

Overview of the National Institute of Allergy and Infectious Diseases

Anthony S. Fauci, M.D.

Director

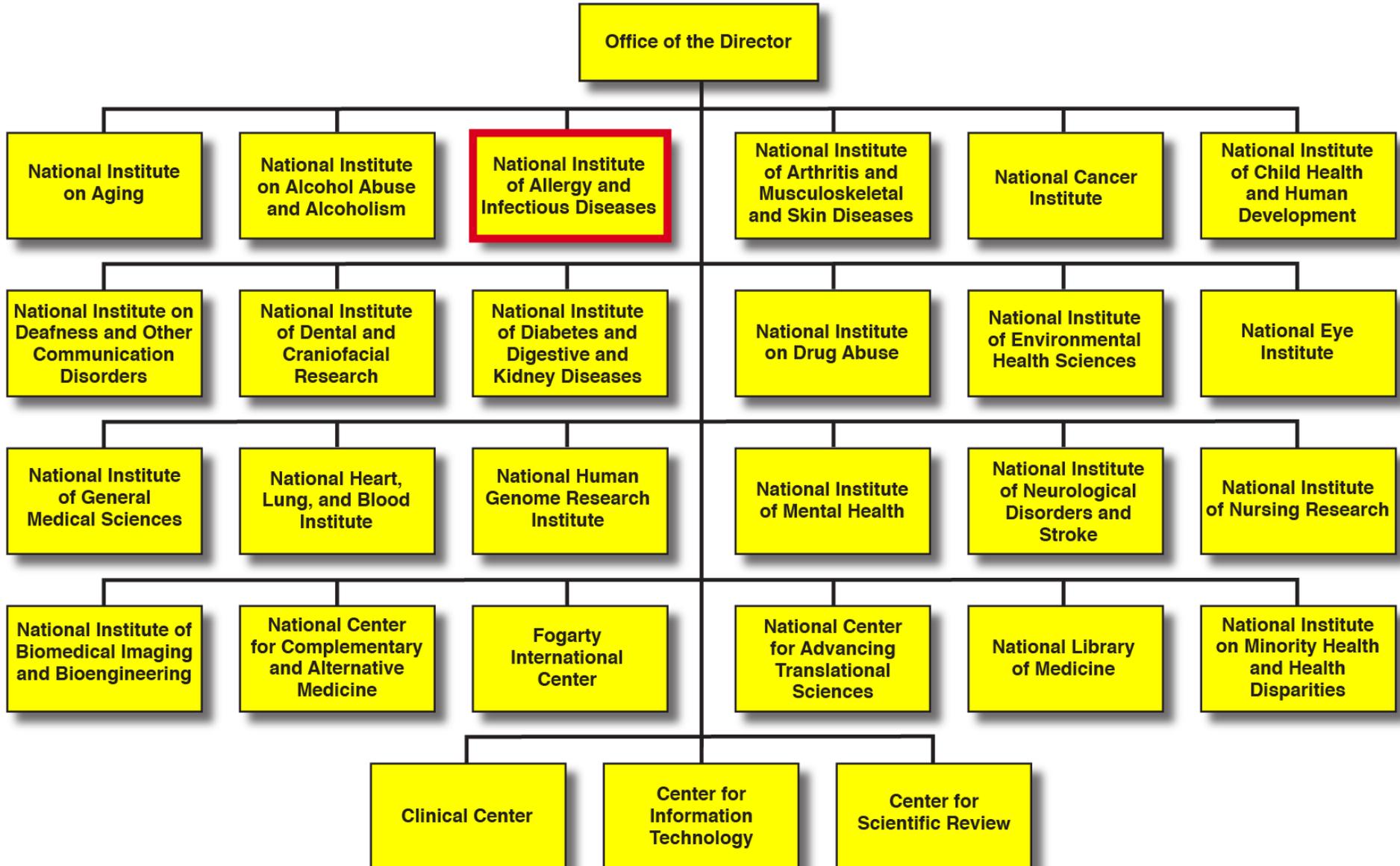
**National Institute of Allergy and
Infectious Diseases**

National Institutes of Health

November 7, 2013



National Institutes of Health



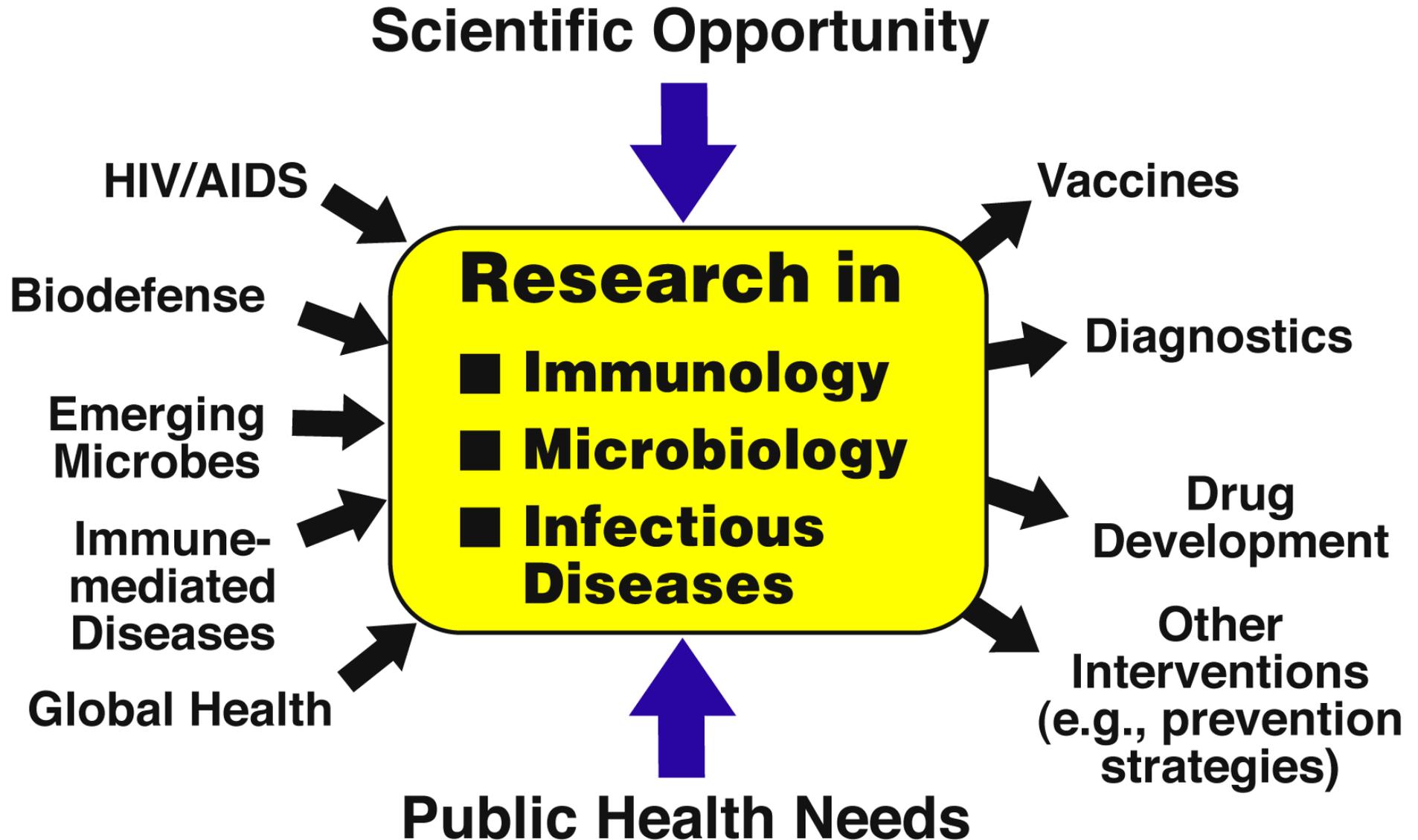
National Institutes of Health Budget Comparison by Institute/Center (Dollars in Thousands)

IC	FY 2014 President's Budget
NCI	\$ 5,125,951
NIAID¹	4,578,813
NHLBI	3,098,508
NHGRI	517,319
NCATS ²	665,688
NIGMS ²	2,401,011
Other ICs	\$ 13,344,588
Subtotal	\$ 29,731,878
OD	1,473,398
B&F	126,111
Total	\$ 31,331,387

¹Includes transfer of \$27M in FY 2014 from NIMH

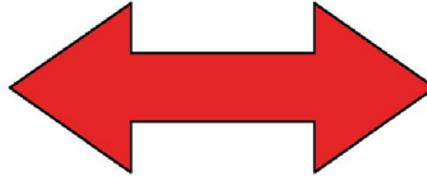
²Realigns selected programs to NCATS

National Institute of Allergy and Infectious Diseases (NIAID)
National Institutes of Health (NIH)

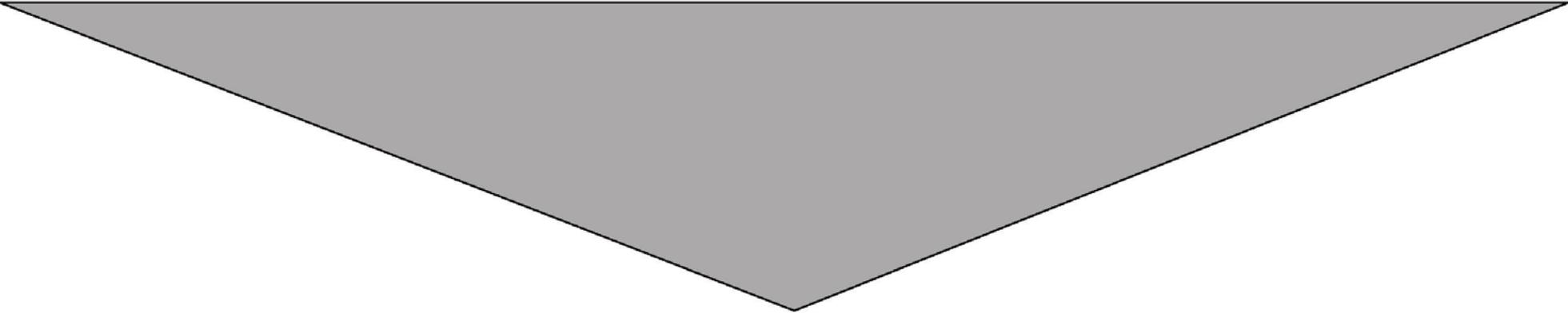


NIAID Research: A Dual Mandate

Maintain and “grow” a robust basic and applied research portfolio in microbiology, infectious diseases, immunology and immune-mediated diseases

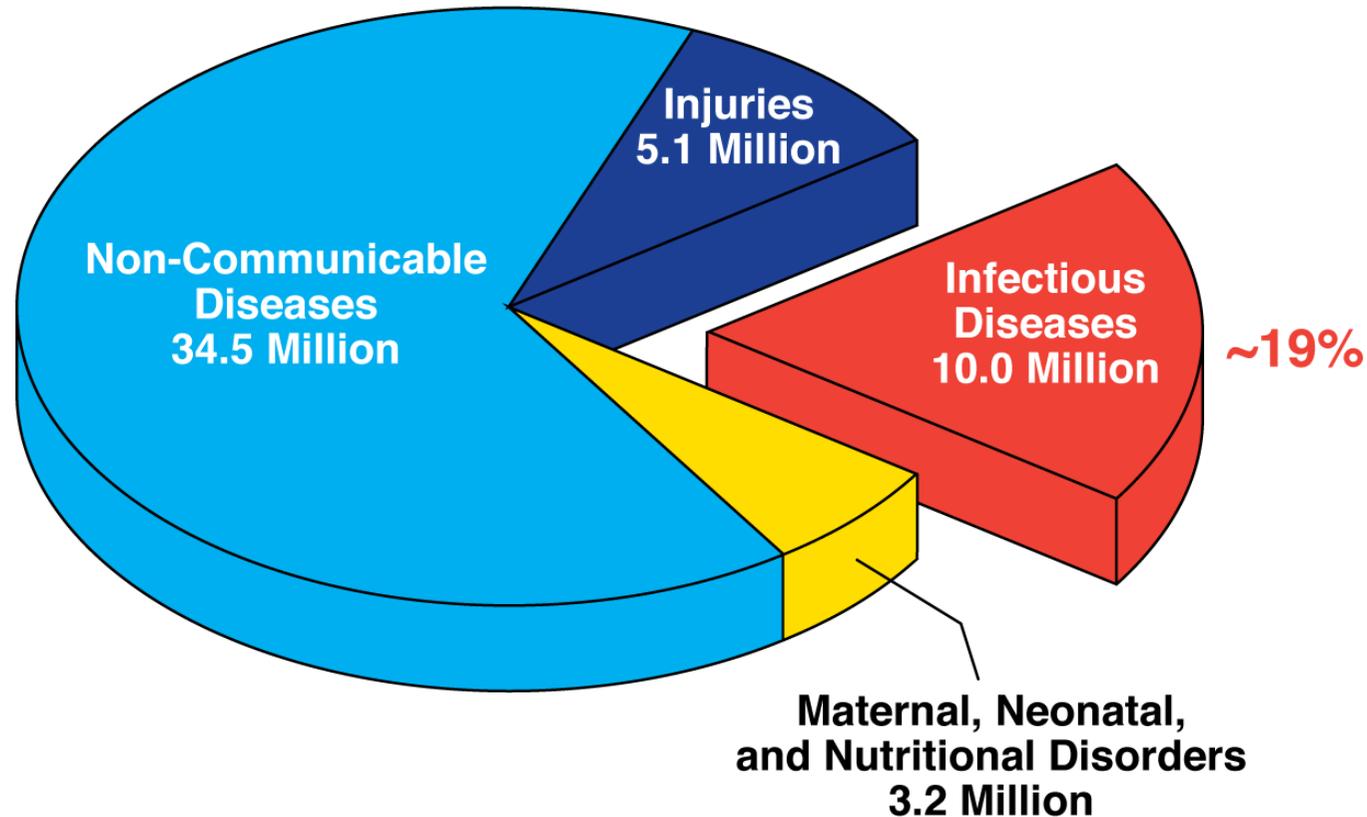


Respond rapidly to new and emerging disease threats



New/Improved Interventions

Infectious Diseases Cause ~19% of All Deaths Worldwide



Total Deaths (2010): ~52.8 Million

Global Health and Infectious Diseases

Established Infectious Diseases

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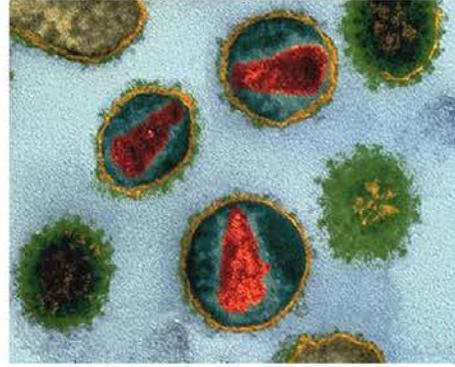
Emerging and Re-Emerging Infectious Diseases

Selected Established Infectious Diseases of Global Public Health Importance

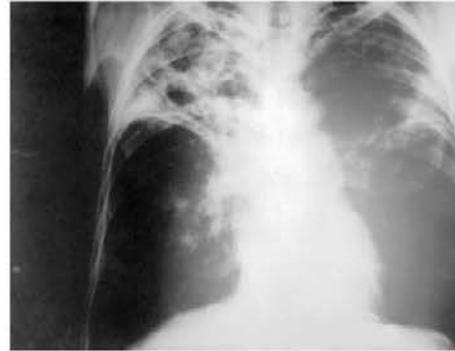
	Estimated 2010 Deaths
Respiratory Infections	2.8 million
HIV/AIDS	1.5 million
Diarrheal Infections	1.5 million
Tuberculosis	1.2 million
Vaccine Preventable Childhood Diseases (measles, pertussis, tetanus, etc.)	277,800
Hepatitis (A, B, C, E)	307,700
Malaria	1.2 million
Neglected Tropical Diseases	155,000

The “Big Three”

■ HIV/AIDS



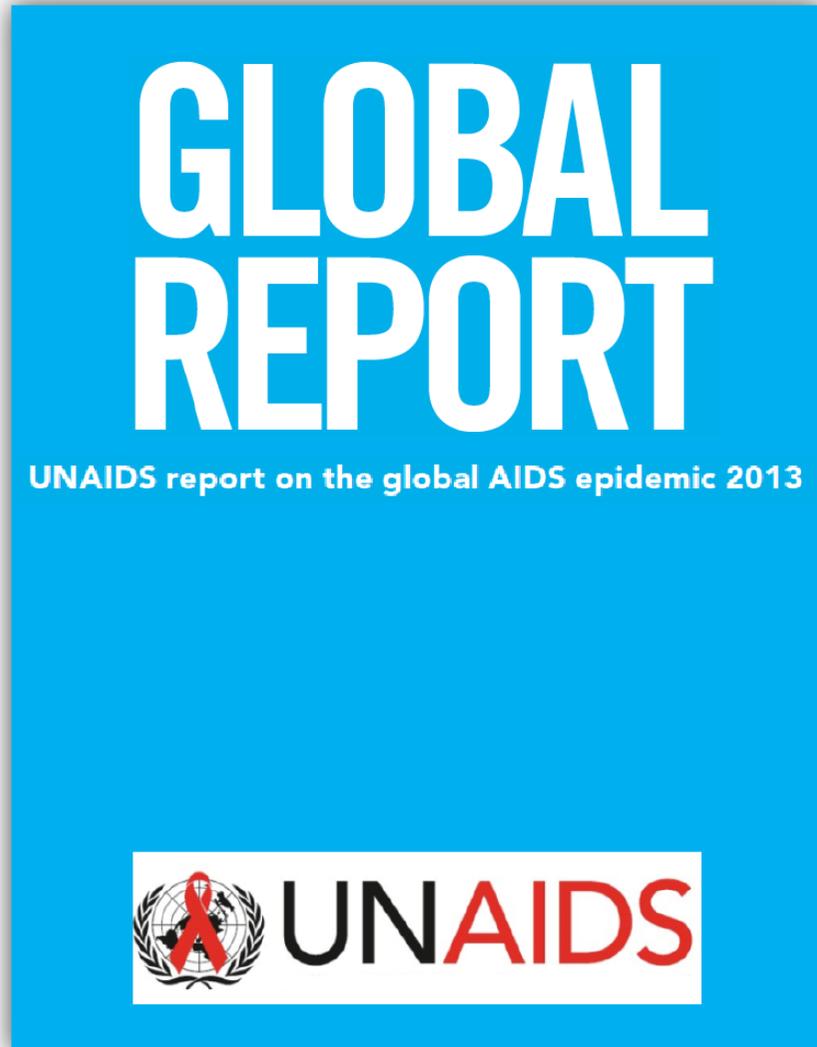
■ Tuberculosis



■ Malaria

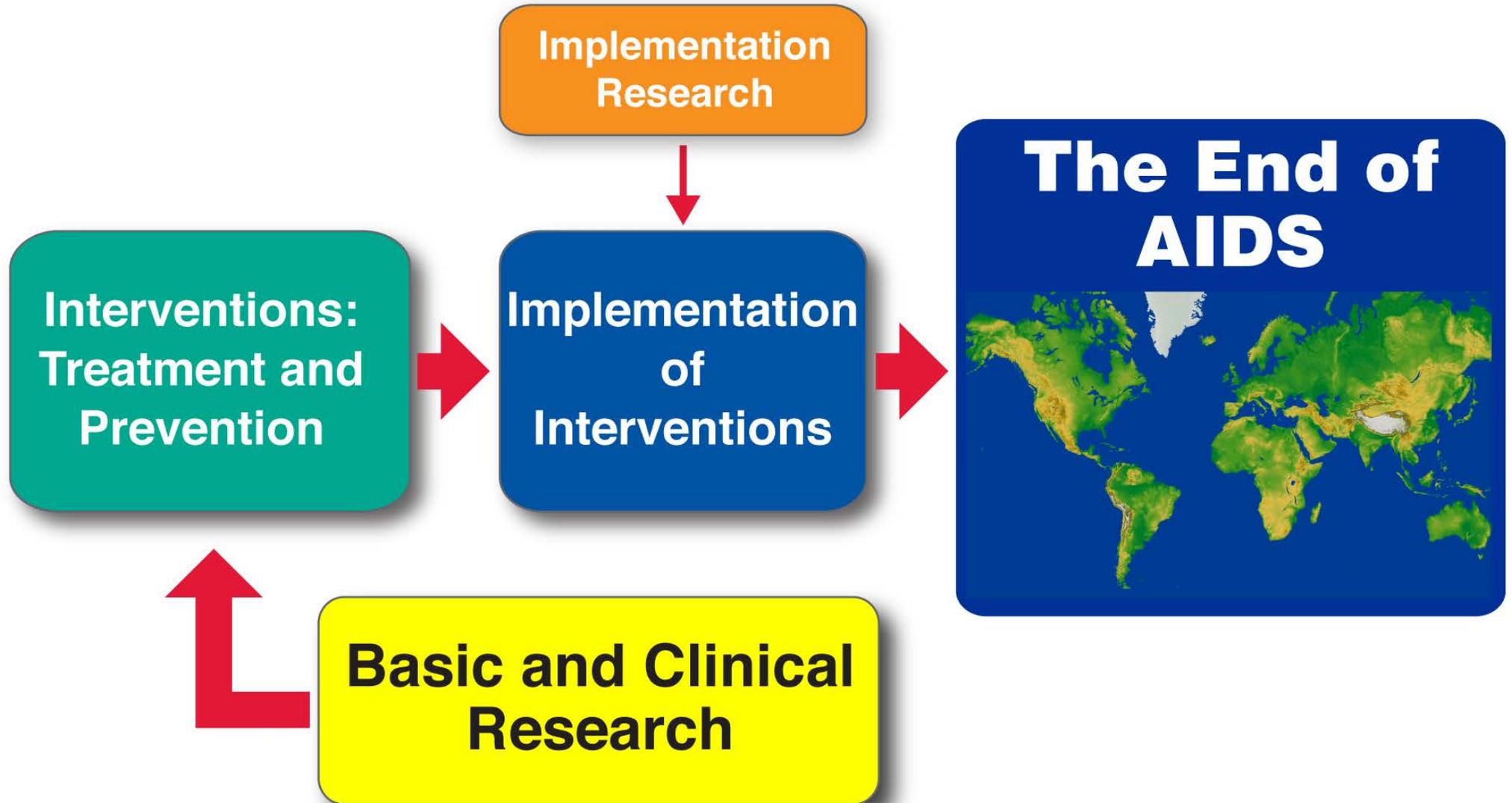


Current Status of the Global HIV/AIDS Pandemic



- **>70 million total HIV infections**
- **36 million total AIDS deaths**
- **35.3 million people living with HIV**
- **1.6 million AIDS deaths in 2012**
- **2.3 million new HIV infections in 2012**

Ending the HIV/AIDS Pandemic



The Science of HIV/AIDS: Much Accomplished

■ **Natural History**

■ **Etiology**

■ **Virology**

■ **Diagnosis**

■ **Epidemiology**

■ **Pathogenesis**

■ **Prevention**

■ **Treatment**

■ **Vaccine Development**



FDA-Approved Antiretroviral Drugs

NRTI

- Zidovudine
- Didanosine
- Zalcitabine*
- Stavudine
- Lamivudine
- Abacavir
- Tenofovir
- Emtricitabine
- 4 multi-drug combinations

NNRTI

- Nevirapine
- Etravirine
- Delavirdine
- Rilpivirine
- Efavirenz



PI

- Saquinavir
- Ritonavir
- Indinavir
- Nelfinavir
- Amprenavir*
- Lopinavir +Ritonavir
- Atazanavir
- Fosamprenavir
- Tipranavir
- Darunavir

Fusion Inhibitor

- Enfuvirtide (T-20)

Entry Inhibitor

- Maraviroc

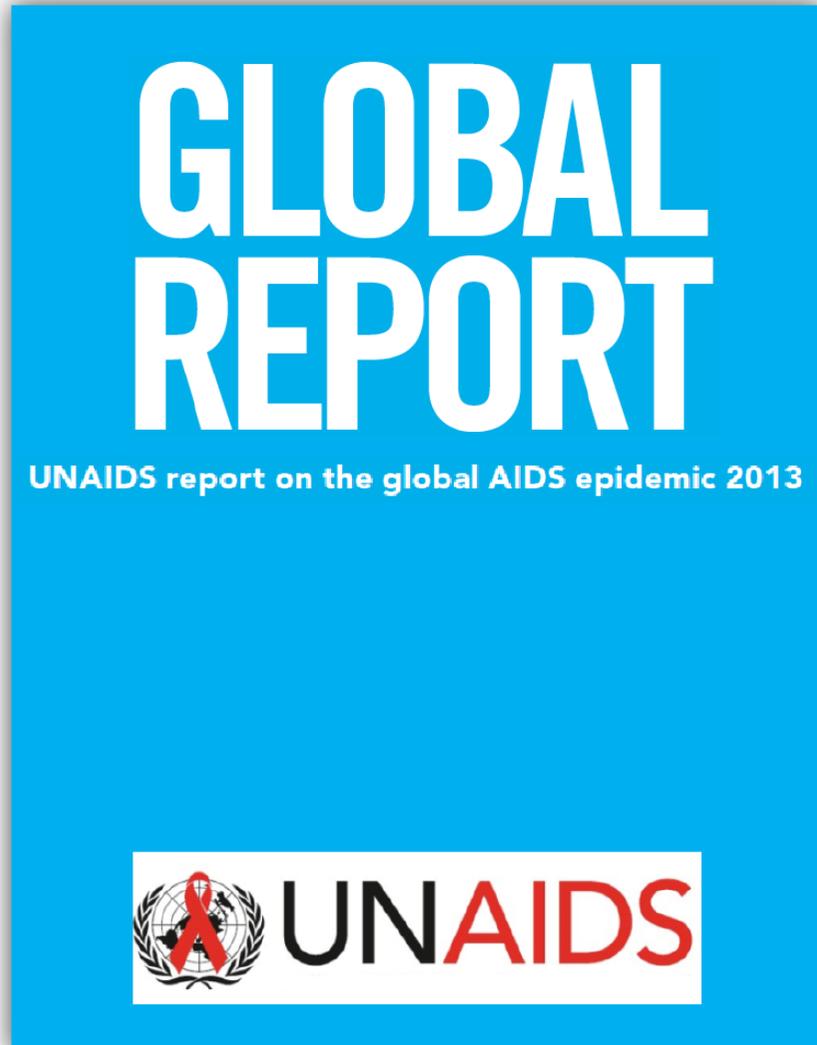
Integrase Inhibitors

- Raltegravir
- Elvitegravir**
- Dolutegravir

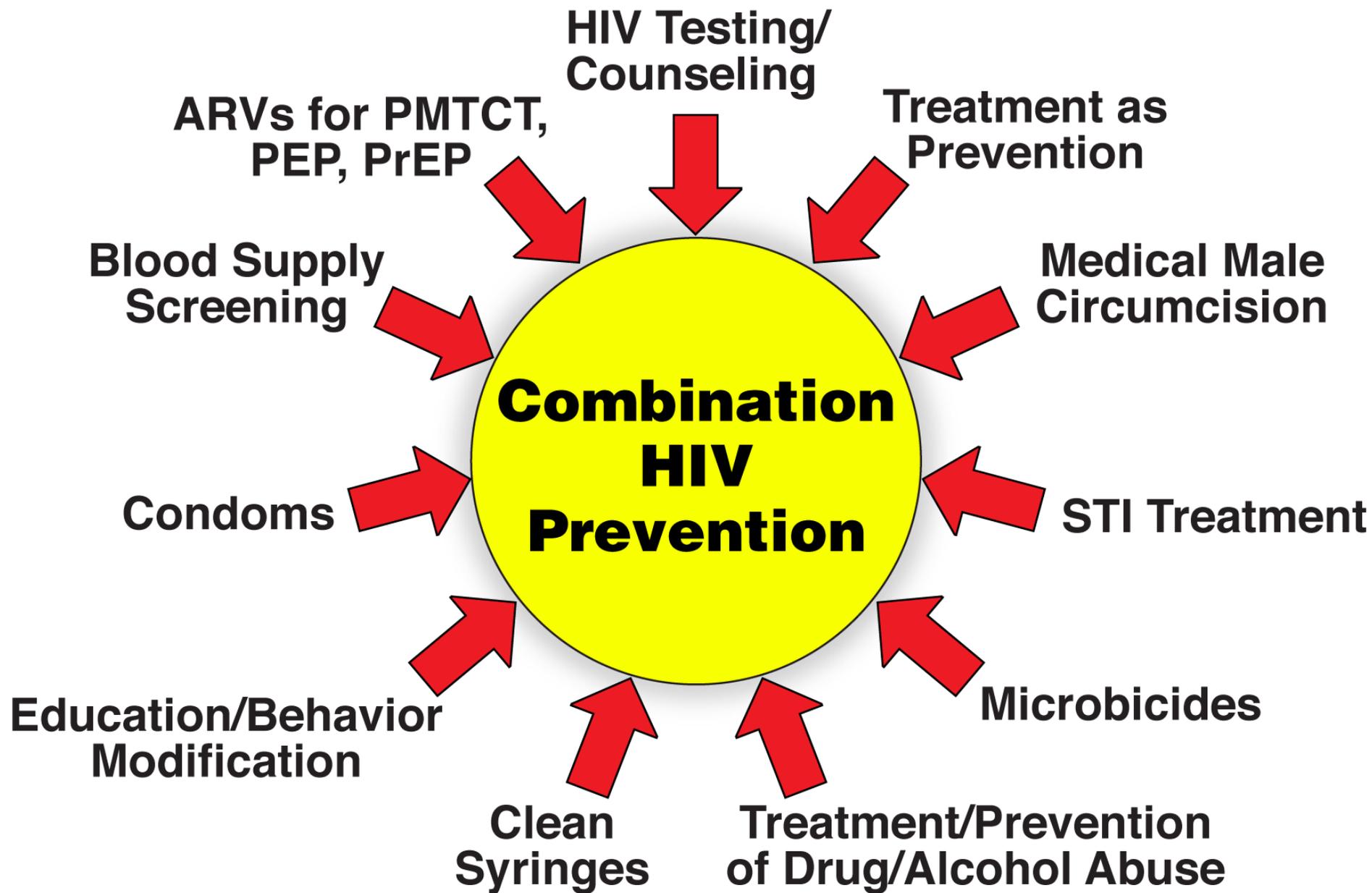
Multi-Class Combinations

- Atripla
- Complera
- Stribild

Current Status of the Global HIV/AIDS Pandemic



- >70 million total HIV infections
- 36 million total AIDS deaths
- 35.3 million people living with HIV
- 1.6 million AIDS deaths in 2012
↓ 30% since 2005
- 2.3 million new HIV infections in 2012



Current Status of the Global HIV/AIDS Pandemic

GLOBAL REPORT

UNAIDS report on the global AIDS epidemic 2013



- **>70 million total HIV infections**
- **36 million total AIDS deaths**
- **35.3 million people living with HIV**
- **1.6 million AIDS deaths in 2012**

■ **2.3 million new HIV infections in 2012**

↓ **33% since 2001**

JAMA[®]

The Journal of the American Medical Association

July 25, 2001

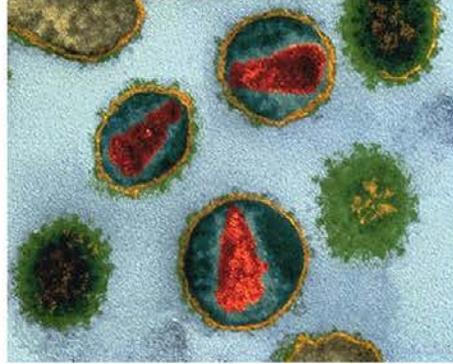


The AIDS Research Model Implications for Other Infectious Diseases of Global Health Importance

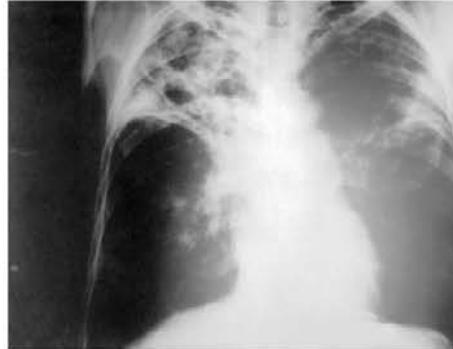
GK Folkers and AS Fauci

The “Big Three”

■ HIV/AIDS



■ Tuberculosis

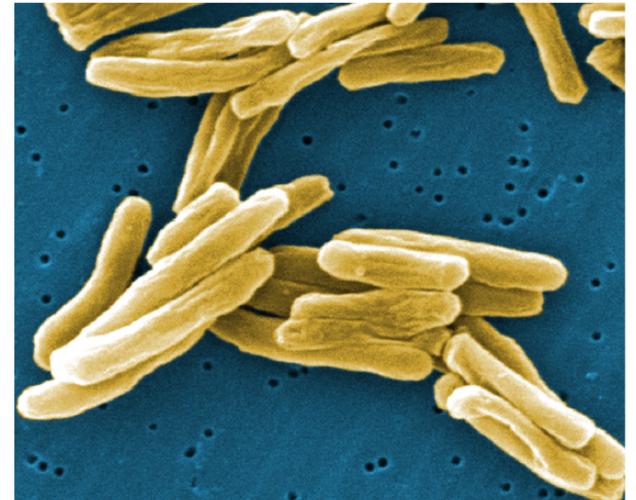


■ Malaria



The Global Burden of Tuberculosis

- One-third of the world's population is infected with *Mycobacterium tuberculosis* (Mtb)
- In 2012
 - 8.6 million new cases, incl. 1.1 million HIV+
 - 1.3 million deaths, incl. 320,000 among HIV+
 - 450,000 cases of MDR-TB, 170,000 deaths
- XDR-TB reported in 92 countries

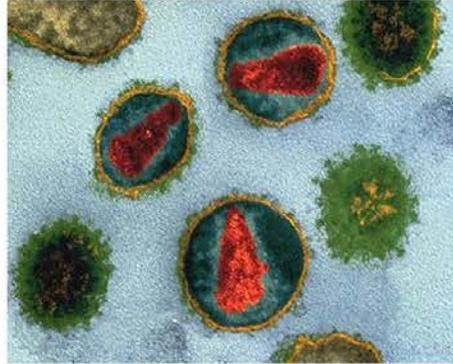


Major Challenges in Tuberculosis Research

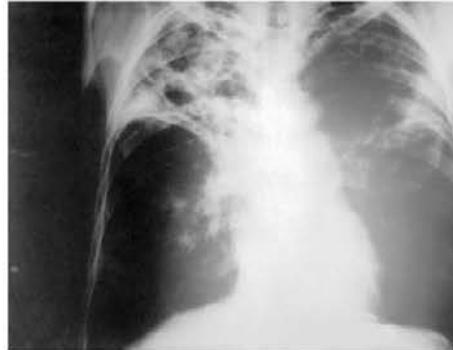
- Our understanding of TB **pathogenesis** is limited
- Available **vaccine** is not effective in preventing adult pulmonary TB
- Standard **diagnostics** are antiquated, insensitive and slow
- Current **drug regimens** are complex and lengthy

The “Big Three”

■ HIV/AIDS



■ Tuberculosis



■ Malaria



The Global Burden of Malaria, 2010

- **660,000 malaria deaths, 90% in Africa**

- **219 million malaria cases**

- **Malaria present in 104 countries and territories**

 - **Half the world's population is at risk**

- **Every 60 seconds a child dies from malaria**

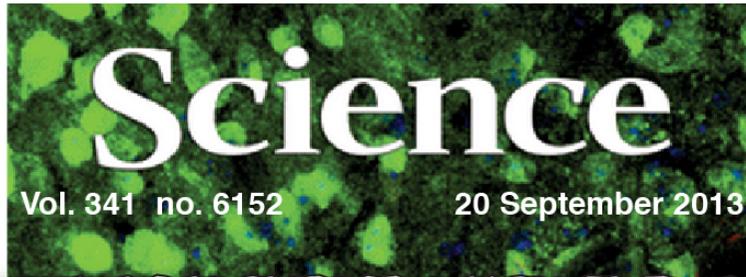


Credit: S. Hollyman

The Research Path to Malaria Control

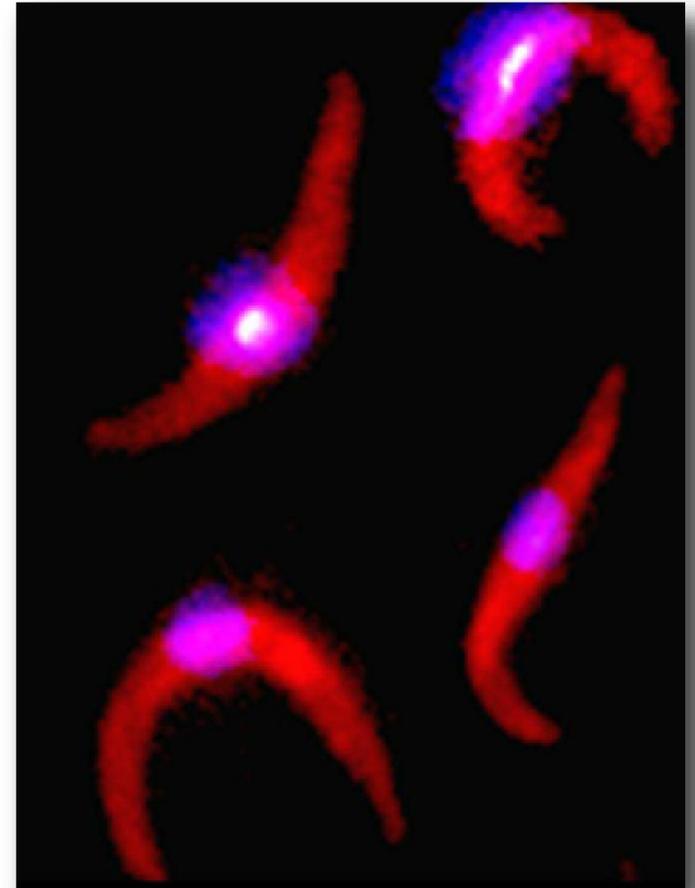
- **New drugs** to expand treatment armamentarium and combat resistance
- New and improved approaches to **vector control**
- Rapid, field-applicable **diagnostic tests** for parasite detection and drug resistance
- Safe, highly effective **vaccines** against multiple parasite species responsible for human malaria

Investigational Malaria Vaccine Found Safe and Protective in Early-Stage Clinical Trial



Protection Against Malaria by Intravenous Immunization with a Nonreplicating Sporozoite Vaccine

R.A. Seder, S.L. Hoffman and VRC 312 Study Team et al.



Irradiated sporozoites, NIAID VRC

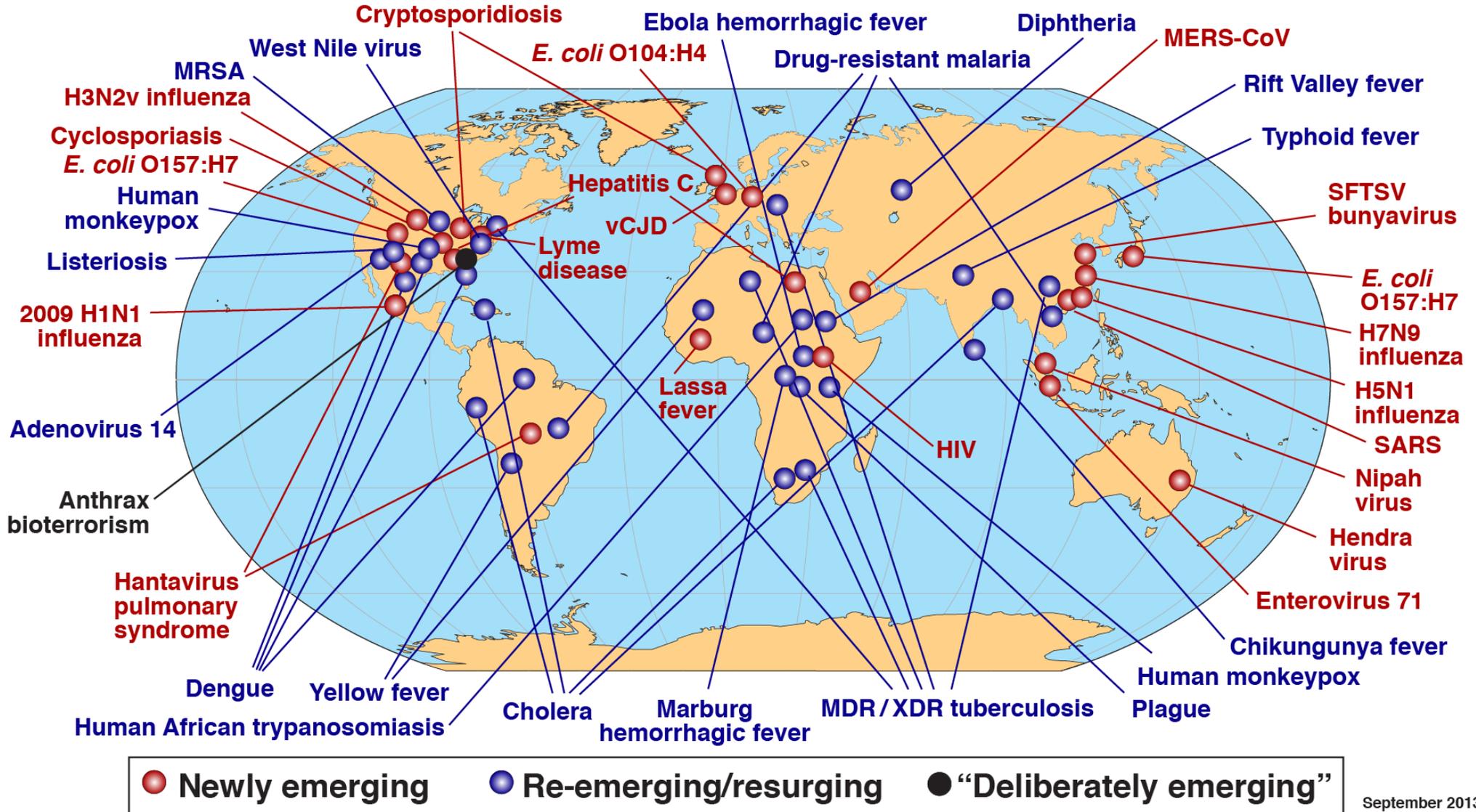
Global Health and Infectious Diseases

Established Infectious Diseases

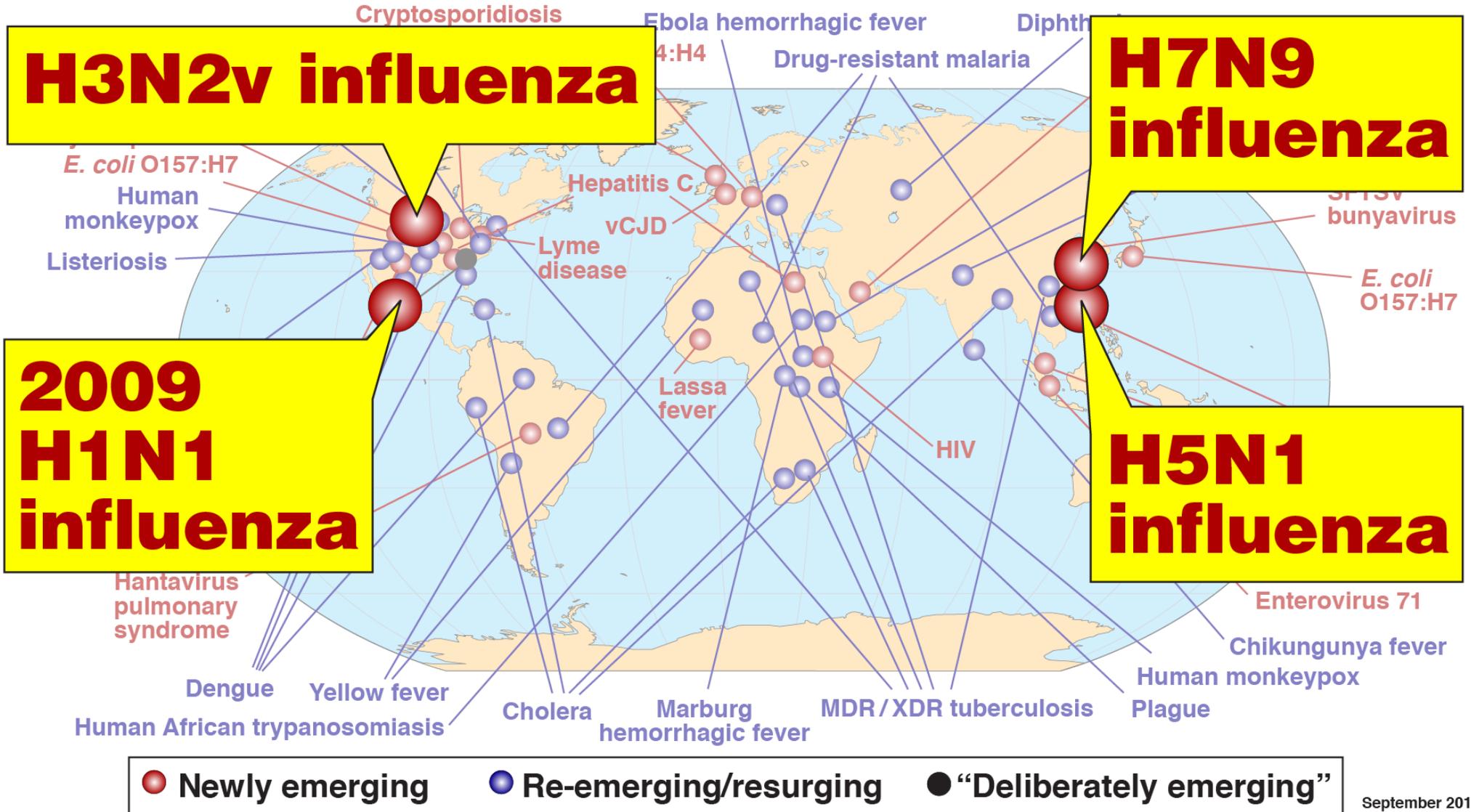
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Emerging and Re-Emerging Infectious Diseases

Global Examples of Emerging and Re-Emerging Infectious Diseases



Global Examples of Emerging and Re-Emerging Infectious Diseases



Building a Better Influenza Vaccine

- **Improved production and surge capacity**
- **Vaccine platforms that allow for more efficient manufacturing and potentially better efficacy**
- **Dose optimization strategies**
- **A "universal" vaccine**

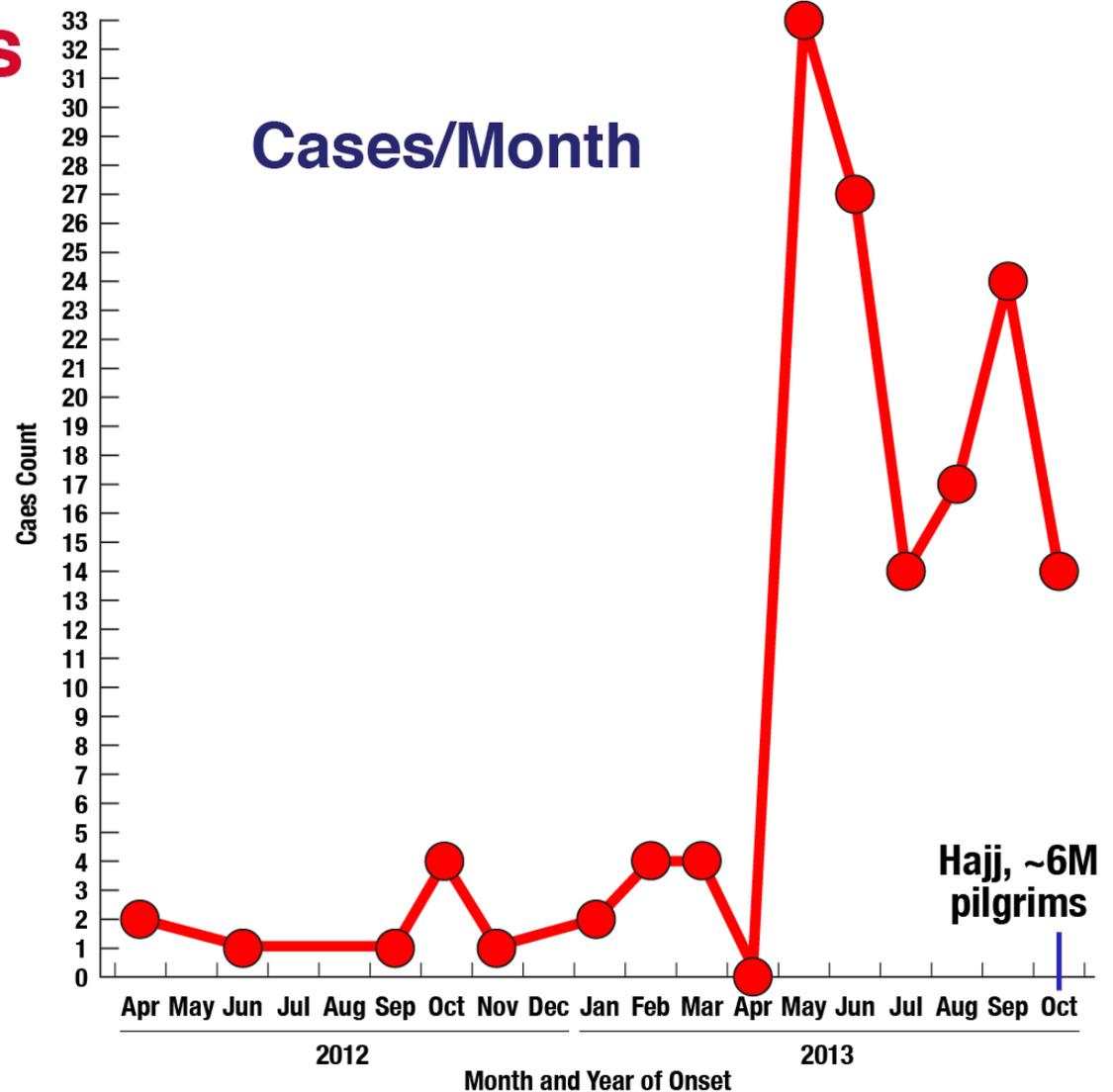
MERS-CoV, April 2012 – Nov. 4, 2013

■ **150 cases/64 deaths**

■ **Some cases associated with clusters**

■ **Animal exposure unknown**

■ **Genetic sequence similar to bat coronavirus**

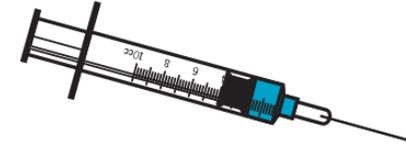




Diagnostics



Therapeutics



Vaccines

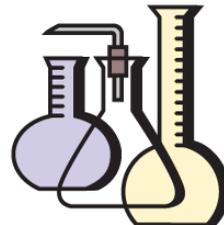


**Research
Resources**

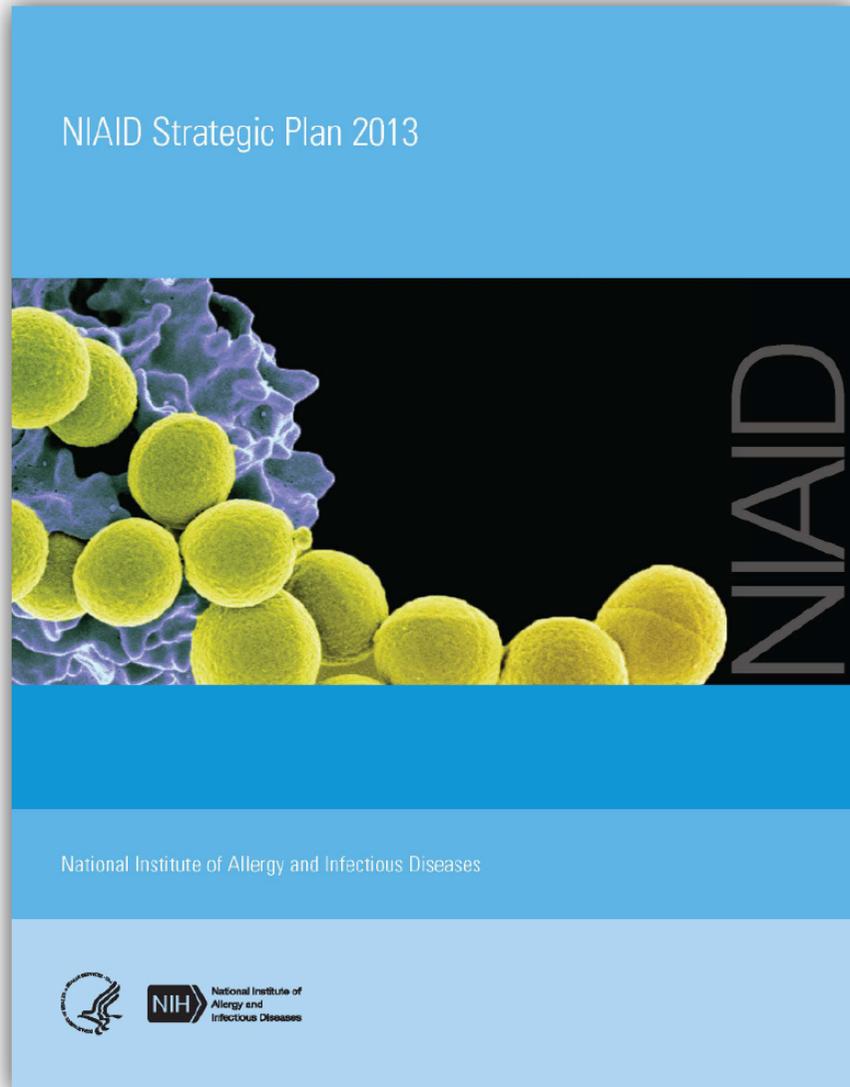


**Clinical
Research**

Basic Research



NIAID Strategic Plan 2013



Priorities in 5 major areas:

- **Infectious diseases (non-AIDS) including emerging and re-emerging diseases and biodefense**
- **HIV/AIDS**
- **Allergy, immunology, and immune-mediated diseases**
- **Essential foundations for the future**
 - **research resources and infrastructure, training, communications/outreach**
- **Global Health**