The National Institutes of Health Overview

Diana W. Bianchi, M.D.
Director, NICHD
December 12, 1988

Diana W. Bianchi, M.D.
Assistant in Medicine
The Children's Hospital
300 Longwood Avenue
Boston, MA 02115

Dear Dr. Bianchi:

Thank you for your interest in the Joseph P. Kennedy, Jr. Foundation Biomedical Research Grants Program for 1989. We received a large number of letters of intent, and from these several were selected to complete the formal proposal process. Although your proposal has a great deal of merit, unfortunately it was not among those chosen for final consideration for funding.

The Foundation uses a number of criteria in deciding which projects to fund: the excellence of the science, the uniqueness of the proposal, its "high risk" nature, and its alignment with the objectives of the Foundation.

We hope you will be successful in finding support for your project elsewhere.

Sincerely yours,
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Sincerely yours,

Eunice Kennedy Shriver

Eunice Kennedy Shriver

Moral of the story: Don’t let your self-worth or career choices be influenced by failure to get grant funding!
Talk Outline

- Overview of the National Institutes of Health
- NICHD Investment in Training
- NICHD Overview and Strategic Plan
- Getting Started: Shared Data and Resources
- Select Programmatic Highlights
National Institutes of Health

- Largest funder of biomedical research in the world
- Consists of 27 separate institutes and centers (ICs)
- Each IC has an individual budget that is appropriated by Congress
- ICs support both extramural research at universities and institutions across the country (~83% of the budget) and intramural research programs (~11% of the budget)
NIH Clinical Center

• World’s largest research hospital

• Admits patients only on clinical research protocols

• More than 9,100 new patients in 2019

• Currently ~ 1,600 clinical studies in progress

• Patients referred by providers or self via www.clinicaltrials.gov

• Career and funding opportunities exist for bench to bedside research
NIH Budget

- NIH FY 2020 budget was $41.68 billion
- NICHD’s FY 2020 budget was ~$1.5 billion
- Additional funds come from special projects
  - HEAL (Helping to End Addiction Long-term)
  - INCLUDE (INvestigation of Co-occurring conditions across the Lifespan to Understand Down syndrome)
  - COVID-19 supplements
Where Does the NIH Money Go?

- RCDC stands for “Research, Condition and Disease Categorization”
- NIH keeps the public informed as to how tax dollars are spent
- RCDC is a computerized process NIH has used since 2009 to categorize and report amount of funding in 265 categories
- No categories for “pregnancy” or “breastfeeding” until 2017

report.nih.gov
# Research, Condition, and Disease Categories

<table>
<thead>
<tr>
<th>Research/Disease Areas (Dollars in millions and rounded)</th>
<th>FY 2016 Actual</th>
<th>FY 2017 Actual</th>
<th>FY 2018 Actual</th>
<th>FY 2019 Actual</th>
<th>FY 2020 Estimated</th>
<th>FY 2021 Estimated</th>
<th>2017/18 Mortality 18/</th>
<th>2017/18 Prevalence (Standard Error) 19/</th>
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<tr>
<td>Acquired Cognitive Impairment</td>
<td>$1,132</td>
<td>$1,560</td>
<td>$1,576</td>
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<td>$132</td>
<td>$121</td>
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<td>Adolescent Sexual Activity</td>
<td>$51</td>
<td>$69</td>
<td>$90</td>
<td>$102</td>
<td>$106</td>
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<td>Agent Orange &amp; Dioxin</td>
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<td>$11</td>
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<td>$8</td>
<td>$8</td>
<td>$8</td>
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<tr>
<td>Aging</td>
<td>$3,150</td>
<td>$3,672</td>
<td>$4,064</td>
<td>$4,653</td>
<td>$5,100</td>
<td>$4,724</td>
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<tr>
<td>Alcoholism, Alcohol Use and Health 1/</td>
<td>$450</td>
<td>$500</td>
<td>$504</td>
<td>$550</td>
<td>$577</td>
<td>$528</td>
<td>72.371</td>
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<tr>
<td>Allergic Rhinitis (Hay Fever)</td>
<td>$7</td>
<td>$6</td>
<td>$5</td>
<td>$7</td>
<td>$7</td>
<td>$7</td>
<td>81.1%</td>
<td>8.22%</td>
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<tr>
<td>ALS</td>
<td>$95</td>
<td>$70</td>
<td>$83</td>
<td>$105</td>
<td>$111</td>
<td>$102</td>
<td>-</td>
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<tr>
<td>Alzheimer’s Disease</td>
<td>$929</td>
<td>$1,361</td>
<td>$1,289</td>
<td>$2,240</td>
<td>$2,644</td>
<td>$2,406</td>
<td>146.894</td>
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<td>Alzheimer’s Disease Including Alzheimer’s Disease Related Dementias (AD/ADRD) 2/</td>
<td>$986</td>
<td>$1,423</td>
<td>$1,911</td>
<td>$2,398</td>
<td>$2,818</td>
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<td>Alzheimer’s Disease Related Dementias (AD/ADRD) 2/</td>
<td>$175</td>
<td>$249</td>
<td>$387</td>
<td>$515</td>
<td>$686</td>
<td>$649</td>
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<tr>
<td>American Indian or Alaska Native 22/</td>
<td>$180</td>
<td>$181</td>
<td>$175</td>
<td>$214</td>
<td>$226</td>
<td>$207</td>
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<tr>
<td>Anorexia</td>
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<td>$10</td>
<td>$11</td>
<td>$11</td>
<td>$12</td>
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<tr>
<td>Anthrax</td>
<td>$23</td>
<td>$30</td>
<td>$43</td>
<td>$52</td>
<td>$31</td>
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<tr>
<td>Antimicrobial Resistance</td>
<td>$430</td>
<td>$473</td>
<td>$502</td>
<td>$527</td>
<td>$631</td>
<td>$803</td>
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## Pregnancy

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<tr>
<th></th>
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<tbody>
<tr>
<td>Pregnancy</td>
<td>+</td>
<td>$319</td>
<td>$419</td>
<td>$487</td>
<td>$515</td>
<td>$473</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Prescription Drug Abuse</td>
<td>$51</td>
<td>$69</td>
<td>$123</td>
<td>$223</td>
<td>$178</td>
<td>$174</td>
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<td>-</td>
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<td>Preterm, Low Birth Weight and Health of the Newborn 21/</td>
<td>$240</td>
<td>$291</td>
<td>$295</td>
<td>$374</td>
<td>$424</td>
<td>$474</td>
<td>5,200</td>
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<tr>
<td>Prevention</td>
<td>$7,566</td>
<td>$8,052</td>
<td>$8,757</td>
<td>$9,485</td>
<td>$9,884</td>
<td>$9,061</td>
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</table>
All Appropriations are Personal

8 out of 13 Members of the House Labor-HHS Appropriations Subcommittee are women
NIH Pediatrics Research Spending by IC, FY 2019

Note: NICHD funds over 18% of pediatrics research at NIH.
Trans-NIH Pediatric Research Consortium (N-PERC)

- Harmonize efforts in child health research across NIH Institutes and Centers
- Meetings held bi-monthly since June 2018
- Identify gaps and opportunities for collaboration
  - Pediatric research workforce
  - Transition from adolescence to adulthood
    - Workshop on transition to adult healthcare for children with chronic conditions (September 2020)
- COVID-19
- Pediatric drugs and devices (BPCA)

https://www.nichd.nih.gov/research/supported/nperc
NICHD Training Budget History

Intent to maintain overall training budget at ~6%

NICHD expenditures on training as a percentage of the annual NICHD Extramural Budget
FY 2018 Pediatric Training/Career Development by IC

Total awarded: $283,551,759
NICHD Overview
NICHD Directors 1963-Present

Robert Aldrich 1963-1964
Donald Harting 1965-1966
Gerald LaVeck 1966-1973
Norman Kretchmer 1974-1981
Mortimer Lipsett 1982-1985
Duane Alexander 1986-2009
Alan Guttmacher 2009-2015
Diana Bianchi 2016-
Our Name is Misleading

55%

Eunice Kennedy Shriver
National Institute of Child Health and Human Development

30%

18%
Mission Statement

The NICHD leads research and training to understand human development, improve reproductive health, enhance the lives of children and adolescents, and optimize abilities for all.
Research Themes

• Understanding the Molecular, Cellular, and Structural Basis of Development

• Promoting Gynecologic, Andrologic, and Reproductive Health

• Setting the Foundation for Healthy Pregnancies and Lifelong Wellness

• Improving Child and Adolescent Health and the Transition to Adulthood

• Advancing Safe and Effective Therapeutics and Devices for Pregnant and Lactating Women, Children, and People with Disabilities
Cross-Cutting Themes

• Global Health
• Health Disparities
• Prevention
• Nutrition
• Infectious Disease

Credit: Guilak Lab, Washington University
Aspirational Goals

• **Goal 1:** Limb Regrowth
• **Goal 2:** Personalized Medicine for Children
• **Goal 3:** Diagnose, Treat, and Cure Endometriosis
• **Goal 4:** Predict Pregnancies at Risk for Fetal Loss
• **Goal 5:** Advance and Apply Knowledge of the Fetomaternal Immune Relationship
• **Goal 6:** Improve Care of Premature Infants
• **Goal 7:** Explore Risks of Technology and Media Exposure in the Developing Brain
• **Goal 8:** Synthesize and Personalize Human Milk
• **Goal 9:** Build Connections Between Atypical Neurodevelopment and Risk of Neurodegeneration
• **Goal 10:** Train Investigators in Artificial Intelligence
NICHD Funding Strategy

- **Goal:** to fund the best science and make the most of our research investments

- Each extramural research branch lists their research priorities on NICHD’s website
  - Recently updated to align with NICHD’s Strategic Plan

- Important to connect with a program officer to see if your project aligns with branch priorities
NICHD Overview
Division of Extramural Research Branches (N=12)

- Child Development and Behavior
- Contraception Research
- Developmental Biology and Structural Variation
- Fertility and Infertility
- Gynecologic Health and Disease
- Intellectual and Developmental Disabilities
- Maternal and Pediatric Infectious Disease
- Obstetric and Pediatric Pharmacology and Therapeutics
- Pediatric Growth and Nutrition
- Pediatric Trauma and Critical Illness
- Population Dynamics
- Pregnancy and Perinatology
Overview/Mission

GHDB's mission is to improve women's reproductive health by guiding and supporting gynecologic research and career development programs with the vision of a future in which women lead lives free of the effects of gynecologic disorders. To achieve this goal, GHDB supports basic, translational, and clinical research programs related to gynecologic health throughout the reproductive lifespan, beginning at puberty and extending through the early menopause.

The branch portfolio includes studies on menstruation, menstrual disorders, uterine fibroids, endometriosis, adenomyosis, polycystic ovary syndrome, pelvic floor disorders, and gynecologic pain syndromes, including both pelvic pain and vulvodynia. Obstetric fistula and female genital cutting are also of interest, as they apply to both international and immigrant communities. Emphasis is placed on the evaluation of disparities in the incidence and treatment responses of these gynecologic conditions across various socioeconomic, racial, and ethnic populations. The branch also supports research training and career development programs for investigators interested in pursuing research careers in women's gynecologic and reproductive health.

Branch Research Priorities

Longitudinal Gynecologic Studies

Gap: The natural history of fibroids, endometriosis, menstrual irregularities, dysmenorrhea, and other gynecologic disorders has been poorly studied, particularly in the early reproductive lifespan.

Priority: Identify ways to participate in ongoing or soon-to-be initiated longitudinal studies to include relevant questions with an emphasis on inclusion of adolescents, to understand better the risk factors and pivot points for preventing these disorders.

Mechanisms of Gynecologic Pain Syndromes
The Process for Review and Funding

Researcher

Initiates grant proposal:
- New project
- Continuing project

NIH Grant Proposal

NIH

Scientists evaluate scientific merit of grant proposal

Scientific Review Panel

Scientists evaluate scientific merit of grant proposal

Program Officer

Main contact for applicant
Helps interpret review results

Congress

Institute Director

Makes final decision
Allocates funds
Provides annual justification to Congress

Institute

National Advisory Councils

Assess programs
Approve applications
Public members
Shared Data and Resources: Opportunities to Get your Research Career Started

- NICHD Data and Specimen Hub (DASH)
- Gabriella Miller Kids First Data Resource
• Centralized resource for researchers to share de-identified data from studies funded by NICHD. DASH also serves as a portal for requesting biospecimens from selected studies in DASH.
• Data sharing launched in August 2015; biospecimen request launched in March 2019
• Aims to accelerate scientific findings to ultimately improve human health
• While not a biorepository itself, DASH serves as a portal for access to biospecimens associated with DASH data collections.
• Investigators worldwide can request both biospecimens and data for secondary analyses; other than the costs of preparing and shipping biospecimens, these specimens are free to investigators.
• Studies with biospecimens currently available include:
  • Genomic and Proteomic Network for Preterm Birth Research (GPN) – three studies
  • NICHD International Site Development Initiative (NISDI) – four studies
  • Mothers and Infants Cohort Study (MICS)
  • National Children’s Study (NCS)

https://dash.nichd.nih.gov
Maternal and Neonatal Outcomes of Induction of Labor Compared with Planned Cesarean Delivery in Women's Gestation

Tetsuya Kawakita, MD,1 Katherine Bowers, PhD2

1Department of Obstetrics and Gynecology, Medstar Washington Hospital Center, Washington, DC; 2Division of Obstetrics and Gynecology, Children's Hospital Medical Center, Cincinnati, Ohio

OBJECTIVE: To evaluate whether the racial and socioeconomic disparities are present in adverse cervical parameters, and if so, when such disparities develop.

STUDY DESIGN: A prospective cohort study was conducted. 170 women with intact uteruses were randomized to undergo either vaginal birth after cesarean or cesarean delivery. The cervical length and cervical shape were measured and compared between the two groups.

RESULTS: The cervical length at birth was significantly shorter in the cesarean delivery group compared to the vaginal birth group. The cervical shape in the cesarean delivery group was also significantly different, with a higher percentage of nulliparas and a lower percentage of multiparas in the cesarean delivery group.

CONCLUSION: Racial and socioeconomic disparities are present in cervical length and shape, and these disparities are likely to be caused by a lack of access to healthcare, resulting in delayed diagnosis and treatment.

Keywords: cesarean delivery, cervical length, cervical shape, racial disparities, socioeconomic disparities.
• Scientific Vision
  • Alleviate suffering from childhood cancer and structural birth defects by fostering **collaborative research** to uncover the etiology of these diseases and supporting **data sharing** within the pediatric research community.
  • Tens of thousands of whole genome sequences

• Kids First Data Resource
  • A platform for empowering collaborative pediatric research
  • Query, search, discover, build & visualize synthetic cohorts
  • Model clinical data in FHIR-based data services for semantic interoperability and coordination
  • Data visualization tools
  • Pull data from multiple sources into one workspace.
Impact: Kids First Sequencing Cohorts 2015-2019

39 projects | 37,000 WGS | 15,000 cases | 13 released datasets | >150 Data Access Requests

- Congenital Diaphragmatic Hernia
- Disorders of Sex Development
- Ewing Sarcoma
- Structural Heart & Other Defects
- Syndromic Cranial Dysinnervation Disorders
- Cancer Susceptibility
- Adolescent Idiopathic Scoliosis
- Neuroblastosmas
- Enchondromatoses
- Orofacial Clefts in Caucasian, Latin American, Asian & African, Filipino populations
- Osteosarcoma
- Familial Leukemia
- Craniofacial Microsomia
- Hemangiomias, Vascular Anomalies & Overgrowth
- Nonsyndromic Craniosynostosis
- Patients with both childhood cancer and birth defects
- Kidney and Urinary Tract Defects
- Microtia
- Hearing Loss
- Bladder Exstrophy
- Cornelia de Lange Syndrome
- Intracranial & Extracranial Germ Cell Tumors
- Esophageal Atresia and Tracheoesophageal Fistulas
- Fetal Alcohol Spectrum Disorders
- Myeloid Malignancies + overlap with Down syndrome
- Congenital Heart Defects and Acute Lymphoblastic Leukemia in Children with Down Syndrome
- Structural Brain Defects
- Structural Defects of the Neural Tube (Spina Bifida: Myelomeningocele)
- CHARGE Syndrome
- Laterality Birth Defects
- T-cell Acute Lymphoblastic Leukemia
- Pediatric Rhabdomyosarcoma
Data Resource Use Case: Compare genetic variants of congenital heart defects & neuroblastoma

Anyone can register & login to the portal (via ORCID, Google). User agrees to terms.

In Explore Data, user searches the terms “heart” and “neuroblastoma”. Discovers data from children with congenital heart disease (KF & BDC data) & neuroblastoma (KF & NCI TARGET).

User builds a synthetic cohort based on these criteria and can view summary & deidentified individual-level clinical, demographic, and phenotypic information.

Synthetic cohort is ported to the File Repository where user selects which genomic and histology image files they want to analyze.

User has or applies for dbGaP access for genomic data.

User pushes genomic, clinical data, and image data into Cavatica for analysis & visualization.

User runs statistical analysis in notebooks.

User iterates through genomic workflows.
COVID-19
TRANS-NIH COVID-19 EFFORTS

In response to COVID-19, NIH has multi-IC collaborative efforts to address interdisciplinary challenges associated with the pandemic.

Technologies for Safe Release from Sheltering in Place
- RADxSM Tech
- RADxSM-ATP
- RADxSM-UP
- RADxSM-rad

Clinical Data Coordination
Virtual Community Workshop on Jumpstarting Access to Clinical Data for COVID-19 Research

Social & Behavioral
Community Engagement Research Alliance (CEAL) Against COVID-19 in Disproportionately Affected Communities (OTA solicitation, awards pending)

Preclinical Therapeutics

Public-Private Partnership (ACTIV)
- Therapeutics: Preclinical WG
- Therapeutics: Clinical WG
- Clinical Trial Capacity WG
- Vaccines WG

Pregnant & Lactating Women & Children
- Multisystem Inflammatory Syndrome in Children (MIS-C) – PreVAIL

Clinical Trial Networks
- COVID-19 Prevention Trials Network (COVPN)

These efforts directly support the NIH’s Strategic Priorities outlined in its Strategic Plan for COVID-19 Research:

- Improve Fundamental Knowledge
- Advance Research to Improve Detection
- Support Research to Advance Treatment
- Accelerate Research to Improve Prevention
- Prevent and Redress Poor COVID-19 Outcomes

Milestone highlights
Rapid Standup & Execution

EARLY APRIL
FNHI (Foundation for the NIH) collaborates with NIH to launch the Accelerating COVID-19 Therapeutic Interventions & Vaccines (ACTIV) Public-Private Partnership

EARLY JUNE
Ramp-up of additional Rapid Acceleration of Diagnostics (RADxSM) programs

EARLY JULY
RADx Data Hub effort and RADxSM-ATP program kick off

LATE JULY
Jumpstarting Access to Clinical Data for COVID-19 Research Virtual Workshop

EARLY AUGUST
Kickoff of increased focus on community engagement efforts & PreVAIL announced

Updated: August 31, 2020
COVID-19: Research Goals for Pediatric Population

• Understand the range of clinical manifestations of SARS-CoV-2/COVID-19
• Understand the etiology and clinical manifestations of MIS-C
• Determine the risk profile for patients that develop
  • MIS-C
  • Severe COVID-19
• Understand the variations in immune response underlying the wide range of clinical manifestations in children infected with SARS-CoV-2, and identify predictive and prognostic immune biomarkers
• Understand long-term consequences of SARS-CoV-2, COVID-19, and MIS-C
COVID-19: NICHD’s Goals and Objectives

We are working to accelerate research and better understand the impact of COVID-19 infection on pregnant and lactating women, children, and people with intellectual, developmental, and physical disabilities.

• Engaged across NICHD to advance scientific understanding of SARS-CoV-2 and COVID-19:
  • Identifying existing opportunities in our networks and intramural laboratories
  • Participating in trans-NIH funding opportunities and notices of special interest
  • Working with the Department of HHS and our federal colleagues to address emerging concerns
Maternal Morbidity and Mortality
Increased Congressional Interest in Maternal Health

December 11, 2019
Significant Health Disparities Exist in Maternal Mortality

Deaths per 100,000 live births

- Hispanic: 11.5
- White: 12.7
- Asian/Pacific Islander: 13.5
- American Indian/Alaska Native: 40.8

Deaths per 100,000 live births

- <20: 10.9
- 20-24: 12.2
- 25-29: 13.3
- 30-34: 15.8
- 35-39: 27.7
- >40: 65.2

Maternal Mortality

700-900 maternal deaths: 60% are preventable

~50,000 near misses

~400,000 women with co-occurring conditions

~6.3 million pregnancies per year in the U.S.

Pregnancy and Maternal Conditions that Increase Risk of Morbidity and Mortality Workshop
May 19-20, 2020
Implementing a Maternal health and PRegnancy Outcomes Vision for Everyone (IMPROVE) Initiative

• Trans-NIH initiative that is in development
• Encompasses both foundational biology as well as social and biobehavioral research
• Community partners will be key voices to assess needs and to implement interventions
Summary

• Many reasons for optimism
  • Bipartisan support for NIH and medical research
  • Recent increases in NIH budget over past three years
  • Better paylines for Early Stage Investigators
• Many opportunities to immediately start your research career using publicly available data and specimens
• Information on NICHD extramural branch priorities is available on our web site. Make use of it!
• Opportunities for research careers outside of traditional academic PI exist
  • NIH intramural research (basic and clinical)
  • NIH extramural program administration
Thank You!