseases




Anthrax bioterrorism

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Legend: ● Newly emerging, ○ Re-emerging/resurging, ● "Deliberately emerging"

January 2018



Bioterrorism: A Clear and Present Danger

HC Lane, J La Montagne and AS Fauci

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February 2002

NIAID Strategic Plan for Biodefense Research

February 2002

NIAID Biodefense Research Agenda for CDC Category A Agents

Responding Through Research

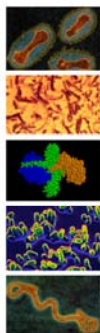
Responding Through Research

National Institutes of Allergy and Infectious Diseases
NATIONAL INSTITUTES OF HEALTH

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Category A Select Agents: Key Achievements

- **Smallpox**
 - Dryvax; MVA; antivirals
- **Anthrax**
 - Next-generation vaccines; antitoxins
- **Botulinum**
 - Antitoxins; mAbs
- **Plague**
 - Antibiotics
- **Ebola**
 - First human vaccine trials; therapeutics; diagnostics



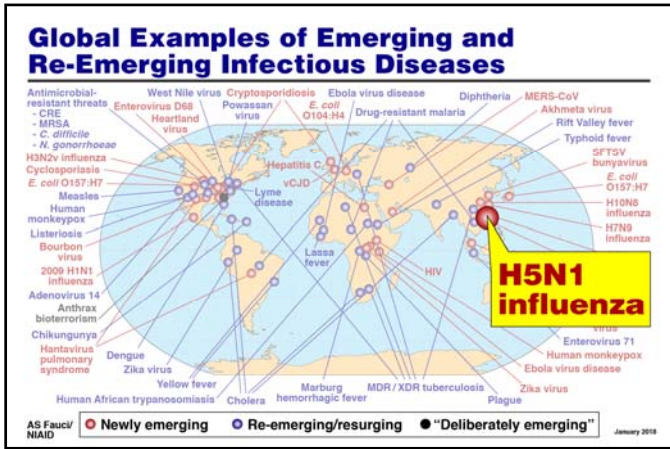
AS Fauci/NIAID

February 5, 2002

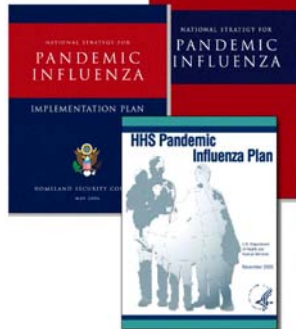


President GW Bush: "Tony, what scares you the most among potential microbial threats that a terrorist might use?"
 Fauci: "Mr. President, I worry more about the natural occurrence of an influenza pandemic and the ongoing plague of HIV than I do about a bioterror attack."

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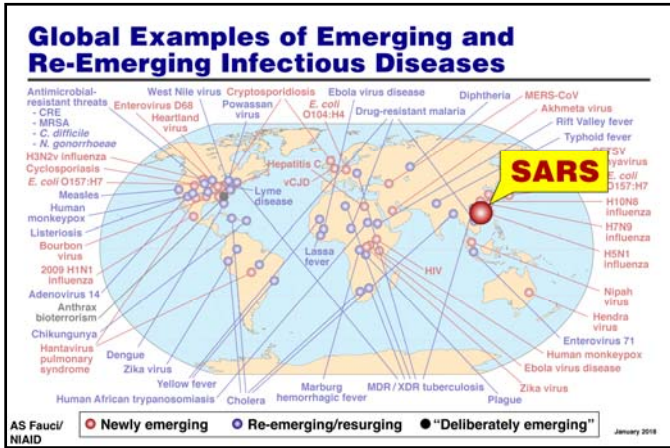


Pandemic Influenza Preparedness Strategy and Implementation



- International Surveillance
- Domestic Surveillance
- Vaccines
- Antivirals
- Communications
- State and Local Preparedness

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SARS: A New Challenge to Global Health



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Early Cases of SARS: Guangdong Province, China



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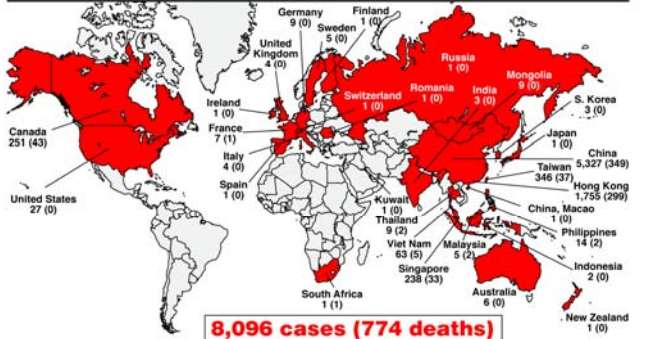
2003 Spread of SARS from Hotel Metropole in Hong Kong



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Sources: MMWR, March 28, 2003; WHO, 2003

Cumulative Reported Cases of SARS November 1, 2002 to July 31, 2003



Source: WHO

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OTTAWA CITIZEN



July 6, 2003

WHO Declares Victory over SARS: Taiwan Last Country to Be Taken off List of Infected Areas

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The Birth of the President's Emergency Plan for AIDS Relief (PEPFAR)

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Addressing HIV/AIDS: Visits to 4 Countries in Sub-Saharan Africa – April 2002



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The President's Emergency Plan for AIDS Relief – \$15B Over 5 Years

Goals:

- Prevent 7 million new infections
- Treat 2 million HIV-infected people
- Care for 10 million HIV-infected people, orphans and other vulnerable children



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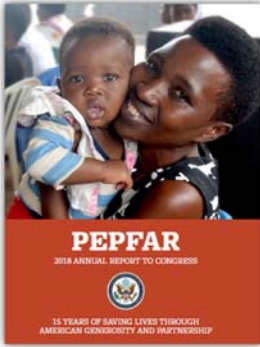


State of the Union Address, January 28, 2003

- President Bush announces the President's Emergency Plan for AIDS Relief (PEPFAR)

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15 Years of PEPFAR



- 14 million people on antiretroviral therapy
- 16 million infections averted
- Testing services for 85.5 million
- Care for 6.4 million orphans and vulnerable children

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May 9, 2018: PEPFAR 15-Year Anniversary Event, Dallas



The Lazarus Effect, 15 Years Later



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Barack H. Obama
2009-2017

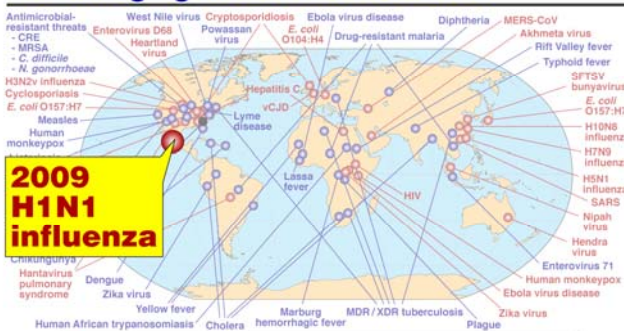
- H1N1 Pandemic Influenza
- MERS
- Chikungunya
- Ebola
- Zika
- Antimicrobial Resistance

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Global Examples of Emerging and Re-Emerging Infectious Diseases



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Beginning of Global H1N1 Influenza Outbreak in March 2009



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Source: WHO

Global H1N1 Influenza Cases, as of April 29, 2009



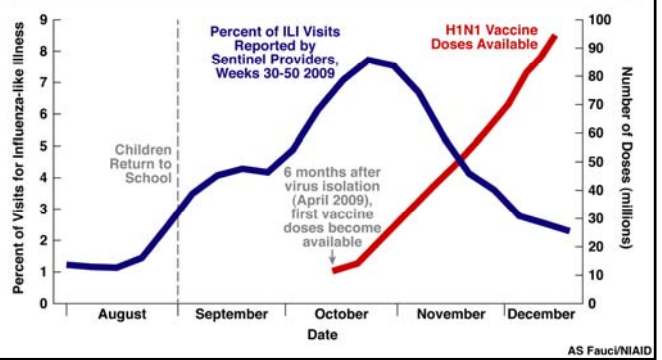
Senate Appropriations Subcommittee Hearing on H1N1 Influenza, April 28, 2009



Countries with Confirmed Pandemic (H1N1) 2009 Influenza Cases as of Sept. 30, 2009



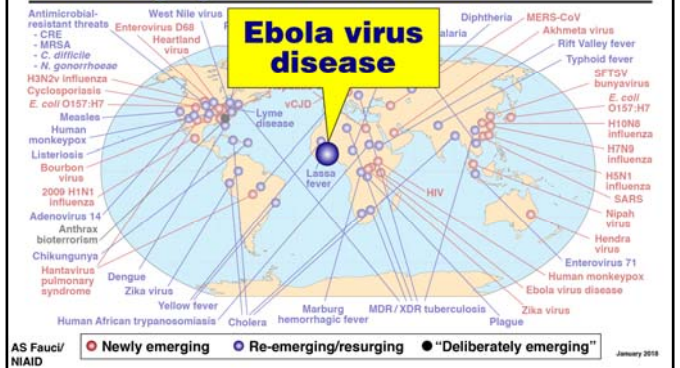
Vaccine Lags Behind 2009 H1N1 Influenza Pandemic

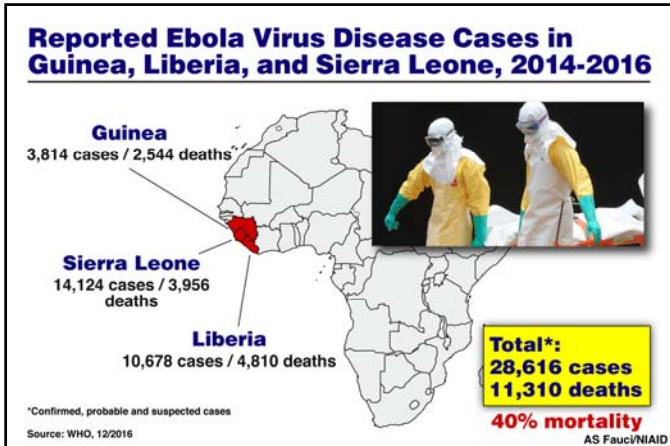


House Oversight and Government Reform Committee Hearing on H1N1 Influenza Vaccines, Sept. 29, 2009



Global Examples of Emerging and Re-Emerging Infectious Diseases



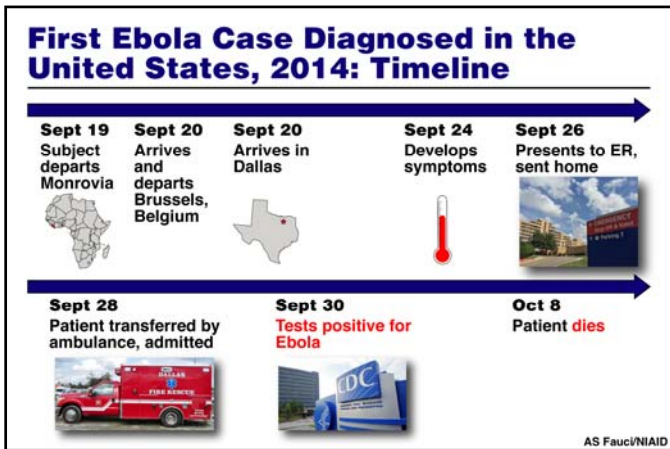


The New England Journal of Medicine
ISSN 0029-7825 • THE NEW ENGLAND JOURNAL OF MEDICINE AND SURGERY
 Vol. 377 October 12, 2017 No. 15

Phase 2 Placebo-Controlled Trial of Two Vaccines to Prevent Ebola in Liberia

SB Kennedy, HC Lane et al. for the PREVAIL I Study Group

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First Two Ebola Transmissions Within the U.S.

The New York Times
 October 12, 2014

Texas Health Worker Tests Positive for Ebola

2nd Ebola Case in U.S. Stokes Fears of Health Care Workers

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USA TODAY
 October 14, 2014

Fear Spreads Faster than Ebola: Our View

By USA Today Editorial Board

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NIH Special Clinical Studies Unit: Designated Ebola Treatment Facility

Nebraska Medical Center
 NIH/Bethesda
 Emory University Hospital

*As of Oct. 2014, three Designated Ebola Treatment Facilities existed in the U.S.

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The Washington Post
October 25, 2014
Nina Pham, Nurse Who Contracted Ebola, is Now Free of Virus and Leaves NIH



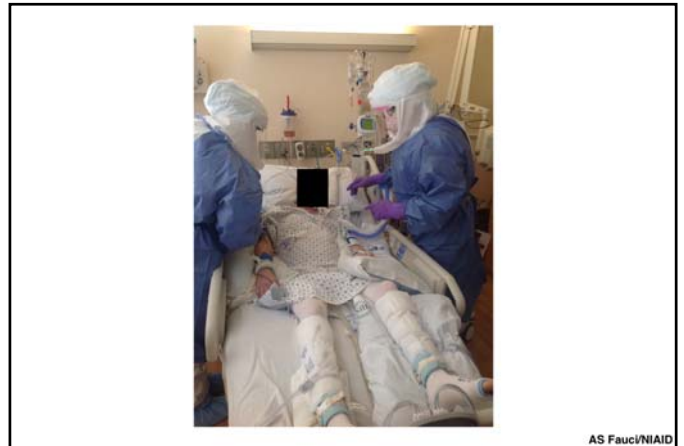
Photo: The Washington Post Photo: Nina Pham

AS Fauci/NIAID

CNN
March 12, 2015
U.S. Ebola Patient Headed to NIH



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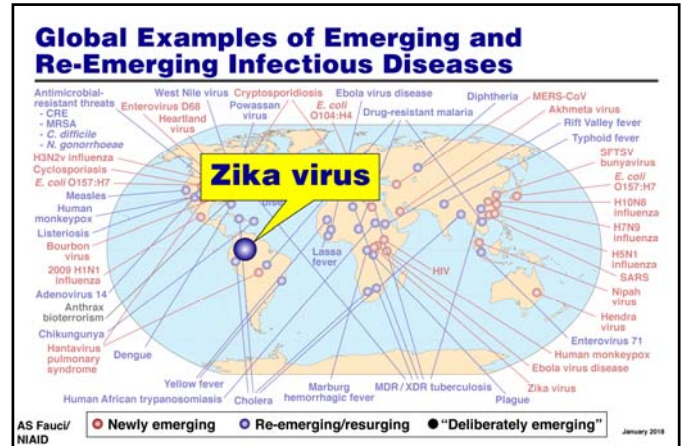
NIH National Institutes of Health
Turning Discovery Into Health

U.S. Department of Health and Human Services
NIH News
National Institutes of Health

Thursday, April 9, 2015

Patient Admitted With Ebola Virus Disease Discharged From NIH Clinical Center

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The New England Journal of Medicine
VOLUME 374 FEBRUARY 18, 2016 NUMBER 7

Zika Virus in the Americas – Yet Another Arbovirus Threat

AS Fauc and DM Morens

AS Fauc/NIID

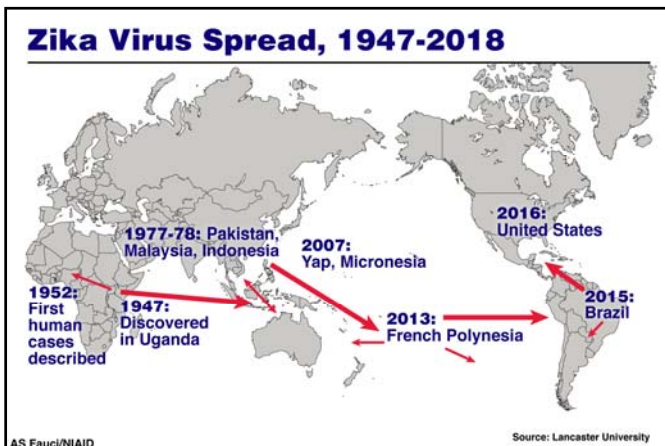
Recently Emerging Human Arboviral Diseases in the Americas

Dengue	1990s
West Nile	1999
Chikungunya	2013
Zika	2015

Others: Bourbon, Cache Valley, Heartland, Itaqi, Mayaro, Oropouche, Powassan

Source: PF Vasconcelos & CH Calisher, Vector Borne Zoonotic Dis 16:295, 2016.

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Symptoms of Zika Virus Infection

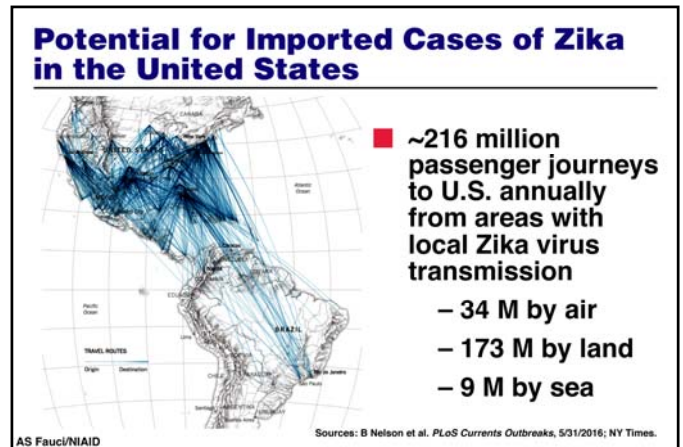
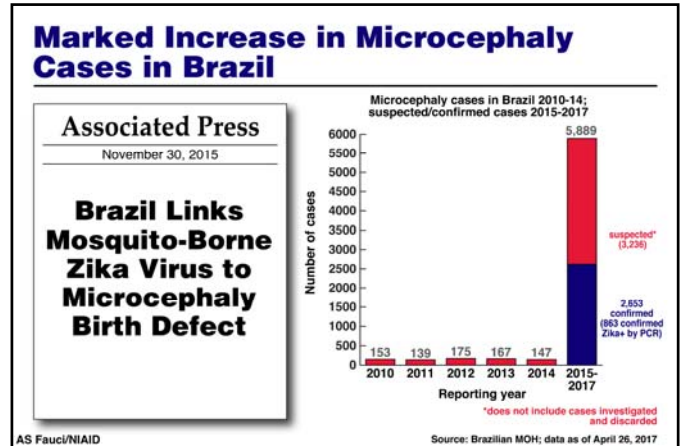
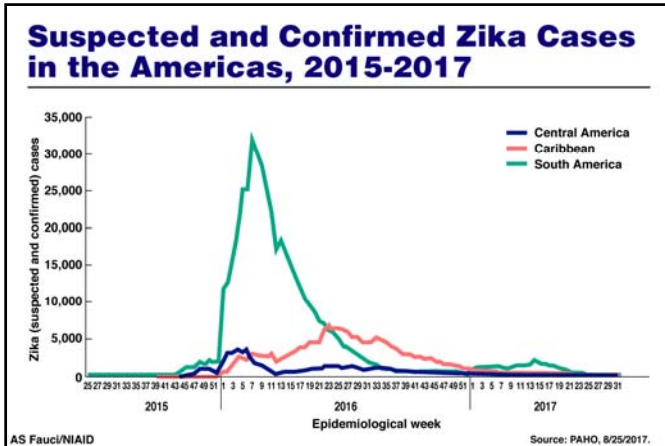
■ 4 in 5 individuals asymptomatic

Incubation 3-12 days

Mild symptoms 2-7 days

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Source: BMJ.com, 2/2016

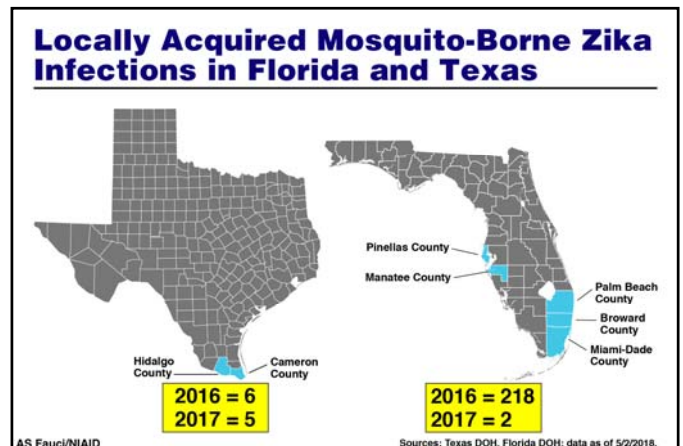


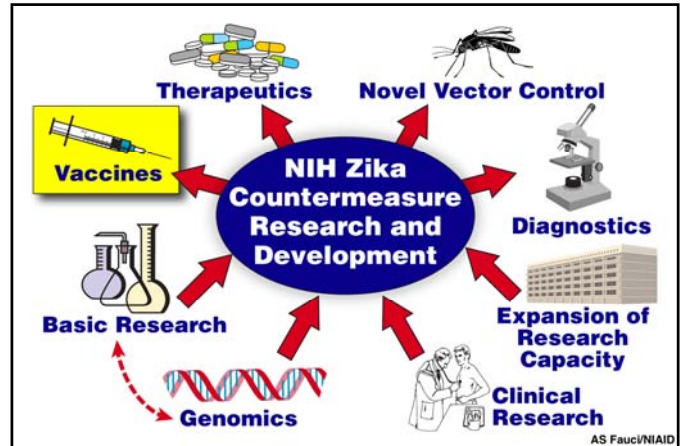
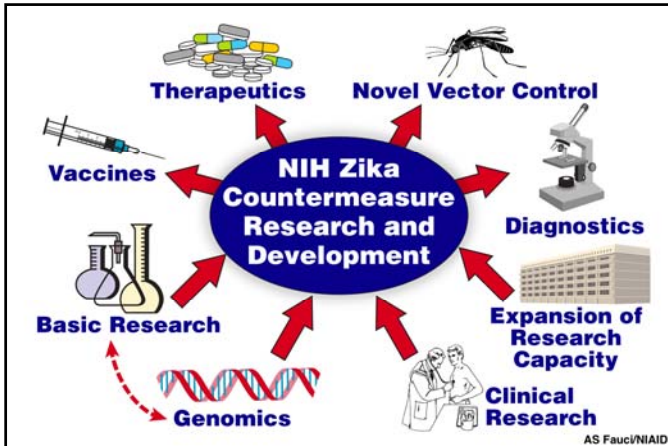
Reported Cases of Zika Virus Disease in the United States, 2015-2018

- U.S. States / District of Columbia
 - **5,700 cases***
 - 5,414 travel-associated
 - 231 locally acquired mosquito-borne
 - 52 sexually acquired
 - 2 laboratory-acquired, 1 unknown
- U.S. Territories
 - **37,229 cases***
 - 37,082 locally acquired
 - 147 travel-associated

*Symptomatic cases; excludes congenital cases

AS Fauci/NIAID Source: CDC, data as of May 2, 2018





Phase 2/2b Clinical Trial of VRC Zika DNA Vaccine

- Part A (non-placebo controlled)**
 - Launched 3/31/2017
 - Fully enrolled – n=90
- Part B (placebo-controlled)**
 - Launched 7/19/2017
 - N=687 as of May 25, 2018; target between 2,400-5,000

Legend: ■ Currently enrolling, ■ Planned

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Five Administrations and Emerging Infectious Diseases

Ronald W. Reagan 1981-1989	George H.W. Bush 1989-1993
William J. Clinton 1993-2001	George W. Bush 2001-2009
Barack H. Obama 2009-2017	

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Six Administrations and Emerging Infectious Diseases

Ronald W. Reagan 1981-1989	George H.W. Bush 1989-1993
William J. Clinton 1993-2001	George W. Bush 2001-2009
Barack H. Obama 2009-2017	Donald J. Trump 2017-present

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What's Next?

AS Fauci/NIAID

THE HILL
April 2, 2017

Health Officials Brace for Return of Zika



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The
New England Journal of Medicine
Established in 1811 as THE NEW ENGLAND JOURNAL OF MEDICINE AND SURGERY
VOLUME 376 APRIL 13, 2017 NUMBER 15

Yellow Fever — Once Again on the Radar Screen in the Americas

Cl Paules and AS Fauci

AS Fauci/NIAID

npr[®]


March 19, 2018

Nigeria Faces Mystifying Spike In Deadly Lassa Fever

It's the worst Lassa fever outbreak ever recorded in Nigeria, according to the World Health Organization.




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 **World Health Organization**
May 8, 2018


New Ebola Outbreak Declared in Democratic Republic of the Congo

- 54 cases, 25 deaths, 922 contacts being traced (as of May 28, 2018)
- Three towns (including the provincial capital)




Bikoro, D.R. Congo

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 **World Health Organization**
REGIONAL OFFICE FOR South-East Asia
May 2018

Outbreak of Nipah Virus Encephalitis in Kerala State of India

- First Nipah outbreak in South India reported 5/19/2018
- 14 deaths, 16 confirmed cases and 12 suspected cases as of 5/30/2018



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Lessons Learned from Previous Pandemics

- Global surveillance
- Transparency and communication
- Infrastructure and capacity building
- Coordinated and collaborative basic and clinical research
- Adaptable platform technologies for vaccines, diagnostics and therapeutics
- Stable funding mechanism – “Public Health Emergency Fund”

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