



Animal Models and Animal and Biological Materials Center and Resource Programs

Stephanie Murphy, V.M.D., Ph.D.
Office of Research Infrastructure Programs

Office of Research Infrastructure Programs (ORIP)

Concept Clearance: Reissue

Animal Models and Animal and Biological Materials Center and Resource Programs

Objective: To support special colonies of laboratory animals, animal-related models, and other such resources as informatics tools, reagents, cultures, biological materials (e.g., cells, tissues, organs), and genetic stocks that serve the biomedical community in a variety of research areas on a national basis

Funds Available and Anticipated Number of Awards: Contingent upon NIH appropriations and the submission of highly meritorious applications

Award Project Period: 4–5 years depending on grant mechanism (P40, U42, U54)

Council Action: Vote for approval of reissuance of the concept for “Animal Models and Animal and Biological Materials Center and Resource Programs”



Background

- **ORIP's Strategic Plan emphasizes development and enhancement of Center and Resource Programs to advance biomedical research, expansion and accessibility to animal models and animal and biological materials, and exploration of ways to improve the reproducibility of research using disease models.**
- **ORIP supports Animal Models and Animal and Biological Materials Center and Resource Programs in diverse areas of biomedical science.**
- **Most of these Center and Resource Programs create, collect, develop, characterize, preserve, and distribute special colonies of high-quality laboratory animals and animal-related models.**
- **Some Centers and Resources provide informatics tools, data, biological materials, other tools, or services that support research projects and that improve and expand animal model systems.**



Purpose

- As part of ORIP's NIH-wide emphasis, Animal Model and Animal and Biological Materials Centers and Resources to be developed must address the research interests of multiple NIH Institutes and Centers.
- Applications must show significant need for the proposed Centers and Resources by the biomedical research community.
- Animal Model and Animal and Biological Materials Centers and Resources must be available and utilized by investigators on a national basis.
- Awards should ensure the quality and welfare of distributed animals and supply expertise to guide reliable studies.



Features of Animal Model and Animal and Biological Material Centers and Resources

- **It is required that Centers and Resources generate program income which will support efforts to enhance the volume of their operations.**
- **Applications must include a marketing or distribution plan, community outreach strategies, and approaches for tracking metrics.**
- **Centers and Resources should have a disaster plan to minimize loss of animal models and animal and biological materials should an adverse event occur.**
- **Collection and reporting of data related to animal models and animal and biological materials (e.g., number, type, distribution, users) is expected.**



Progress and Impacts for Centers (Fiscal Years 2018–2022)

Program	Application Type	Number of Applications	Number of Awards	Grantee Publications
Centers (P40) (2018–2022)	New	2	1	442
	Renewal	20	17	
Pilot Centers (U54) (2015–2019) (2020–2022)	New	14	3	240
	New	8	3	
Limited Competition Resource Programs (U42) (2018–2022)	Renewal	17	12	253
Total		61	36	935



Current Centers Portfolio

Biological Materials and Informatics, Other

- National Natural Toxins Research Center
- Nonhuman Primate Antibody Resource
- *Drosophila* Genomics Resource Center
- Center for Neuroanatomy with Neurotropic Viruses
- *Caenorhabditis* Genetics Center

Primate

- Squirrel Monkey Breeding and Research Resource
- Vervet Research Colony
- Specific-Pathogen-Free Baboon Research Resource
- Caribbean Primate Research Center

Rodent

- National Gnotobiotic Rodent Resource Center
- Rat Resource and Research Center
- Special Mouse Strains Resource



Amphibian

- National *Xenopus* Resource
- *Ambystoma* Genetic Stock Center



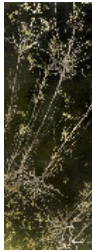
Fish

- Zebrafish International Resource Center



Invertebrate

- Bloomington *Drosophila* Stock Center
- National Resource for *Aplysia*
- *Tetrahymena* Stock Center



Zebrafish International Resource Center (ZIRC)

ZIRC is a premier zebrafish repository that has provided animals, materials, and services to the research community for more than 22 years.

Supported by ORIP and NICHD

Highlights:

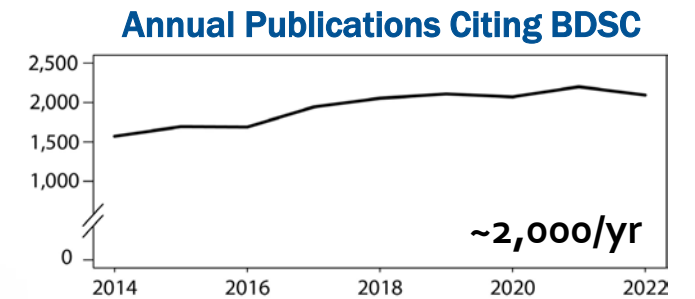
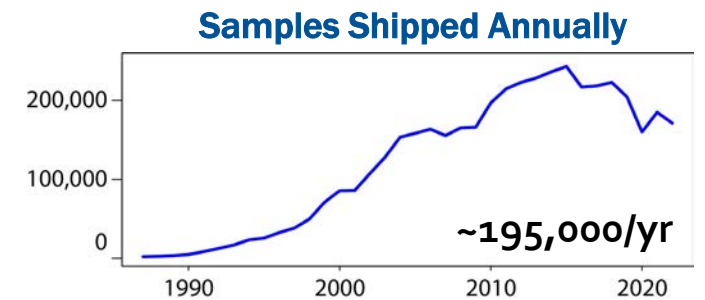
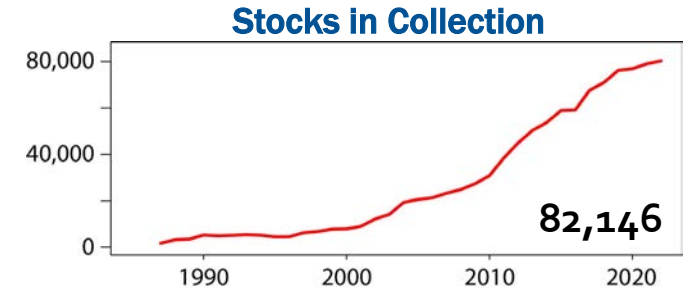
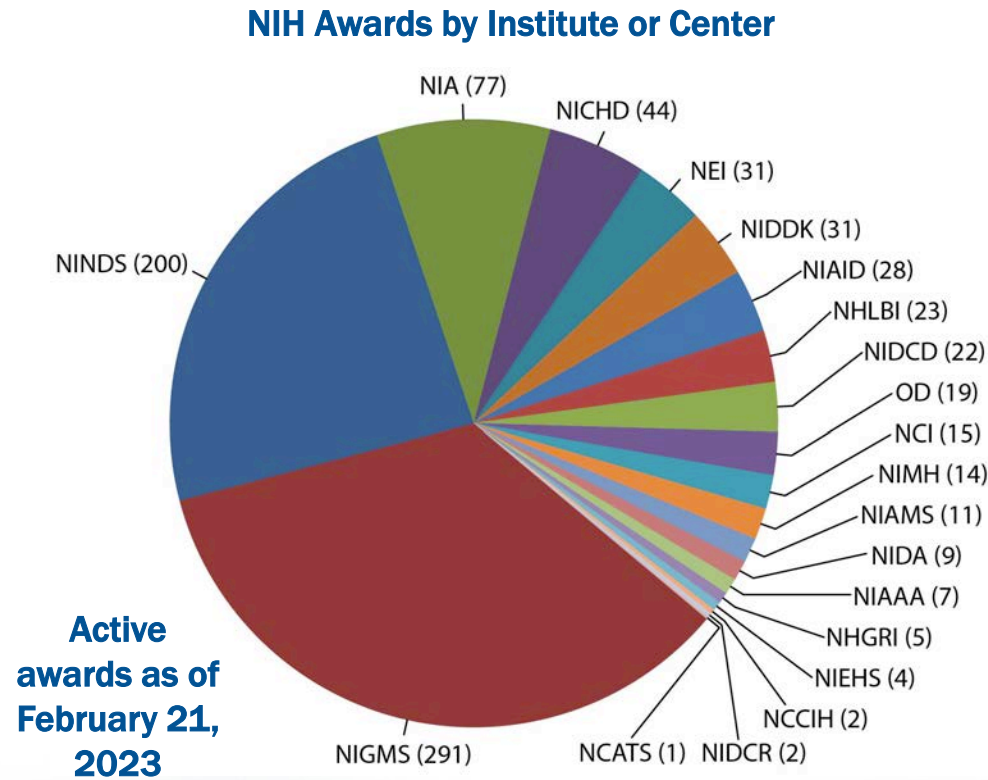
- Provides resources and services to PIs supported by active NIH grants from at least 21 NIH Institutes, Centers, and Offices
- Only national repository for zebrafish genetic stocks (12,885 lines and 46,057 alleles) and research materials (e.g., antibodies, cDNA/expressed sequence tags)
- Provides the highest-quality animal lines raised under stringent health monitoring
- Develops, characterizes, maintains, cryopreserves, and distributes wild-type, transgenic, and mutant zebrafish
- Provides pathology and consultation services
- Develops diagnostic platforms to screen for common pathogens that are threats to laboratory zebrafish
- Distributed 75,143 animals to 376 national and international laboratories in 2022



Bloomington *Drosophila* Stock Center (BDSC)

The BDSC collects, curates, maintains, and distributes genetically defined *Drosophila* strains with significant research value.

- Funded by ORIP (primary), NIGMS, NICHD, and NINDS
- Supports at least 836 active NIH grants from 21 NIH Institutes, Centers, and Offices



Pilot Centers for Precision Disease Modeling Initiative



Program Objectives

To accept nominations of the unique human genomic variants from the research community for a cost-effective, high-throughput testing in an animal model pipeline

To create animal model systems that have the potential to be used in preclinical applications, such as standardized and rigorous safety, toxicity, and efficacy testing

To improve methods to rapidly model disease-specific genomic alterations, including robust phenotyping to assess whether specific genetic changes recapitulate a human phenotype

To develop systematic approaches to functional genomic validation of potential causes of disease and markers of therapy

To stratify potential patient responses on the basis of genetic/omics criteria

NOFO	Submitted Applications	Awarded Applications
PAR-14-280 2014	14	3
PAR-20-085 2020	8	3

Baylor College of Medicine Center for Precision Medicine Models

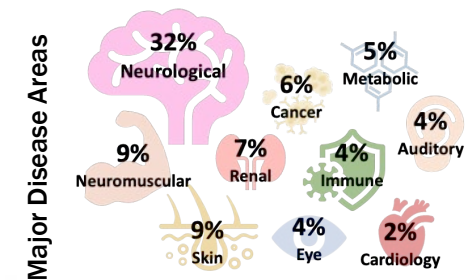
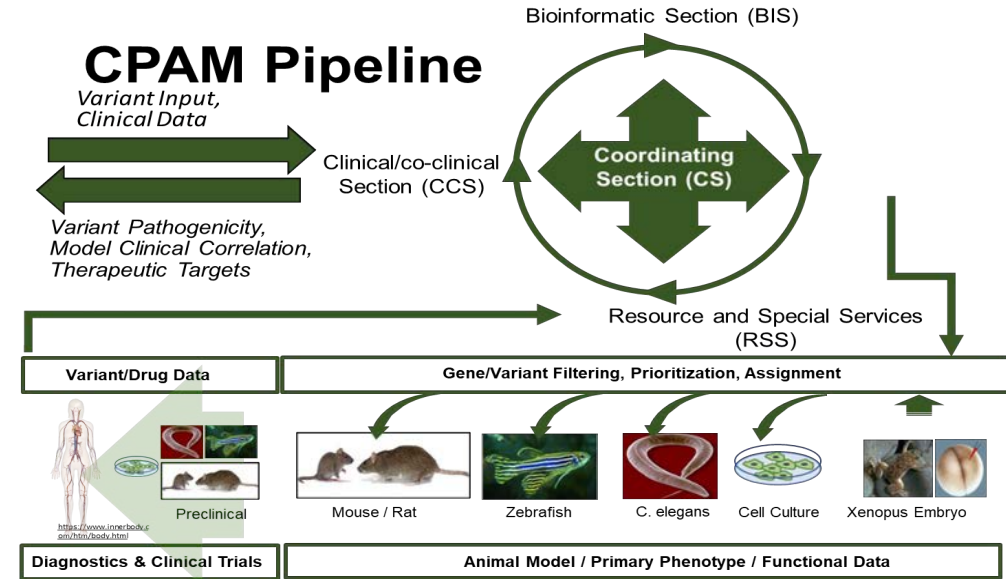
The Jackson Laboratory Center for Precision Genetics

The University of Alabama at Birmingham Pilot Center for Precision Animal Modeling



Pilot Center for Precision Animal Models

- 91 patient variant submissions were selected to generate 54 models (5 rat, 23 mouse, 21 zebrafish, 2 worm, 3 cell), and 22 variant submissions are in review.
- Some variants are in multiple species, and most are precision engineered patient missense models.
- 27 out of 54 models have been established
- 13 out of 17 *Xenopus* pathogenicity screens have been performed
- 30 collaborators span 17+ institutions and foundations
- One treatment intervention is under exploration and four bioinformatic tools have been developed
- Center for Precision Animal Modeling contributions led to one funded and five pending NIH/U.S. Department of Defense grants focused on rare diseases



Limited Competition Resource Programs Portfolio

- **National Swine Resource and Research Center**
 - Specific-pathogen-free swine, reagents, organs, and tissues for the research community, including genetic modification and cryopreservation of strains
 - Key research areas: xenotransplantation, cardiovascular, diabetes, gastrointestinal, and cancer
- **Specific-Pathogen-Free Macaque Breeding Colonies**
 - Specific-pathogen-free macaques of defined major histocompatibility complex class I type for AIDS research
 - 10 awards to 8 Institutions
- **Human Tissue and Organ Research Resource**
 - Leading source of human tissues, cells, and organs for scientific research
 - Nationwide human tissue acquisition network of 130 tissue source sites across 45 states



National Swine Resource and Research Center (NSRRC)

The NSRRC is a unique resource that creates and provides swine models upon request and distributes reagents, organs, and tissues to the research community, including genetic modification and cryopreservation of strains

Supported by ORIP, NIAID, and NHLBI

Highlights:

- Provides resources and services to PIs supported by active NIH grants from at least **14** NIH Institutes, Centers, and Offices
- Key research areas: xenotransplantation, gastrointestinal, cardiovascular, diabetes, chronic eye conditions, congenital heart defects, cancer, somatic cell genome editing, and reproductive biology
- State-of-the-art biosecurity (specific-pathogen-free for **14** pathogens), animal care, and laboratories
- Current inventory of around **317** live animals representing **21** genetic backgrounds
- During the past 4 years:
 - Created **30** new genetically engineered and reanimated models
 - Distributed **3,575** samples (i.e., live animals, embryos, semen, and tissues) to **111** investigators at **61** institutions
 - Performed **168** embryo transfers with genetically modified embryos



Concept Clearance

Vote for approval of reissuance of the concept for “Animal Model and Animal and Biological Materials Center and Resource Programs.”

