THE NATIONAL INSTITUTES OF HEALTH: AN INSIDER'S OVERVIEW

Catherine Y. Spong
Deputy Director, NICHD

Eunice Kennedy Shriver National Institute of Child Health and Human Development

NIH Mission

. . .to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce the burdens of illness and disability.

NIH Core Components

- Extramural Research – Supports research in universities, medical schools, hospitals, and research institutions throughout U.S. and overseas
- Intramural Research – Conducts research in NIH's own labs
- Training – Helping train researchers
- Communication – Fosters communication of medical information

NIH'S 27 Institutes and Centers

NIDDK

NIDA
NATIONAL INSTITUTE ON DRUG ABUSE

NCATS

NATIONAL CANCER INSTITUTE

NIBIB

NIMH
National Institute of Mental Health

CIT
Center for Information Technology

Eunice Kennedy Shriver
NICHD
National Institute of Child Health & Human Development

center for scientific review

NCCAM
NATIONAL CENTER FOR COMPLEMENTARY AND ALTERNATIVE MEDICINE

FOGARTY

NIMHD

NIAAA
National Institute on Alcohol Abuse and Alcoholism

NIDCD

National Heart Lung and Blood Institute

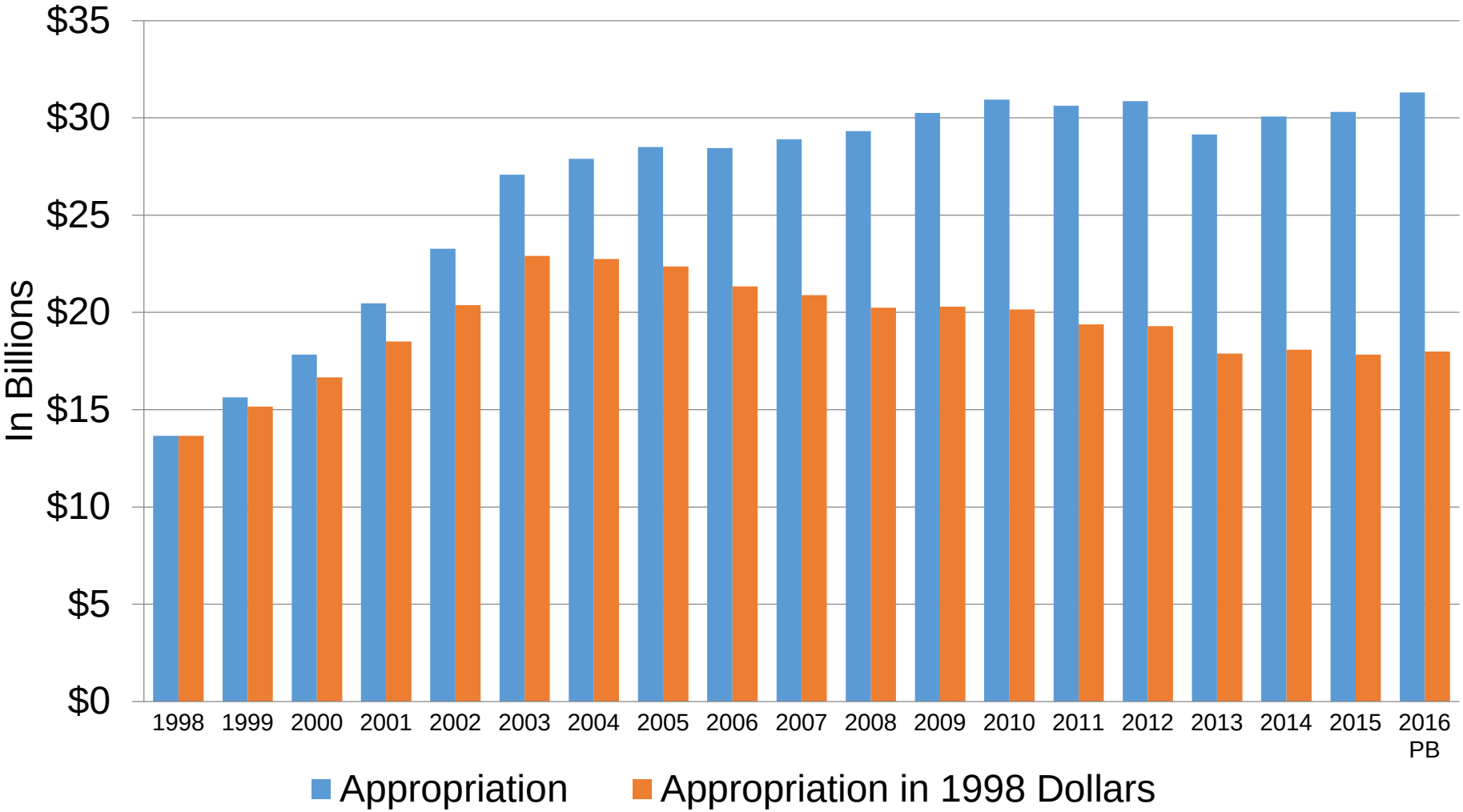
NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE

NIAMS

NATIONAL LIBRARY OF MEDICINE

NATIONAL INSTITUTE OF NURSING RESEARCH

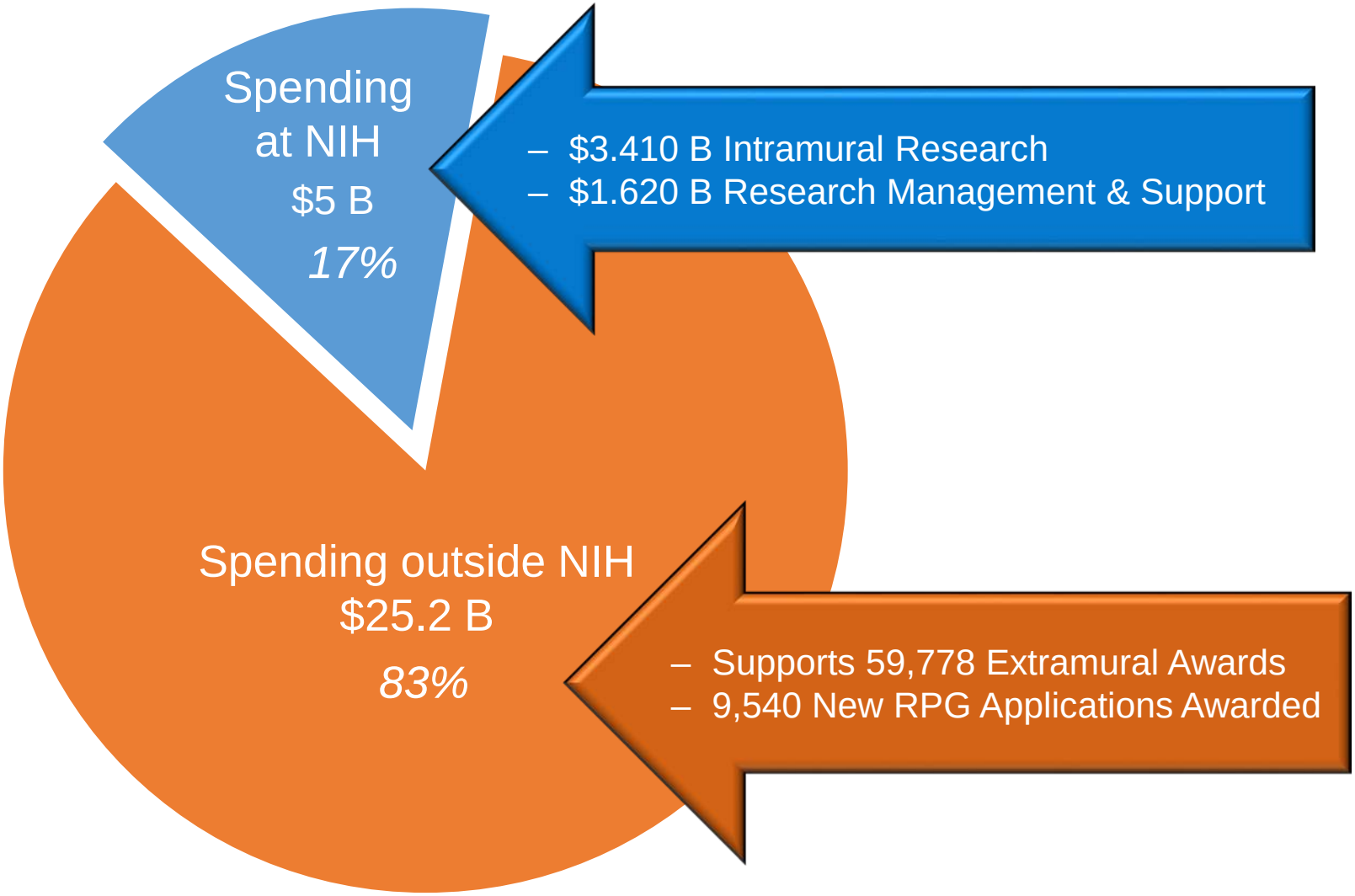
NIH Program Level in Nominal Dollars and Constant 1998 Dollars, FY1998 – FY2016



What NIH Does With All That Money

- The largest funder in the world of biomedical and behavioral research
- Many young trainees join NIH and later become leaders in science across the US and around the world
- >135 grantees, staff, or trainees have become Nobel Laureates (so far)

FY 2015 NIH Funding: $30.3 Billion



The NIH Clinical Center

- World's largest clinical research center
- Admits patients only on clinical research protocols
- Patients referred by providers or self via www.clinicaltrials.gov
- Currently ~ 1,500 clinical studies in progress
- 40 languages translated to support the global audience of patients, staff, and visitors

What NIH Does With All That Money

- Supports the world's best (and coolest) science
- Most of it (~70%) is "investigator initiated"
- But, NIH also leads historic "big science" projects that change the world

Human Genome Project: Led by NIH

New BRAIN Initiative: Led by NIH

- Launched at the White House April 2013
- To accelerate development and application of new technologies to produce dynamic pictures of the brain that show how individual brain cells and complex neural circuits interact
- Began in FY14 at $110M for the first year, including $40M from NIH

Precision Medicine Initiative: Led by NIH

- Announced during the State of the Union by President Obama in January 2015
- **Vision:** Build a broad research program to encourage creative approaches to precision medicine, test them rigorously, and, ultimately, use them to build the evidence base needed to guide clinical practice
- **Near Term:** apply the tenets of precision medicine to a major health threat – cancer
- **Longer Term:** generate the knowledge base necessary to move precision medicine into virtually all areas of health and disease

The NIH Grant Process in Brief….

Researcher

NIH Grant Proposal

Initiates grant proposal:
- New project
- Continuing project

Scientific Review Panel

Scientists evaluate scientific merit of grant proposal

Program Officer

Main contact for applicant
Helps interpret review results

Institute National Advisory Councils

Assess programs
Approve applications
Public members

Institute Director

Makes final decision
Allocates funds
Provides annual justification to Congress

Funds

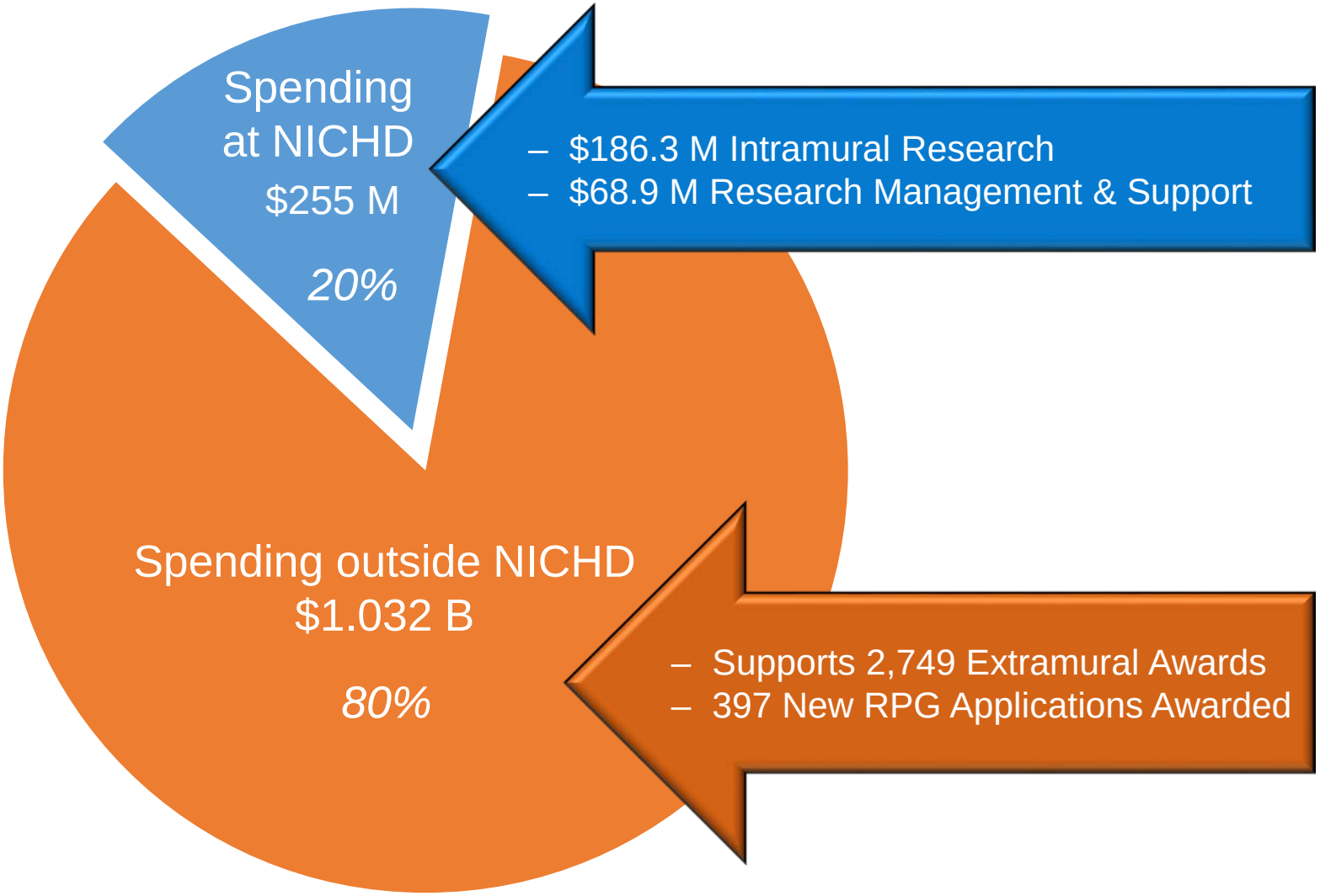
Congress

NICHD: One of NIH's 27 Institutes and Centers

The NICHD Mission is to Ensure…

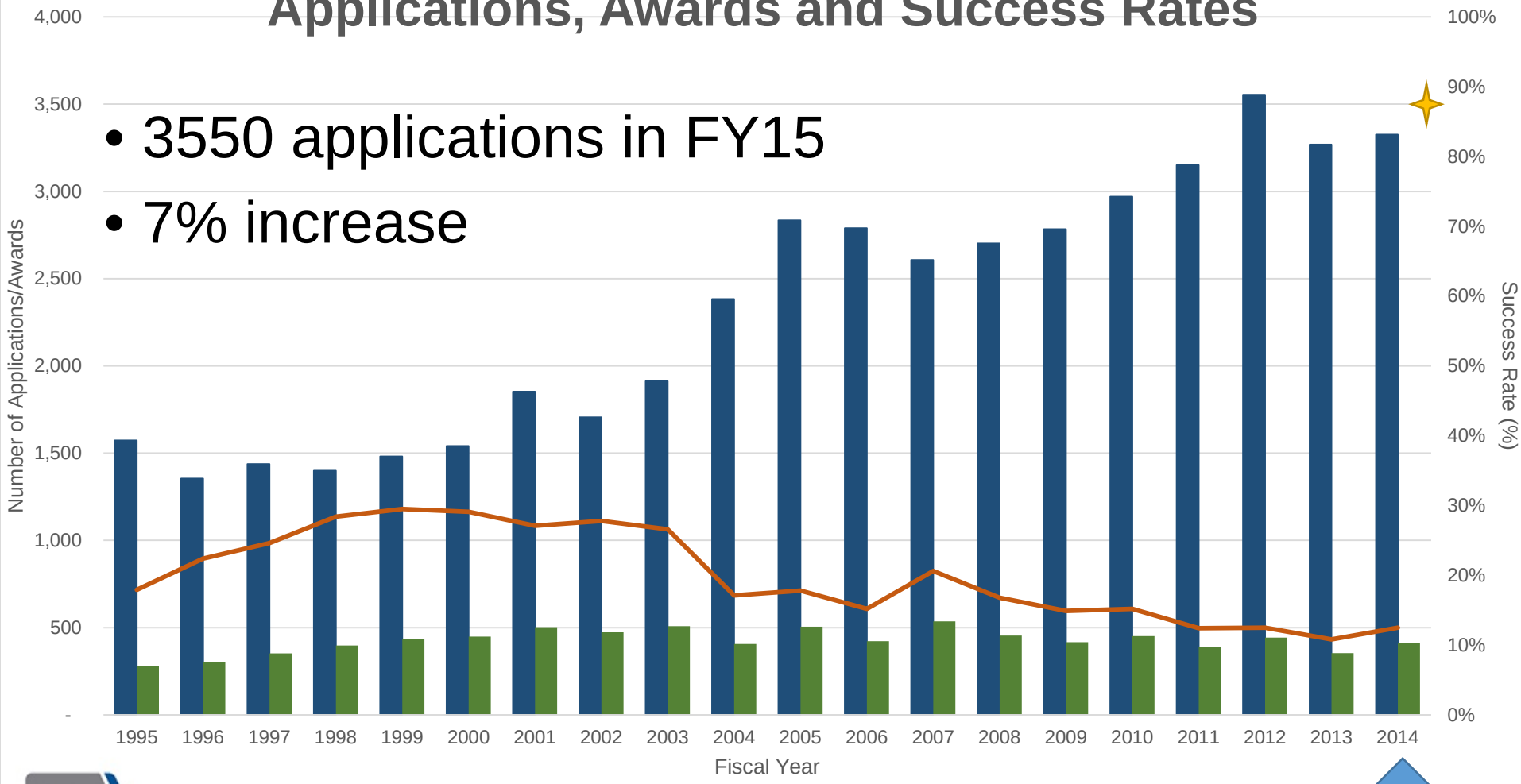
- That every person is born healthy and wanted
- That women suffer no harmful effects from reproductive processes
- That all children have the chance to achieve their full potential for healthy and productive lives, free from disease or disability
- The health, productivity, independence, and well-being of all people through optimal rehabilitation

FY 2015 NICHD Funding: $1.29 Billion



NICHD Research Project Grants: Competing Applications, Awards and Success Rates

- 3550 applications in FY15
- 7% increase



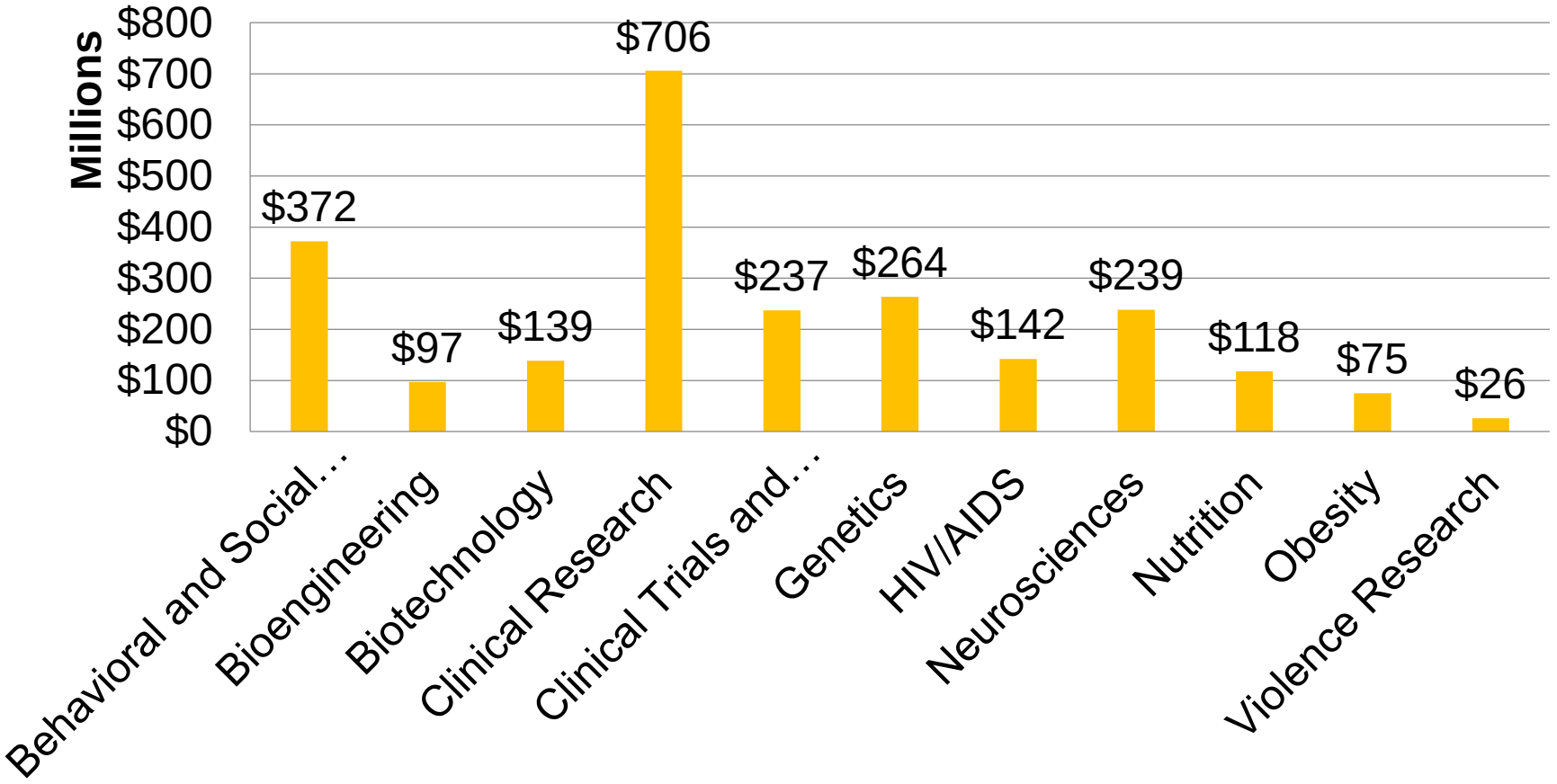
National Institutes of Health
Office of Extramural Research

A2 policy change

Our Funding Strategy

- Funding the best science
- To make the most of our future research investments, we look at our grant portfolios, research centers and networks, and training programs to assess their impact—for science, and for care.
- We prioritize investments in areas that:
  - Have tremendous scientific opportunities
  - Have the potential to meet key public health needs
  - Might otherwise go ignored – If not us, then who?

NICHD Spending by Key Cross-Cutting Categories, FY 2015



Note: Some categories overlap

What NICHD Does With All That Money

- Support the world's best and coolest science
- Most of it (~70%) is investigator initiated
- But, NICHD also leads historic "big science" projects that change the world

NICHD Initiatives

Human Placenta Project

Overarching goal:

Understanding human placental development and function in real time

HPP Draft Principles

- NICHD as lead, but a collaborative, transdisciplinary effort involving multiple funders and researchers
- Intermediate deliverables and metrics with ability to redirect its scientific foci and its funding
- Open access data and research tools
- Transdisciplinary training
- It should sunset

PregSource™

- A crowd-sourced, interactive, mobile app to:
  - Detail the natural history – and variations - of human pregnancy
  - Provide accurate info about pregnancy from trusted sources
  - Let pregnant women know about opportunities to participate in targeted research
- 20 partner organizations

PregSource™
Crowdsourcing to Understand Pregnancy

Scientific Rationale: Defining Normal Pregnancy

PregSource™
Crowdsourcing to Understand Pregnancy

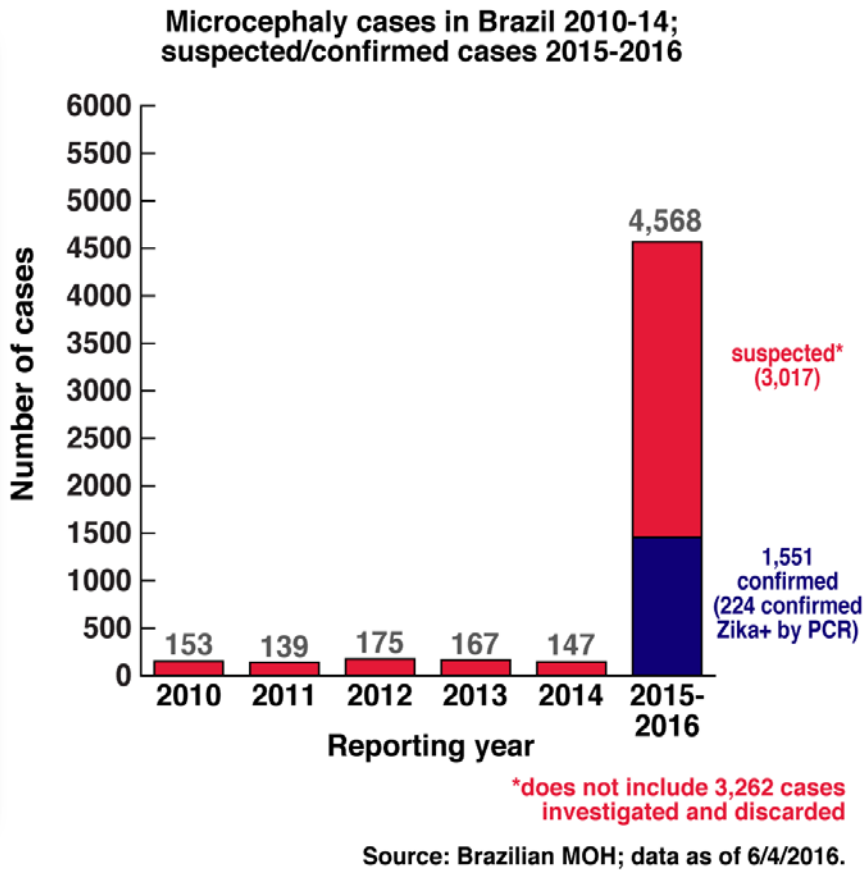
- Women will provide information about common pregnancy experiences in near-real-time:
  - Sleep
  - Nausea
  - Exercise
  - Weight
  - Medication use
- Answers to these topics will help researchers build a more complete picture of normal pregnancy and develop strategies for improving maternal care

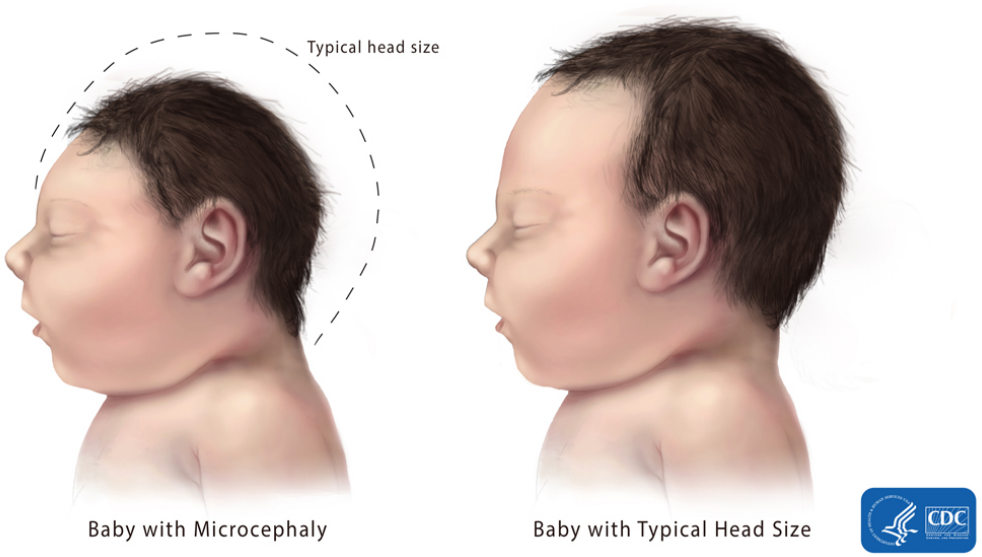
Questionnaires

- Weekly educational updates and appropriate reminders to complete questionnaires
- Woman can see aggregate data showing how her responses compare to other participants'
- Pregnancy-related educational information from our Partners will be available in an online Resource Library
- Plan to follow through 6-12 months after delivery

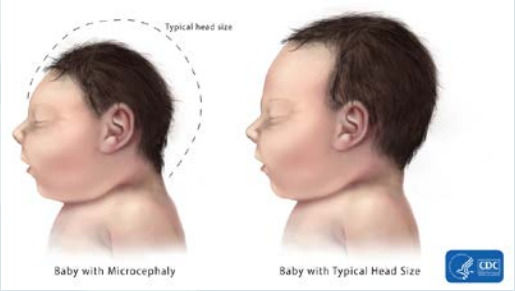
Brazil Zika Outbreak

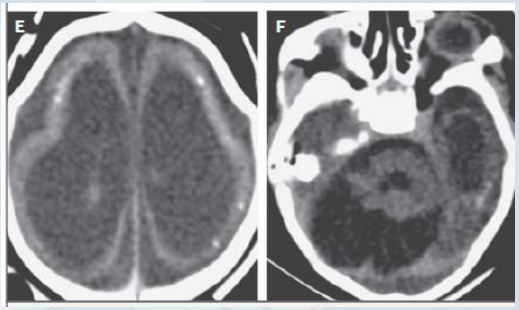
- May 2015: First infection in Brazil
- October 2015: increase in microcephaly

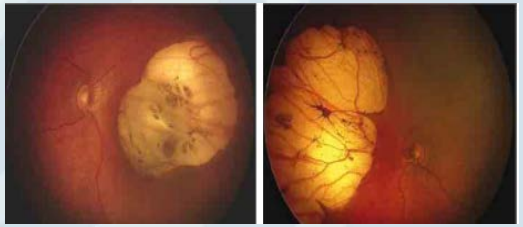




Zika Associated Pregnancy Outcomes







- Fetal loss/miscarriage, stillbirth
- Fetal growth abnormalities
- Fetal brain anomalies
  - Microcephaly
  - Ventriculomegaly
  - Intracranial calcifications
- Eye abnormalities
- Neurologic
  - Hypertonia
  - Arthrogryposis
  - Seizures
  - Neurobehavioral anomalies

Miranda-Filho et al, AJPH April 2016, Vol 106 No. 4

Newer Findings

- WHO Update
  - Unpublished data from Colombia and Panama suggest other systems affected such as cardiac, digestive, and genitourinary
  - http://www.who.int/bulletin/volumes/94/6/16-176990
- Brazilian Journal of Otorhinolaryngology, in press, case study noting hearing loss (Leal, et al, doi:10.1016/j.bjorl.2016.06.001)

Zika Research Gaps: Pregnancy and Pregnancy Outcomes

- Risk of infection in pregnancy
  - Modeling estimates microcephaly risk of 1-13% from 1st trimester infection *NEJM Johansson 6/8/16*
- Outcome from asymptomatic infection
- Sequelae of Zika exposed and infected infants without microcephaly
- Long-term reservoirs for Zika
- Evaluation, management, treatment for children exposed to Zika in utero

PAR-16-106 - Rapid Assessment of Zika Virus (ZIKV) Complications (R21)

- Open March 20, 2016 and expires on March 1, 2019
- Applications accepted on a rolling basis, beginning on April 20, 2016

Provides an expedited (rapid) funding mechanism for research on Zika virus (ZIKV) and its complications given the urgent need to determine whether ZIKV infection causes microcephaly and other congenital abnormalities in babies and the potential rapid spread of ZIKV to the United States.

NIH Funds Zika Virus Study Involving U.S. Olympic Team

- Researchers will monitor potential Zika virus exposure among a subset of athletes, coaches and other U.S. Olympic Committee (USOC) staff attending the 2016 Summer Olympics and Paralympics in Brazil
- Aims to improve understanding of how the virus persists in the body and to identify potential factors that influence the course of infection

Zika in Infants and Pregnancy (ZIP) Cohort Study

- Multi-site, multi-country prospective observational cohort study
- To determine the risks of Zika infection during pregnancy on maternal and fetal outcomes while controlling for potential confounders
- 10,000 women
- Standardized protocol, data collection
- Supported by NICHD, NIAID, NIEHS and Fundacao Oswaldo Cruz-Fiocruz

ZIP Study Sites

ZIP Cohort Study

- Recruitment through prenatal clinics and community outreach
- Enrollment early in pregnancy with monthly assessments during pregnancy
- Clinical information and biospecimens will be collected
- Infants will be evaluated within 48 hours of birth and at 3, 6, and 12 months

Zika Cohort Study

<13 wks gestation
Offered enrollment into cohort study

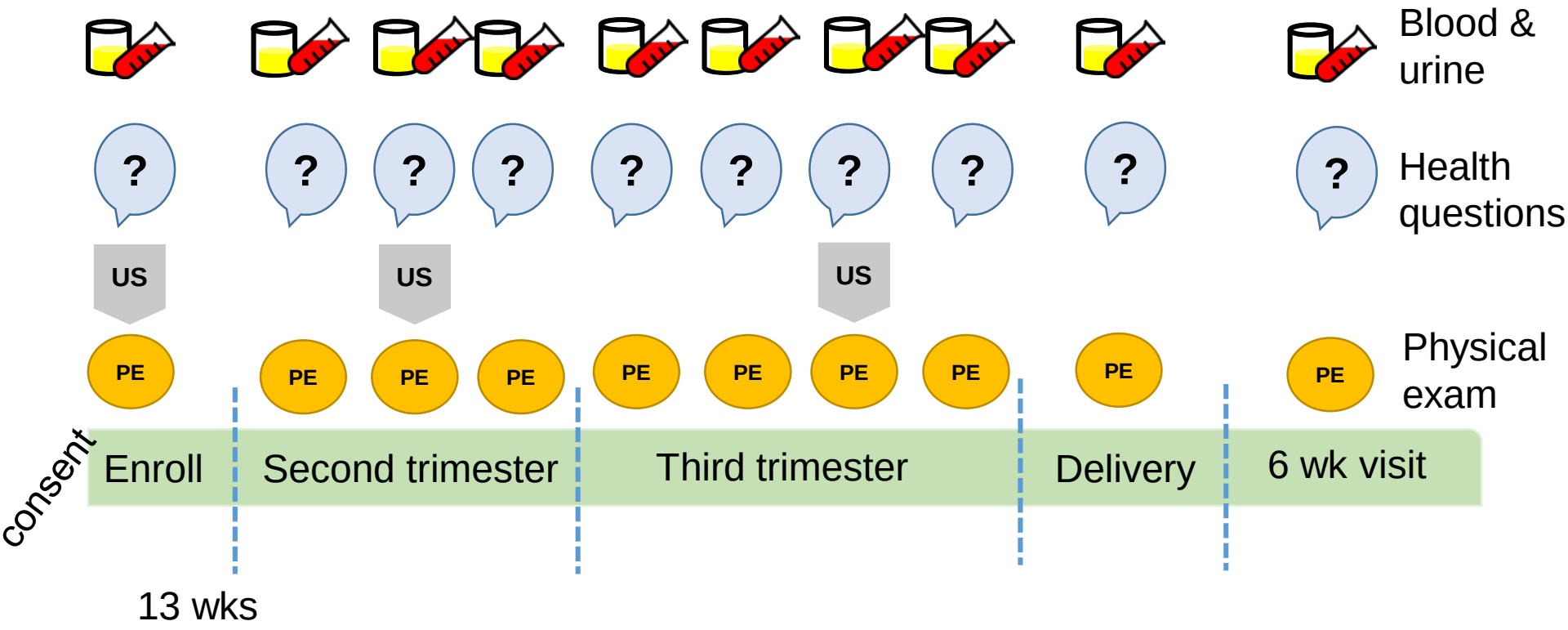
Followed through pregnancy

- Zika infection - symptomatic
- Zika infection - asymptomatic
- No Zika infection

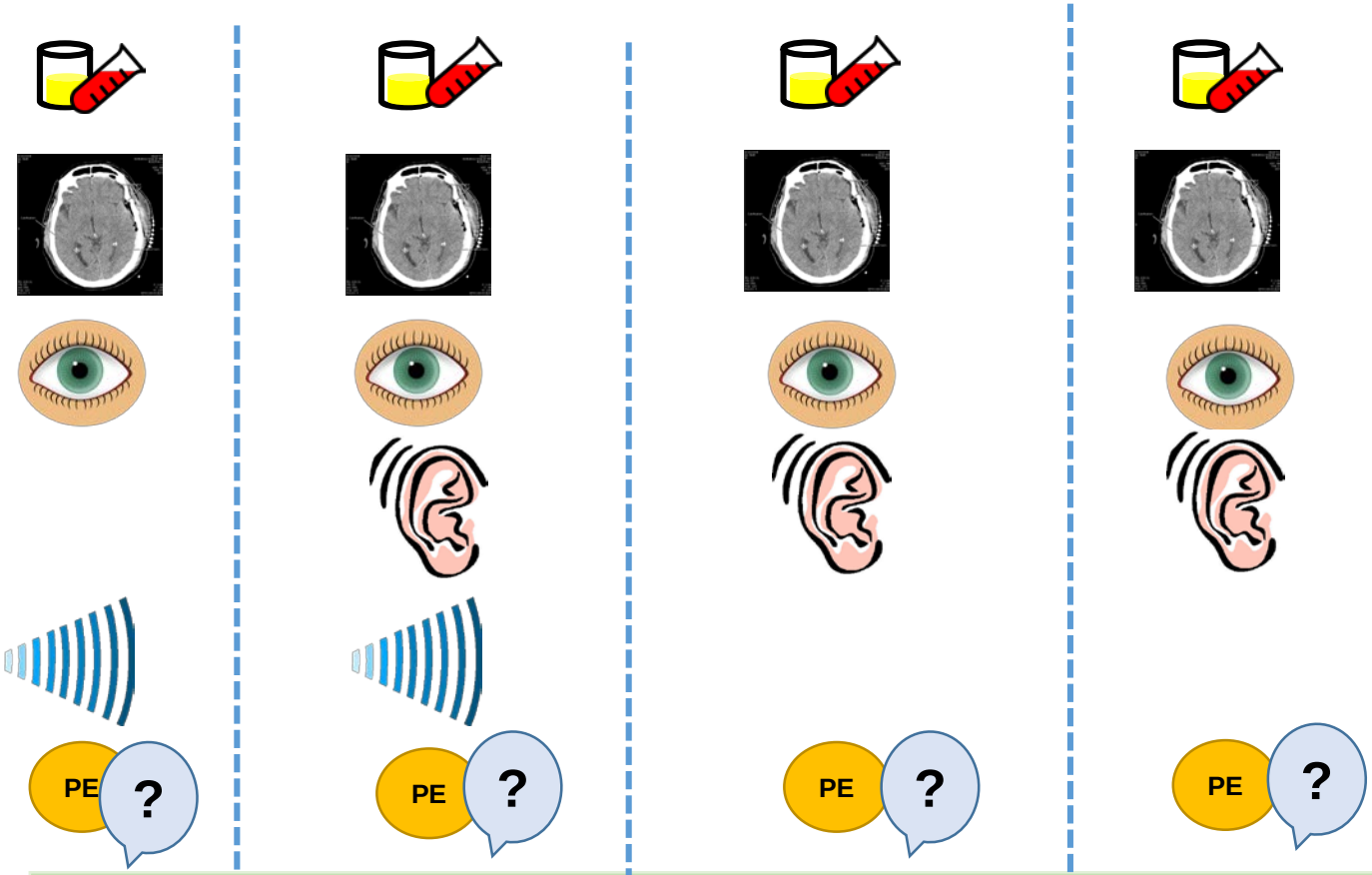
All children followed: those with and without anomalies

Cofactors:
- environmental exposures
- co/prior infections
- toxins

Zika Cohort Study Template: Pregnancy



Zika Cohort Study Template: Infant



Birth	3 months	6 months	12 months

Plasma, saliva & urine

Head US & CT data *if obtained*

Ophthalmologic exam

Audiology assessment

Otoacoustic emissions

History & Physical

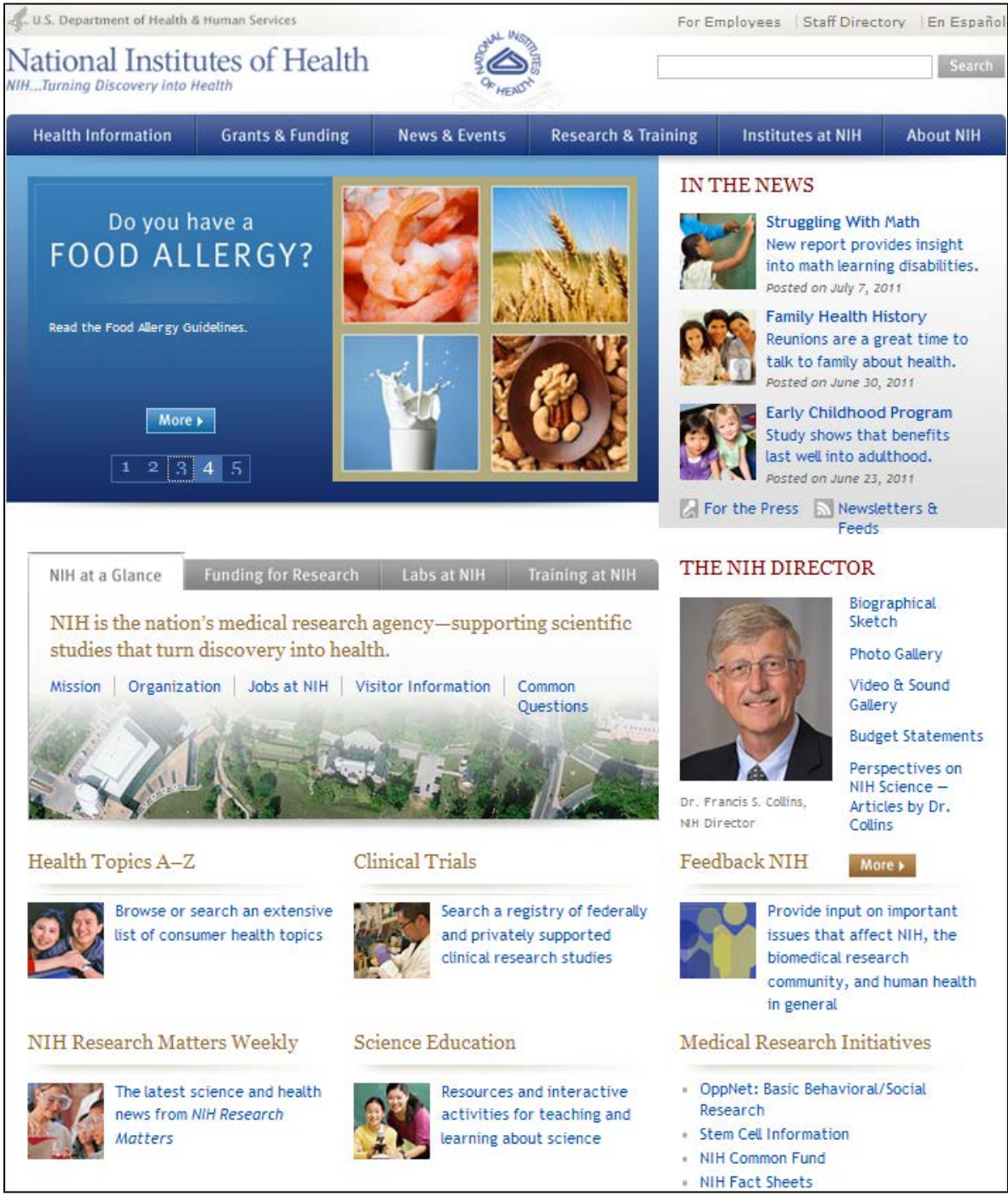
Workshop Focused on the Children

- September 2016 in Bethesda, Maryland
- Define the evidence to understand how prenatal Zika virus infection affects child development and to identify strategies for evaluation, management, and treatment

Registration now open:
https://palladianpartners.cvent.com/ZIKV2016

Photo attribution: Agência Brasil

Find out more: **www.nih.gov**



NIH…Turning Discovery Into Health

Questions?